Alaska Maritime National Wildlife Refuge

Final Comprehensive Conservation Plan, Wilderness Review and Environmental Impact Statement

August 1988

US Fish and Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. TUDOR RD.
ANCHORAGE, ALASKA 99503

IN REPLY REFER TO:
RS/1099K

NOV 4 1988

Dear Reader:

Enclosed for your information is the Record of Decision for the Final Comprehensive Conservation Plan/Environmental Impact Statement and Wilderness Review (Plan) for the Alaska Maritime National Wildlife Refuge, Alaska. This Plan was prepared pursuant to Sections 304(g)(1) and 1317 of the Alaska National Interest Lands Conservation Act of 1980, Section 3(d) of the Wilderness Act of 1964, and Section 102(2)(c) of the National Environmental Policy Act of 1969.

I have selected Alternative C, the Preferred Alternative, as described in the final Plan and the enclosed Record of Decision. The Record of Decision and attached appendices clarify certain aspects of the Final Alaska Maritime Refuge Plan.

Sincerely,

Walter D. Steuglitz

Regional Director

Enclosure

RECORD OF DECISION
ALASKA MARITIME NATIONAL WILDLIFE REFUGE
Comprehensive Conservation Plan,
Environmental Impact Statement,
Wilderness Review, and Wild River Plan

This Record of Decision is based on the Final Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review (Plan) for the Alaska Maritime National Wildlife Refuge dated August 1988. It also considers comments from the public received during the public review period for the draft Plan and comments received on the final Plan. The Plan describes three alternatives for managing Alaska Maritime Refuge and the effects of implementing each of these alternatives. An alternative reflecting current management is included as one of the management strategies (Alternative A, the Current Situation). The other alternatives reflect a broad spectrum of management emphasis.

It is my decision to select Alternative C, the Preferred Alternative, as described in the final Plan, for implementation with the attached changes. This alternative includes a wilderness proposal of 109,648 acres.

The determination of impacts on subsistence is found in the Environmental Consequences chapter of the Plan, and is in accordance with Section 810 of the Alaska National Interest Lands Conservation Act. In order to implement some aspects of this Record of Decision, the U.S. Fish and Wildlife Service may prepare regulations governing resource protection in Alaska Maritime Refuge for public review. If this occurs, the regulations will be published in a proposed form and public hearings will be conducted in the vicinity of the refuge to solicit public comment prior to regulation finalization.

11/4/88
Date

Walter D. Steuglitz
Regional Director

Attachments

APPENDIX A
To the Record of Decision
Alaska Maritime National Wildlife Refuge
Comprehensive Conservation Plan

The Fish and Wildlife Service recognizes and appreciates the comments received from the Alaska Federation of Natives (Federation) in their October 13, 1988, letter on the final Alaska Maritime Plan. To address concerns raised by the Federation, the following statement is hereby made a part of the Alaska Maritime Record of Decision. The statement replaces the text found in the Final Plan on page III-12.

When Congress enacted the Alaska Native Claims Settlement Act (Native Claims Act) in 1971, it allowed village corporations to select and obtain title to the surface estate of land within established national wildlife refuges (i.e., Bering Sea, Bogoslof, Pribilof Islands, St. Lazaria, Tuxedni, Chamisso Island, Forrester Island, Hazy Islands, Aleutian Islands, Simeonof Island, and Semidi Islands refuges) to satisfy their entitlements under the Act. This private land has a unique status under federal law. Congress attempted to protect the real economic and social needs of Alaska Natives acquiring refuge land against those values of the National Wildlife Refuge system. Under Section 22 (g) of the Native Claims Act, requirements were enacted to ensure that the Native corporations' use and enjoyment of their land would not materially impair the purposes for which the wildlife refuges had been established. Although Native village corporation land is privately owned and no longer part of the refuge, the Service retains an oversight function on the use and development of the land conveyed to village corporations under the Native Claims Act.

The Service is concerned with protecting the important resource values of these private lands, while also enabling Native landowners to derive economic benefits from their land. To ensure that resource values are protected, the Service has entered into negotiations with 22(g) landowners in an attempt to establish a mutually acceptable process for 22(g) implementation. The Service will work together with the Native corporations to ensure that Native and federal interests on 22(g) land are protected.

APPENDIX B
To the Record of Decision
Alaska Maritime National Wildlife Refuge
Comprehensive Conservation Plan

The Fish and Wildlife Service recognizes and appreciates the comments received from the State of Alaska (State) in their October 21, 1988 letter on the final Alaska Maritime Plan. To address concerns raised by the State, the following statements and clarifications are hereby made a part of the Alaska Maritime Record of Decision.

Wilderness Recommendation

The Service would be willing to explore land exchanges in areas of high geothermal potential (i.e. the northwest portion of Atka Island) if specific proposals are made. Since such an exchange would be possible regardless of wilderness status, the Atka Island parcel remains part of the wilderness proposal.

Mariculture

The Service would like to reiterate that requests for permits for specific mariculture projects, including upland facilities in support of projects proposed on adjacent state tidelands, will be reviewed and may be permitted on a case-by-case basis. Reclassification of any refuge lands for mariculture would be based on this compatability review and the plan revised accordingly. Any criteria for evaluating mariculture proposals will be consistent with state guidelines to the maximum extent possible, when such guidelines become available. In addition, the Service will explore the development of a cooperative interagency task force with state agencies to address mariculture issues of mutual state/federal concern.

Commercial Fishing

Commercial fishing support facilities, including all land-based sites, activities, and facilities on refuge lands may be permitted in all management categories, subject to reasonable regulation in accordance with provisions of the Alaska National Interest Lands Conservation Act.

The Service believes that the existing Memorandum of Understanding with the Alaska Department of Fish and Game is adequate with respect to management of commercial fishing in marine refuge areas. This is consistent with the Service response to the state's comments on the draft plan (page IX-52).

The Service confirms the statement, on page III-26, that the cyclic nature of fisheries will be taken into consideration when applying the "1979 level" criteria. The determination of the "1979 level" will be consistent with previous agreements with the Alaska Department of Fish and Game.

Population Levels

The first sentence under the heading "Fish and Wildlife and Habitat Management" on page III-16 of the final plan should be replaced with the following:

> It is the intent of the Service to maintain wildlife populations in the Alaska Maritime Refuge at levels near the carrying capacity of refuge habitats, subject to naturally occurring fluctuations in populations. The Alaska Lands Act mandates that fish and wildlife populations and habitats be conserved in their natural diversity.

Fire Management

Prescribed burning is permitted as a management tool for hazardous fuel reduction or restoration of natural vegetation patterns under all land management categories (see Table 34, page III-5 of the final plan). At this time, no prescribed burning is planned or anticipated for the Alaska Maritime Refuge. This is intended to clarify statements about prescribed burning found on pages III-26 and III-73 of the final plan.

Designated Areas for Off-Road Vehicles

The Service would invite and encourage the participation of Alaska Department of Fish and Game in any future study of traditional Off-Road Vehicle use areas or routes on Alaska Maritime Refuge. The state expressed specific concern about the lack of Off-Road Vehicle route designation along Safety Sound. The Service does not consider designation of this route necessary since the State of Alaska holds and maintains a road right-of-way for the Nome-Council road which runs along refuge lands at Safety Sound.

Togiak Herring Fishery

The Service appreciates information provided by the Bristol Bay Coastal Resource Service Area and the State of Alaska regarding potential impacts and conflicts arising from the Togiak Herring Fishery. The Service is willing to consider future cooperative planning and monitoring efforts in the area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. TUDOR RD.
ANCHORAGE, ALASKA 99503

IN REPLY REFER TO:
PSS/PL - 1576C

AUG 26 1988

Dear Reader:

Enclosed for your review is the final comprehensive conservation plan, environmental impact statement, and wilderness review (plan) for Alaska Maritime National Wildlife Refuge, Alaska. This plan has been prepared pursuant to sections 304(g)(1), 1008, and 1317 of the Alaska National Interest Lands Conservation Act of 1980 (Alaska Lands Act), section 3(d) of the Wilderness Act of 1964, and section 102(2)(C) of the National Environmental Policy Act of 1969. The plan includes three alternative strategies for long-term management of the Alaska Maritime Refuge.

When producing long term management plans for the nation's national wildlife refuges, the U.S. Fish and Wildlife Service (Service) actively seeks comments from the general public on the development of management alternatives and on the choice of a preferred management strategy. The management of national wildlife refuges in Alaska must conform to the legal and administrative requirements listed in the first section of this document. Requirements that have a direct impact on the development of the long range plan and on the choice of the preferred management alternative are discussed below.

According to the National Wildlife Refuge System Administration Act and section 304(b) of the Alaska Lands Act, no use of a national wildlife refuge will be permitted unless it is first determined to be compatible with the purposes for which the refuge was established. Section 304(g) of the Alaska Lands Act requires the preparation of a plan such as this for each unit of the National Wildlife Refuge System established or enlarged by the Alaska Lands Act. The plan designates areas within the refuge according to their resources and values, outlines programs for conserving fish and wildlife resource values, and specifies uses within each area that may be compatible with the major purposes of the refuge. In addition, the plan discusses opportunities that will be made available for fish- and wildlife-oriented recreation, ecological research, environmental education and interpretation, and economic use of refuge lands.

In addition to presenting the Service's long-range management strategies for Alaska Maritime Refuge, the plan evaluates the effect of the proposed management alternatives on subsistence uses and needs, as required by section 810 of the Alaska Lands Act. The law requires the Service to give adequate notice and hold public hearings before implementing any part of the plan determined to have an effect on subsistence. These requirements are met by: (1) public hearings held in conjunction with the development of this plan, (2) the section 810 evaluation found as part of the text, and (3) the consideration of comments received.

Section 1008(a) of the Alaska Lands Act directs the Secretary of the Interior to establish an oil and gas leasing program on federal lands in Alaska except where prohibited by law or on those units of the System where oil and gas development would be incompatible with refuge purposes. Through the planning process with its opportunity for public review, the Service is trying to determine to what extent oil and gas development should be permitted. The Secretary also must consult with the Secretary of Energy to determine the national interest in developing oil and gas on refuge lands. This finding could influence the establishment of an oil and gas program. In addition, the Secretary must seek the views of the Governor, local governments, Native village and regional corporations, the Alaska Land Use Council, representatives of the oil and gas industry, conservation groups, and other interested individuals to determine the public interest in or opposition to oil and gas exploration and leasing activities.

During the process of developing plans, the public has an opportunity to suggest what additional lands, if any, should be placed in the National Wilderness Preservation System. Section 1317 of the Alaska Lands Act requires the Service to review all lands in the National Wildlife Refuge System in Alaska not congressionally designated as wilderness to determine their suitability or nonsuitability as wilderness and to subsequently recommend areas for inclusion in the National Wilderness Preservation System.

Although large tracts of land in refuges in Alaska may be found to be suitable as wilderness, not all suitable land will be proposed for wilderness designation because of management strategies that will be used to meet refuge purposes. As a result, the range of wilderness alternatives is evaluated subsequent to the selection of the Service's preferred management alternative. The refuge already includes eight wilderness areas established as early as 1970 and two wilderness areas established by the Alaska Lands Act. Two wilderness proposals are examined in the draft plan for Alaska Maritime Refuge. The preferred alternative identified in the draft plan includes a wilderness proposal.

With passage of the Alaska Lands Act, Congress established more than 19 million acres of wilderness on refuges in Alaska. Therefore, the criteria used to determine what land the Service additionally proposes for wilderness designation includes (1) the need for wilderness unit boundary adjustment and (2) the addition of selected areas with outstanding resource values that may have been inadvertently overlooked during the original wilderness review and subsequent designations undertaken by Congress. A summary of public comments on the Service's recommended wilderness proposal is included in this final plan, which is part of the wilderness package that will be sent to Congress.

Comments provided on the draft plan have been taken into account in preparation of this plan. A Record of Decision will be published no sooner than 45 days following publication of this document, and the Service will begin implementing the management directions in the preferred alternative.

Requests for further information should be directed to the Regional Director, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, Alaska 99503, Attention: William W. Knauer, or contact Mr. Knauer at (907) 786-3399.

Sincerely,

Walter O Stieglitz

Regional Director

Enclosure

ALASKA MARITIME NATIONAL WILDLIFE REFUGE
FINAL COMPREHENSIVE CONSERVATION PLAN,
WILDERNESS REVIEW
AND
ENVIRONMENTAL IMPACT STATEMENT

AUGUST 1988

U.S. FISH AND WILDLIFE SERVICE
REGION 7, 1011 E. TUDOR RD.
ANCHORAGE, AK 99503

Alaska Maritime National Wildlife Refuge, created in 1980 by an Act of Congress, extends from Forrester Island in southeastern Alaska to Attu Island at the tip of the Aleutian Chain and almost to Barrow on the Arctic Ocean. This final comprehensive conservation plan and environmental impact statement describes three alternatives for managing Alaska Maritime Refuge and the effects of implementing each. An alternative reflecting current management is included as one of the management strategies. The U.S. Fish and Wildlife Service's preferred alternative is identified and the criteria used in its selection are presented. The plan also includes a wilderness review which evaluates the suitability of nonwilderness lands for wilderness designation under each management alternative.

For further information contact William W. Knauer (907) 786-3399.

TABLE OF CONTENTS

	Page
Table of Contents - Wilderness Review	vi
List of Tables	viii
List of Figures	x
SUMMARY	xiii
I. INTRODUCTION	
Purpose and Need for Action	I-1
Overview of Alaska Maritime Refuge	I-1
Purposes of Alaska Maritime Refuge	I-3
Legal Context	I-3
Planning Process	I-5
Special Values	I-7
Potential Problems Affecting Fish, Wildlife and Habitats	I-14
Public Involvement	I-17
Significant Issues	I-31
Revisions to the Draft Plan	I-32
II. AFFECTED ENVIRONMENT	
OVERVIEW	
Physical Environment	II-1
Geography	II-1
Land Status	II-1
Biological Environment	II-2
Habitats	II-2
Freshwater Fishery Resources	II-9
Birds	II-9
Mammals	II-33
Marine Resources	II-56
Threatened and Endangered Species	II-61
Off-Refuge Environment	II-62
Interactions Between Commercial Fisheries and Wildlife	II-62
Fish Processing	II-66
Mariculture	II-66
Oil and Gas Exploration and Development	II-67
Logging	II-72
Marine Debris	II-73
Human Environment	II-73
Cultural Resources	II-73
Sociocultural and Socioeconomic Systems	II-74
Wilderness Review	II-77
Background and Legal Requirements	II-77
Criteria for Wilderness Review and Evaluation	II-77
Evaluation of Wilderness Review Units	II-79
CHUKCHI SEA UNIT	
Physical Environment	II-83
Geography	II-83
Land Status	II-83
Climate	II-83
Geology	II-84
Water Resources	II-93
Biological Environment	II-93
Vegetation	II-93
Fishery Resources	II-94
Birds	II-94
Mammals	II-96
Human Environment	II-97
Cultural Resources	II-97
Subsistence Uses	II-97
Recreational Uses	II-97
Economic Uses	II-98
Military Uses	II-98
Communities	II-98
Barrow	II-99
Point Hope	II-100
Wilderness Review Units	II-102
BERING SEA UNIT	
Physical Environment	II-106
Geography	II-106
Land Status	II-106
Climate	II-106
Geology	II-107
Water Resources	II-122
Biological environment	II-122
Vegetation	II-122
Fishery Resources	II-123
Birds	II-124
Mammals	II-126
Human environment	II-127
Cultural Resources	II-127
Subsistence Uses	II-128
Recreational Uses	II-128
Economic Uses	II-128
Military Uses	II-128
Communities	II-129
Nome	II-129
St. Paul and St. George	II-131

Page

Wilderness Review Units II-133

ALEUTIAN ISLANDS UNIT
Physical Environment. II-137
Geography II-137
Land Status II-137
Climate II-138
Geology II-138
Water Resources II-157
Biological Environment. II-157
Vegetation II-157
Fishery Resources II-160
Birds II-163
Mammals II-168
Threatened and Endangered Species II-169
Human Environment II-170
Cultural Resources. II-170
Subsistence Uses. II-170
Recreational Uses II-170
Economic Uses II-171
Military Uses II-171
Communities II-172
Adak. II-172
Atka II-174
Unalaska-Dutch Harbor II-177
Wilderness Review Units II-180

ALASKA PENINSULA UNIT
Physical Environment II-192
Geography II-192
Land Status II-192
Climate II-192
Geology II-200
Water Resources II-202
Biological Environment II-202
Vegetation II-202
Fishery Resources II-203
Birds II-203
Mammals II-208
Threatened and Endangered Species II-211
Human Environment II-211
Cultural Resources II-211
Subsistence Uses II-212
Recreational Uses II-212
Economic Uses II-212
Military Uses II-212
Communities II-212
Perryville, Sand Point, King Cove. II-213
Wilderness Review Units II-217

Page

GULF OF ALASKA UNIT
Physical Environment II-224
Geography II-224
Land Status II-224
Climate II-225
Geology II-225
Water Resources II-241
Biological Environment II-241
Vegetation II-241
Fishery Resources II-242
Birds II-243
Mammals II-246
Threatened and Endangered Species II-246
Human Environment. II-246
Cultural Resources II-246
Subsistence Uses II-247
Recreational Uses II-247
Economic Uses II-247
Military Uses II-248
Communities II-248
Kodiak II-248
Homer. II-251
Seward II-252
Sitka. II-254
Wilderness Review Units. II-256

III. MANAGEMENT ALTERNATIVES
Management Categories. III-1
Intensive Management III-1
Moderate Management III-2
Minimal Management III-2
Designated Wilderness III-2
Common Management Directions for All Alternatives III-3
Cooperation with other Government Agencies III-3
Cooperation with Existing Military Installations III-3
Cooperation with Owners of Refuge Inholdings and Adjacent Lands . . III-11
Native Conveyed 22(g) Lands . . . III-12
Pribilof Terms and Conditions . . III-12
Land Exchanges III-14
Access to Inholdings III-15
Section 17(b) Easements and Nonexclusive Use Easements . . . III-15
The Iditarod Trail III-15
Other Historic Roads and Trails. . III-16
Fish and Wildlife and Habitat Management III-16

Page

Proposed Transfer of Lands to Other Refuges III-19
Subsistence III-20
Wilderness III-21
Recreational Access III-22
Interpretation and Education . . . III-23
Cabins III-23
Oil and Gas Studies and Leasing. . III-23
Geothermal and Coal Leasing . . . III-24
Mineral Assessment III-24
Mining Operations III-25
Transportation and Utility Systems III-25
Commercial Uses III-25
Fire Management III-26
Air and Water Protection III-26
Hazardous Material Control III-28
Shorelands, Tidelands, and Submerged Lands III-28
Water Columns. III-29
Visual Resource Management III-29
Litter and Waste Control III-29
Historical and Cultural Resources. III-30
Refuge Administration and Facilities III-31
Management of Selected Lands . . . III-31
Refuge Management Plans III-32
Description of the Alternatives . . III-32
Alternative A (Current Situation) III-32
Alternative B III-60
Alternative C (Preferred Alternative) III-68

IV. ENVIRONMENTAL CONSEQUENCES
Introduction IV-1

CHUKCHI SEA UNIT
Alternative A (Current Situation) . . IV-3
Scenario - Life of the Plan IV-3
Scenario - Long Term IV-5
Biological Impacts IV-6
Socioeconomic Impacts IV-8
Impacts of the Wilderness Proposal IV-8
Subsistence/Section 810 Evaluation and Findings IV-11
Alternative B IV-12
Scenario - Life of the Plan . . . IV-12
Scenario - Long Term IV-13
Biological Impacts IV-13
Socioeconomic Impacts IV-13
Impacts of the Wilderness Proposal . IV-13
Subsistence/Section 810 Evaluation and Findings IV-16

Page

Alternative C (Preferred Alternative) IV-16
Scenario - Life of the Plan . . . IV-16
Scenario - Long Term IV-16
Biological Impacts IV-17
Socioeconomic Impacts IV-17
Impacts of the Wilderness Proposal IV-18
Subsistence/Section 810 Evaluation and Findings IV-20

BERING SEA UNIT
Alternative A (Current Situation) . IV-21
Scenario - Life of the Plan . . . IV-21
Scenario - Long Term IV-23
Biological Impacts IV-24
Socioeconomic Impacts IV-25
Impacts of the Wilderness Proposal IV-26
Subsistence/Section 810 Evaluation and Findings IV-28
Alternative B IV-29
Scenario - Life of the Plan . . . IV-29
Scenario - Long Term IV-29
Biological Impacts IV-30
Socioeconomic Impacts IV-30
Impacts of the Wilderness Proposal IV-30
Subsistence/Section 810 Evaluation and Findings IV-32
Alternative C (Preferred Alternative) IV-32
Scenario - Life of the Plan . . . IV-32
Scenario - Long Term IV-33
Biological Impacts IV-33
Socioeconomic Impacts IV-33
Impacts of the Wilderness Proposal IV-34
Subsistence/Section 810 Evaluation and Findings IV-37

ALEUTIAN ISLANDS UNIT
Alternative A (Current Situation) . IV-39
Scenario - Life of the Plan . . . IV-39
Scenario - Long Term IV-43
Biological Impacts IV-44
Socioeconomic Impacts IV-47
Impacts of the Wilderness Proposal IV-48
Subsistence/Section 810 Evaluation and Findings IV-52
Alternative B IV-53
Scenario - Life of the Plan . . . IV-53
Scenario - Long Term IV-54
Biological Impacts IV-54
Socioeconomic Impacts IV-55
Impacts of the Wilderness Proposal IV-55
Subsistence/Section 810 Evaluation and Findings IV-58

Page

Alternative C (Preferred Alternative) IV-59
Scenario - Life of the Plan . . . IV-59
Scenario - Long Term IV-60
Biological Impacts IV-60
Socioeconomic Impacts IV-60
Impacts of the Wilderness Proposal IV-61
Subsistence/Section 810
Evaluation and Findings IV-66

ALASKA PENINSULA UNIT
Alternative A (Current Situation) . IV-67
Scenario - Life of the Plan . . . IV-67
Scenario - Long Term IV-68
Biological Impacts IV-69
Socioeconomic Impacts IV-73
Impacts of the Wilderness Proposal IV-73
Subsistence/Section 810
Evaluation and Findings IV-77
Alternative B IV-78
Scenario - Life of the Plan . . . IV-78
Scenario - Long Term IV-78
Biological Impacts IV-79
Socioeconomic Impacts IV-79
Impacts of the Wilderness Proposal IV-79
Subsistence/Section 810
Evaluation and Findings . . . IV-82
Alternative C (Preferred Alternative) IV-82
Scenario - Life of the Plan . . . IV-82
Scenario - Long Term IV-83
Biological Impacts IV-83
Socioeconomic Impacts IV-84
Impacts of the Wilderness Proposal IV-84
Subsistence/Section 810
Evaluation and Findings IV-88

GULF OF ALASKA UNIT
Alternative A (Current Situation) . IV-90
Scenario - Life of the Plan . . . IV-90
Scenario - Long Term IV-95
Biological Impacts IV-96
Socioeconomic Impacts IV-99
Impacts of the Wilderness Proposal IV-99
Subsistence/Section 810
Evaluation and Findings IV-104
Alternative B IV-105
Scenario - Life of the Plan . . . IV-105
Scenario - Long Term IV-106
Biological Impacts IV-107
Socioeconomic Impacts IV-108
Impacts of the Wilderness Proposal IV-108
Subsistence/Section 810
Evaluation and Findings IV-111

Page

Alternative C (Preferred Alternative)IV-111
Scenario - Life of the Plan . . . IV-111
Scenario - Long Term IV-114
Biological Impacts IV-114
Socioeconomic Impacts IV-115
Impacts of the Wilderness Proposal IV-115
Subsistence/Section 810
Evaluation and Findings IV-120
Summary of the Section 810(a)
Evaluation and Findings IV-121
Mitigation IV-121
Short Term Uses Versus Long
Term Productivity IV-122
Irreversible and Irretrievable
Commitment of Resources IV-122

V. EVALUATION OF ALTERNATIVES
Evaluation Criteria V-1
Relative Costs of the Alternatives . . V-2
Selection of the Preferred
Alternative V-2

VI. CONSULTATION AND COORDINATION VI-1

VII. LIST OF PREPARERS VII-1

VIII. REFERENCES VIII-1

IX. APPENDICES
A. International Treaties IX-1
B. Scientific Names of the Fish and
Wildlife of the Alaska Maritime
Refuge IX-3
C. Fish and Wildlife Species Found on
Alaska Maritime Refuge and the
Extent to which They Use Ecosystem
Subcomponents on the refuge . . IX-15
D. Breeding Status and Abundance of
Birds on Alaska Maritime Refuge IX-25
E. Distribution of Mammals on
Alaska Maritime Refuge IX-33
F. Master Memorandum of Understanding
between ADF&G and the Service . IX-35
G. Memorandums of Understanding
between the Military and the
Department of Energy,
and the Service IX-38
H. Consistency Determination for Alaska
Coastal Zone Management Policies IX-XX
I. Comments on the Draft Plan
and Selected Service Responses . IX-xx

OTHER DOCUMENTS AVAILABLE

Summary of selected legal references
Alaska Maritime National Wildlife Refuge Issues and Concerns (Wilson 1985)
Vegetation of Alaska Maritime (Talbot et al. 1985)
Description of Affected Human Environment; Sociocultural and Socioeconomic Systems of the Alaska Maritime National Wildlife Refuge (Impact Assessment, Inc. 1985)

TABLE OF CONTENTS - WILDERNESS REVIEW

Page

PUBLIC INVOLVEMENT
Wilderness Issues and Concerns I-32

AFFECTED ENVIRONMENT
Wilderness Review (overview) II-77
Background and Legal Requirements . II-77
Criteria for Wilderness Review and Evaluation II-77
Chukchi Sea Wilderness Review II-102
Bering Sea Wilderness Review II-133
Aleutian Islands Wilderness Review . . II-180
Alaska Peninsula Wilderness Review . . II-217
Gulf of Alaska Wilderness Review . . . II-256

MANAGEMENT ALTERNATIVES
Management Categories
Wilderness Management Category . . . III-2
Common Management Directions for All Alternatives
Wilderness Management III-21
Description of the Alternatives
Wilderness Proposal for Alternative A III-60
Wilderness Proposal for Alternative B III-67
Wilderness Proposal for Alternative C (Preferred Alternative) III-73

ENVIRONMENTAL CONSEQUENCES
CHUKCHI SEA UNIT
Alternative A (Current Situation) . . . IV-3
Scenario for the Life of the Plan . . IV-3
Scenario for the Long Term Wilderness Impacts IV-5
Impacts of the Wilderness Proposal (no areas proposed) IV-8
Wilderness values IV-8
Wildlife populations IV-11
Alternative B IV-12
Scenario for the Life of the Plan . IV-12
Scenario for the Long Term Wilderness Impacts IV-13
Impacts of the Wilderness Proposal (all suitable areas proposed) . . IV-13
Wilderness values. IV-14
Wildlife populations IV-15
Alternative C (Preferred Alternative). IV-16
Scenario for the Life of the Plan . IV-16
Scenario for the Long Term Wilderness Impacts IV-16
Impacts of the Wilderness Proposal . IV-18
Wilderness values IV-18
Wildlife populations IV-19

BERING SEA UNIT
Alternative A (Current Situation) . . IV-21
Scenario for the Life of the Plan . IV-21
Scenario for the Long Term Wilderness Impacts IV-23
Impacts of the Wilderness Proposal (no areas proposed) IV-26
Wilderness values IV-26
Wildlife populations IV-28
Alternative B IV-29
Scenario for the Life of the Plan . IV-29
Scenario for the Long Term Wilderness Impacts IV-29
Impacts of the Wilderness Proposal (all suitable areas proposed) . . IV-30
Wilderness values IV-30
Wildlife populations IV-32
Alternative C (Preferred Alternative). IV-32
Scenario for the Life of the Plan . IV-32
Scenario for the Long Term Wilderness Impacts IV-33
Impacts of the Wilderness Proposal . IV-34
Suitable area proposed for wilderness IV-34
Wilderness values IV-34
Wildlife populations IV-35
Suitable area not proposed for wilderness IV-36
Wilderness values IV-36
Wildlife populations IV-37

ALEUTIAN ISLANDS UNIT
Alternative A (Current Situation) . . IV-39
Scenario for the Life of the Plan . IV-39
Scenario for the Long Term Wilderness Impacts IV-43
Impacts of the Wilderness Proposal (no areas proposed) IV-48
Wilderness values IV-48
Wildlife populations IV-52
Alternative B IV-53
Scenario for the Life of the Plan . IV-53
Scenario for the Long Term Wilderness Impacts IV-54
Impacts of the Wilderness Proposal (all suitable areas proposed) . . IV-55

Page

Wilderness values IV-55
Wildlife populations IV-58
Alternative C (Preferred Alternative) IV-59
Scenario for the Life of the Plan . IV-59
Scenario for the Long Term Wilderness Impacts IV-60
Impacts of the Wilderness Proposal . IV-61
Suitable area proposed for wilderness IV-61
Wilderness values IV-61
Wildlife populations IV-64
Suitable area not proposed for wilderness IV-65
Wilderness values IV-65
Wildlife populations IV-66

ALASKA PENINSULA UNIT
Alternative A (Current Situation) . . IV-67
Scenario for the Life of the plan . IV-67
Scenario for the Long Term Wilderness Impacts IV-68
Impacts of the Wilderness Proposal (no areas proposed) IV-73
Wilderness values IV-73
Wildlife populations IV-77
Alternative B IV-78
Scenario for the Life of the Plan . IV-78
Scenario for the Long Term Wilderness Impacts IV-78
Impacts of the Wilderness Proposal (all suitable areas proposed) . . IV-79
Wilderness values IV-80
Wildlife populations IV-81
Alternative C (Preferred Alternative) IV-82
Scenario for the Life of the Plan . IV-82
Scenario for the Long Term Wilderness Impacts IV-83
Impacts of the Wilderness Proposal . IV-84
Suitable area proposed for wilderness IV-84
Wilderness values IV-84
Wildlife populations IV-86
Suitable area not proposed for wilderness IV-86
Wilderness values IV-86
Wildlife populations IV-88

GULF OF ALASKA UNIT
Alternative A (Current Situation) . . IV-90
Scenario for the Life of the Plan . IV-90
Scenario for the Long Term Wilderness Impacts IV-95

Page

Impacts of the Wilderness Proposal (no areas proposed) IV-99
Wilderness values IV-100
Wildlife populations IV-104
Alternative B IV-105
Scenario for the Life of the Plan . IV-105
Scenario for the Long Term Wilderness Impacts IV-106
Impacts of the Wilderness Proposal (all suitable areas proposed) . . IV-108
Wilderness values IV-108
Wildlife populations IV-110
Alternative C (Preferred Alternative) IV-111
Scenario for the Life of the Plan . IV-111
Scenario for the Long Term Wilderness Impacts IV-114
Impacts of the Wilderness Proposal . IV-115
Suitable area proposed for wilderness IV-116
Wilderness values IV-116
Wildlife populations IV-118
Suitable area not proposed for wilderness IV-118
Wilderness values IV-118
Wildlife populations IV-120

LIST OF TABLES

Number		Page
1.	Major issues and concerns identified for the Alaska Maritime Refuge	I-21
2.	Land and water status within the refuge as of November 1987	II-3
3.	Life-history data for Alaska salmon	II-10
4.	Marine resources in the Alaska Maritime Refuge	II-57
5.	Outer Continental Shelf planning areas and their estimated reserves	II-69
6.	Active leases on Alaska Outer Continental Shelf adjacent to units of the Alaska Maritime Refuge	II-71
7.	State and Native selected lands suitable for wilderness designation in the Alaska Maritime Refuge	II-80
8.	Land status within the Chukchi Sea Unit as of November 1987	II-83
9.	Communities near the Chukchi Sea Unit	II-99
10.	Population characteristics of Barrow	II-100
11.	Population projections for Barrow	II-100
12.	Population characteristics of Point Hope	II-101
13.	Population projections for Point Hope	II-101
14.	Land status within the Bering Sea Unit as of November 1987	II-107
15.	Communities near the Bering Sea Unit	II-129
15A	Nome area population and employment	II-129
16.	Population characteristics of Pribilof Island communities	II-131
17.	Pribilof Islands regional economy	II-132
18.	Subsistence activities in the Pribilof Islands	II-134
19.	Land status within the Aleutian Islands Unit as of November 1987	II-137
20.	Aleutian Islands annual temperatures	II-138
21.	Thermal springs in the Aleutian Islands Unit	II-158
22.	Salmon streams in the Aleutian Islands Unit	II-160
23.	Aleutian Islands area commercial salmon harvest, 1951-1985	II-162
24.	Aleutian Islands Unit summary of seabird populations	II-164
25.	Wildlife related recreational uses on Adak, 1983 through 1986	II-173
26.	Employment in Atka, June 1983	II-175
27.	Land status within the Alaska Peninsula Unit as of November 1987	II-200
28.	Salmon and steelhead streams in the Alaska Peninsula Unit	II-204
29.	Population characteristics of Alaska Peninsula Unit communities	II-214
30.	Population projections for Alaska Peninsula Unit communities	II-214
31.	Land status within the Gulf of Alaska Unit as of November 1987	II-225
32.	Yearly temperatures and precipitation of cities in the Gulf of Alaska Unit, 1984	II-225
33.	Vascular flora of southeastern Alaska	II-242
34.	Management activities, public uses, and economic uses permitted in management categories	III-4
35.	Marine environment management activities, public uses, and economic uses permitted in management categories	III-13
36.	Management category designations by alternative	III-34
37.	Summary of management category designations by alternative	III-50
38.	Summary of management category designations by alternative for the Chukchi Sea Unit	IV-3
39.	Summary of the wilderness proposal by alternative for the Chukchi Sea Unit	IV-10
40.	Summary of management category designations by alternative for the Bering Sea Unit	IV-21
41.	Summary of the wilderness proposal by alternative for the Bering Sea Unit	IV-27
42.	Summary of management category designations by alternative for the Aleutian Islands Unit	IV-39
43.	Summary of the areas suitable for wilderness designation in the Aleutian Islands Unit	IV-44
44.	Summary of the wilderness proposal by alternative for the Aleutian Islands Unit	IV-47
45.	Summary of management category designations by alternative for the Alaska Peninsula Unit	IV-67
46.	Summary of the wilderness proposal by alternative for the Alaska Peninsula Unit	IV-75

Number Page

47. Summary of management category designations by alternative for the Gulf of Alaska Unit IV-90
48. Summary of the wilderness proposal by alternative for the Gulf of Alaska Unit IV-101
49. Summary of the alternatives for Alaska Maritime Refuge V-3
50. Summary of the impacts for Alaska Maritime Refuge V-6
51. Summary of the wilderness impacts for the Alaska Maritime Refuge V-13
52. Staffing levels and development costs of the three alternatives V-16

LIST OF FIGURES

Number		Page
1.	Location of Alaska Maritime Refuge	I-4
2.	National Wildlife Refuges in Alaska	I-6
3.	The refuge comprehensive conservation planning process	I-8
4.	General refuge planning requirements	I-9
5.	Geographic extent of Alaska Maritime Refuge	II-2
6.	Representative habitats of colonial seabirds	II-4
7.	Distribution of seabirds and geese nesting on Buldir Island	II-6
8.	Distribution of northern fulmers in Alaska	II-12
9.	Distribution of Leach's storm-petrels in Alaska	II-15
10.	Distribution of fork-tailed storm-petrels in Alaska	II-15
11.	Distribution of red-faced cormorants in Alaska	II-16
12.	Distribution of pelagic cormorants in Alaska	II-16
13.	Distribution of double-crested cormorants in Alaska	II-17
14.	Distribution of mew gulls in Alaska	II-17
15.	Distribution of glaucous-winged gulls in Alaska	II-18
16.	Distribution of glaucous gulls in Alaska	II-18
17.	Distribution of red-legged kittiwakes in Alaska	II-19
18.	Distribution of black-legged kittiwakes in Alaska	II-19
19.	Distribution of arctic terns in Alaska	II-20
20.	Distribution of Aleutian terns in Alaska	II-20
21.	Distribution of murres in Alaska	II-23
22.	Distribution of ancient murrelets in Alaska	II-23
23.	Distribution of pigeon guillemots in Alaska	II-25
24.	Distribution of black guillemots in Alaska	II-25
25.	Distribution of least auklets in Alaska	II-26
26.	Distribution of crested auklets in Alaska	II-26
27.	Distribution of parakeet auklets in Alaska	II-27
28.	Distribution of whiskered auklets in Alaska	II-27
29.	Distribution of Cassin's auklets in Alaska	II-28
30.	Distribution of rhinoceros auklets in Alaska	II-28
31.	Distribution of horned puffins in Alaska	II-30
32.	Distribution of tufted puffins in Alaska	II-30
33.	Distribution of northern (Steller) sea lions in Alaska	II-33
34.	Distribution of harbor seals in Alaska	II-36
35.	Distribution of northern fur seals in Alaska	II-36
36.	Distribution of ringed seals in Alaska	II-39
37.	Distribution of ribbon seals in Alaska	II-39
38.	Distribution of bearded seals in Alaska	II-42
39.	Distribution of spotted seals in Alaska	II-42
40.	Distribution of Pacific walrus in Alaska	II-43
41.	Distribution of sea otters in Alaska	II-43
42.	Distribution of polar bears in Alaska	II-47
43.	Distribution of gray whales in Alaska	II-47
44.	Distribution of beluga whales in Alaska	II-49
45.	Distribution of killer whales in Alaska	II-49
46.	Outer Continental Shelf Program planning areas in the Alaska Maritime Refuge	II-70
47.	Summary of the prehistoric occupations of the Arctic	II-75
48.	Location of the Chukchi Sea Unit	II-85
49.	Legend for land status in the Chukchi Sea Unit	II-86
50. A-F	Land status in the Chukchi Sea Unit as of November 1987	II-87
51. A-C	Location of the Bering Sea Unit	II-108
52.	Legend for land status in the Bering Sea Unit	II-111
53. A-H	Land status in the Bering Sea Unit as of November 1987	II-112
54. A-C	Location of the Aleutian Islands Unit	II-139
55.	Legend for land status in the Aleutian Islands Unit	II-142
56. A-M	Land status in the Aleutian Islands Unit as of November 1987	II-143
57.	Location of the Alaska Peninsula Unit	II-193

Number | Page

58. Legend for land status in the Alaska Peninsula Unit II-194
59. A-E Land status in the Alaska Peninsula Unit as of November 1987 . . . . II-195
60. A-C Location of the Gulf of Alaska Unit II-227
61. Legend for land status in the Gulf of Alaska Unit II-230
62. A-J Land status in the Gulf of Alaska Unit as of November 1987 . . . II-231
63. Alternatives A and B - Womens Bay Area III-51
64. Alternative A - Afognak Area III-52
65. Alternative A - Unimak Island III-53
66. Alternatives A, B, and C - Attu Island III-54
67. Alternatives A, B, and C - Shemya Island III-55
68. Alternative A - Amchitka Island . . . III-56
69. Alternatives A, B, and C - Adak Island III-57
70. Alternative A - Atka Island and ORV routes III-58
71. Alternative A, B, and C - St. Paul Island and ORV routes III-59
72. Refuge staffing pattern for Alternatives A and B III-61
73. Alternative B - Afognak Area III-63
74. Alternatives B and C - Unimak Island . III-64
75. Alternatives B and C - Amchitka Island III-65
76. Alternative B - Atka Island and ORV routes III-66
77. Alternative C - Womens Bay Area . . . III-70
78. Alternative C - Afognak Area III-71
79. Alternative C - Atka Island and ORV routes III-72
80. Refuge staffing pattern for Alternative C III-74
81. Relative annual costs of the alternatives V-17

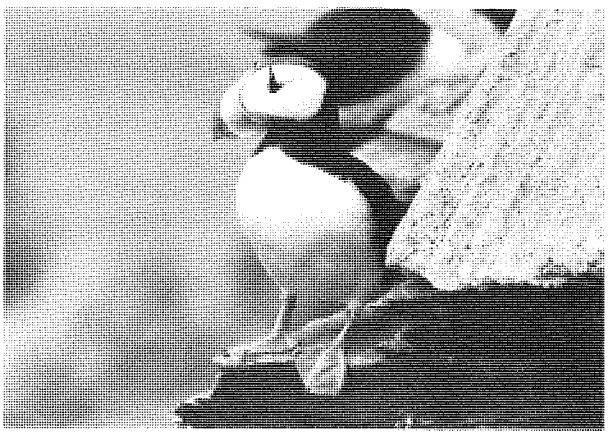
SUMMARY

INTRODUCTION

This document describes three alternatives for managing Alaska Maritime National Wildlife Refuge and identifies the possible consequences of implementing the alternatives. Each alternative provides broad policy guidance for managing the refuge. Each alternative also identifies lands proposed for wilderness designation.

The approximately 4.9 million acre Alaska Maritime Refuge was established in 1980 by the Alaska National Interest Lands Conservation Act (Alaska Lands Act). This act added 1.9 million acres of additional lands to eleven pre-existing refuges, combining a majority of Alaska's seabird habitat into one refuge. The Alaska Maritime Refuge is divided into five distinct geographic refuge units: the Chukchi Sea Unit, the Bering Sea Unit, the Aleutian Islands Unit, the Alaska Peninsula Unit, and the Gulf of Alaska Unit (Figure 1).

The sea is common to all parts of the Alaska Maritime Refuge, but each unit has its own unique features. Lush rain forests dominate many of the precipitous small islands in the Gulf of Alaska Unit; there are mountains rising directly from the sea to over 9,000 feet in the volcanic Aleutian Islands Unit; and treeless areas of permafrost and high coastal escarpments as well as low, sandy, barrier islands are found in the Chukchi Sea Unit.



Seabirds help us keep a close watch on the quality of the environment to which they are adapted - the sea. Seabird droppings are a source of phosphates and nitrates needed to maintain phytoplankton, the tiny marine plants that form the basis of the ocean's food chain.

Section 303(1)(b) of the Alaska Lands Act sets forth the following major purposes for which Alaska Maritime Refuge was established and shall be managed:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to marine mammals, marine birds and other migratory birds, the marine resources upon which they rely, bears, caribou and other mammals;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents;

(iv) to provide, in a manner consistent with subparagraphs (i) and (ii), a program of national and international scientific research on marine resources; and

(v) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

PLANNING PROCESS

The first step in developing a comprehensive conservation plan, environmental impact statement and wilderness review (plan), for the Alaska Maritime Refuge was to collect information on resources and uses. Public meetings, workshops, and other means were used to learn what people were concerned about and what they felt should be done on the refuge. All available information was then analyzed, with the help of resource specialists from several agencies and the private sector, to

identify special values, problems, and issues as required by the Alaska Lands Act.

The following were identified as special values of the refuge: seabirds, marine mammals, cultural resources, Asiatic migrant birds, the

Aleutian Islands biosphere reserve, Unimak Pass, St. Matthew Island, the Pribilof Islands, Sandman Reefs, the Shumagin, Semidi, Barren, and the Chiswell island groups, and St. Lazaria and Forrester islands.

Seven potential problems affecting fish and wildlife were identified for the Alaska Maritime Refuge: gill net mortality, depletion of forage fish by commercial fisheries, eradication of introduced predators, marine mammals management, grazing and trespass problems, lack of detailed resource data, and subsistence monitoring.

Issues raised by the public include fish and wildlife populations and habitats, military presence, commercial activities, access and transportation, interpretation and environmental education, wilderness, cabins, cultural resources, subsistence, public use, and pollution.

The Service used criteria set forth in the Council of Environmental Quality's implementing regulations (40 CFR 1508.27) for the National Environmental Policy Act in determining what issues were significant. Five issues were identified as being significant for the plan based on the above analysis: fish and wildlife populations and habitat, mariculture, commercial development, interpretation and environmental education, and wilderness designation. Two issues were identified as being significant for wilderness designation based on the above analysis: wildlife populations and habitat, and wilderness values.

Public Comments on the Draft Plan

Following a 90 day review of the draft plan by federal and state government agencies, Native corporations, special interest groups, and the general public, the Service has revised the draft plan. The revisions to the preferred management alternative are summarized below. A detailed account of the comments and how they were used in revising this document is included in Appendix I. After a 45 day comment period following publication of this final plan, the Service will issue a record of decision and will begin implementing the selected alternative.

Revisions to the Draft Plan

As a result of comments received, the Service modified one of the alternatives in this final plan.

Changes in Alternative C, the Preferred Alternative, are:

- o areas previously designated for moderate management in the Afognak marine area are now proposed for intensive management;

- o areas previously designated for moderated management in the Womens and Middle bays marine area are now proposed for intensive management.

Other minor changes are listed in the introduction chapter.

Implementation and Revision of the Comprehensive Plan

Implementation of the proposed actions in this plan will depend on the availability of funds and personnel and the coordination of many governmental activities. These factors will determine the extent of development, management, and maintenance the refuge accomplishes in any given year. Following adoption of the plan, the Service will implement the plan and, as necessary, undertake detailed "management planning" for the operation of the refuge. In accordance with Service policy, detailed management plans will be prepared to address specific resource and public use management activities such as fisheries, wildlife management, and recreation. Appropriate public involvement will be conducted.

The Alaska Maritime Refuge plan provides broad policy guidance for managing the refuge over the next ten years. It should be viewed as a dynamic document that will be reviewed and updated periodically. Every three to five years the Service will review public comments, local and state government recommendations, staff recommendations, and research studies, among

other sources, to determine if revisions to the plan are necessary. If major changes in the plan are proposed, public meetings may be held, or new environmental assessments/environmental impact statements may be necessary. Full review and updating of the plan will occur every ten years.

In implementing the plan the Service will periodically prepare site-specific evaluations to determine whether various proposed activities or uses are compatible with refuge purposes. All compatibility determinations will be reviewed by the regional office to ensure the findings are consistent with Service policy. A record of compatibility determinations will be kept on file and will provide the basis for future decisions on refuge uses.

If regulations of any type are proposed, the Service is required to follow the legal requirements for a rule-making process, including public involvement.

COMMON MANAGEMENT DIRECTIONS

Management of the refuge under any alternative is governed by federal law, Service policy, and principles of sound resource management, all of which restrict the range of potential activities. Accordingly, certain management directions must be implemented in all of the management alternatives for the Alaska Maritime Refuge. These common management directions include:

- o coordinating management with other resource management agencies, existing military installations, and owners of refuge inholdings and adjacent lands, including local governments and Native councils;
- o studying possible land exchanges and cooperative agreements that would ensure consistent management and protection of fish and wildlife habitats;
- o ensuring that fish and wildlife populations and ecological relationships necessary to conserve natural diversity are maintained;
- o collecting data on seabirds, shorebirds, waterfowl, fish, raptors, upland birds and songbirds, marine mammals, terrestrial mammals, endangered species, public use, and other topics that are of primary management interest;
- o ensuring that subsistence opportunities are maintained by assessing potential impacts of proposed uses or activities, conducting research, enforcing regulations, and monitoring fish and wildlife populations and uses;
- o maintaining opportunities for hunting, fishing, and other wildlife-oriented activities on the refuge;
- o providing interpretive and environmental education services;
- o protecting water quality and quantity and air quality on the refuge;
- o permitting the use of snowmachines (during periods of adequate snow cover), motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities on refuge lands and for travel to and from allotments, subject to reasonable regulations;
- o ensuring that adequate and feasible access for economic and other purposes is provided to private interests with valid subsurface or occupancy rights on or adjacent to the refuge;
- o mariculture may be permitted on a case-by-case basis in moderate or internive management areas subject to the provisions of state and federal law, the National Environmental Policy Act, and a compatibility determination; a special use permit would be required in addition to the permits normally required;
- o permitting oil and gas studies, including seismic exploration, throughout the refuge subject to a site-specific determination of compatibility with refuge purposes and consistency with management objectives; the exception is designated wilderness where only an Interior Department agency or its contractors can use mechanized equipment for oil and gas studies;
- o prohibiting oil and gas development on refuge lands in minimal management areas and in designated wilderness; on all other areas oil and gas leasing may be permitted but not until the oil and gas potential has been assessed, a national interest determination made, and a compatibility determination completed.

ALTERNATIVES AND ENVIRONMENTAL CONSEQUENCES

The following section briefly describes the alternatives and the environmental consequences that result from their implementation. The alternatives are general in nature and provide

broad strategies for management of refuge resources and users. Each alternative designates areas within the refuge using management categories described in Chapter III. To evaluate the effects of each alternative the Service developed three scenarios for each refuge unit that describe events likely to occur on the refuge. These scenarios and the impacts resulting from the implementation of the alternatives are described in Chapter IV.

ALTERNATIVE A (CURRENT SITUATION)

This alternative would maintain the existing range and intensity of management and recreational and economic uses. It is assumed that existing laws, executive orders, regulations and policies governing Service administration and operation of the National Wildlife Refuge System would remain in effect.

Alternative A emphasizes protection of existing fish and wildlife populations and habitats and natural diversity while restoring endangered and other species to natural levels. Fish and wildlife management focuses on monitoring and on eradication of introduced predators. Continued public use of the refuge would be allowed using existing access methods and routes. Opportunities for hunting, fishing, and other recreational uses would be maintained, as would scientific research, wildlife, and wildland observation opportunities, trapping, and subsistence uses.

Management Directions

The following management directions summarize Alternative A. Alternative A would:

- o maintain the existing mix of undeveloped habitats and developed military and commercial use sites;
- o protect seabird colonies and marine mammal haulouts;
- o emphasize protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels;
- o focus fish and wildlife management on monitoring and on eradication of introduced predators;
- o accommodate the existing military installations on Adak, Shemya, Attu and Amchitka islands and at Cape Lisburne;
- o provide for continued subsistence use of refuge resources;
- o maintain traditional access opportunities;
- o maintain trapping opportunities;
- o maintain opportunities for hunting, fishing, and wildlife observation;
- o recommend no additional areas for wilderness designation; 56 percent of the refuge is already designated wilderness.

Table 36 in the management alternatives chapter shows the location of management categories in Alternative A. Approximately one percent of the refuge is in intensive management, one percent is in moderate management, 42 percent is in minimal management and 56 percent is existing wilderness. Intensive management areas include military installations, the developed shoreline of Womens Bay and several marine areas around Afognak Island. Moderate management areas buffer military installations; a small area in Raspberry Strait is also in this category. Existing wilderness includes most refuge lands in the Aleutian Islands, the St. Matthew Island group in the Bering Sea, Chamisso Island in Kotzebue Sound, the Semidi Islands and Simeonof Island south of the Alaska Peninsula, Chisik and Duck islands in Cook Inlet, and St. Lazaria, Hazy, and Forrester islands in southeast Alaska.

Environmental Consequences

Chukchi Sea Unit

Fish and Wildlife

- o negligible negative impacts on marine fauna due to commercial fishing and loss of lagoon habitat in Peard Bay; little or no impact on refuge fresh water fish populations expected;
- o negligible to major negative impacts on seabirds and marine mammals due to oil development and possible oil spills; minor negative impacts due to commercial fisheries; minor positive impacts due to increased monitoring; negligible negative impacts on seabirds due to quarry activities;
- o negligible to major negative direct and indirect impacts on waterfowl and shorebirds due to possible oil spills, particularly for phalaropes during migration;
- o negligible impacts on terrestrial mammals, raptors, upland birds and songbirds due to human disturbance; negligible to minor

negative impacts on terrestrial mammals due to an increase in hunting pressure;

Water Quality and Quantity
o negligible impacts on water quality and quantity;

Cultural Resources
o negligible impacts on cultural resources;

Population and Economy
o negligible impacts on population;
o negligible impacts on economy;

Recreation
o negligible impacts on recreation;

Wilderness Values
o negligible short term impacts;
o minor negative long term impacts;

Subsistence
o negligible impacts on subsistence.

Bering Sea Unit

Fish and Wildlife
o negligible negative impacts on marine fauna due to commercial fishing; little or no effect on refuge freshwater fish;
o minor to major negative impacts on seabirds and marine mammals due to commercial fisheries; minor negative impacts due to entanglement in drift nets; negligible to major negative impacts on seabirds due to oil development and possible oil spills; negligible to minor negative impacts on marine mammals due to possible oil spills;
o negligible to major negative impacts on waterfowl and shorebirds due to possible oil spills; negligible impacts on terrestrial mammals, raptors, upland birds, and songbirds;

Water Quality and Quantity
o negligible impacts on water quality and quantity;

Cultural Resources
o negligible impacts on cultural resources;

Population and Economy
o negligible impacts on population;
o negligible impacts on economy;

Recreation
o moderate increase in interpretive opportunities;

Wilderness Values
o negligible short term impacts;
o minor negative long term impacts;

Subsistence
o negligible impacts on subsistence.

Aleutian Islands Unit

Fish and Wildlife
o minor to major negative impacts on marine fauna due to commercial fishing; minor impacts from increased fishing near military bases and in the eastern Aleutian Islands near Dutch Harbor;
o positive impacts on seabirds due to increased monitoring efforts; minor potential impacts on seabirds regionally from oil spills, but severe potential impacts locally; minor to major negative impacts as well as possible benefits to seabird productivity by commercial fishery; benefits from increase in numbers and diversity of breeding seabirds as fox and introduced predators are removed from islands; minor negative impacts on seabirds due to entanglement in gill nets;
o moderate to major negative impacts on marine mammals due to commercial fisheries; minor negative impacts on marine mammals due to possible oil spills;
o minor to severe potential negative impacts on waterfowl due to oil spills; major local benefits from increase in numbers and diversity of breeding waterfowl as fox and introduced predators are removed from islands; benefit to waterfowl from increased monitoring and improved management;
o negligible impacts on most species of shorebirds from potential oil spills; major local impacts on phalaropes from oil spills during migration;
o negligible impacts on raptors; major local benefits to upland birds and songbirds due to eradication of introduced fox; minor local negative impacts on terrestrial mammals due to hunting, poaching, and human disturbance;
o major positive impacts on Aleutian Canada geese due to fox removal; negligible impacts on Aleutian shield fern;

Water Quality and Quantity
o negligible impacts on water quality and quantity;

Cultural Resources
o negligible impacts on cultural resources;

Population and Economy
o negligible impacts on population;
o negligible impacts on economy;

Recreation
o negligible impacts on recreation;

Wilderness Values
o negligible short term impact;
o minor negative long term impact;

Subsistence
o negligible impacts on subsistence.

Alaska Peninsula Unit

Fish and Wildlife
o unknown impacts from increase in seabird populations on forage fish species due to the removal of fox on refuge islands; negligible impacts on freshwater fish;
o minor to major negative impacts on seabirds and marine mammals due to oil development and possible oil spills; minor to major negative impacts due to commercial fisheries; minor positive impacts due to increased monitoring; major positive impacts on seabirds from removal of introduced species;
o minor to major negative direct and indirect impacts on waterfowl and shorebirds due to possible oil spills; major local positive impacts from the removal of introduced species;
o negligible negative impacts on raptors due to the removal of introduced rodents; major local positive impacts on upland birds and songbirds due to the removal of introduced species;
o elimination of introduced fox may result in burgeoning ground squirrel and vole populations on some islands which could cause more localized damage to vegetation and erosion;
o major positive impacts on endangered species due to the removal of introduced predators;

Water Quality and Quantity
o negligible impacts on water quality and quantity;

Cultural Resources
o negligible impacts on cultural resources;

Population and Economy
o negligible impacts on population;
o negligible impacts on economy;

Wilderness Values
o negligible short term impacts;
o minor negative long term impacts;

Recreation
o negligible impacts on recreation;

Subsistence
o negligible impacts on subsistence.

Gulf of Alaska Unit

Fish and Wildlife
o major localized negative impacts on marine fauna due to log transfer facilities; negligible localized negative impacts due to one 0.5 acre mariculture project; minor to major localized negative impacts due to possible oil spills; minor impacts due to commercial fisheries; no impacts anticipated for freshwater fish due to limited habitat;
o minor to major negative impacts on seabirds due to oil development and possible oil spills; minor negative impacts from commercial fisheries; negligible negative impacts due to timber harvest; major positive impacts due to the removal of introduced predators; negligible to minor negative impacts due to increased tourist use; minor negative impacts due to entanglement in set nets;
o minor negative localized impacts on waterfowl due to increased urban development; minor to severe negative impacts due to possible oil spills; minor to moderate negative localized impacts due to industrial discharge;
o minor negative localized impacts on shorebirds due to an increase in urban development; minor negative localized impacts on raptors due to timber harvest; minor negative localized impacts on upland birds, songbirds, and terrestrial mammals due to timber harvest;
o minor negative impacts on sea otters due to conflicts between otters and commercial

fisheries; negligible localized negative impact due to one 0.5 acre mariculture project; minor to moderate negative impact due to increase in harvest of sea otter food sources; minor to major negative impacts due to possible oil spills; negligible negative impacts due to tourist disturbance;

Water Quality and Quantity
o negligible impacts on water quality and quantity;

Cultural Resources
o negligible impacts on cultural resources;

Population and Economy
o negligible impacts on population;
o negligible impacts on economy;

Recreation
o major positive impacts on interpretive opportunities and recreation;

Subsistence
o negligible impacts on subsistence.

ALTERNATIVE B

This alternative is similar to Alternative A, the current situation alternative, except that all additional areas that qualify are proposed for wilderness designation.

Alternative B emphasizes maintenance of wilderness values, protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels. Fish and wildlife management would focus on monitoring and on eradication of introduced predators. Opportunities for hunting, fishing, and other recreational uses would be maintained, as would scientific research, wildlife and wildland observation opportunities, trapping, and subsistence uses. There would be an increased focus on interpretation and environmental education.

Management Directions

Alternative B has the following management directions in common with Alternative A:
o maintain the existing mix of undeveloped habitats and developed military and commercial use areas;
o protect seabird colonies and marine mammal haulouts;
o emphasize protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels;
o focus fish and wildlife management on monitoring and on eradication of introduced predators;
o accommodate the existing military installations on Adak, Shemya, Attu and Amchitka islands and at Cape Lisburne;
o provide for continued subsistence use of refuge resources;
o maintain traditional access opportunities;
o maintain trapping opportunities;
o maintain opportunities for hunting, fishing, and wildlife observation;
o fifty-six percent of the refuge is already designated wilderness.

In addition, Alternative B would:
o recommend for wilderness designation the additional six percent of the refuge which qualifies;
o designate 20,768 acres of tidelands, submerged lands and water column for moderate management in Raspberry Strait;
o designate an additional 26,266 acres of Amchitka Island for intensive management to accommodate additional radar facilities.

Table 36 in the management alternatives chapter shows the location of the management categories and wilderness proposal in Alternative B. Approximately one percent of the refuge would be in intensive management, two percent would be in moderate management, 35 percent would be in minimal management, 56 percent is in existing wilderness, and six percent would be proposed for wilderness designation.

Environmental Consequences

Chukchi Sea Unit

Fish and Wildlife
o negligible negative impacts on marine fauna due to commercial fishing and loss of lagoon habitat in Peard Bay; little or no impacts on refuge freshwater fish populations;
o negligible to major negative impacts on seabirds and marine mammals due to oil development and possible oil spills; minor

negative impacts due to commercial fisheries; minor positive impacts due to increased monitoring; negligible negative impacts on seabirds due to quarry activities;
- o negligible to major negative direct and indirect impacts on waterfowl and shorebirds due to possible oil spills, particularly for phalaropes during migration; minor positive impacts on waterfowl and shorebirds due to protection of critical coastal barrier island habitats;
- o negligible impacts on terrestrial mammals, raptors, upland birds and songbirds due to human disturbance; negligible to minor negative impacts on terrestrial mammals due to an increase in hunting pressure;

Water Quality and Quantity
- o negligible impacts on water quality and quantity;

Cultural Resources
- o negligible impacts on cultural resources;

Population and Economy
- o negligible impacts on population;
- o negligible impacts on economy;

Recreation
- o minor increase in interpretive opportunities;

Wilderness Values
- o negligible short term impacts;
- o minor positive long term impacts;

Subsistence
- o negligible impacts on subsistence.

Bering Sea Unit

Fish and Wildlife
- o negligible negative impacts on marine fauna due to commercial fishing; minor positive impacts on freshwater fish due to increased studies;
- o minor to major negative impacts on seabirds and marine mammals due to commercial fisheries; minor negative impacts due to entanglement in drift nets; negligible to major negative impacts on seabirds due to oil development and possible oil spills; negligible to minor negative impacts on marine mammals due to possible oil spills;
- o negligible to major negative impacts on waterfowl and shorebirds due to possible oil spills; negligible impacts on terrestrial mammals, raptors, upland birds, and songbirds;

Water Quality and Quantity
- o negligible impacts on water quality and quantity;

Cultural Resources
- o negligible impacts on cultural resources;

Population and Economy
- o negligible impacts on population;
- o negligible impacts on economy;

Recreation
- o moderate increase in interpretive opportunities;

Wilderness Values
- o negligible short term impacts;
- o minor positive long term impacts;

Subsistence
- o negligible impacts on subsistence.

Aleutian Islands Unit

Fish and Wildlife
- o minor to major negative impacts on marine fauna due to commercial fishing; minor impacts from increased fishing near military bases and in the eastern Aleutian Islands near Dutch Harbor;
- o minor positive impacts on seabirds due to increased monitoring efforts and food habits studies; minor impacts on seabirds regionally from potential oil spills, but severe potential impacts locally; minor to major negative impacts as well as possible benefits to seabird productivity by commercial fishery; benefits from increase in numbers and diversity of breeding seabirds as fox and introduced predators are removed from islands; minor negative impacts on seabirds due to entanglement in gill nets;
- o moderate to major negative impacts on marine mammals due to commercial fisheries; minor negative impacts on marine mammals due to possible oil spills;
- o minor to severe negative impacts on waterfowl due to possible oil spills; major local benefits from increase in numbers and diversity of breeding waterfowl as fox and

introduced predators are removed from islands; benefit to waterfowl from increased monitoring and improved management;
- o negligible impacts on most species of shorebirds from potential oil spills; major local impacts on phalaropes from oil spills during migration;
- o negligible impacts on raptors; major local benefits to upland birds and songbirds due to eradication of introduced fox; minor local negative impacts on terrestrial mammals due to hunting, poaching, and human disturbance;
- o major positive impacts on Aleutian Canada geese due to fox removal; negligible impacts on Aleutian shield fern;

Water Quality and Quantity
- o negligible impacts on water quality and quantity;

Cultural Resources
- o negligible impacts on cultural resources;

Population and Economy
- o negligible impacts on population;
- o negligible impacts on economy;

Recreation
- o minor to moderate increase in interpretive opportunities;

Wilderness Values
- o negligible short term impact;
- o minor positive long term impact;

Subsistence
- o negligible impacts on subsistence.

Alaska Peninsula Unit

Fish and Wildlife
- o unknown impacts from increase in seabird populations on forage fish species due to the removal of fox on refuge islands; negligible impacts on freshwater fish;
- o minor to major negative impacts on seabirds and marine mammals due to oil development and possible oil spills; minor to major negative impacts due to commercial fisheries; minor positive impacts due to increased monitoring; major positive impacts on seabirds from removal of introduced species;
- o minor to major negative direct and indirect impacts on waterfowl and shorebirds due to possible oil spills; major local positive impacts from the removal of introduced species;
- o negligible negative impacts on raptors due to the removal of introduced rodents; major local positive impacts on upland birds and songbirds due to removal of introduced species;
- o elimination of introduced fox may result in burgeoning ground squirrel and vole populations on some islands which could cause more localized damage to vegetation and erosion;
- o major positive impacts on endangered species due to the removal of introduced predators;

Water Quality and Quantity
- o negligible impacts on water quality and quantity;

Cultural Resources
- o negligible impacts on cultural resources;

Population and Economy
- o negligible impacts on population;
- o negligible impacts on economy;

Recreation
- o minor increase in interpretive opportunities;

Wilderness Values
- o negligible short term impacts;
- o minor positive long term impacts;

Subsistence
- o negligible impacts on subsistence.

Gulf of Alaska Unit

Fish and Wildlife
- o major localized negative impacts on marine fauna due to log transfer facilities; localized negative impacts due to two to five 0.5 acre mariculture projects; minor to major localized negative impacts due to possible oil spills; minor impacts due to commercial fisheries; no impacts anticipated for freshwater fish due to limited habitat;
- o minor to major negative impacts on seabirds due to oil development and possible oil spills; minor negative impacts from commercial fisheries; negligible negative impacts due to timber harvest; major positive impacts due to the removal of introduced predators; negligible to minor negative impacts due to

increased tourist use; minor negative impacts due to entanglement in set nets;
- o minor negative localized impacts on waterfowl due to increased urban development; minor to severe negative impacts due to possible oil spills; minor to moderate negative localized impacts due to industrial discharge;
- o minor negative localized impacts on shorebirds due to an increase in urban development; minor negative localized impacts on raptors due to timber harvest; minor negative localized impacts on upland birds, songbirds, and terrestrial mammals due to timber harvest;
- o minor negative impacts on sea otters due to conflicts between otters and commercial fisheries; localized negative impacts due to two to five 0.5 acre mariculture projects; minor to moderate negative impacts due to increase in harvest of sea otter food sources; minor to major negative impacts due to possible oil spills; negligible negative impacts due to tourist disturbance;

Water Quality and Quantity
- o localized minor negative impacts from two to five 0.5 acre mariculture projects;

Cultural Resources
- o negligible impacts on cultural resources;

Population and Economy
- o negligible impacts on population;
- o minor positive impacts on local economy depending on the success of mariculture projects;

Recreation
- o localized minor negative impacts on recreation due to mariculture development; major increase in interpretive opportunities;

Subsistence
- o localized minor negative impacts on subsistence due to mariculture development.

ALTERNATIVE C (PREFERRED ALTERNATIVE)

Alternative C emphasizes protection of existing fish and wildlife populations and habitats, restoration of endangered and other species to natural levels, and increased opportunities for wildlife viewing and other non-consumptive uses. Fish and wildlife management would focus on monitoring, improvement of information on seabird-prey interactions, and on eradication of introduced predators. Opportunities for hunting, fishing, and other recreational uses would be maintained, as would scientific research, wildlife and wildland observation opportunities, trapping, and subsistence uses. Public use management would focus on increased interpretation and environmental education. Wilderness recommendations would be limited to minor boundary adjustments to existing wilderness and islands with outstanding resource values.

Management Directions

Alternative C has the following management directions in common with Alternatives A and B:
- o protect seabird colonies and marine mammal haulouts;
- o emphasize protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels;
- o fish and wildlife management would focus on monitoring and on eradication of introduced predators;
- o accommodate the existing military installations on Adak, Shemya, Attu and Amchitka islands and at Cape Lisburne;
- o provide for continued subsistence use of refuge resources;
- o maintain traditional access opportunities;
- o maintain trapping opportunities;
- o maintain opportunities for hunting, fishing, and wildlife observation;
- o fifty-six percent of the refuge is already designated wilderness.

As in Alternative B, Alternative C would:
- o designate an additional 26,266 acres of Amchitka Island for intensive management to accommodate additional radar facilities.

In addition, Alternative C would:
- o recommend an additional three percent of the refuge for wilderness designation;
- o recommend 640 acres on Popof Island for intensive management;
- o designate 6020 acres of Womens Bay tidelands, submerged land and water column for intensive management;
- o recommend 335,984 acres of Afognak tidelands, submerged lands and water column for intensive management, including most of the area around

Afognak Island except the area offshore from Kodiak Refuge.

Table 36 in the management alternatives chapter shows the location of the management categories and wilderness proposal for Alternative C. Approximately eight percent of the refuge would be in intensive management, one percent would be in moderate management, 32 percent would be in minimal management, 56 percent is existing wilderness, and three percent would be proposed for wilderness designation.

Environmental Consequences

Chukchi Sea Unit

Fish and Wildlife
- o negligible negative impacts on marine fauna due to commercial fishing and loss of lagoon habitat in Peard Bay; little or no impact on refuge fresh water fish populations expected;
- o negligible to major negative impacts on seabirds and marine mammals due to oil development and possible oil spills; minor negative impacts due to commercial fisheries; moderate positive impacts due to increased monitoring; negligible negative impacts on seabirds due to quarry activities;
- o negligible to major negative direct and indirect impacts on waterfowl and shorebirds due to possible oil spills, particularly for phalaropes during migration; minor positive impacts on waterfowl and shorebirds due to protection of critical coastal barrier islands habitats;
- o negligible impacts on terrestrial mammals, raptors, upland birds and songbirds due to human disturbance; negligible to minor negative impacts on terrestrial mammals due to an increase in hunting pressure;

Water Quality and Quantity
- o negligible impacts on water quality and quantity;

Cultural Resources
- o negligible impacts on cultural resources;

Population and Economy
- o negligible impacts on population;
- o negligible impacts on economy;

Recreation
- o minor increase in interpretive opportunities;

Wilderness Values
- o negligible short term impacts;
- o minor positive long term impacts;

Subsistence
- o negligible impacts on subsistence.

Bering Sea Unit

Fish and Wildlife
- o negligible negative impacts on marine fauna due to commercial fishing; minor positive impacts on marine fauna and freshwater fish due to increased studies;
- o minor to major negative impacts on seabirds and marine mammals due to commercial fisheries; minor negative impacts due to entanglement in drift nets; negligible to major negative impacts on seabirds due to oil development and possible oil spills; negligible to minor negative impacts on marine mammals due to possible oil spills; negligible to minor positive impacts on seabirds and marine mammals due to a higher degree of protection for Walrus and Otter islands; positive benefits to management due to increased studies;
- o negligible to major negative impacts on waterfowl and shorebirds due to possible oil spills; negligible impacts on terrestrial mammals, raptors, upland birds, and songbirds; positive impacts due to increased monitoring studies;
- o minor negative impacts on waterfowl and shorebirds due to possible oil spills; minor to moderate positive impacts due to increased studies and information;
- o negligible impacts on raptors and upland birds and songbirds, and terrestrial mammals; minor positive impacts due to increased studies and information;

Water Quality and Quantity
- o minor benefits to management due to increased studies;

Cultural Resources
- o negligible impacts on cultural resources;

Population and Economy
o negligible impacts on population;
o negligible impacts on economy;

Recreation
o moderate increase in interpretive opportunities;

Wilderness Values
o negligible short term impacts;
o minor positive long term impacts;

Subsistence
o negligible impacts on subsistence.

Aleutian Islands Unit

Fish and Wildlife
o minor to major negative impacts on marine fauna due to commercial fishing; minor impacts from increased fishing near military bases and in the eastern Aleutian Islands near Dutch Harbor;
o moderate to major positive impacts on seabirds due to increased monitoring efforts and food habits studies; minor impacts on seabirds regionally from potential oil spills, but severe potential impacts locally; minor to major negative impacts as well as possible benefit to seabird productivity by commercial fishery; benefits from increase in numbers and diversity of breeding seabirds as fox and introduced predators are removed from islands; minor negative impacts on seabirds due to entanglement in gill nets;
o moderate to major negative impacts on marine mammals due to commercial fisheries; minor negative impacts on marine mammals due to possible oil spills; positive impacts due to increased prey base information;
o minor to severe negative impacts on waterfowl due to potential oil spills; major local benefits from increase in numbers and diversity of breeding waterfowl as fox and introduced predators are removed from islands; benefit to waterfowl from increased monitoring and improved management;
o negligible impacts on most species of shorebirds from potential oil spills; major local impacts on phalaropes from oil spills during migration;
o negligible impacts on raptors; major local benefits to upland birds and songbirds due to eradication of introduced fox; minor local negative impacts on terrestrial mammals due to hunting, poaching, and human disturbance;
o major positive impacts on Aleutian Canada geese due to fox removal; negligible impacts on Aleutian shield fern;

Water Quality and Quantity
o negligible impacts on water quality and quantity;

Cultural Resources
o negligible impacts on cultural resources;

Population and Economy
o negligible impacts on population;
o negligible positive impacts on economy due to three additional refuge positions added at Adak;

Recreation
o major increase in interpretive opportunities;

Wilderness Values
o negligible short term impact;
o minor positive long term impact;

Subsistence
o negligible impacts on subsistence.

Alaska Peninsula Unit

Fish and Wildlife
o unknown impacts from increase in seabird populations on forage fish species due to the removal of fox on refuge islands; negligible impacts on freshwater fish;
o minor to major negative impacts on seabirds and marine mammals due to oil development and possible oil spills; minor to major negative impacts due to commercial fisheries; minor to major positive impacts due to increased monitoring; major positive impacts on seabirds from removal of introduced species;
o minor to major negative direct and indirect impacts on waterfowl and shorebirds due to possible oil spills; major local positive impacts from the removal of introduced species;
o negligible negative impacts on raptors due to the removal of introduced rodents; major local positive impacts on upland birds and songbirds due to the removal of introduced species;
o elimination of introduced fox may result in burgeoning ground squirrel and vole

populations on some islands which could cause more localized damage to vegetation and erosion; negligible local effects on terrestrial mammals from road construction on Popof Island;
o major positive impacts on endangered species due to the removal of introduced predators;

Water Quality and Quantity
o negligible impacts on water quality and quantity;

Cultural Resources
o negligible impacts on cultural resources;

Population and Economy
o negligible impacts on population;
o negligible impacts on economy;

Recreation
o minor increase in interpretive opportunities;

Wilderness Values
o negligible short term impacts;
o minor positive long term impacts;

Subsistence
o negligible impacts on subsistence.

Gulf of Alaska Unit

Fish and Wildlife
o major localized negative impacts on marine fauna due to log transfer facilities; localized negative impacts due to seven to thirteen 0.5 acre mariculture projects; major localized changes to the ocean floor due to single finfish mariculture project; minor to major localized negative impacts due to possible oil spills; minor impacts due to commercial fisheries; no impacts anticipated for freshwater fish due to limited habitat;
o minor to major negative impacts on seabirds due to oil development and possible oil spills; minor negative impacts from commercial fisheries; negligible negative impacts due to timber harvest; major positive impacts due to the removal of introduced predators; negligible to minor negative impacts due to increased tourist use; minor negative impacts due to entanglement in set nets; minor to moderate benefits to management due to increased monitoring and studies;
o minor negative localized impacts on waterfowl due to increased urban development; minor to severe negative impacts due to possible oil spills; minor to moderate negative localized impacts due to industrial discharge;
o minor negative localized impacts on shorebirds due to an increase in urban development; minor negative localized impacts on raptors due to timber harvest; minor negative localized impacts on upland birds, songbirds, and terrestrial mammals due to timber harvest;
o minor negative impacts on sea otters due to conflicts between otters and commercial fisheries; localized negative impacts due to seven to fourteen 0.5 acre mariculture projects including a single finfish mariculture project; localized negative impacts due to the development of two additional commercial docks and several government docks; minor to moderate negative impact due to increase in harvest of sea otter food source; minor to major negative impacts due to possible oil spills; negligible negative impacts due to tourist disturbance;

Water Quality and Quantity
o localized minor negative impacts from seven to thirteen 0.5 acre mariculture projects, two additional commercial docks and several government docks; major localized impacts from single finfish mariculture project;

Cultural Resources
o moderate to major impacts on the local economy depending on the success of mariculture projects;

Population and Economy
o negligible impacts on population;
o moderate to major positive impacts on local economy depending on the success of mariculture projects;

Recreation
o localized minor negative impacts on recreation due to mariculture development; major positive impact on interpretive opportunities;

Subsistence
o localized minor negative impacts on subsistence due to mariculture development.

SECTION 810(a) EVALUATION

The continued opportunity for subsistence use is one purpose of Alaska Maritime Refuge. Subsistence considerations are addressed in many parts of the plan. All of the management alternatives share a common management direction with respect to subsistence. In its section 810 evaluation of the alternatives, the Service determined that none of the management proposals would significantly restrict subsistence use.

In implementing Alternative C, the preferred alternative, the Service will work with local villages, the Alaska Department of Fish and Game, the State Boards of Fisheries and Game, and other concerned groups and individuals to ensure that subsistence opportunities are not adversely affected. Future project proposals may require detailed section 810 determinations.

SELECTION OF THE PREFERRED ALTERNATIVE

The Service has selected Alternative C as its preferred alternative for managing the Alaska Maritime Refuge, on the basis that it would both satisfy the purposes of the refuge and ensure that opportunities are maintained for the widest range of users. The Service would carefully monitor and regulate all uses and activities to ensure that adverse impacts to refuge resources and users are minimized.

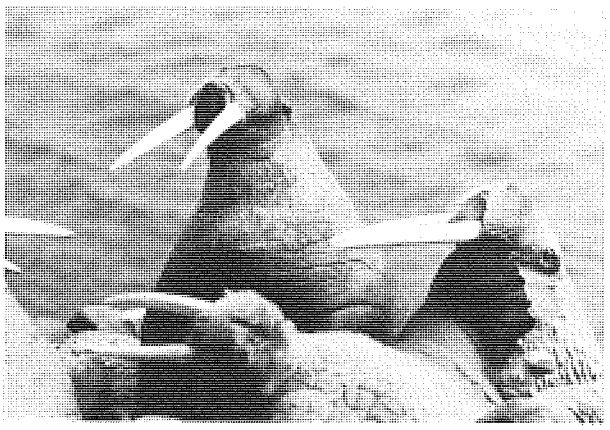
The proposed management alternative would maintain existing values of the refuge. By conducting intensive studies and developing mitigation in areas of moderate and intensive use, the Service can meet its mandates and public needs for controlled development. The other alternatives were not selected because they were not as responsive to public concerns or management needs.

INTRODUCTION

PURPOSE AND NEED FOR ACTION

The Alaska Maritime National Wildlife Refuge Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review (plan) is a congressionally mandated plan that provides general guidance for managing the Alaska Maritime Refuge. The Alaska Maritime plan will need to be periodically reviewed and updated. Future management plans will treat specific management issues such as fisheries, wildlife, wilderness, and recreation.

This document describes the physical, biological, and human environment of the Alaska Maritime Refuge and three alternatives for long range management. Each alternative has a different management emphasis and wilderness proposal. The document includes a draft environmental impact statement that assesses the effects of the alternatives. The Fish and Wildlife Service (Service) has evaluated the three alternatives and selected one for implementation. After public review, the selected alternative may be revised, and a final Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review will be published.



About 80 percent of the world's population of Pacific walrus winters in the Bering Sea. Although conservation of marine mammals and "the marine resources upon which they rely" is a purpose of Alaska Maritime Refuge, the Service has only indirect means of accomplishing this outside of refuge lands.

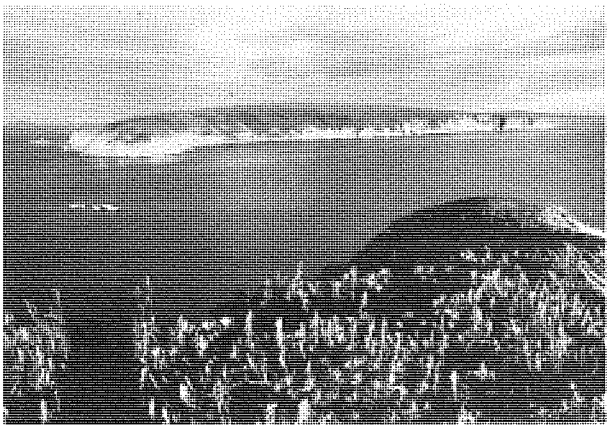
In 1980, the Alaska National Interest Lands Conservation Act (Alaska Lands Act) established the Alaska Maritime National Wildlife Refuge by merging 11 previously existing refuges and adding additional acreage. Both Service policy and the Alaska Lands Act require preparation of a plan to guide management of units of the National Wildlife Refuge System. Service policy states that "national wildlife refuges will have approved master plans to guide refuge management decisions in response to the goals, objectives, and long range plans of the Service" (4 RM 1.1). Section 304 of the Alaska Lands Act directs the Secretary of the Interior to "prepare and from time to time, revise, a comprehensive conservation plan ... for each refuge" in Alaska. Section 1317 of the Alaska Lands Act directs the Secretary to study refuge lands and make recommendations for inclusion in the National Wilderness Preservation System. The National Environmental Policy Act of 1969 requires that federal agencies analyze impacts in an environmental impact statement before taking major actions that may significantly affect the quality of the human environment.

A comprehensive conservation plan is also needed to:

- ensure that national policy is incorporated into management of the Alaska Maritime Refuge;
- provide a direction and basis for refuge management decisions;
- provide continuity in refuge management;
- provide a basis for budget requests.

OVERVIEW OF THE ALASKA MARITIME NATIONAL WILDLIFE REFUGE

The approximately 4.9 million acre Alaska Maritime National Wildlife Refuge was established in 1980 by the Alaska Lands Act. This act added 1.9 million acres of additional lands to 11 existing refuges, combining a majority of Alaska's seabird habitat into one refuge. These 11 previously existing refuges were established as preserves and breeding grounds for native birds and, where applicable, for the propagation of reindeer and furbearing



The former Chamisso Island Refuge in Kotzebue Sound was combined with 10 other previously existing refuges and an additional 1.9 million acres to create the Alaska Maritime Refuge. Chamisso is one of 10 existing wilderness areas on the refuge.

animals, and for the encouragement and development of fisheries. These refuges were:

Bering Sea Refuge -- Established on February 27, 1909; 81,340 acres; designated wilderness on October 23, 1970;

Bogoslof Refuge -- Established on March 2, 1909; 175 acres; designated wilderness on October 23, 1970;

Pribilof Islands Refuge -- Established on February 27, 1909; 171.2 acres;

St. Lazaria Refuge -- Established on February 27, 1909; 65 acres; designated wilderness on October 23, 1970;

Tuxedni Refuge -- Established on February 27, 1909; 5,683 acres; designated wilderness on October 23, 1970;

Chamisso Island Refuge -- Established on December 7, 1912; 455 acres; designated wilderness in January 1975.

Forrester Island Refuge -- Established on January 11, 1912; 2,800 acres; designated wilderness on October 23, 1970;

Hazy Islands Refuge -- Established on January 11, 1912; 32 acres; designated wilderness on October 23, 1970;

Aleutian Islands Refuge -- Established on January 1, 1913; 2,720,225 acres; designated wilderness on December 2, 1980;

Simeonof Island Refuge -- Established on February 29, 1958; 26,046 acres; designated wilderness in October 1976;

Semidi Islands Refuge -- Established on May 17, 1932; 251,930 acres; designated wilderness on December 2, 1980;

Each of the 11 refuges included in the Alaska Maritime Refuge had their own establishing authority and purposes. Section 305 of the Alaska Lands Act states in part that:

> All proclamations, Executive orders, public land orders, and other administrative actions in effect on the day before the date of the enactment of this Act with respect to units of the National Wildlife Refuge System in the State shall remain in force and effect except to the extent that they are inconsistent with this Act or the Alaska Native Claims Settlement Act and, in any such case, the provisions of such Acts shall prevail.

The Alaska Lands Act also delineated five distinct geographic refuge units: the Chukchi Sea Unit, the Bering Sea Unit, the Aleutian Islands Unit, the Alaska Peninsula Unit, and the Gulf of Alaska Unit (Figure 1). Additional wilderness was also designated in the Aleutian Islands, on Unimak Island, and in the Semidi Islands by the Alaska Lands Act.

The Alaska Maritime Refuge is administered from the port town of Homer, Alaska, at the southern end of the Kenai Peninsula. The Aleutian Islands Unit is administered from a sub-headquarters on Adak. All other units are administered from Homer.

There are approximately 3,000 headlands, islands, islets, and pinnacle rocks within the refuge. These areas are used annually by about 40 million nesting seabirds, 80 percent of Alaska's seabird population.

The sea is common to all parts of the Alaska Maritime Refuge, but each unit has its own unique features. Lush rain forests dominate many of the precipitous small islands in the Gulf of Alaska Unit; mountains rise directly from the sea to over 9,000 feet in the volcanic Aleutian Islands Unit; and treeless, high coastal escarpments underlain by permafrost as well as low, sandy, barrier islands are found in the Chukchi Sea Unit.

PURPOSES OF THE ALASKA MARITIME NATIONAL WILDLIFE REFUGE

Section 303(1)(b) the Alaska Lands Act sets forth the following major purposes for which Alaska Maritime Refuge was established and shall be managed:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to marine mammals, marine birds and other migratory birds, the marine resources upon which they rely, bears, caribou and other mammals;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents;

(iv) to provide, in a manner consistent with subparagraphs (i) and (ii), a program of national and international scientific research on marine resources; and

(v) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

LEGAL CONTEXT

Alaska Maritime National Wildlife Refuge is one of over 430 units of the National Wildlife Refuge System managed by the U.S. Fish and Wildlife Service (Department of the Interior). The principal federal statutes affecting refuge planning and management are discussed briefly below. Regulations developed to guide implementation of applicable laws are codified under Title 50 of the U.S. Code of Federal Regulations (50 CFR).

National Wildlife Refuge System Administration Act of 1966

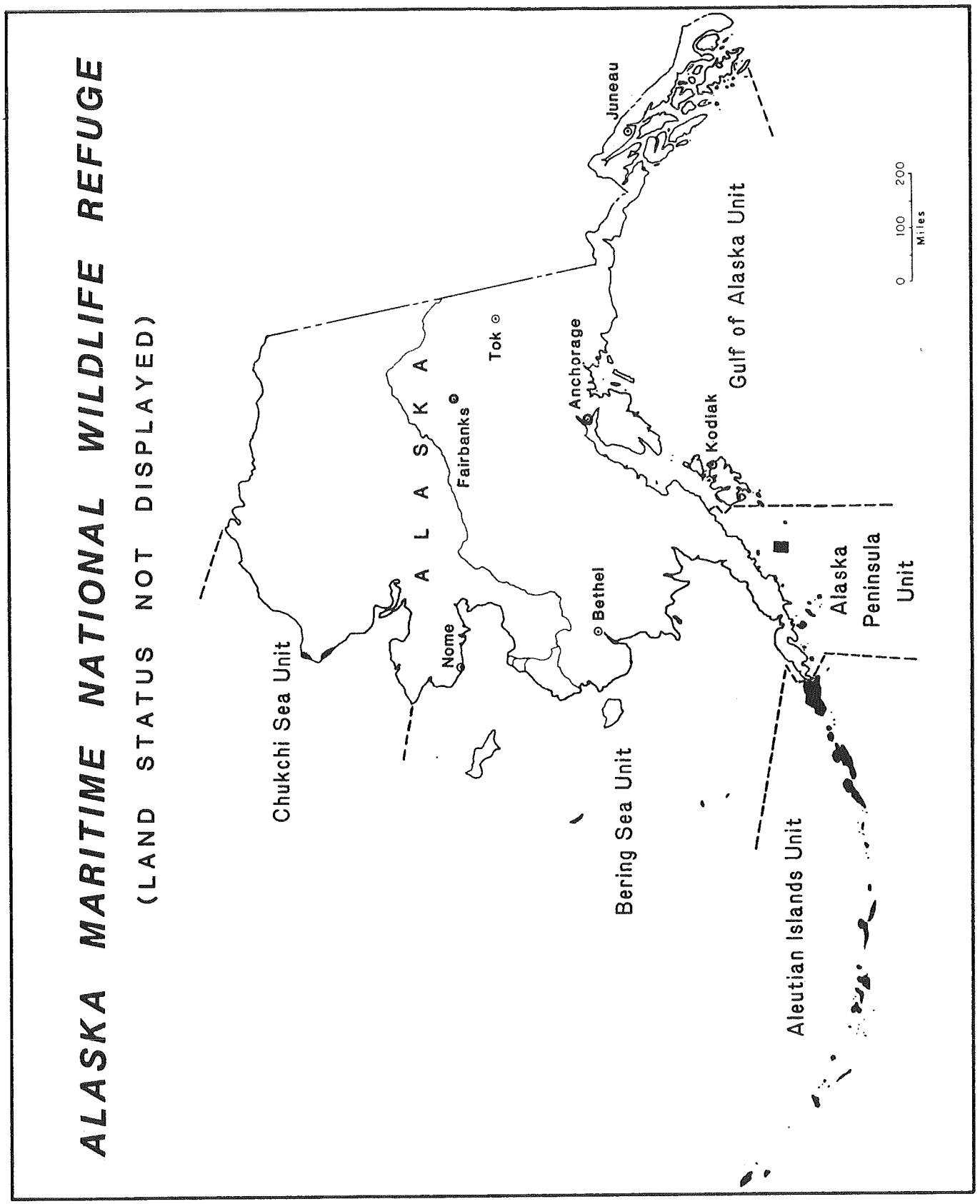
This act established the National Wildlife Refuge System, primarily to conserve valuable habitat for migratory birds (especially waterfowl), large game animals, and endangered species. The act defines fundamental policies for administration and management by the Fish and Wildlife Service of all units of the National Wildlife Refuge System, including Alaska Maritime Refuge. It defines key terms, establishes criteria for opening refuges to migratory bird hunting, and explains procedures for divestiture of lands. This act also establishes the concept of "compatibility" whereby proposed uses of refuge lands must first be determined to be compatible with the purposes for which individual refuges were established. The refuge system includes over 430 units in 49 states, with 16 refuges in Alaska (Figure 2).

Alaska National Interest Lands Conservation Act of 1980 (Alaska Lands Act)

In addition to amending the Alaska Native Claims Settlement Act and the Alaska Statehood Act, the Alaska Lands Act expands the federal conservation system throughout the state (including refuges, parks, forests, wilderness areas, and rivers and trails). It expanded seven refuges, of which Alaska Maritime National Wildlife Refuge was one; it also established many new refuges. With respect to national wildlife refuges, the Alaska Lands Act defines refuge purposes, specifies planning and management requirements, and authorizes studies and programs related to wildlife and wildland resources, subsistence opportunities, commodity resources, and recreational and economic uses (oil and gas exploration and development, access, and transportation and utility systems).

Section 1317 of the Alaska Lands Act requires that all refuge lands that were not designated as wilderness be reviewed as to their suitability for wilderness designation.

Figure 1. Location of Alaska Maritime Refuge.



National Environmental Policy Act of 1969

This act requires that federal agencies carefully analyze impacts prior to taking major federal actions that may significantly affect the quality of the human environment. Implementation of any one of the alternative plans for management of Alaska Maritime Refuge is considered a major action and this planning process is, therefore, subject to National Environmental Policy Act requirements. This document combines the environmental impact statement required by National Environmental Policy Act with the comprehensive plan required by the Alaska Lands Act.

Wilderness Act of 1964

This act established the National Wilderness Preservation System and prescribed policy for wilderness designation and management. The comprehensive plan evaluates the suitability of refuge lands for wilderness designation and serves as the basis for the wilderness recommendation that will go to Congress.

International Treaties

Migratory bird treaties with Canada, Mexico, Japan, the Soviet Union, and the Convention on Nature Protection and Wildlife Conservation in the Western Hemisphere provide mandates for protecting and managing species and critical habitat. Appendix A describes the treaties in greater detail.

Other Laws

Laws which affect mineral leasing, recreational use, commercial fishing, and other activities on federal lands were considered in this planning effort. The technical supplement of this plan contains a summary of legal references and summarizes their provisions.

PLANNING PROCESS

Legal and Administrative Planning Requirements

Section 304 of the Alaska Lands Act contains the requirements for comprehensive conservation planning. It also specifies that prior to developing a plan for any refuge, the Secretary of the Interior is required to identify and describe:

(A) the populations and habitats of the fish and wildlife resources of the refuge;
(B) the special values of the refuge, as well as any other archeological, cultural, ecological, geological, historical, paleontological, scenic, or wilderness values of the refuge;
(C) areas within the refuge suitable for use as administrative sites or visitor facilities, or for visitor services, as provided for in sections 1305 and 1306 of this Act;
(D) present and potential requirements for access with respect to the refuge, as provided for in Title XI; and
(E) significant problems which may adversely affect the populations and habitats of fish and wildlife identified and described under subparagraph (A).

Each comprehensive conservation plan must:

(A) be based upon the identifications and the descriptions required to be made under paragraph (2)-

(i) designate areas within the refuge according to their respective resources and values;

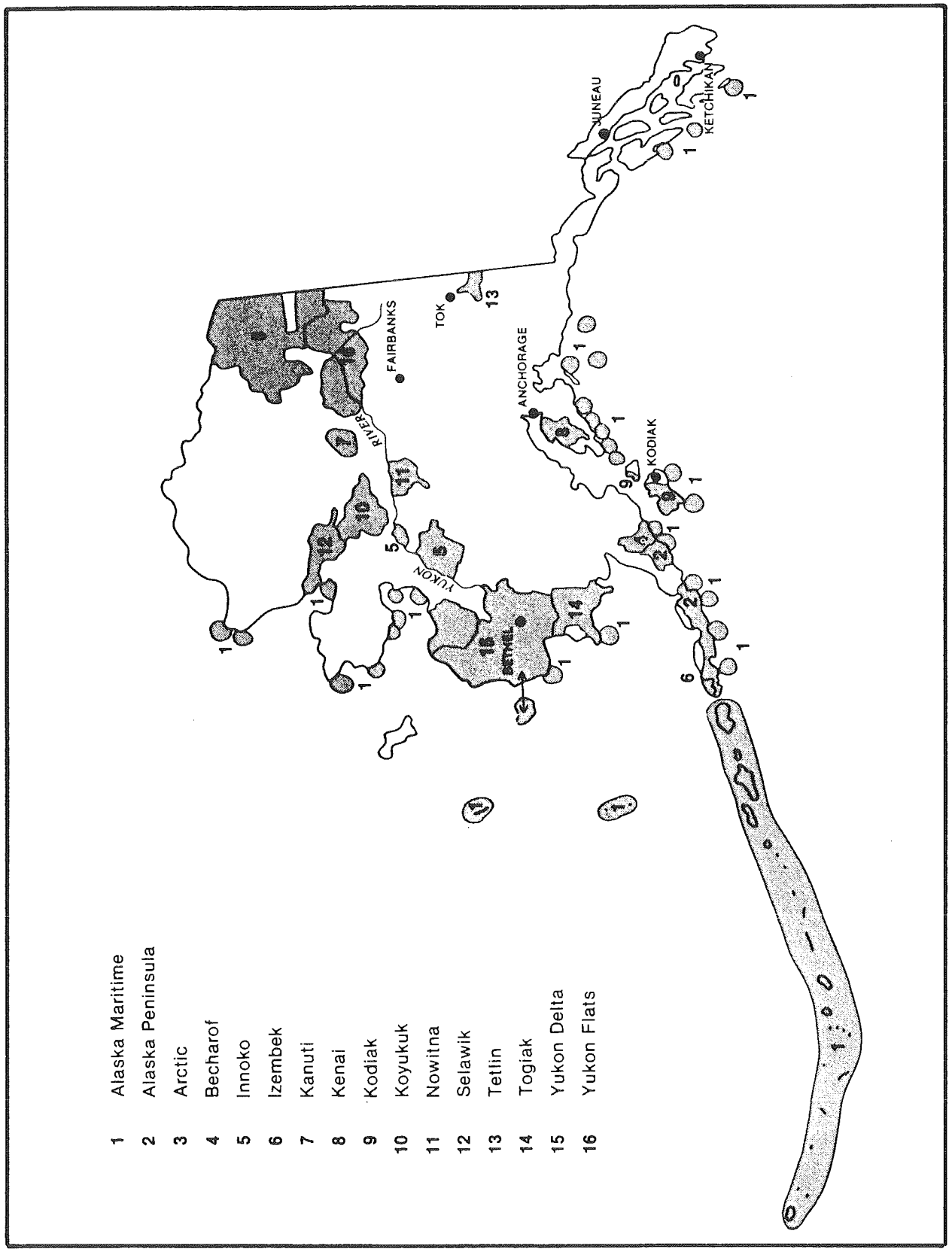
(ii) specify the programs for conserving fish and wildlife and the programs relating to maintaining the values referred to in paragraph (2)(B), proposed to be implemented within each such area;

(iii) specify the uses within each such area which may be compatible with the major purposes of the refuge; and

(B) set forth those opportunities which will be provided within the refuge for fish and wildlife oriented recreation, ecological research, environmental education, and interpretation of refuge resources and values, if such recreation, research, education, and interpretation is compatible with the purposes of the refuge.

In preparing and revising the plans, the Secretary is required to ensure adequate interagency coordination and public

Figure 2. National Wildlife Refuges in Alaska.



participation. Specifically, interested and affected parties such as state agencies, Native corporations, local residents, and political subdivisions must be provided meaningful opportunities to present their views. Furthermore, prior to adopting a plan, the Secretary is to issue notice of its availability in the Federal Register, make copies available in regional offices of the Fish and Wildlife Service throughout the United States, and provide opportunity for public review and comment.

Finally, section 1317 of the Alaska Lands Act requires the Secretary to conduct a review consistent with provisions of the Wilderness Act of all refuge lands in Alaska not already designated as wilderness. The Secretary is to forward recommendations to the President and Congress regarding any lands considered suitable for addition to the National Wilderness Preservation System based on this review and public comment.

Description of the Planning Process

The planning process used to develop alternatives for Alaska Maritime Refuge was designed to fulfill the legal mandates cited above as well as the administrative requirements of the Fish and Wildlife Service and the National Wildlife Refuge System (Figures 3 and 4).

The mission of the Service is "to provide the federal leadership in the conservation, protection, and enhancement of fish and wildlife populations and their habitats for the continuing benefit of people (Service Management Plan 1982)."

The mission of the refuge system is "to provide, preserve, restore, and manage a national network of lands and waters sufficient in size, diversity, and location to meet society's needs for areas where the widest possible spectrum of benefits associated with wildlife and wildlands is enhanced and made available (Service Management Plan 1982)."

Together, these mission statements and the refuge purposes lay the foundation upon which plan alternatives were developed and evaluated. The effects of implementing each of the alternatives upon physical, biological, and human environments were then assessed. The alternatives were also evaluated on their ability to achieve refuge purposes and resolve issues. Based upon this evaluation, a preferred alternative was identified.

After review of the draft document by government agencies, Native corporations, special interest groups, and the general public, the Service will revise the alternatives as necessary and adopt one for implementation. This alternative will become the Alaska Maritime Refuge Comprehensive Conservation Plan.

The refuge staff will, as necessary, undertake management planning following completion and adoption of this plan. Management plans will specify in greater detail the management activities that will be used to implement the comprehensive conservation plan. They will address specific resource issues and public uses such as habitat, hunting, fishing, and environmental education.

Appropriate public involvement and cooperative planning efforts are continued through completion of the detailed management plans.

SPECIAL VALUES

Section 304(g) of the Alaska National Interest Lands Conservation Act directs the Secretary of the Interior to identify and describe "special values of the refuge, as well as any other archaeological, cultural, ecological, geological, historical, paleontological, scenic or wilderness values of the refuge." The Service identified the following special values for Alaska Maritime Refuge:

1. Seabirds - Alaska's coastal waters and islands contain one of the world's largest remaining seabird concentrations, both in terms of breeding populations for 30 species and wintering populations for other species. Millions of shearwaters breed in the southern hemisphere but winter in Alaska. About 50 million seabirds breed along the Alaska coast, more than breed in the rest of North America. Approximately 40 million seabirds nest on the 3,000 headlands, islands, islets, and rocks found within the refuge itself. Many of these

Figure 3. The refuge comprehensive conservation planning process.

Step 1 - PREPLANNING
- o Identify laws, regulations, and policies affecting refuge management
- o Develop analysis methods and capabilities
- o Prepare public involvement plan
- o Hold region-wide public scoping meetings
- o Identify management issues and concerns

Step 2 - INVENTORY AND ANALYSIS
- o Identify and compile resource information needed for planning
- o Describe the physical, biological, economic, and social environments
- o Establish data base
- o Determine capability of resources to respond to issues and concerns

Step 3 - FORMULATE MANAGEMENT ALTERNATIVES
- o Develop alternative strategies for management
- o Identify different combinations of uses for resources

Step 4 - EVALUATION OF ALTERNATIVES
- o Evaluate the effects of implementing each alternative on the physical, biological, and human environments
- o Evaluate the ability of each alternative to achieve refuge purposes and resolve issues and concerns
- o Identify changes from baseline resource information

Step 5 - PLAN SELECTION
- o Select a preferred alternative
- o Prepare and distribute a draft plan describing the alternatives and their expected effects if implemented
- o Provide opportunities for public review and comment

Step 6 - SELECT COMPREHENSIVE CONSERVATION PLAN
- o Review and evaluate public comments received on the draft plan
- o Prepare and distribute a final plan that responds to public comments
- o Provide opportunities for public review and comment
- o Prepare a Record of Decision

Step 7 - PLAN IMPLEMENTATION
- o With appropriate state and public involvement, prepare a detailed management plan(s) identifying specific actions necessary to implement the plan and achieve its goals and objectives
- o Begin implementing the plan

Step 8 - PERIODIC UPDATING OF PLAN
- o Every three years solicit public comments
- o Review all public comments, local, state, and federal recommendations, scientific data, and other information to update plan as needed
- o Make minor changes as an appendix to the plan after appropriate public review and approval by the Regional Director, with notification to the affected agencies and individuals
- o Make major changes by going through the planning process

species, including whiskered, crested, and least auklets, red-legged kittiwakes, Aleutian terns, and red-faced cormorants occur nowhere else except the Bering Sea and nearby parts of the North Pacific. Other species, including fork-tailed storm-petrels and tufted puffins, breed in other portions of the North Pacific in relatively low numbers, but the overwhelming majority breed in Alaska. Most Alaskan waters do not have commercial forage fisheries, with the exception of pollock, so Alaska is one of the few places where seabirds have a relatively intact food chain. Introduced predators like arctic fox have decimated portions of these seabird populations, but even so Alaskan seabirds are a world class wildlife resource.

Figure 4. General refuge planning requirements.

The Fish and Wildlife Service planning process for each refuge involves three stages progressing from the development of a broad comprehensive conservation plan, environmental impact statement, and wilderness review, to refuge management plans for specific resources and, finally, annual work plans for specific projects.

COMPREHENSIVE CONSERVATION PLANS address topics of resource management, visitor use, refuge operations, and development in general terms. The wilderness review determines which lands are suitable for inclusion in the National Wilderness Preservation System. The goal of this is to establish a consensus between the Service and interested agencies, groups, and individuals about the types and levels of visitor use, development, and resource protection that will occur. Decisions are based on the refuge purposes, its significant values, the activities occurring there now, and the resolution of any major issues surrounding possible land use conflicts within and adjacent to the refuge. The following kinds of detailed management plans are prepared after completion of the plan.

⇩

REFUGE MANAGEMENT PLANS identify the actions that will be taken to preserve and protect natural and cultural resources. Examples include a fishery management plan, wildlife habitat management plan, seabird management plan, and a public use management plan.

⇩

ANNUAL WORK PLANS identify specific tasks or projects to be completed in the current year to implement the detailed management plans.

APPROPRIATE PUBLIC INVOLVEMENT AND COOPERATIVE PLANNING EFFORTS ARE CONTINUED THROUGH THE COMPLETION OF THE DETAILED MANAGEMENT PLANS.

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2. Marine Mammals - One of the refuge's unique assets is the concentrations of breeding marine mammals, such as the northern fur seal, the northern sea lion, and harbor seal. Walrus use haul outs on refuge lands in the Bering and Chukchi seas. Sea otters are numerous in nearshore waters, occasionally hauling out on shore. Polar bears are brought to refuge lands by the ice pack in the two northern units. The marked declines, by half, of sea lions and fur seals, particularly in the Aleutian Islands, the eastern Bering Sea, and the Alaska Peninsula areas highlight how important remaining rookeries may be. Many of these rookeries are on refuge lands. At different times over the last century, sea otters, fur seals, sea lions and whales have fluctuated greatly in numbers because of hunting, sometimes coming close to extinction. Refuge lands play an important part in the life cycles and existence of these spectacular wildlife resources.

3. Cultural Resources - Aleut and World War II - Aleuts, the Native people of the Aleutians, thrived in villages along the coasts of the Aleutian Islands and the Alaska Peninsula for thousands of years. Prehistoric populations numbered 10,000 - 16,000. Present day Native corporations claim 358 historic village/cemetery sites throughout the Aleutians. These seafaring people lived in underground lodges called barabaras and traveled along the coast in their sleek, kayak-like bidarkas. An abundance of plants, sea mammals, birds and fish provided them with food, clothing and shelter.

During World War II, the Japanese seized Kiska and Attu islands on June 7, 1942, after bombing the military bases on Dutch Harbor on June 3rd and 4th. This was six months after their attack on Pearl Harbor. The United States responded by constructing large staging and bombing bases in the Aleutians. Thousands of structures were erected on Adak, Amchitka, Shemya, and other refuge islands. An assault on Attu Island resulted in a hard-won victory for the United States, followed by the Japanese evacuation of Kiska Island. Prior to the invasion of Kiska Island, there were approximately 100,000 American and Canadian military forces in the Aleutian Chain. These remote islands were probably the war's least known and least publicized combat zone. The recapture of Attu was the only battle of the war fought on United States soil; it was also the only battle fought in a National Wildlife Refuge.

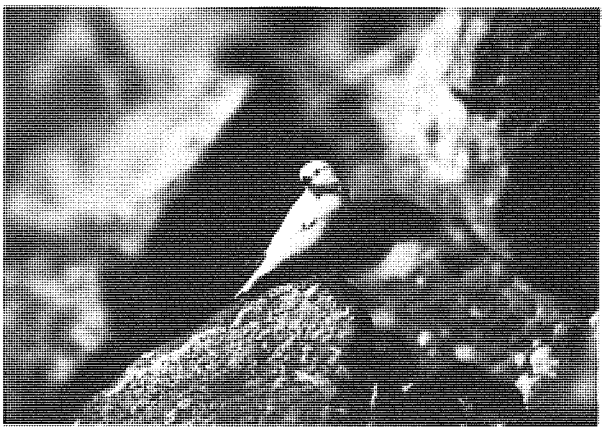
4. Migrant Asiatic Birds - Separating the north Pacific Ocean from the Bering Sea and bridging from North America to Asia, the Aleutian Islands offer refuge to an international variety of birds. Migrants converge from all points of the compass. Over 90 Asian species have been observed in the Aleutians, particularly from Adak to Attu. Several have been reported nowhere else in North America (oriental pratincole, Chinese egret, black-winged stilt, lanceolated warbler, Siberian blue robin, and great spotted woodpecker to name a few) and some, including the whooper swan, bean goose, Asian form of the green-winged teal, common pochard, tufted duck, smew, white-tailed eagle, common greenshank, wood sandpiper, Far Eastern curlew, common sandpiper, long-toed stint, eye-browed thrush, olive tree-pipit and rustic bunting, occur annually or nearly so.

5. Aleutian Islands - Biosphere Reserve - The Aleutian Islands are designated a Biosphere Reserve by the International Union for Conservation of Nature and Natural Resources, Morges, Switzerland. The primary objective is to conserve for present and future use the diversity and integrity of biotic communities of plants and animals within natural ecosystems and to safeguard the genetic diversity of species on which their continuing evolution depends. Examples of the Chain's uniqueness are: 1) Buldir Island (4,915 acres) provides nesting habitat for 21 species of seabirds, totaling over two million individuals. It is also the nesting stronghold of the endangered Aleutian Canada goose. 2) Kiska Island contains the worlds largest nesting population of least auklets, 1.3 million birds. 3) The Rat and Andreanof island groups are one of the few areas where sea otters survived commercial exploitation. Sea otters have expanded into other areas of their historic range along the Aleutian Chain from these island groups. The Aleutian population is estimated to be 55,100 - 73,700 sea otters. 4) There are more salmon spawning streams, 360, in the Aleutians than on any other refuge in the United States. 5) Bogoslof Island (160 acres) contains one of two breeding groups of northern fur seals and one of five nesting colonies of red-legged kittiwakes in the United States. 6) Chagulak Island (2,082 acres) provides habitat for the world's largest nesting population of over 500,000 northern fulmars.

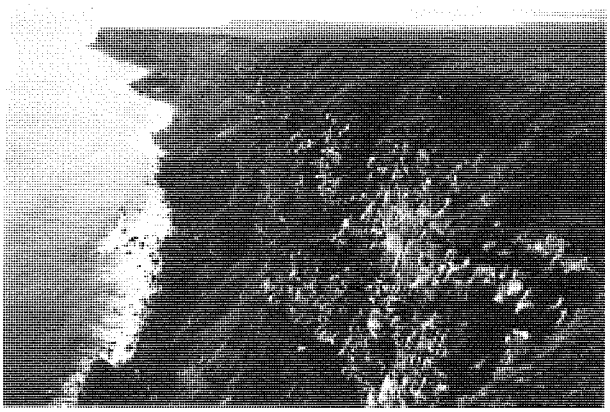
6. Eastern Aleutians - Unimak Pass - The area of Unimak Pass, the Krenitzin Islands, and the Fox Islands is of great importance to marine birds and mammals during breeding, migration, and winter. At least 1.8 million breeding seabirds nest in the eastern Aleutian Islands between Samalga Pass and Unimak Pass. Breeding tufted puffins number over one million, 40 percent of all known breeding tufted puffins in Alaska. Six of the eight largest tufted puffin colonies known in Alaska, each over 100,000 birds, are found in this region. The Fox Islands have, in addition, at least 46 islands with three and sometimes five nocturnal species nesting: fork-tailed storm-petrel, Leach's storm-petrel, ancient murrelet, Cassin's auklet, and whiskered auklet. At least 621,000 birds of these five nocturnal species nest here, with the storm-petrels comprising 91 percent of this total. As much as 50 percent of the world population of whiskered auklets may breed and winter here. Numerous seabirds and waterfowl are known to use the eastern Aleutians during winter, including large concentrations of auklets and species of concern like emperor geese.

Unimak Pass itself is a major migration route for birds, marine mammals, and fish moving between the Bering Sea and the northern Pacific Ocean during all seasons. During April and May up to 25,000 shearwaters have been seen to pass Cape Sarichef each hour on numerous occasions, with sizeable proportions of the 24 million shearwaters in Alaskan waters passing nearby at one time or another. Many of the millions of seabirds breeding in the Bering and Chukchi Seas pass through this area as ice covers the eastern Bering Sea. About 16,000 gray whales (most of the world's population) make the passage through here each spring and fall. Northern fur seals use the Unimak Pass region as a major route to and from their rookeries in the Pribilof Islands and their wintering areas in the northeastern Pacific Ocean. All five species of salmon, halibut, and other fish species also migrate through the pass. All of the Aleutians have high wildlife values, but the unique concentrations found in the eastern Aleutians makes them special.

7. St. Matthew Island (Includes Hall and Pinnacle islands) - These uninhabited wilderness islands lie together in the Bering Sea 120 miles from the nearest land. Geographically they are the most isolated part of Alaska and the furthest from human habitation. They are beautiful, mostly volcanic islands with sheer cliffs and waterfalls dropping into the sea. Petrified wood, agates, and geodes can be found on some parts of St. Matthew Island.



Nearly all of the world population of Mckay's Bunting nests on St. Matthew and Hall islands in the central Bering Sea.



One of the largest concentrations of breeding seabirds in the Bering Sea occurs in the Pribilof Islands. St. Paul Island is home to more than 25,000 murres, and Alaska's largest murre colony is located on St. George Island.

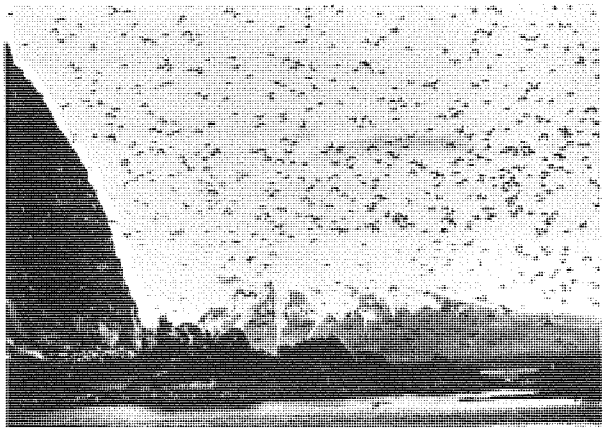
Wildlife abounds in summer. These islands comprise one of the largest seabird concentrations in the North Pacific. Walrus, northern sea lions, and seals haul out at several places. Gray whales frequent the shoreline, arctic fox den on the island, and a variety of shore and terrestrial birds are also present. Nearly the entire world's population of McKay's Bunting nests here. In winter, the endangered bowhead whale frequents the adjacent waters and polar bears come down to the islands on the icepack.

8. Pribilof Islands - The Pribilof Islands comprise the most famous seabird colony and marine mammal rookery in all of the North Pacific Ocean. Over two and one half million seabirds of twelve different species nest here. This includes 90 percent of the world's red-legged kittiwake population (there are only three other colony locations in the world, two in the Aleutian Islands and one in the Soviet Union) as well as Alaska's largest murre colony. The world's largest rookery for the northern fur seal is found here and has declined recently to 800,000 animals from a past population of 1.5 million. Sometimes referred to as the "Galapagos Islands of the North

Pacific," the Pribilof Islands are one of three sites on the refuge that have well established tourist businesses associated with them. Tourists come to see seabirds, fur seals, and the Asiatic migrant bird species which frequent these islands.

9. Sandman Reefs - The largest number of nesting seabirds off the southern Alaska Peninsula after the Semidi Islands is found in over 100 small islands and rocks comprising the Sandman Reefs. With the exception of a few islands, this area remained free of fox introductions and therefore has huge numbers of fossorial seabirds (burrow nesting birds), primarily nocturnal nesting species. Fossorial seabirds are a main target for fox predation and because there are relatively few islands in the Alaska Maritime Refuge where fox were not introduced, there are few islands with large numbers of fossorial seabirds. Perhaps up to 60 percent of the state's Cassin's auklets breed on many of the tiny islands in this area. Enormous numbers of storm-petrels, especially Leach's, also nest here. A small population of rhinoceros auklets on Patton Island is the westernmost colony in North America for this nocturnal seabird. Besides hundreds of thousands of nocturnal nesters, nearly 200,000 puffins use these islands, and probably the largest double-crested cormorant colony in Alaska also occurs in the Sandmans. Because of the widespread shoals and reefs, thousands of sea otters inhabit this area. The Sandmans and nearby Sanak Islands are also important wintering areas for emperor geese, brant, and sea ducks. Five of the Sandmans have been Native selected.

10. Shumagin Islands - Including nocturnals, over a million seabirds breed in the Shumagins, the most extensive group of islands south of the Alaska Peninsula. Nearly 400,000 seabirds, including the largest horned and tufted puffin, Cassin's auklet, ancient murrelet, and storm petrel colonies in the Shumagins, are found on Castle Rock. Over 200,000 murres breed on Karpa Island, which is the second largest murre colony south of the Alaska Peninsula. Large numbers of ancient murrelets also nest on Karpa which, like Castle Rock, apparently never witnessed introductions of fox. Prior to 1916 when red fox were released on the island, Big Koniuji Island



Over 200,000 murres nest on 600 acre Karpa Island. It is one of the two most vital seabird islands in the Shumagins.

reportedly had more nesting crested auklets than the Pribilofs, where at least 250,000 presently occur. This colony, the easternmost nesting site for the crested auklet in North America, is now markedly reduced in size. Big Koniuji also contains what was the biggest horned puffin colony in the Shumagins before the recent declines. This spectacular island, a blend of towering granite cliffs dotted with nesting cormorants and kittiwakes has a variety of deep bays, lagoons, and gleaming white sand beaches utilized by seals, river otters, sea otters, and waterfowl. More nesting mew gulls are found in the Shumagins that anywhere else in the Alaska Maritime Refuge, and more humpback and fin whales may occur in the outer Shumagins than elsewhere in Alaska. All of the Shumagin Islands, except Karpa Island, have been Native selected and one of these islands (Simeonof) is designated wilderness.

11. Barren Islands - The seven named islands comprising this group possess the largest aggregation of nesting seabirds in the northern Gulf of Alaska. At least 500,000 seabirds representing 18 species breed on these precipitous islands. Fork-tailed storm-petrels swirl about most of the islands after dark and are the most abundant species. Tufted puffins are the most common diurnal nesting bird. Over half the area's birds use East Amatuli Island, which also has one of the only two northern fulmar colonies in the northern Gulf of Alaska.

East Amatuli Island, one of the three largest of the Barren Islands, is seasonal home to more than a quarter million birds.

Tens of thousands of murres and kittiwakes nest on East Amatuli and Nord islands, and the second largest sea lion rookery in the region is situated on Sugarloaf. Brant and other waterfowl stop on Ushagat, which has considerable marsh habitat as well as stands of spruce used by crossbills and other forest birds. Some of the most splendid and diverse scenery in the refuge is present on this island, which also offers outstanding and relatively accessible recreational opportunities. Three of the Barren Islands have been Native selected.

12. Semidi Islands - These nine named rugged islands were recognized for their importance to marine birds and mammals early on and were designated as a refuge in 1932. With an estimated 2.4 million nesting seabirds representing 20 species, about one-quarter of the resident seabirds in the Gulf of Alaska breed on the Semidi Islands. In terms of biomass, the proportion is closer to one-third. The most abundant birds are common and thick-billed murres, with a combined population exceeding one million birds. Hundreds of thousands of horned puffins breed in burrows on two islands. The 250,000 horned puffins nesting on tiny Suklik Island probably constitutes the world's largest colony for this species. Other species with populations numbering more than 100,000 individuals include the northern fulmar, fork-tailed and Leach's storm-petrels, black-legged kittiwake, and tufted puffin. Both species of storm-petrels commonly nest in side chambers of puffin burrows. Parasitic jaegers nest in a loose colony on Chowiet Island. This behavior has not been reported elsewhere in the Gulf of Alaska. Red-faced and pelagic cormorants commonly change breeding colony location from year to year. The Semidi Islands are the easternmost breeding site for least auklets. A small population of endangered Aleutian Canada geese also breeds on one of the islands. This part of the refuge is unusual in that the surrounding submerged lands are also part of the refuge. All of the Semidi Islands have been Native selected and all of these islands are designated wilderness.

13. The Chiswell Islands - Roughly 60 percent of all nesting seabirds along the south side of the Kenai Peninsula use these small, rugged islands southwest of Seward. Fork-tailed storm-petrels abound on most of the dozen, generally forested, islands composing the Chiswells. Thousands of tufted puffins swarm about Beehive and some of the other grassy sea stacks. Matushka Island is the most diverse of the Chiswells in terms of numbers of nesting species, including a sizable rhinoceros auklet colony. Murres, kittiwakes, and cormorants also nest among the cliffs and spires of this and other islands. Chiswell Island has a sea lion rookery. The Chiswells are one of the few places in the refuge where diverse and abundant marine birds and mammals can easily and affordably be seen. These islands are the most heavily visited, 24,000 people each summer, of any refuge colonies. Tour boats come from Seward, 35 miles away, to view the Chiswells and adjacent Kenai Fjords National Park.

14. St. Lazaria and Forrester Islands - Over 500,000 seabirds nest on 65 acre St. Lazaria Island, making it one of the most productive colonies in the state. Storm-petrels are the most numerous of the dozen nesting species. Leach's storm-petrels outnumber fork-tailed storm-petrels in most years. Rhinoceros auklets and ancient murrelets also burrow beneath the vegetation to nest. Thousands of tufted puffins as well as a few horned puffins use the island. Pelagic and Brandt's cormorants nest on the island on some years, this being one of the most northern sites for the latter species. Common and thick-billed murres nest on the cliffs, a southeastern range

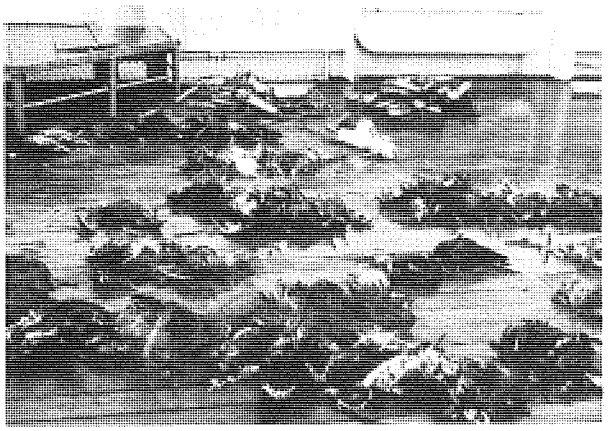
extension for the latter species. St. Lazaria is one of only two large seabird concentrations in southeast Alaska and is one of the few outstanding seabird islands readily accessible to visitors. Charter boats from Sitka and occasionally cruise ships visit St. Lazaria.

Over a million seabirds of 13 species breed on Forrester Island and nearby islets making it the largest seabird colony in all of southeast Alaska as well as being the largest east of the Semidi Islands. Five of Alaska's six nocturnal nesting seabirds nest here, and the estimated 108,000 rhinoceros auklets represent the largest concentration of this species in the state and one of the two largest in North America. An incredible 780,000 storm-petrels nest on tiny Petrel Island, located just off the south end of Forrester Island. This equates to 3.5 pairs of storm-petrels per square meter. One of the only populations of northern fulmars in the eastern Gulf of Alaska also occurs on these rugged forested islands. Over 2,000 northern sea lions also haul out at Forrester Island.

POTENTIAL PROBLEMS AFFECTING FISH, WILDLIFE, AND HABITATS

Section 304(g)(2)(E) of Alaska National Interest Lands Conservation Act requires the Service to identify problems that may adversely affect fish, wildlife, and habitats, on the refuge. Significant problems identified thus far are:

1. Depletion of Forage Fish by Commercial Fisheries - Modern commercial fisheries can be so effective with modern technology utilizing sonar and other gear that fish stocks can be depleted. The smaller fish such as herring, capelin, and sand lance as well as younger age classes of larger fish serve as food for seabirds, marine mammals, and larger fish. If over-fishing occurs, seabirds, marine mammals, and larger commercially attractive fish such as salmon are likely to decline in numbers. Alaska so far is one of the few places in the world where commercial fisheries have not targeted all forage fish species. One exception in Alaska is the heavily fished pollock stocks in the eastern Bering Sea. The younger age classes of pollock support the marine bird and mammal populations in that area. Recent declines in productivity and populations of both marine birds, such as the red-legged kittiwake, and marine mammals, such as fur seals and sea lions, in the eastern Bering Sea and the eastern Aleutian Islands have raised concern about this issue. The Service lacks crucial data needed to advise fishery management agencies on seabird food requirements.



Seabirds and marine mammals can be caught and drowned in commercial fishing nets, particularly lost nets of "ghost nets." Some of these nets are over nine miles long.

2. Net Mortality - Seabirds and marine mammals are often caught and drowned in nets. The high seas fisheries such as those for salmon and squid are thought to take the largest numbers. Lost nets (called ghost nets) are especially deadly since they never stop fishing and inevitably kill birds, marine mammals, and fish over long periods of time. Studies on the Japanese high seas salmon gill net fisheries have shown that shearwaters and alcids (puffins, murres, guillemots, and auklets) are the predominant birds caught. An average of 160,000 birds were estimated to die in these gill nets each year. The Driftnet Impact Monitoring, Assessment, and Control Act of 1987 (P.L. 100-220, Title IV) requires observations and reports on seabird mortality by the Department of Commerce, in cooperation with the Service. The act contains no restrictions on fishing. Nets may not intentionally be discarded under the terms of the Plastic Pollution Research and Control Act of 1987 (P.L. 100-220, Title II).

Introduced Predators - The introduction of mammals to oceanic islands often brought disaster to colonies of nesting birds. Alien predation has been more significant worldwide in the reduction or extinction of more populations in historic times than any other factor. Alaska is no exception, for beginning in the late 1700's the Russians released fox on some of the Aleutian Islands. Fur farming greatly escalated in the late 1800's and early 1900's, and by 1929 there were 600 fox farms in Alaska, most of which were on islands. Practically every Alaskan island in the North Pacific from Attu, at the western end of the Aleutians, to the Alexander Archipelago witnessed introductions of fox. Consequently only relict populations of surface and burrow-nesting species of seabirds presently persist in many areas. Fox farmers also filled barrels with ground squirrels and voles and released them on islands where there were no rodents as an additional food supply for fox. Norway rats also were inadvertently introduced to some islands, especially during World War II. Although fox naturally disappeared from many islands or were exterminated on some, rodents remained to directly prey on seabirds eggs and chicks as well as to destroy habitat. Populations of small nocturnal burrow nesting seabirds, such as storm-petrels, Cassin's auklets, and ancient murrelets, apparently suffered the most from the combinations of introduced fox and rodents. Many once large colonies vanished entirely, and diurnal burrow nesting seabirds like puffins also were drastically reduced in numbers along with terns and gulls. Murres, kittiwakes, and other cliff nesters have been little affected by alien mammals. Besides seabirds, introduced mammals have in many cases profoundly affected insular distribution, abundance, and species composition of nesting waterfowl, shorebirds, ptarmigan, and even passerines. The Aleutian Canada goose survived on only three small islands, ptarmigan were extirpated from at least two islands, and winter wrens and song sparrows are absent or scarce on others.

Alien fox remain on over 40 refuge islands, located in the Aleutians and off the Alaska Peninsula, and their removal would provide the most tangible benefits possible for the restoration of bird populations and species diversity. The feasibility of eradicating introduced voles and ground squirrels is being investigated.

Foxes introduced to many islands by fur farmers decimated bird populations. The recovery program for the endangered Aleutian Canada goose calls for fox removal on certain islands and reintroductions of geese to newly fox-free islands.

Though few cases have been quantified, dramatic recoveries of bird populations have occurred in Alaska and elsewhere following removal of introduced predators. Bird recolonization of numerous islands over a wide geographic area will make species less vulnerable to an overall drastic decline.

4. Marine Mammal Management - The management of marine mammals poses special problems for the refuge because of: 1) the delegation of management authority between the Service and the National Marine Fisheries Service; the Service manages polar bear, walrus, and sea otter, the National Marine Fisheries Service manages whales and seals; and 2) the fact that the three species the Service manages generally use offshore habitats, outside the refuge. Federal management under the Marine Mammal Protection Act (Act) of 1972, which imposed a moratorium on the taking of marine mammals, is restricted to species monitoring. The Act does provide for the state of Alaska to request return of management of marine mammals and to develop approved management programs, which may include harvesting. Since it is not known if or when management might be returned

Sea lion numbers have declined about 50 percent at several areas in the refuge. The cause of the decline is uncertain, but may be related to commercial fisheries.

to the state, this document was prepared assuming continuation of existing federal management.

At present, more than 90 percent of the world's sea otters (estimated at 112,000 - 164,000) live in coastal Alaska waters (100,000 - 150,000 animals) surrounding the Alaska Maritime Refuge. Present and foreseeable conservation issues regarding sea otters in Alaska involve: 1) increasing conflicts with commercial, subsistence, and recreational shellfisheries; 2) incidental take in gillnet and other fisheries; 3) hunting by Alaska Natives; 4) coastal and offshore development; 5) increasing interest in commercial harvest of sea otters; 6) the growing importance of sea otters to the Alaska tourist industry; and 7) the live capture and removal of sea otters for public display and scientific research.

The Act contains an exemption to the moratorium on taking for the nonwasteful taking of nondepleted marine mammals by Alaska Natives for certain purposes. The Service has no authority to set quotas, seasons, or other restrictions on the take of marine mammals by Alaska Natives unless the species or stock is determined to be depleted. The Service intends to implement mandatory marking, tagging, and reporting regulations in 1988, in order to monitor the Native harvest of polar bear, walrus, and sea otter.

5. Grazing and Trespass Problems -

Although cattle were removed from the three most overgrazed islands which will remain in the refuge, overuse continues on Long, Wanda, and Rabbit islands as well as on three small unnamed islands adjoining Sanak Island. All of these islands are designated wilderness. Cattle wander onto refuge islands at low tide from Native selected Sanak, Clifford, and Finneys islands in the Sanak group. Short of fencing the entire perimeter of these refuge islands at exorbitant cost, there is no way to keep trespassing cattle off of them, and damage to vegetation will continue. Since both cattle and fox from Sanak freely traverse Long, Rabbit, Wanda, and three unnamed refuge islands, they are of little or no value to birds and thus should be offered for trade. In addition, permitted cattle grazing occurs on refuge land on Wosnesenski, Umnak, Unalaska, and Akun islands. The Service could also consider trading these lands.

Reindeer grazing occurs on Atka and Umnak islands in the Aleutian Islands Unit, and on Hagemeister, St. Paul, and St. George islands in the Bering Sea Unit. The small herds on Umnak, St. Paul, and St. George islands are not causing any refuge resource problems presently. Except on Hagemeister Island, which is entirely in Service ownership, these animals graze both on refuge lands and on neighboring private lands. The Atka reindeer are "feral," not having been reduced to ownership through marking or branding. The Service needs to conduct a range survey on Atka Island in cooperation with the Axtam Corporation and the Soil Conservation Service. Such a survey was conducted on

Hagemeister Island in 1987; results show that the reindeer herd needs to be reduced to stop a downward trend in range condition.

6. Lack of Detailed Resource Data - Improved knowledge of fish and wildlife populations, habitats, and human use would assist in managing Alaska Maritime Refuge. Data are most needed to recognize management and wildlife population problems. The refuge is widespread and most areas are wild, rugged, and swept by storms. The refuge staff has never visited some areas, and most areas are visited only once every five to ten years. 1) Basic population trends need to be determined for most seabirds. At present, murres and kittiwakes are the only species with possibly adequate data. Two seabird species with very small populations and restricted ranges need special attention: the red-legged kittiwake is reasonably well monitored but is declining for unknown reasons, and little is known about the whiskered auklet, a species that may be critically vulnerable to oil spills. 2) Studies on effects of aircraft traffic, other disturbances, and increased oil development on seabirds and marine mammals are needed so such activities can be reasonably regulated. 3) Wildlife use of refuge areas during spring, fall, and winter needs to be determined. Most data to date has been collected during the short but critical summer season. 4) The effects of introduced voles, rats, ground squirrels, and rabbits on native wildlife species need to be determined. 5) Interelationships between marine birds and mammals, commercial fisheries and ocean prey species need to be studied.

7. Subsistence Monitoring - The opportunity for continued subsistence uses by local residents, consistent with conservation of fish and wildlife populations and international treaty obligations, is a purpose of the refuge. Section 806 of the Alaska Lands Act also requires that the Service monitor the status of fish and wildlife populations harvested by subsistence and other users. This monitoring is intended to identify problems before species become depleted and to ensure that preference is given to subsistence users as required by law.

With very limited exceptions, the Migratory Bird Treaty Act (Treaty Act) prohibits the hunting of migratory birds, even for subsistence, between March 10 and September 1. Under the Treaty Act, 1) Indians may take scoters at any time for food, 2) Eskimos and Indians may take auks, auklets, guillemots, murres, puffins, and their eggs at any time for food and clothing, and 3) any person in Alaska may take snowy owls and cormorants at any time for food and clothing.

Largely because of the illegal nature of most subsistence hunting of migratory birds, subsistence harvest of migratory birds has been poorly documented in most areas of Alaska. There are several problems associated with this lack of knowledge about harvest levels. The Service has little data on how many birds are taken annually or how the harvest may affect the populations of target species. Gulls, kittiwakes, and fulmars are not legal to take but apparently are taken at many sites. The red-legged kittiwake is a favorite food on the Pribilof Islands, but the population appears to be declining and could warrant special attention if the decline continues.

The Service also intends to monitor Native use of marine mammals for subsistence and handicraft uses, as allowed under the Marine Mammal Protection Act. The Service intends to implement mandatory marking, tagging, and reporting regulations in 1988.

PUBLIC INVOLVEMENT

Section 304(g)(4) of the Alaska Lands Act requires the Service to consult with state agencies, Native corporations, and the general public concerning the management of the Alaska Maritime Refuge. This assures that all interested parties, in particular residents of the area affected by refuge administration, have an opportunity to present their views.

Scoping

Public involvement for the Alaska Maritime Refuge began with the publication of a notice in the Federal Register on Tuesday, November 5, 1985. The "scoping" period was advertised as lasting through April 15, 1986.

On October 29 and 30, 1985, the refuge manager and the planning team attended the Coastal District Conference held by the state's Division of Governmental Coordination in Anchorage. The

Service participated in the work sessions, made a short presentation on Alaska Maritime Refuge planning, and maintained a display and an information table.

In November 1985 memos were sent to Fish and Wildlife Service employees asking them to participate in an in-house scoping effort for the refuge. At the same time, 100 in-house scoping documents were delivered to the state Conservation Systems Unit Coordinator who distributed them according to her mailing list for conservation system units and coastal zone management. Comments for each in-house effort were grouped and compiled in January 1986.

On December 16, 1985, legal advertisements announcing the scoping effort were sent to local papers for publication. On December 20, 1985, letters were mailed to community leaders in over 90 communities potentially affected by refuge management. The letter told of the scoping period, included a toll-free telephone number, two maps, and a response form to request inclusion on the project mailing list. The toll-free telephone number was installed in the Anchorage Regional Office to take comments and answer questions from the Alaskan public.

In January 1986 letters were mailed to school administrators of communities within or adjacent to the refuge. They were advised of the scoping period, sent maps, and a mailing list request form. Eight to ten posters with self-addressed, self-stamped response postcards attached to some of the posters were sent to each of 93 communities.

A special issue of the planning newsletter, the Plan-it was distributed in January 1986. Twelve thousand copies were printed and distributed to the refuge mailing list, schools, libraries and regional education centers, through the state Conservation Systems Unit Coordinator, and bulk mailed to over 80 communities.

A full page advertisement about scoping was published in the February issue of Horizons Magazine. Also in February, public service announcements were sent to radio and television stations and the refuge manager met with the Juneau Audubon Society about the refuge and planning. The Juneau Audubon Society has adopted the Alaska Maritime Refuge. Additional materials were also delivered to the Juneau League of Women Voters.

In March 1986 notice of scoping was published in Audubon newsletters throughout the state. Postcards reminding people that the response period was ending were sent out during the first week of March to everyone who received a letter or was on the mailing list. In April, the Plan-it was sent to all private nonprofit fish hatcheries throughout the state.

The responses from the above activities were compiled and discussed in an Issues Compendium, made available to the public in June 1986 and summarized in a newsletter published in September 1986.

Alternative Development

In October 1986 another newsletter explained and summarized the preliminary management alternatives for the Alaska Maritime refuge. An enclosed comment sheet enabled the public to respond to the alternatives presented in the newsletter and comment on any specific areas they were interested in.

Forty public meetings were held in 37 communities, mostly between January and March 1987, to explain preliminary alternatives and encourage informal public response. At this point in the planning process, fairly specific proposals could be discussed, but were not yet formalized into a massive report. The staff made many office visits to talk with village, regional and nonprofit corporation representatives as well as representatives of IRA councils, special interest associations, and government commissions or agencies. Environmental education programs about the refuge were offered in local schools whenever possible.

A half hour video tape introducing the Alaska Maritime Refuge was made available to the public on a loan basis in February 1987. This video gives a tour of the refuge and describes current management. It was used during the public meetings and was sent to several communities where meetings could not be held.

All comments received at the meetings or in writing were compiled into a reference document.

Public Review of the Draft Plan

The draft plan was made available for public review and comment on February 19, 1988. The 90 day comment period closed on May 20, 1988. The Service received 48 letters from federal and state agencies, organizations, and individuals. These are reproduced along with the Service's responses to selected comments in Appendix I. A total of 145 people participated in 20 public meetings and one teleconference. A complete listing of public meetings and informal office visits on the draft plan can be found in the Consultation and Coordination chapter. Comments received on the draft plan are summarized below.

Of the written comments which supported an alternative, 18 supported Alternative B and three supported Alternative C. Of the comments from individual Alaskans, all supported Alternative B if any alternative was mentioned, many favored proposing Native selected lands for wilderness designation if otherwise qualified, and many felt the head of Womens Bay should be protected. Most of these letters were from Kodiak. Three individuals were opposed to mariculture on the refuge and one supported it.

Six conservation organizations submitted letters supporting selection of Alternative B, consideration of Native selected lands for wilderness, and land acquisition and trades. Several Native corporations and the Kodiak Island Borough expressed support for mariculture, a desire for more intensive management areas particularly in the marine areas, numerous questions concerning land status, concern for access to private land, and concern for maintenance of economic opportunities. Koncor Forest Products Co. requested more intensive management in the waters around Afognak, and Exxon Co. requested intensive management along possible pipeline routes on Akun and Unalaska. The state of Alaska favored mariculture around Afognak, Unalaska, and potentially other sites, opposed wilderness designation of the geothermal areas on Atka, and disputed Service ownership of tidelands, waters, and submerged lands. These letters can be reviewed in Appendix I.

The 16 people attending the Atka meeting were primarily concerned with management of 22G lands on Atka. They did not want the Service to interfere with their ability to develop their land. Many expressed interest in acquiring the Korovin geothermal sites from the Service and were concerned that the wilderness designation proposed in Alternatives B and C would hinder a land trade. Most favored Alternative A for Atka Island.

The Adak meeting was the largest with 26 attendees. Most comments supported the amount of wilderness proposed in Alternative B. Many expressed concerns about mariculture including disapproval of commercial use of a refuge, concern that the otter population might suffer, and concern that exotic diseases or species may be introduced. A few supported mariculture. Some were opposed to removing World War II remains because of their historic value.

The 14 people attending the Unalaska meeting wanted to see the Service become more involved on Unalaska including coordination with their coastal planning effort and development of interpretive facilities particularly at the airport. They were opposed to the current location of the Aleutian Unit headquarters on Adak. They were concerned that the wilderness proposal for Atka might affect a land trade for the geothermal sites. One suggested a partial wilderness alternative for the Korovin volcano parcel on Atka. One expressed support and no one expressed opposition to wilderness designation for the small islands surrounding Unalaska. Some favored moderate management along the shoreline of Unalaska to allow for shore-based facilities in support of mariculture.

Seven people total attended the meetings in Homer, Seward, and Soldotna. Reservations were expressed about mariculture including concern that the Service was moving too quickly on too large a scale, concern that otter pupping would be affected if areas were not identified and closed to mariculture, concern that wintering birds would be affected, and concern that funding would not be adequate for monitoring. One felt the Service should acquire Gull Island.

Participant in the Chignik Bay teleconference were most concerned about how the wilderness proposal for Seal Cape would affect hunting, subsistence, and fish processors in the bay. The Golovin meeting focused on land status questions for Cape Darby. Nome participants

were concerned about subsistence use of Safety Sound, marine mammals management, and marine research.

The six people at the Juneau meeting were concerned that mariculture would affect marine mammals. They supported wilderness for all areas that qualify, more research, continued fox eradication, and cleanup of World War II toxics. The seven people at Sitka were primarily concerned about whether or not the birds were being affected by sightseeing on and in the waters surrounding St. Lazaria Island. Most felt the current access situation does not harm the birds. Several supported the largest amount of wilderness possible.

The 20 people attending the Kodiak meeting were concerned about the impact of management of the refuge marine areas on the local economy particularly the fishing industry. Concern was expressed as to how the Service would interpret section 304(d) of the Alaska Lands Act in light of expected increased fishing at Afognak and Karluk. Several people expressed a desire for local involvement in step down plans and compatibility determinations. Several felt Womens Bay shouldn't be in the refuge. Several supported mariculture.

The nine people attending the meeting in St. George were concerned that the Service not hinder development of an airport. Several wanted to see roads to the bird cliffs. Much discussion concerned changes and causes for changes in the bird populations. The 10 people at the St. Paul meeting were concerned with oil spills and determining responsibility for them. Several favored wilderness for Otter and Walrus islands, and some questioned what that would mean. Some favored road access to Tolstoy Point.

Ten people attended the hearing in Anchorage. One felt refuges were a "lock-up," and another supported more wilderness. One wanted Native values considered. One supported keeping the geothermal area on Atka out of wilderness, and cleaning up only the toxins on World War II sites leaving the other remains for their historic value.

These public meetings were recorded. Both verbal and written comments were used in reviewing the draft plan. Public comments are not treated as "votes" and the Service does not necessarily select the alternative with the most support. However, public comment is one of the two major criteria used in selecting a preferred alternative. The purposes of the refuge and other provisions of the Alaska Lands Act make up the other major criterion (see the evaluation of the alternatives chapter for a more complete discussion).

Future Public Involvement

The public will have an additional opportunity to review the final Alaska Maritime Refuge plan during a 45 day comment period following publication. Then the Service will issue a record of decision and begin implementing the preferred alternative. Any changes to the preferred alternative resulting from comments during the protest period will be described in the record of decision. Additional opportunities for public review and comment will be provided as the plan is updated and as step-down management plans are prepared.

The Issues

Significant planning and wilderness issues to be considered in the plan were identified during scoping based on the concerns expressed by the public and management. Table 1 summarizes these issues and concerns. While this table does not include all the issues and concerns identified, it focuses attention on those the Service considers to be the most important. These issues and concerns were analyzed in more detail to determine which issues are significant planning and wilderness issues for the Alaska Maritime plan.

Fish and wildlife populations and habitat - General statements of concern and beliefs about what people think the refuge should be doing for wildlife, such as "protect wildlife and habitats" and "wildlife resource studies are needed" were received. Regardless of geographic location, all comments tended to be more globally ecological in concern than site specific. There was a definite tone of wanting the Service to look beyond refuge boundaries for both problems and solutions. Comments regarding logging were all pro-logging but only if logging benefited wildlife, not just provided jobs. All written comments regarding introduced species

Table 1. Major issues and concerns identified for the Alaska Maritime Refuge.

Fish and Wildlife Populations and Habitats
- o maintenance of populations and habitats
- o control of introduced species
- o grazing
- o research
- o law enforcement
- o visitor disturbance to key seabird colonies
- o seabird/prey relationships

Military Presence
- o military facilities
- o military exercises

Commercial Activities
- o logging
- o oil and gas
- o commercial fishing
- o mariculture
- o commercial development in Womens Bay
- o mineral development and mining

Access and Transportation
- o continued use of traditional methods of access
- o development of transportation and utility corridors

Interpretation and Environmental Education
- o continued need for information and education programs on the refuge

Wilderness
- o designation of additional wilderness on the refuge
- o impacts on wilderness values

Cabins
- o opportunities for cabin construction

Cultural Resources
- o native cultural sites
- o World War II sites

Subsistence
- o continued use of the refuge for hunting, fishing, gathering of vegetative materials, and other subsistence related activities.

Public Use
- o recreation
- o hunting, trapping and fishing

Pollution
- o water quality and quantity
- o control of toxic spills
- o ocean trash

and grazing favored continuing programs to eliminate cattle, foxes, ground squirrels and voles; however they differed in the methods they desired to see used. During the public meetings in Alaska Peninsula communities, several people questioned the need to eliminate introduced species.

No comments were received against expanding research on the refuge and all comments regarding threatened and endangered species were strongly for "protecting against extinction." Three different comments received from tribal council presidents in the Kodiak area wanted the Service to cooperate with Native authorities regarding law enforcement in critical subsistence areas. Comments concerning marine mammals were varied. Some were concerned about the primary producers in the marine environment which maintain the marine birds, mammals and fish, others believed that increasing sea otter populations should be controlled, and others spoke to the need to protect sea otters and seals. Comments from urban Alaskans expressed concern about the impacts of commercial fisheries activities on seabird populations. Other comments related to the effect of aircraft and helicopter overflights on egg loss of murres early in their incubation period.

Comprehensive Conservation Plan

- o What impact would the plan have on the amount of habitat and population levels of fish and wildlife on the refuge?

This is a significant issue. The purposes for establishing the Alaska Maritime Refuge are set forth in section 303(1)(B) of the Alaska Lands Act and include:

> (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to marine mammals, marine birds and other migratory birds, the marine resources upon which they rely, bears caribou and other mammals:

The alternatives addressed in the plan are different ways of carrying out this purpose. The effects of the alternatives on fish and wildlife populations and habitats are analyzed in the environmental consequences chapter. Management of endangered species such as the Aleutian Canada goose is discussed in the common management directions.

- o What impact would the plan have on the control of introduced species?

  This is not a significant planning issue. Control of introduced species is a feature of all alternatives, subject only to alternative funding levels. Mammals are not native to most islands in Alaska Maritime Refuge. Fox farmers introduced foxes, voles and ground squirrels on many of the islands. Wildlife native to these islands is extremely vulnerable to predation by these species. Dramatic population declines occurred in many bird populations and the Aleutian Canada goose was threatened with extinction. Eradication of introduced predators is a key element of the Aleutian Canada goose recovery program; it also benefits other indigenous species. Refuge purposes require maintenance of fish and wildlife populations and habitats in their natural diversity.

- o What would be the impact of the plan on grazing on the refuge?

  This is not a significant planning issue because grazing may be permitted at pre-Alaska Lands Act levels, subject to reasonable regulation; no new or increased levels of grazing would be permitted per Service policy. Cattle and reindeer grazing occurs on several islands under special use permit.

- o What would be the impact of the plan on research on the Alaska Maritime Refuge?

  This is not a significant planning issue. A program of national and international marine research is a purpose of the refuge. Priority research needs are identified in the common management directions and would be implemented as funding permits. The different alternatives recommend different levels of funding and this would affect the amount of research which could be accomplished.

- o What impact would the plan have on law enforcement on the refuge?

  This is not a significant issue for this plan. Enforcement of refuge regulations is independent of the planning process.

- o What would be the impact of the plan on visitor disturbance to key seabird colonies?

  This is not a significant planning issue. Regulations to control visitor use would be developed through a formal rule-making procedure as needed. Environmental education would be used to minimize the need for additional regulations.

- o What impact would the plan have on seabird/prey interactions on the Alaska Maritime Refuge?

  This is not a significant planning issue. Regulations which would affect the availability of prey species are not a part of this plan and would be developed independent of the planning process.

Wilderness Designation

- o What would be the impact of wilderness designation on the amount of habitat and population levels of fish and wildlife on the refuge?

  This is a significant wilderness designation issue for wildlife. The effects of

designation on species are described in the environmental consequences chapter for Alternative B. Alternative B recommends six percent of the refuge for wilderness while Alternatives A and C propose zero and three percent respectively. It is not a significant issue for fish, because there are no offshore waters, no fresh water lakes which support fish, and few streams which support fish on the 301,754 acres which are under consideration for wilderness. No management actions proposed in any of the alternatives would affect fish in the streams which occur on those areas.

- o What impact would wilderness designation have on the control of introduced species?

  This is not a significant wilderness issue. Control of introduced species is a feature of all alternatives, subject only to alternative funding levels. It would not be affected by wilderness designation.

- o What would be the impact of wilderness designation on grazing on the refuge?

  This is not a significant wilderness issue. Grazing is an allowable use in wilderness. Restrictions on grazing are a result of Service policy, not the requirements of the Wilderness Act. New grazing operations will not be permitted on the refuge under any alternative. Only one island under consideration for wilderness, Hagemeister, currently has grazing. Grazing will continue to be permitted on that island at 1979 levels under all alternatives providing that the impacts are compatible with refuge purposes.

- o What would be the impact of wilderness designation on research on the Alaska Maritime Refuge?

  This is not a significant wilderness issue. Research is a purpose of the refuge and is not affected by wilderness designation. Research activities proposed in the alternatives such as counting, behavior studies, and feeding studies could occur in wilderness.

- o What impact would wilderness designation have on law enforcement on the refuge?

  This is not a significant wilderness issue. Wilderness designation does not change the Service policy on law enforcement.

- o What would be the impact of wilderness designation on visitor disturbance to key seabird colonies?

  This is not a significant wilderness issue. Regulations to control visitor use would be developed through a formal rule-making procedure as needed. This would occur in wilderness or nonwilderness areas. Environmental education would be used to minimize the need for additional regulations.

- o What impact would wilderness designation have on seabird/prey interactions on the Alaska Maritime Refuge?

  This is not a significant wilderness issue. Seabirds feed at sea, not on areas proposed for wilderness. Regulations which would affect the availability of prey species are not proposed in any alternative and would occur independent of wilderness designation.

Military presence - There are four military facilities on islands within the Alaska Maritime Refuge. These facilities are located on Adak, Attu, Amchitka, and Shemya. Comments regarding military facilities were against any increase in military use of refuge lands especially when this use involved explosive testing.

Comprehensive Conservation Plan

- o What would be the impact of the plan on military facilities?

  This is not a significant planning issue. The Alaska Lands Act section 1310 provides for operation and maintenance of facilities for national defense purposes and related air and water navigation aids within the refuge.

- o What would be the impact of the plan on military exercises?

This is not a significant planning issue. Existing policies, rules, regulations and agreements between the Service and the military accommodate military exercises in specified parts of the refuge.

Wilderness Designation

o What would be the impact of wilderness designation on military facilities?

This is not a significant wilderness issue. The Alaska Lands Act section 1310, cited above, includes provisions for military facilities, including new facilities, in wilderness.

o What would be the impact of wilderness designation on military exercises?

This is not a significant wilderness issue. Military exercises can not be conducted in designated wilderness. However, military exercises are accommodated in nonwilderness parts of the refuge. Additional needs would be addressed on a case-by-case basis between the Service and the military. Only five islands in the Aleutian Chain west of the more populated Fox Islands have portions being considered for wilderness designation. All of these islands are already partially designated wilderness. These are also the only areas under consideration that are in proximity to existing military facilities. The proposal for Atka island, approximately 70,644 acres, surrounds Native owned lands and is an important subsistence use area. On Amchitka, 49 percent is potentially available for military use, while 22 percent is considered for wilderness designation.

The parcels on the three other islands range in size from about 300-700 acres. No interest has been expressed in the use of any of these areas for military exercises.

Commercial activities - Responses from outside Alaska were opposed to any development. Some comments were "protect against development," and "oppose any development which harms species or habitats." Comments from rural Alaskans showed a spectrum of concern from "we are concerned that our villages be allowed to improve shore facilities for commercial fishing and processing, that we be able to meet new initiatives in aqua- and mariculture" to "want the area preserved as a last frontier and not spoiled like the rest of the country. An entire race of people depend upon this frontier both physically and mentally." Two oil companies urged the Service to "preserve opportunities for leasing, subsurface evaluation and all that's necessary for oil and gas exploration." Some comments from rural Alaskans were opposed to any development at all.

Comprehensive Conservation Plan

o What would be the impact of the plan on logging and log transfer facilities?

This is not a significant planning issue because few areas of the refuge are forested and these areas provide needed habitat diversity. Logging rights on Delphin and Discover islands, in the Afognak area, were conveyed to a private owner by the Alaska Lands Act section 1427(m); management and harvest of these timber resources is required to be in accordance with management plans developed jointly with the Service.

Siting of log transfer facilities on Afognak Island is not a significant issue for the plan because these facilities must be evaluated on a case-by-case basis using either an environmental assessment or environmental impact statement as required by the Alaska Lands Act Title XI.

o What would be the impact of the plan on mineral development and mining?

This is not a significant issue because section 304(c) of the Alaska Lands Act withdrew all public lands in each National Wildlife Refuge in Alaska from location, entry, and patent under the mining laws. This withdrawal, however, is subject to valid existing rights.

o What would be the impact of the plan on oil and gas development?

This is not a significant issue because available information indicates the refuge does not have oil and gas potential (see the

affected environment chapter). No leasing would occur until 1) the oil and gas potential is assessed; 2) a national interest determination is made; and, 3) the compatibility of leasing with refuge purposes is assessed. Final decisions on leasing would not be made until the assessments listed above are completed. This process would not be completed in time to be included in this plan. Areas in moderate and intensive management in this plan might be opened to oil and gas leasing after the above assessments were completed. Minimal management areas would not be opened to leasing unless the plan was rewritten in compliance with the National Environmental Policy Act process, including opportunities for public involvement. The 56 percent of the refuge that is currently designated wilderness is closed to oil and gas leasing. Leasing would not be permitted on any proposed wilderness areas after the President forwards the recommendation to Congress.

Geological and geophysical studies may be allowed in the nonwilderness portion of the refuge where site specific stipulations can be designed to ensure compatibility with refuge purposes and objectives of this plan. Studies involving mechanized equipment are not allowed in wilderness.

- What would be the impact of the plan on commercial fishing?

This is not a significant planning issue. The Alaska Lands Act section 304(d) provides for commercial fishing provided it is not inconsistent with refuge purposes and not a significant expansion beyond 1979 levels. In water managed by the Service, Womens and Middle bays, the half mile wide strip between Wolcott Reef and Sturgeon Lagoon near Karluk, and the area around Afognak Island, commercial fishing would be managed per a memorandum of understanding to be developed with appropriate state agencies. Commercial fishing is not allowed in water areas that are designated wilderness. The water column around Simeonof Island is the only such area in the refuge. The submerged lands around the Semidi Islands are also designated wilderness so some gear types might be restricted there.

- What would be the impact of the plan on shore-based facilities in support of commercial fishing?

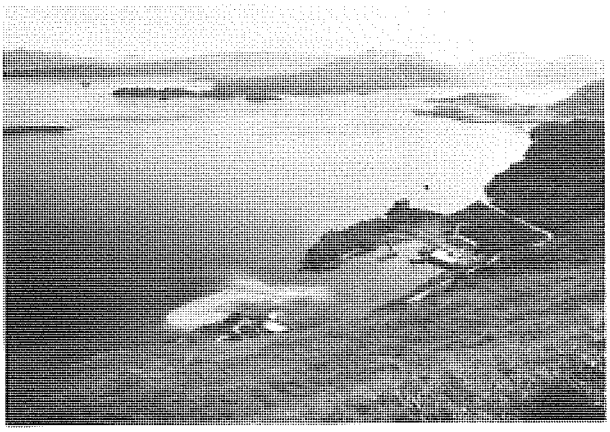
This is not a significant planning issue. Provided the conditions of the Alaska Lands Act section 304(d) are satisfied, facilities in support of fishing could be allowed on a case by case basis subject to Service policy.

- What would be the impact of the plan on commercial development in Womens Bay?

This is a significant planning issue. The Service manages the submerged land, tidelands, and water column in Womens Bay and the north half of Middle Bay; this area was originally withdrawn by executive order for naval purposes. The Coast Guard maintains a facility in the bay. Commercial activities include docks, mooring buoys, and waste water outfalls. A diverse habitat area, it also supports seabirds, herring spawning, commercial fishing, subsistence and recreational use. The effects of the alternative management strategies considered are analyzed in the environmental consequences chapter.

- What would be the impact of the plan on mariculture?

This is a significant planning issue. Most forms of mariculture are not currently legal in Alaska; this situation is expected to change in the near future. Mariculture could be permitted in moderate or intensive management, subject to project review. This issue is of greatest significance in two of the five water areas managed by the Service, the waters around Afognak Island and in Womens and Middle bays near the city of Kodiak. Service managed water near Karluk is too exposed to Shelikof Strait to offer much mariculture potential. The submerged lands around the Semidi Islands and the water column and tidelands around Simeonof Island are designated wilderness so mariculture cannot be permitted.



Womens Bay on Kodiak Island accommodates a wide variety of industrial, military, commercial, recreational, and subsistence use while providing important fish and wildlife habitat. Kodiak Reduction, Inc., a seafood by-products plant at Gibson Cove, is permitted to discharge a maximum of 10,000 gallons of effluent per day.

Shorebased facilities in support of mariculture would only be considered in moderate or intensive management areas.

Wilderness Designation

o What would be the impact of wilderness designation on logging?

This is not a significant wilderness issue because none of the islands under consideration for wilderness have commercial timber resources. Only two islands, which are not already wilderness, have commercial timber resources. Logging rights on Delphin (80 acres) and Discoverer (200 acres) islands, in the Afognak area, were conveyed to a private owner by the Alaska Lands Act section 1427(m); management and harvest of these timber resources is required to be in accordance with management plans developed jointly with the Service.

Log transfer facilities are not a significant issue. No other areas are suitable for log transfer facilities except the waters around Afognak Island which do not qualify as wilderness and are not proposed under any alternative.

o What would be the impact of wilderness designation on mineral development and mining?

This is not a significant wilderness issue because there are no mining claims in areas proposed for wilderness designation. The Alaska Lands Act section 304(c) withdraws refuge lands from location, entry, and patent under the mining laws.

o What would be the impact of wilderness designation on oil and gas exploration and development?

Oil and gas activities are not a significant wilderness issue, because existing data indicates the refuge has a low oil and gas potential. Oil and gas leasing is not allowed in wilderness areas. Surface disturbing exploration activities are not allowed unless conducted by an Interior Department agency in accordance with section 1010 of the Alaska Lands Act. Although the industry has indicated an interest in shore based transshipment facilities, none of the islands or headlands under consideration for wilderness have suitable harbors for oil loading on to large tankers.

o What would be the impact of wilderness designation on commercial fishing?

This is not a significant wilderness issue. Service managed waters in the Kodiak and Afognak areas do not qualify for wilderness designation. The other water areas managed by the Service are already designated wilderness.

o What would be the impact of wilderness designation on shore-based facilities in support of commercial fishing?

This is not a significant issue. Shore-based facilities in support of commercial fishing would not be permitted in designated wilderness. Potentially affected fisheries operate under a limited entry system and additional feasible sites, such as protected shores and harbors, are largely on private lands. It is unlikely that shore-based facilities consistent with the provisions of the Alaska Lands Act section 304(d), described above, would be proposed

for the areas under consideration for wilderness designation.

o What would be the impact of wilderness designation on mariculture?

This is not a significant wilderness issue. As a commercial activity, mariculture is not permitted in designated wilderness. However, the water areas within the refuge where mariculture might be practiced have been judged unsuitable for wilderness designation.

o What would be the impact of wilderness designation on commercial development in Womens Bay?

This is not a significant wilderness issue. Womens Bay has been judged unsuitable for wilderness designation.

Access and transportation - This category included comments about access to or within the refuge for whatever reason. Western coastal U.S. responses were in favor of restricting access to and through the refuge. Comments from rural Alaskans offered information about the methods of access used or places they went on the refuge. There were no statements for or against machines or methods of access, but it was inferred from information given that continued access using traditional means is desired. Urban Alaskan comments were split into three groups; against increased access, for access with or without restrictions, and comments on current existing access.

Comprehensive Conservation Plan

o What would be the impact of the plan on the continued use of traditional methods of access?

This is not a significant planning issue because under section 1109 of the Alaska Lands Act, valid existing rights of access are guaranteed. Section 1110(a) allows the use of snowmachines, motorboats, airplanes, and non-motorized surface transportation methods for traditional activities and for travel to and from villages and homesites, subject to reasonable regulation. Section 811 permits, for subsistence purposes, appropriate use of snowmobiles, motorboats, and other means of surface transportation traditionally employed for such purposes by local residents, subject to reasonable regulation.

o What impact would the plan have on the level of transportation and utility corridor development on the refuge?

This is not a significant planning issue because in addition to sections 1109 and 1110(a) of the Alaska Lands Act which are discussed above, section 1110(b) assures that the state or private owner or occupier of state owned or privately owned land, including subsurface rights, or a valid mining claim or other valid occupancy shall be given such rights as may be necessary to assure adequate and feasible access for economic and other purposes to these lands, subject to reasonable regulation. Construction of roads, pipelines, and transmission lines not subject to the above discussion could be built through the refuge subject to the provisions of Title XI of the Alaska Lands Act. However, the probability of roads or other utility corridors not covered by section 1110(b) being requested during the life of the plan are low.

o What would be the impact of the plan on access restrictions?

This is not a significant planning issue. Although seasonal restrictions on access to critical habitat areas were discussed during the planning process, the Service concluded that they are not necessary at this time. Critical habitats can be adequately protected through environmental education programs targeted at charter boat operators and their clients, who make up the majority of visitors to these typically remote areas. Regulations, should they be needed in the future, would be developed through a special rule-making process including full public involvement.

Wilderness Designation

o What would be the impact of wilderness designation on the continued use of traditional methods of access?

This is not a significant wilderness issue. See the above discussion of the Alaska Lands Act sections 811, 1109, and 1110(a). Whether an area is or is not wilderness would not affect the use of traditional methods of access under these provisions of the Alaska Lands Act.

o What impact would wilderness designation have on the level of transportation and utility corridor development on the refuge?

This is not a significant wilderness issue. Under Title XI of the Alaska Lands Act it is required that proposed utility or transportation corridors crossing designated wilderness have presidential and congressional approval prior to receiving appropriate authorization to proceed with construction. Any transportation corridors which may be proposed would probably be to provide access to private inholdings for economic or other purposes or for travel to and from villages and homesites, activities which are guaranteed under provisions of Title XI of the Alaska Lands Act. Transportation corridors can be built through designated wilderness, subject to provisions of Title XI. These provisions include Congressional concurrence.

o What would be the impact of wilderness designation on access restrictions?

This is not a significant wilderness issue. Wilderness designation in and of itself does not make access restrictions necessary. Access restrictions, should they be needed in the future, would be developed through a special rule-making process including full public involvement.

Interpretation and education - Regardless of the origin of comments, all favored some type of interpretive program on the refuge. Many comments pointed out how interpretation can help management. Other comments spoke to the need for educational and informational material for both refuge visitors and for people who would never visit the refuge but want to know about it.

Comprehensive Conservation Plan

o What impact would the plan have on the Service's information and environmental education program on the refuge?

This is a significant planning issue. The level of interpretive activity varies across the alternatives and is discussed in the management alternatives chapter. Activities that would occur in all alternatives are discussed in the common management directions section.

Wilderness Designation

o What impact would wilderness designation have on the Service's information and environmental education program on the refuge?

This is not a significant wilderness issue. The interpretation and environmental education program is an administrative program that would not be affected by wilderness designation. Also, these activities would not actually take place in wilderness.

Wilderness - Comments received regarding wilderness reflect the full spectrum of thought. For example, three Alaskan oil companies suggested that "there is no further need for wilderness other than for those provisions provided for in the Alaska Lands Act for small adjustments to existing wilderness designated areas." On the other end is the comment "Take into account diminishing wilderness on a national and global scale. Put into context, these remote islands seem less distant and more significant. Provide wilderness designation to the maximum extent practicable with special emphasis on coastal protection."

Comprehensive Conservation Plan

o Should any additional parts of the refuge be designated wilderness?

This is a significant issue and is addressed in several places in the plan. The wilderness review section of the affected environment chapter evaluates the wilderness qualities of the refuge according to

criteria based on the Wilderness Act and Service policy. The environmental consequences chapter evaluates the effect of several alternative wilderness proposals.

Wilderness Designation

o What impact would the alternatives have on the wilderness values on the refuge?

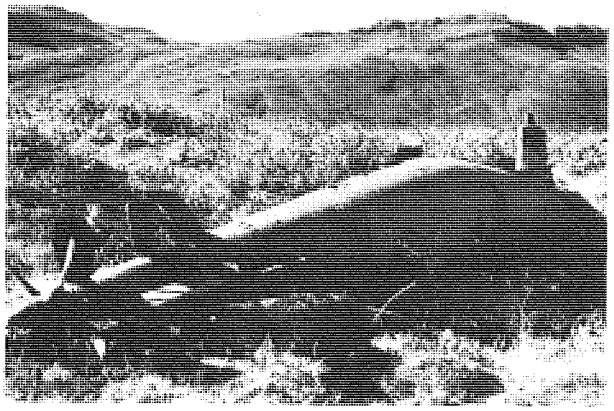
This is a significant wilderness issue. Management activities, economic development, and other actions which may occur under the various alternatives analyzed in this document could result in impacts to various refuge resources. In turn, these impacts could affect such wilderness qualities as naturalness, opportunities for solitude, and opportunities for primitive recreation. If more of the refuge is designated as wilderness, many economic development activities and other actions which could adversely impact these wilderness qualities would not be allowed to occur.

Cultural resources - Comments received regarding cultural resources fell into two categories - those that concerned World War II remains and continuing military presence and comments pertaining to Native cultures. Comments from rural Alaska varied but most provided site-specific information about the historic use of an area by Natives, uses that continue through the present day.

Comprehensive Conservation Plan

o What impact would the plan have on cultural sites, including Native and World War II sites?

This is not a significant planning issue. A variety of laws protect cultural resources. Federal regulations govern actions with the potential to directly or indirectly effect any archaeological or historic site. These regulations apply no matter what management alternative is implemented. Under all alternatives, World War II material will be managed in accordance with a policy published December 20, 1985, in the Federal Register.



Historic remains from World War II, such as this Japanese mini-submarine abandoned at Kiska, are common in the Aleutian Islands.

Wilderness Designation

o What impact would wilderness designation have on cultural sites, including Native sites and World War II historic sites?

This is not a significant wilderness issue. Management actions which would occur in wilderness areas such as fish and wildlife monitoring and eradication of introduced species would not impact cultural resources. See discussion above.

Cabins - A wide range of comments were received regarding further construction of cabins on the refuge. These comments ranged from "no new cabins and phase out those in conflict with resources," to "allow the building of hunting cabins."

Comprehensive Conservation Plan

o What impact would the plan have on the level of cabin construction on the refuge?

Construction of cabins on the refuge is not a significant issue in terms of the plan. The Service's policy on construction and use of cabins on refuges would not be affected by the management alternative chosen. Service regulations on existing cabins within Alaskan refuges (50 CFR 36.33[b][1]) state that traditional and customary use of

existing cabins would be allowed to continue provided their use is compatible with refuge purposes. Construction of new cabins for private recreational use is prohibited by section 1303(b) of the Alaska Lands Act. However, new cabins may be permitted if compatible with refuge purposes and if the use of the cabin is either directly related to the administration of the area (including public use cabins) or is necessary to provide for the continuation of an ongoing activity or use otherwise allowed within the area.

Wilderness Designation

o What impact would wilderness designation have on the level of cabin construction on the refuge?

Construction of cabins in wilderness areas is not a significant wilderness issue. Wilderness designation would have no effect on the construction and use of cabins as outlined in the policy discussed above.

Subsistence - The tone of rural Alaskan responses was for the continued right to live a subsistence lifestyle in the traditional manner. Many offered information about where and what they take and use in their subsistence tradition. Urban Alaskans also supported subsistence in their comments but qualified their support by saying they were for subsistence as long as it did not harm the resource. Comments from outside Alaska were in favor of limiting subsistence to major islands and phasing out subsistence uses.

Comprehensive Conservation Plan

o What impact would the plan have on the level of subsistence hunting, fishing, gathering of vegetative materials, and other subsistence activities on the refuge?

This is not a significant planning issue because the provision of opportunities for continued subsistence activities by local residents is a purpose of the refuge. Title VIII of the Alaska Lands Act provides general guidance to the Service in managing subsistence use.

Wilderness Designation

o What impact would wilderness designation have on the level of subsistence hunting, fishing, gathering of vegetative materials, and other subsistence activities on the refuge?

The provision of opportunities for continued subsistence activities is not a significant wilderness issue. Wilderness designation does not restrict hunting, fishing, or other subsistence activities nor does it restrict access by snowmachines, motorboats, or other means of surface transportation traditionally employed for such purposes by local residents.

Public use - A "go-slow" attitude prevailed in the comments concerning the increase of public use on the refuge. Comments such as "develop without damaging the resources," "the area should remain open for the public to see and enjoy, but not to exploit," and "encourage recreation where compatible with the preservation of indigenous wildlife" are representative of these responses.

Comprehensive Conservation Plan

o What impact would the plan have on recreational use of the refuge, including hunting, and fishing?

Public use of the refuge, including guiding and outfitting, is not a significant issue in the plan. Hunting and fishing would be permitted subject to state and federal regulations, regardless of management category. Recreational uses such as backpacking and associated activities would be permitted throughout the refuge in all alternatives. Management of recreational use is discussed in the common management directions. All guiding and outfitting activities on refuges are required to have special use permits under 50 CFR 27.97 and 29.1 in addition to state licenses.

Wilderness Designation

o What impact would wilderness designation have on recreational use of the refuge, including hunting, and fishing?

Public use of the refuge is not a significant wilderness issue. Wilderness designation would preclude the development of many visitor facilities, however no facilities are proposed for areas suitable for wilderness. Also, improved facilities essential to protect refuge and wilderness resources, prevent or correct unsanitary conditions, disperse visitors, reduce other hazards, or otherwise control uses may be permitted (6 RM 8.9C). Guiding and outfitting activities could occur as discussed previously. Most recreational pursuits that are occurring on the refuge presently, such as bird watching, hunting, and fishing, would not be affected by wilderness designation.

Pollution - Some comments regarding pollution on the refuge said "clean up World War II toxics." Others had to do with the discharge of oily ballast water, oil, grease, soap and detergents and other garbage-type waste from sea-going vessels and the impact of these upon beaches, wildlife, fish and waters. The Service was asked to clean up beaches and to conduct research on the impact of such pollution on seabirds.

Comprehensive Conservation Plan

o What impact would the plan have on water quality and quantity?

This is a significant planning issue in some parts of the refuge specifically around Afognak Island and in Womens Bay. Certain kinds of commercial activities would be restricted depending on the management alternative selected. Effluent discharge and floating seafood processors might be allowed in moderate and intensive management areas, subject to site specific review. Levels of water quality monitoring vary across the alternatives.

There are no significant threats to fresh water resources of the suitable areas due to the nature of the islands that comprise most of the refuge.

o What impact would the plan have on the control of toxic spills on the refuge?

This is not a significant planning issue. Toxic spills are accidental in nature and their effects would be controlled the same way under all alternatives as described in the common management directions.

o What impact would the plan have on the control of ocean trash on the Alaska Maritime Refuge?

This is not a significant planning issue. Regulations to control ocean trash would be developed independent of the planning process.

Wilderness Designation

o What impact would wilderness designation have on water quality and quantity?

This is not a significant wilderness issue because the affected areas, Afognak waters and Womens Bay, are not considered suitable for wilderness designation. There are no significant threats to fresh water resources due to the remote nature of the islands that comprise the areas suitable for wilderness designation.

o What impact would wilderness designation have on the control of toxic spills on the refuge?

This is not a significant wilderness issue. Toxic spills would be controlled the same way under all alternatives. Toxic spill response procedures are described in the common management directions.

o What impact would wilderness designation have on the control of ocean trash on the Alaska Maritime Refuge?

This is not a significant wilderness issue. Regulations to control ocean trash would be developed independent of wilderness designation.

SIGNIFICANT ISSUES

The Service used criteria set forth in the Council of Environmental Quality's implementing regulations (40 CFR 1508.27) for the National Environmental Policy Act in determining what issues were significant. Issues were identified as being significant, based on the above

analysis, because of the degree to which the action would affect the future of wildlife in the refuge, the degree to which the action would affect the quality of the human environment, and the degree to which controversy is generated by both in the management alternatives and environmental consequences chapters.

Five issues were identified as being significant for the comprehensive conservation plan:

- o What impact would the plan have on the amount of habitat and the population levels of fish and wildlife on the refuge?
- o What would be the impact of the plan on mariculture?
- o What would be the impact of the plan on commercial development in Womens Bay?
- o What impact would the plan have on the Service's information and environmental education program on the refuge?
- o Should any additional parts of the refuge be designated wilderness?

Two issues were identified as being significant for wilderness designation:

- o What would be the impact of wilderness designation on the amount of habitat and the population levels of wildlife on the refuge?
- o What impact would the alternatives have on the wilderness values on the refuge?

REVISIONS TO THE DRAFT PLAN

As a result of comments received on the draft plan several changes have been made in the plan. Changes include:

- o a number of land status maps have been redrafted to update status and improve clarity;
- o land ownership in several controversial areas is discussed in greater detail;
- o results of the Bureau of Land Management oil and gas assessment for the refuge have been integrated into the document as appropriate;
- o minor changes have been made to the table "Marine environment management activities, public uses, and economic uses permitted in the management categories;"
- o new wording has been added on the Pribilof Terms and Agreement and research on marine resources;
- o discussions of 22(g), the Iditarod Trail, proposed land transfers and commercial uses have been modified or expanded;
- o in Alternative C, the Preferred Alternative, the moderate management areas previously shown for the marine areas of Afognak Island and Womens and Middle bays have been reclassified for intensive management; the minimal management designations in these areas remain the same.

AFFECTED ENVIRONMENT OVERVIEW

PHYSICAL ENVIRONMENT

Geography

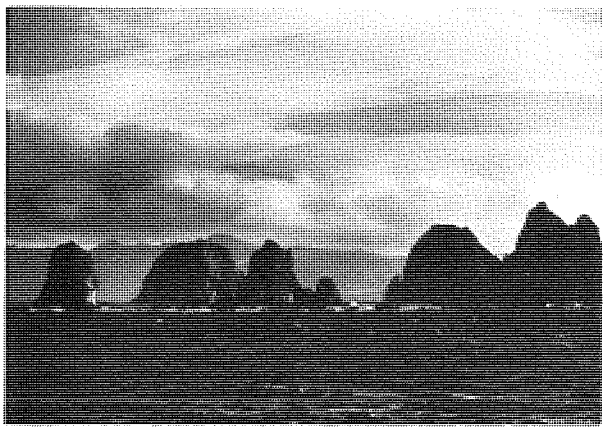
The Alaska Maritime National Wildlife Refuge extends from Forrester Island in Southeastern Alaska to Attu Island at the tip of the Aleutian Chain and almost to Barrow on the Arctic Ocean (See Figure 1). Within the refuge boundary are about 4.9 million acres of headlands, islands, islets, rocks, tidelands, submerged lands, and waters which are divided into the following units:

Chukchi Sea Unit - includes barrier islands along the Chukchi Sea, and the outer mainland of Cape Lisburne and Cape Thompson, Chamisso Island, and other lands in the Chukchi Sea.

Bering Sea Unit - includes several islands and headlands on Norton Sound, extensive wilderness on St. Matthew Island, the Pribilof Island's bird cliffs, Hagemeister Island, and other smaller islands in the Bering Sea.

Aleutian Islands Unit - includes the volcanic, mostly treeless, Aleutian Islands chain and Bogoslof Island.

Alaska Peninsula Unit - includes more than 800 islands, islets, and rocks off the south side of the Alaska Peninsula between the tip of the Alaskan Peninsula and Katmai National Park. Several areas of offshore waters are also included within the refuge.



The Haystacks, in the Shumagin Islands, are typical of many "sea stacks" important to marine mammals and birds in the refuge.

Gulf of Alaska Unit - includes Forrester, Hazy, and St. Lazaria subunits in southeastern Alaska; islands off the coast of the Kenai Peninsula; islands and rocks in Cook Inlet; and islands and waters surrounding Kodiak and Afognak Islands.

See Table 36 in the Management Alternatives Chapter for a complete listing of lands and waters located within the refuge units.

Most of the refuge is accessible by boat, but due to the rocky, rugged shorelines on some islands, access is difficult. Amphibious planes can provide access in some areas. Figure 5 displays the geographic extent of the refuge in comparison to the continental United States.

Land Status

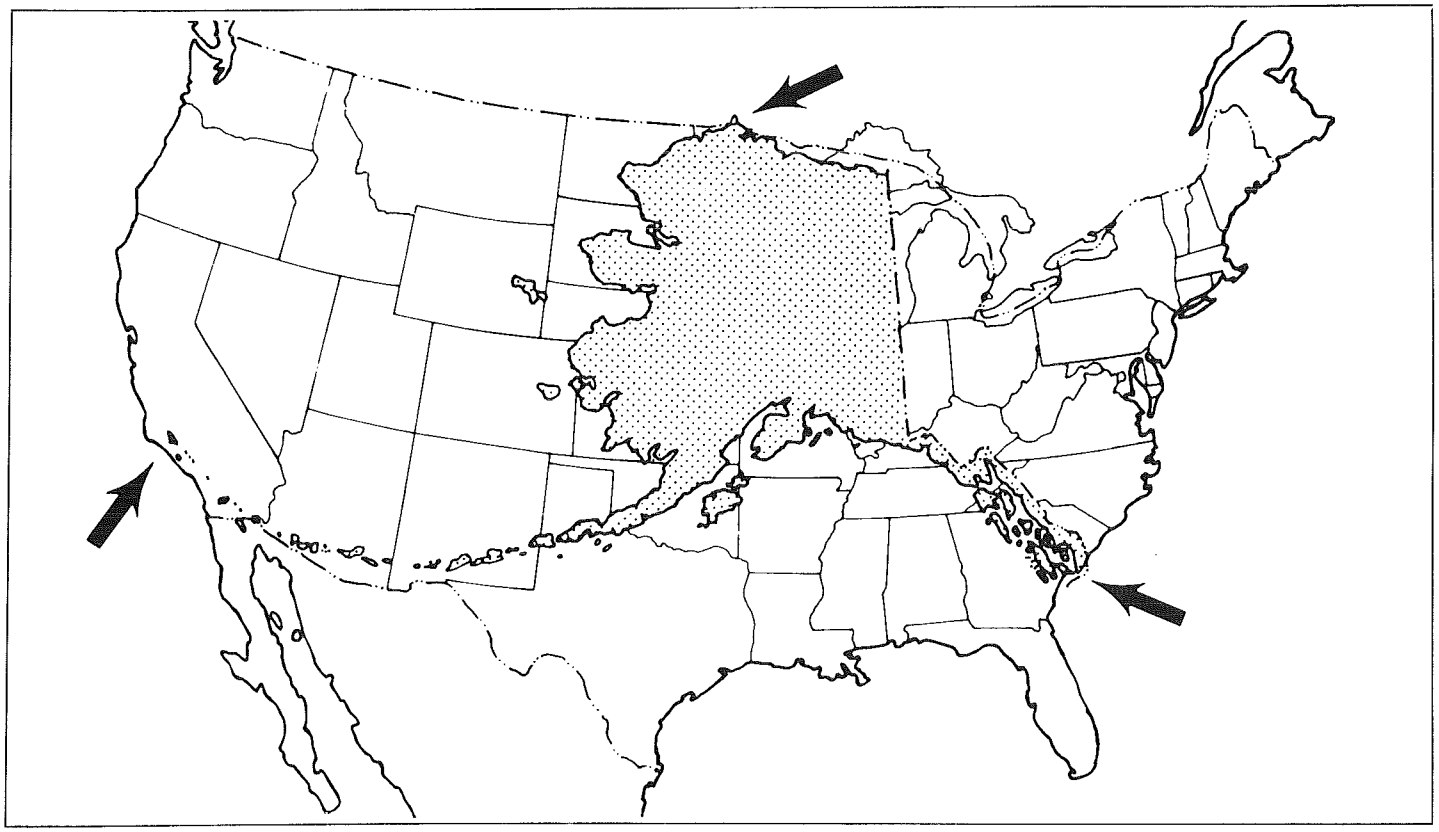
Legislation affecting land ownership in Alaskan refuges includes the Alaska Statehood Act, the Alaska Native Claims Settlement Act, and the Alaska National Interest Lands Conservation Act. These acts transferred lands from federal to state and Native ownership.

The land status of Alaska Maritime National Wildlife Refuge changes constantly as selected lands are conveyed, exchanged, or relinquished. Table 2 summarizes land status within the refuge as of November 1, 1987. Figures 49 A-F, 51 A-H, 53 A-M, 55 A-E, and 57 A-J show the arrangement of ownership and are located in the Physical Environment Chapter of each refuge unit section.

Of the approximately 7.2 million acres within the congressional refuge boundary, about 48 percent has not been selected and will remain in federal ownership. The remaining 52 percent has been selected or conveyed. Overselections are extensive throughout the refuge and much of the selected land will also remain in federal ownership.

Approximately 56 percent or 2.7 million acres of the Alaska Maritime Refuge is congressionally designated wilderness.

Figure 5. Geographic extent of the Alaska Maritime Refuge.



The refuge extends from Forrester Island in Southeast Alaska to Attu Island at the tip of the Aleutian Chain and almost to Barrow on the Arctic Ocean. That is equivalent to having a single refuge in the "Lower 48" with units from Savannah, Georgia, to Santa Barbara, California to International Falls, Minnesota. The refuge headquarters in Homer, Alaska would be midway, in Springfield, Missouri.

United States military installations are located on Attu, Shemya, Amchitka, and Adak Islands in the Aleutians, in Womens Bay on Kodiak Island in the Gulf of Alaska Unit, and at Cape Lisburne in the Chukchi Sea Unit. The Service is also responsible for management of the submerged lands surrounding the Semidi Islands; the watercolumn and tidelands around Simeonof Island; the tidelands, submerged lands, and watercolumn from Wolcott Reef to Sturgeon Lagoon in the Karluk area of Kodiak Island; the tidelands, submerged lands and watercolumn around Afognak island; and the tidelands, submerged lands, and watercolumn in Womens Bay. The marine areas in Womens Bay are not owned by the Service but the Alaska Lands Act gave the Service responsibility for managing them.

The State of Alaska asserts that these areas of water and tide and submerged lands are in state ownership; this issue will most likely be resolved in the courts. Except as noted above, the state has jurisdiction over tide and submerged lands within this refuge.

BIOLOGICAL ENVIRONMENT

Habitats

Alaska Maritime Refuge contains a variety of wildlife habitats because of the vast distances it spans and the great diversity of climate. An overall description of wildlife habitats on the refuge will assist the reader in visualizing the requirements of bird and mammal species

Table 2 . Land and water status within Alaska Maritime National Wildlife Refuge as of 11/1/87.

Ownership	Acres	% of refuge
Unselected lands, including tidelands, submerged lands and waters	3,473,902	48%
Selected (village, regional, state)	1,363,000	19%
Conveyed	2,377,000	33%
Native Allotment	23,000	1%
Total	7,236,902	

(U.S. Fish and Wildlife Service 1987)

described in subsequent sections. This classification of habitat types is based on the system of Kessel (1979), slightly modified by Refuge biologists based on their experience with coastal and marine areas. Diagrams of representative habitats for most seabird species are shown in Figure 6. Figure 7 illustrates how seabirds and geese separate into groups according to habitat. Principal species of wildlife found in each habitat are listed in Appendix C. Vegetation is described in greater detail in the Biological Environment Chapter in each refuge unit.

Unvegetated habitats - Barren rocks, cliffs, beaches, and scree without vegetation. Most of these are along the shoreline.

Rocky shores and reefs - Shorelines of rock outcroppings or boulders, and offshore rocks and reefs, regularly washed by tides. This is the most common type of shoreline on islands and headlands in the Gulf of Alaska, Alaska Peninsula, and Aleutian Islands units, and on islands in the Bering Sea. Rocks provide resting and breeding habitat for many seabirds and marine mammals, roosts for waterfowl, and roosts and feeding habitat for shorebirds.

Beaches and tidal flats - Flat or nearly flat shorelines of gravel, sand, silt, or mud, subject to regular tidal inundation. Sand or gravel beaches are common on outer coastlines of many islands. On much of the coast they are restricted to small coves between rocky stretches, but beaches are common on the Bristol Bay shore of Unimak Island and from the Kuskokwim Delta north. Mudflats are found in sheltered places such as estuaries (tidal flats where rivers enter the sea) and at the heads of inlets and bays. These shorelines support diverse invertebrates and are important for shorebirds, waterfowl, and seals.

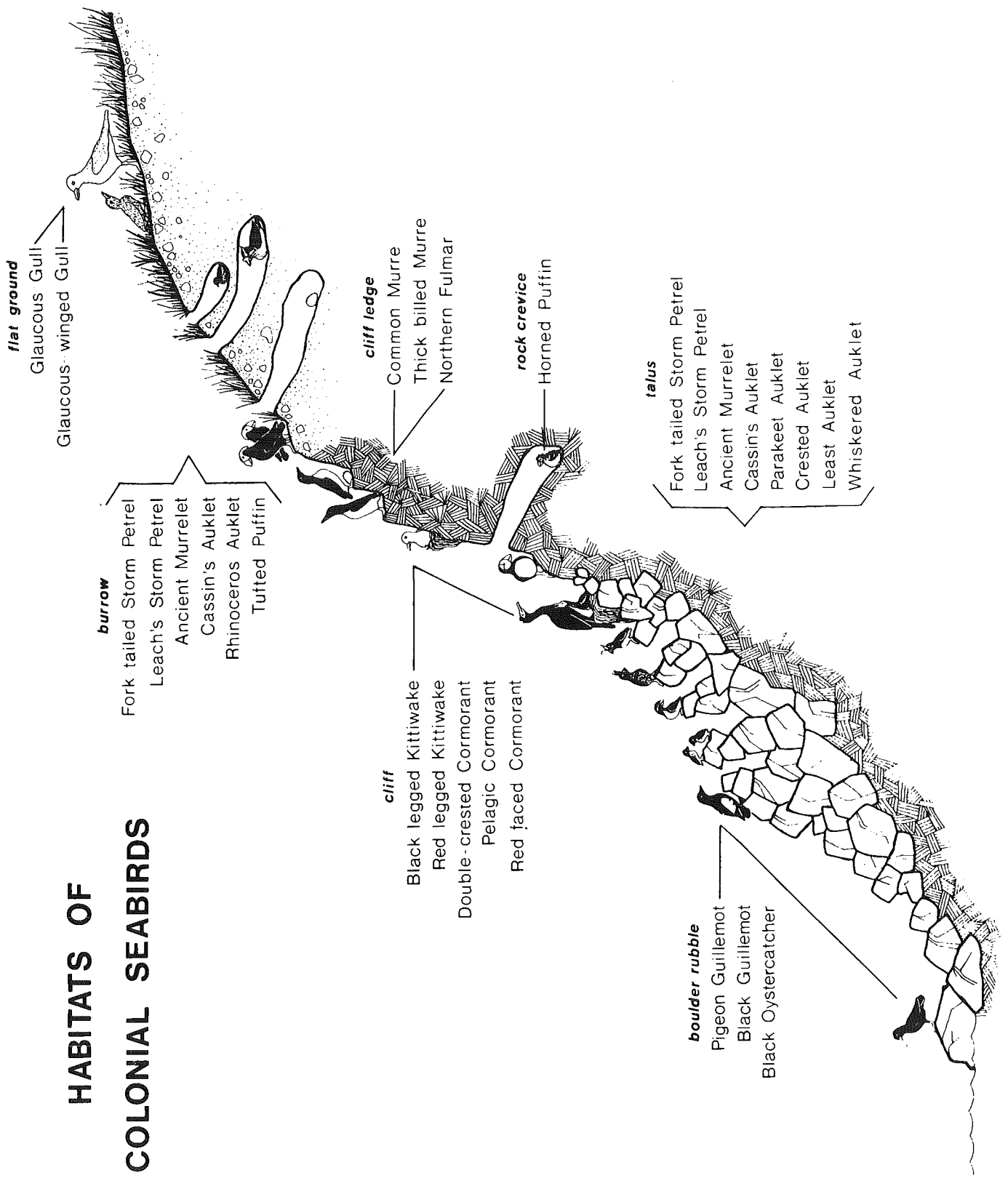
Barrier islands - Low, flat islands parallel to and near the coast; common offshore of sandy beaches in the Chukchi Sea Unit. The lagoons between island and beach are important nearshore habitat. Sea ducks and seabirds rely on the islands as nesting habitat, and waterfowl and shorebirds congregate on some of them in late summer to prepare for migration.

Cliffs - Steep or vertical rocky faces along shorelines rising well above the tides in all parts of the refuge, on offshore "stacks" (rock towers), or in inland canyons and mountains of larger islands and mainland areas. Seabirds, raptors, and other birds nest on their ledges, in crevices, and on steep soil-covered margins.

Talus and boulder rubble - Slopes with large blocks of rock (about eight inches in diameter or larger), with or without soil and vegetation between the rocks. Generally located at the bottom of cliffs and on steep slopes between them, both along coasts and inland. Crevices between the rocks are important habitat for some seabirds and small mammals. A special rocky habitat is the rugged lava flows on the sides of Aleutian volcanoes, which are used by colonies of crevice-nesting seabirds.

Scree and fell-fields - Substrates of small stones (the size of gravel up to eight inches in diameter), barren or with sparse vegetation. Scree covers the upper reaches of many mountains on larger islands and the mainland. It provides nesting or feeding habitat for songbirds and a few seabirds. (Alluvial gravel bars, an important habitat

Figure 6. Representative habitats of colonial seabirds.



along lowland rivers, are rare in Alaska Maritime Refuge.)

Subterranean soil - The soil beneath a mat of vegetation or in the banks of streams is important habitat for several burrowing seabirds and small rodents. This type is widespread on the refuge.

Fresh or brackish waters - Standing or flowing water above sea level.

Ponds and lakes ("lacustrine waters")- Standing water from large lakes to small ponds. The category includes the immediate shorelines of water bodies, which may be bare or support vegetation such as sedges and floating vegetation. Mainland areas and many of the larger islands have lakes, which are important primarily for fish, waterfowl, gulls, and terns.

Rivers and streams ("fluviatile waters") - Flowing surface waters and their immediate shorelines. Streams are found on mainland areas and on all islands except the smallest and most rocky, though some are too steep or narrow to support wildlife. They are used by fish, waterfowl, gulls, and shorebirds.

Meadows - Flat or sloping ground covered with dense grass, sedges, and leafy nonwoody vegetation (forbs); soil can be well-drained to wet and marshy. Meadow habitats on the refuge have sometimes been referred to as "lowland tundra" (Sekora 1973).

Wet meadow - Sedges, horsetail (Equisetum), or mosses on wet or saturated soil, sometimes in shallow water. May be freshwater or brackish. Found alongside ponds and lakes, and on gentle slopes moistened by seeping water, where the soil is often peaty. Habitat for waterfowl, terns, and some shorebirds.

Grass and forb meadows - Dense grass and leafy vegetation on relatively dry soil at lower elevations (below 1,000 feet). Meadows are the most common plant association on many islands throughout the refuge, and include several types that intergrade with each other. Various lush mixtures of grass, ferns, and flowering plants such as Angelica grow two to four feet tall on gentle to steep slopes. On some flat areas this meadow includes tussock-forming plants and is very difficult to walk across. Extensive tracts of nearly pure grass (beach-rye, bluejoint) cover other slopes and flat areas. Beach-rye also stabilizes sandy slopes and dunes along shorelines. Meadows provide habitat for some songbirds, notably the Lapland longspur and nesting waterfowl. Burrowing seabirds and small mammals depend on meadow soils (see "Subterranean soil").

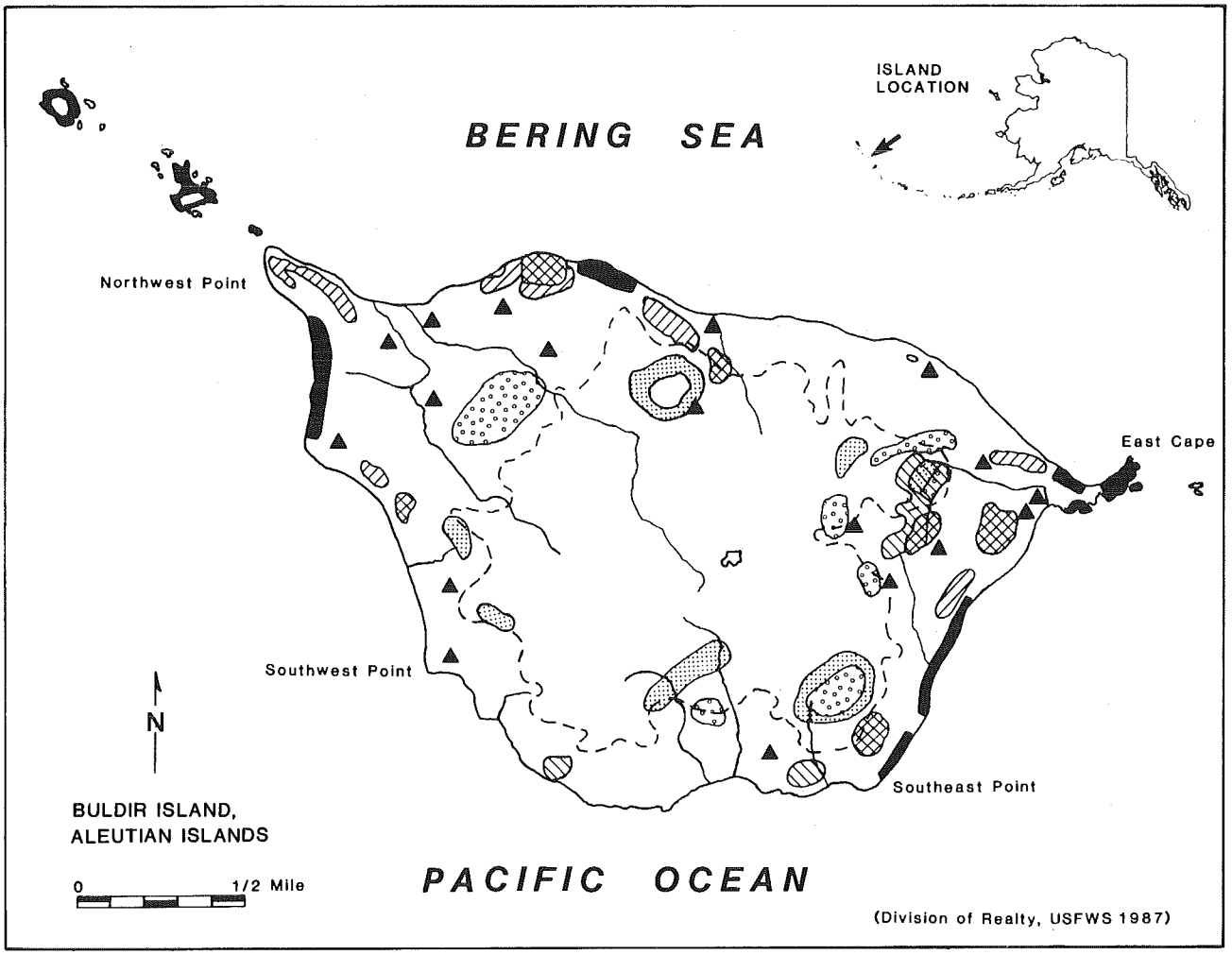
Dwarf shrub meadow - A type of lowland tundra with low woody shrubs mixed among sedges, grasses, tussocks, and small ponds. This is an important habitat on the mainland, but the only extensive tract in Alaska Maritime Refuge is on the Bristol Bay side of Unimak Island. It is important for songbirds, sandpipers, waterfowl, and seasonally for caribou.

Scrub habitats - Dominated by woody shrubs ranging from a few inches to 15 feet (5 m) in height.

Dwarf shrub mat (heath, prostrate tundra, alpine tundra) - Principal vegetation is very short woody shrubs less than one foot (0.4 m) tall, often prostrate (creeping along the ground). Plants include crowberry, cranberry, and prostrate willow. Other vegetation such as flowering plants, sedges, moss, or lichen may be mixed in, or much of the ground may be bare. Poorly-drained areas may be underlain by peat. This is the principal vegetation type on steep terrain and high plateaus in the Aleutian Islands and Alaska Peninsula units above 1000 feet, where it grades into barren scree on the highest mountains. The dwarf shrub vegetation is also found on nearly flat to moderate slopes at low elevations on some islands in the Aleutians, and it is common in the Bering and Chukchi Sea units. Inhabited by some shorebirds, large mammals, songbirds and ptarmigan.

Low shrub thicket - Shrubs one to three feet (0.4 to 1.1m) tall, such as willows and alders. These thickets form widely scattered stands along sheltered ravines and watercourses on some islands in the Aleutians, and on the mainland and nearby islands of the Bering Sea and Chukchi Sea Units. Important as the only habitat in such areas for some songbird species.

Figure 7. Distribution of seabirds and geese nesting on Buldir Island.



Legend For Buldir Island

— — Grass-forb meadow below this line, dwarf shrub mat above it

Cliff-nesters: black-legged kittiwakes, red-legged kittiwakes, common murres, thick-billed murres, pelagic cormorants, red-faced cormorants

Burrow-nesters: tufted puffins. Others are fork-tailed and leach's storm-petrels, which nest everywhere in grass-forb meadow, and scattered auklets (cassin's and rhinoceros).

Crevice-nesters: horned puffins, and auklets (crested, whiskered, and least). Others scattered along rocky shoreline are parakeet auklets and pigeon quillemots.

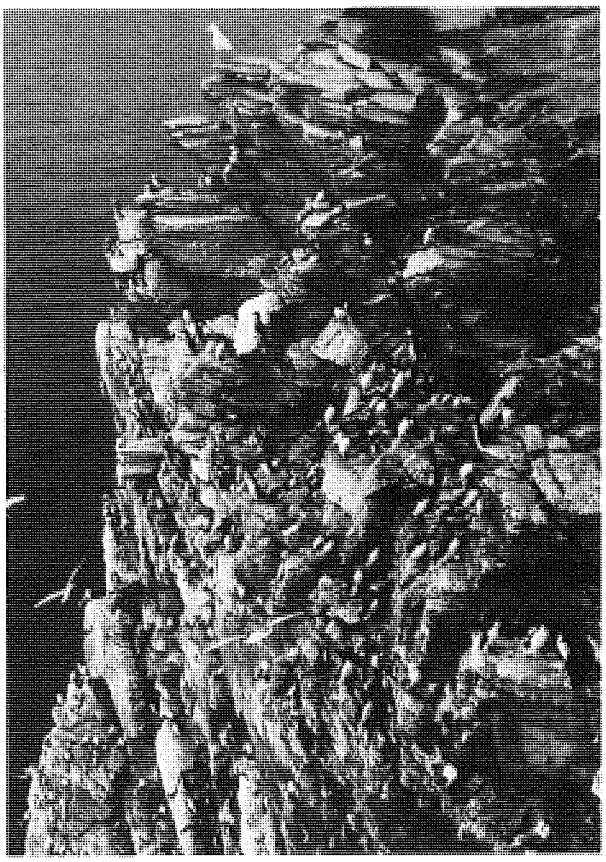
Nesters in open meadow:

Aleutian Canada goose brood rearing area

Aleutian Canada goose fall feeding area

▲ Glaucous-winged gull colony

Medium to tall shrubs - Shrubs three to fifteen feet (1.1 to 5 m) tall. Shrubs of this height are absent in northern and western parts of the refuge due to the severe climate, except occasionally in sheltered valleys. Taller shrubs are abundant on the southeastern side of Unimak Island and on larger islands in the Alaska Peninsula and Gulf of Alaska units. Primary species are willows and alders; secondary are salmonberry, elder, and devil's club. The habitat is important for ptarmigan and for numerous songbird species.



Cliff nesting seabirds were mostly protected from predation by introduced foxes, rats, and ground squirrels.

Forests - The only type of forest in the Alaska Maritime Refuge is coastal coniferous forest on many islands of the north-central and eastern Gulf of Alaska Unit, particularly St. Lazaria and the Forrester islands. Dominant trees are Sitka spruce and western hemlock. Coniferous forest is important for a number of songbirds and at least one seabird, the marbled murrelet. Forest becomes rare on refuge lands in the western Gulf of Alaska Unit. There is one stand on Ushagat Island in the Barren Islands group and Delphin and Discoverer islands, in the waters off Afognak, are heavily forested. There are no forested areas on refuge lands in the other four units of the refuge.

Marine habitats - The waters off the coast of Alaska are the feeding grounds of all seabirds and marine mammals of the refuge. Although the Alaska Maritime Refuge only includes limited land below the high tide line, the Service must consider marine resources and habitats when managing Refuge wildlife that depend on them (section 303(1)(B)(i) of the Alaska Lands Act). The sea is differentiated into a variety of habitats, due to interactions between depth and topography of the sea floor, currents, tides, ice cover, and water masses having different temperatures and salinities. The characteristics of these habitats and the food species they support require various adaptations in the birds and mammals that feed there.

Marine habitats off the coast of Alaska have been best studied in the Bering Sea, due to its rich resources and potential for development (Kinder and Schumacher 1981). Some of the domains described below may be similar in the northern Gulf of Alaska, but depths are greater in this area. The continental shelf south of the Aleutians is more narrow, but exhibits a comparable zonation of habitats (D. Forsell pers. comm. 1986).

Nearshore waters - Protected coastal waters such as bays, fjords, inlets, estuaries, and lagoons. Waters are usually relatively shallow (less than 60 feet, or 20 m), although some are several times as deep. The heavy waves that pound more exposed coastlines are absent. Due to discharge of rivers, some nearshore waters have different temperatures and salinity than the adjacent sea. The bottom of protected

waters has abundant invertebrates and bottom-dwelling fish, and is an important nursery area for young fish such as herring. Bays and lagoons are important to birds and mammals that feed on the bottom, such as sea ducks, cormorants, guillemots, and sea otters. Other species adapted for feeding near shore include terns and murrelets. Some shallow lagoons, especially along Bristol Bay, support dense beds of eelgrass (Zostera), an important food of migrating geese. Sheltered inlets in southern units of the refuge are important for wintering loons, grebes, waterfowl, and some seabirds. Lagoons behind barrier islands in the Chukchi Sea Unit are important for ducks and geese.

Continental shelf - Between the outer coastline and the deep ocean lies a relatively shallow region of the sea. Its outer limit ("shelf break") is approximately 600 feet (200 m) deep, and at this point the bottom falls away abruptly to the deep ocean, 1.5 miles (2000 m) or deeper. The shelf break lies 2 to 20 miles offshore in the parts of Aleutians, but 45 to more than 300 miles from land in parts of the Bering Sea. Three major habitats or "domains" have been described in seas over the continental shelf.

Inner shelf domain (also called coastal domain) - Immediately offshore lies shallow water less than 150 feet (50 m) deep that is well mixed by winds and tides. Some nutrients reach these waters from rivers, and the bottom supports a rich fauna of molluscs, crabs, and other invertebrates, but zooplankton and fish are fewer here than in waters farther from shore. Dense schools of fish are present on the inner shelf, primarily in summer when they arrive to spawn, or when (as with salmon) young fish are moving out to sea. Birds using this zone include gulls and terns, auklets, and bottom-feeders such as cormorants and sea ducks.

A special habitat is created on rocky bottoms just offshore by "forests" of kelp (Laminaria), which support spawning herring, other fish, and shellfish and are commonly used by sea otters.

Localized rich zones are created near shore by tidal currents in narrow "passes" between islands, such as those in the Aleutian chain. Tides rush between the islands with currents up to 12 knots, and pull water laden with nutrients and food organisms from the deep ocean across the narrow shelf and through the passes. These are important feeding areas for species such as storm-petrels, kittiwakes, whiskered auklets, and marine mammals. Some passes such as Avatanak Strait in the eastern Aleutians and Whale Passage north of Kodiak Island support much larger seabird colonies than nearby waters. Unimak Pass is used as a migration route and feeding ground by a large proportion of the shearwaters, northern fur seals, and some whale species of the entire north Pacific.

Middle shelf domain - Waters of the middle domain are between 150 and 300 feet (50 and 100 m) deep. They are not completely mixed by winds and tides, and there is little mixing between the upper mixed layer and the water below during the summer. Consequently, nutrients from the bottom do not reach surface waters during the time of greatest biological production. There is also little input from land or the open ocean; the middle domain therefore has relatively low productivity. As with the inner domain the ecosystem is dominated by the benthic community. Bottom-feeding birds are largely unable to use this zone due to its depth, but some marine mammals forage here, and seabirds such as common murres feed at mid-water levels.

In areas where the continental shelf is narrow or drops steeply the middle domain may be unimportant (Kessel 1979).

Outer shelf domain - This zone extends from the outer limit of the middle domain to the edge of the continental shelf or "shelf break". Waters are 300 to 600 feet (100 to 200 m) deep. The outer domain receives an inflow rising from the deep ocean, carrying abundant nutrients from the ocean floor; nutrient imput to the outer domain is therefore much greater than to the inner and middle domains, and biomass of food organisms for predators is higher. Zooplankton and fish that feed on them, such as juvenile walleye pollock, are concentrated here. The zone is important to a variety of species that feed offshore at the surface or mid-water levels: northern fulmar, kittiwakes, tufted puffin, northern fur seal, and northern sea lion.

Ocean waters - The open sea lies beyond the shelf break. It is 1.5 miles (2000 m) deep

or deeper. Much of it is poor in nutrients and food organisms, but undersea topography and currents concentrate resources in locations where roving seabirds can exploit them. Northern fulmars, kittiwakes, and storm-petrels feed here during the breeding season, and many species disperse over the ocean during winter.

Freshwater fishery resources

The freshwater fishery resources of the Alaska Maritime Refuge are relatively diverse because the refuge encompasses such a broad geographical area. However, the lack of suitable habitats limits the abundance of most species. Since the refuge consists primarily of rugged, windswept islands and rocky headlands, most streams are short, have steep gradients, and may be blocked by waterfalls, logs and other obstacles. Lakes are few in number, are often small and shallow, and may have limited access for fish. Thus, while five species of Pacific salmon occur on the refuge, pink and chum salmon are most abundant and widely distributed. Pink and chum salmon spawn and rear in intertidal and freshwater habitats considered marginal for other species. Life-history data for Alaska salmon is included in Table 3.

Typically, Dolly Varden/Arctic char is the only game species occurring in refuge lakes. However, rainbow trout, coho salmon, and kokanee have been introduced into some lakes to provide sport fishing.

Birds

Alaska Maritime Refuge contains a rich, distinctive bird fauna. The marine environment and numerous nesting islands support a unique assemblage of seabirds, several of which are almost restricted to the refuge. A remarkable diversity of other species migrates through Alaska Maritime Refuge because its lands span the north Pacific almost to Siberia, providing a stopping place for birds from both American and Asia. A few Asian species stay to breed. In winter fewer birds use the refuge than in other seasons, but the southern and eastern units are important even in this season for resident species and for several that visit from northern regions.

In this section seabirds will be described first and other birds subsequently. Habitats are described earlier in this chapter. Further details on birds are given in the chapter on each unit of the refuge, especially on issues affecting them. A complete list of bird species for the refuge is given in Appendices C and D, along with breeding status and abundance where these are known.

Seabirds - Alaska Maritime Refuge contains one of the world's most important concentrations of seabirds. The Gulf of Alaska and the Bering Sea are exceptionally rich in marine resources, and the numerous islands of the refuge provide good nesting habitat. Thirty species of seabirds totalling more than 50 million individuals breed in Alaska, approximately 80 percent of these (40 million) in the refuge.

The most numerous seabird species in Alaska are northern fulmars, storm-petrels, kittiwakes, murres, and puffins. These also form the largest and most spectacular colonies. Eight Alaskan species breed nowhere else in the world except in this state and adjacent Siberia. Besides the birds that breed on the refuge, the waters offshore are important for several species that breed in the southern hemisphere and migrate to Alaska during our summer.

The biology of all seabirds have some features in common. These birds spend most of their lives at sea. They are adapted for long periods on the wing, and many can rest on the water. They obtain their food from the open water; they hunt for long periods across the surface of the sea for the widely scattered places where their prey concentrate. Most only come to shore during summer to nest, and even at this time they obtain all their food from the sea. In order to breed, they must have nesting areas that are (1) the appropriate habitat for each species, (2) relatively close to concentrations of necessary marine foods (further details are under "Marine Resources"), and (3) safe from predators. Remote islands and sheer headlands fill these criteria, and most seabirds can nest only in such places. After rearing their young the birds return to sea.

Some Alaskan species frequent sheltered bays during winter, but many roam the open Pacific

Table 3. Life-history data for Alaska salmon.

	Species				
	Pink	Chum	Coho	Sockeye	Chinook
Number of eggs	2,000	3,000	3,500	3,700	4,800
Spawning season	mid-Jun to Oct	Jul-Nov	Jul-Dec	June-Nov	mid-May to mid-Dec
Time in freshwater	several days to several weeks	less than 1 month	1-2 years	1-4 years	3-12 months 1-2 years
Out-migration of smolts	Feb-Apr	May-Sept	Feb-mid-Jul	May-Sept	Mar-Aug
Length of ocean phase (years)	1 and 1/3	1/2 to 5	1 to 2	1/2 to 4	1 to 5
Age at maturity (years)	2	2 to 6	2 to 4	3 to 7	2 to 8
Major spawning areas	intertidal and short streams	river-lake systems	short coastal streams and intertidal	river-lake systems	large rivers & tributaries

(Morris et al. 1983)

throughout most of the year. Little is known about the location or needs of open-water species in the non-breeding season.

Issues affecting seabirds - In spite of the remoteness of Alaska Maritime Refuge, some problems face its seabirds. During the past 50 years, introduced predators such as fox have severely reduced populations of most species that do not nest on sheer cliffs (see "Mammals"). Populations of a few species are declining, and some other species exhibit periodic breeding failures; the significance of these failures is not yet understood. Exploration or development of oil or other minerals in Alaskan waters can potentially harm seabirds through disturbance, pollution, or habitat destruction. Some onshore developments can affect breeding success in nearby colonies. Commercial fisheries are capable of affecting seabird survival in several ways. Potential impacts of development on seabirds are discussed further at the end of this chapter. Problems that affect particular species are described in this section.

Seabirds are an important recreational and educational resource in areas accessible to tourists: parts of Prince William Sound, Resurrection and Kachemak Bays, and the Pribilof Islands. Disturbance of birds does not appear serious where they are viewed from boats, nor in most cases from cliff tops if suitable precautions are taken, but impacts can be severe if people enter a colony. They should be monitored at all sites. Public awareness of seabirds is increasing; however, more education is needed about the importance of seabirds as a national and international wildlife resource and the management needed to insure healthy populations in a modern world.

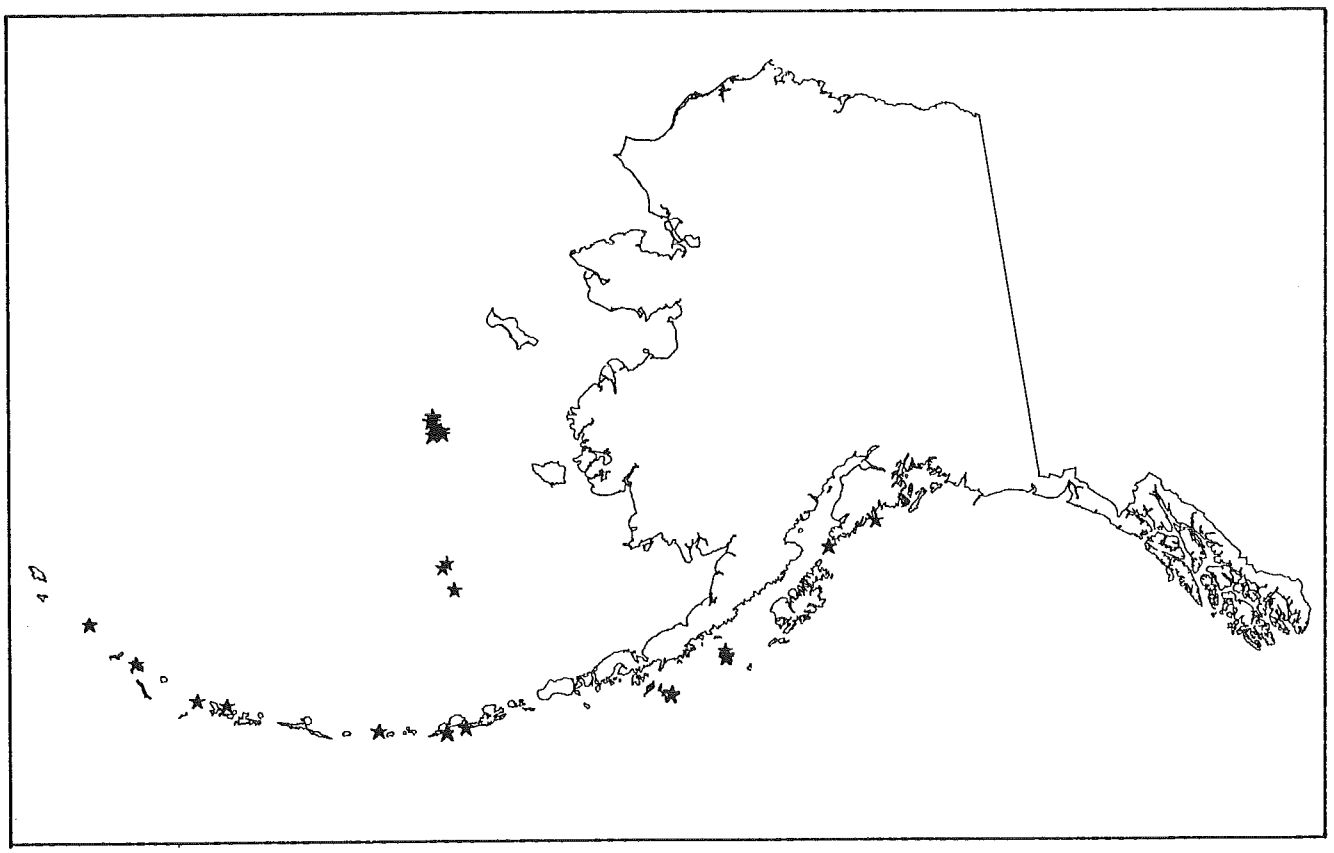
Information to assist the Service in mitigating problems of seabirds in Alaska is being collected, but more is needed. Studies began almost 30 years ago in northwest Alaska when the Project Chariot nuclear harbor excavation was proposed. Work was expanded ten years ago with the Outer Continental Shelf Environmental Assessment Program of offshore oil leasing impacts. For the first time a comprehensive census and survey of colony locations was made of Alaskan seabirds. Their diets and life history were also examined in several areas throughout the state. This work is continuing under personnel of the refuge, other Service offices, and private investigators. There are still major information gaps however. It remains difficult to determine numbers of several seabird groups, especially those that nest underground. Census work is expensive and time-consuming in remote areas such as most of the Aleutian chain; consequently there are no data for most years in that unit. Patterns and causes of breeding failures must be better known, in order to distinguish natural fluctuations from problems caused by humans. This requires regular yearly study of selected sites. Food habits, amounts of food required, and the location of important feeding areas for seabirds need to be known in order to protect their food resources, yet information on these is very sparse.

Northern fulmar - This widespread Eurasian and North American species breeds in Alaska from the Bering Sea southwards (Figure 8). There are approximately 2 million birds in the state (Sowls and Slothower 1987), and populations appear to be stable; however, numbers and trends are uncertain because the birds' long and irregular feeding trips make censusing difficult. Almost all (99 percent) are located in only four colonies: St. Matthew Island, the Pribilofs, Chagulak, and the Semidis (Sowls et al. 1978). The largest colonies contain over 500,000 birds. Fulmars usually nest on steep soil-covered slopes at the tops of cliffs, although they will use wide cliff ledges if threatened by foxes. A pair produces a single egg each year.

Fulmars forage farther than most seabirds during the breeding season, moving offshore over the shelf break and adjacent ocean up to 60 miles (100 km) from the colony (Hunt et al. 1981b, Gould et al. 1982, Schneider and Hunt 1984). Prey are taken from the surface or just beneath it; the birds do not dive for prey. The fulmar is relatively flexible in its food requirements and includes fish, squid, zooplankton, and jellyfish in its diet (Ainley and Sanger 1979, Hunt et al. 1981a, Baird and Gould 1983, Sanger 1983). The birds usually forage singly, except that large flocks also gather behind fishing boats to consume any offal dumped (Hunt et al. 1981b). In the Bering Sea fulmars depend heavily on walleye pollock, a commercially important fish (Hunt et al. 1981b). The fulmar's predilection for offal from fishing boats may have caused its populations to rise in some parts of the world (Bailey and Hislop 1978).

Storm-petrels - Two species of this group breed in Alaska, Leach's storm-petrel and the fork-tailed storm-petrel. Both are found throughout the North Pacific, and in Alaska from the western Aleutians through the Gulf of Alaska (Figures 9-10). Storm-petrels are strictly nocturnal, always arriving at the nest before dawn and leaving after dark. Both species nest underground, the fork-tailed usually in crevices between talus or in rocky soil, the Leach's in burrows that it digs in soft grassy soil (although each uses the other's nesting habitat to a small extent). Storm-petrels require intensive work to count accurately because of the birds' concealed nests and nocturnal habits, but there are approximately 6 million of each species in the state (Sowls and Slothower 1987). Single colonies number in the hundreds of thousands. Together the storm-petrels comprise about one fifth of the state's seabirds.

Figure 8. Distribution of northern fulmars in Alaska.

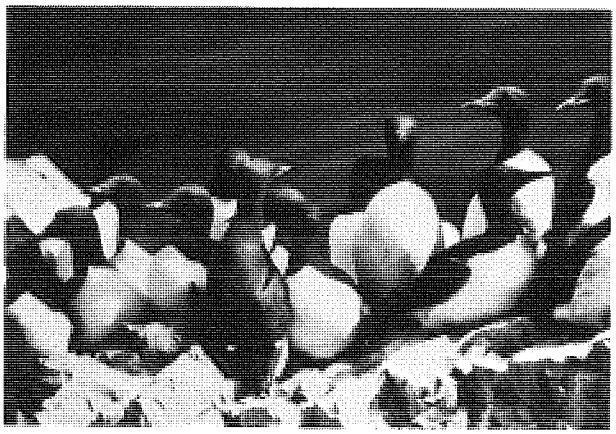


(U.S. Fish and Wildlife Service 1987)

Food is obtained far from the nesting colony; the fork-tailed storm-petrel feeds over the outer shelf and the adjacent ocean, the Leach's storm-petrel only over the deep ocean (Ainley and Sanger 1979, Hunt et al. 1981d). They seize various zooplankton, small fish, and squid while sitting on the surface of the water (Ainley and Sanger 1979, Baird and Gould 1983). Zooplankton or squid predominate, but in some parts of the Gulf of Alaska and Bering Sea the birds may depend on fishes such as capelin and sandlance (Sanger 1983).

Storm-petrels are highly vulnerable to introduced predators such as foxes and rodents because their nests are not protected by cliffs and are easy to dig out. Such predators were introduced to most islands in the Aleutians and the Gulf of Alaska, resulting in the elimination of storm-petrels on nearly every one of these islands (Bailey and Faust 1980). The birds have recolonized several islands since foxes died out or were removed, but are probably far below their original numbers in the state. The birds are also vulnerable to visitors such as cattle or humans, whose trampling collapses the fragile burrows and causes desertion of nearby burrows that escape destruction (Nelson and Lehnhausen 1983).

Shearwaters and albatrosses - These relatives of fulmars and petrels do not breed in North America, but they migrate to Alaskan waters during our summer and are a major part of the food web that includes refuge birds. Short-tailed and sooty shearwaters breed in the southern hemisphere. They spend their winter feeding on squid, fish (particularly capelin), and zooplankton at or near the surface (Hunt et al. 1981a, Sanger 1983). Most sooty shearwaters remain south of the Aleutians, whereas short-tailed shearwaters spend late summer in the Bering sea, where they are more numerous than any species that breeds there (Hunt et al. 1981d). Laysan, black-footed, and short-tailed albatrosses breed in Hawaii and Japan and feed in the north Pacific during the summer. The short-tailed albatross is



Like most seabirds these common murres are long-lived (about 20 years) and lay only a single egg each year. Because of this long life and low reproductive rate, populations take a long time to recover from declines in numbers due to oil spills and other causes.

endangered, its only known breeding site being a small island off Japan.

Cormorants - Four species of cormorants breed in Alaska. Almost the entire world population of the red-faced cormorant is restricted to Alaska, from the Bering sea through the Aleutians and Gulf of Alaska (Figure 11). This species is, however, as numerous as the next, both numbering about 150,000 in Alaska (Sowls and Slothower 1987). The pelagic cormorant of western North America breeds widely in the state from the Chukchi Sea southward (Figure 12). The double-crested cormorant, which is widespread in North America, nests along the south coast of the state from Bristol Bay and the eastern Aleutians southward, and also occupies some inland lakes (Figure 13). There are about 20,000 double-crested cormorants in the state (Sowls and Slothower 1987). The range of Brandt's cormorant lies mostly south of Alaska, which boasts only a few colonies in southeastern Alaska comprising less than 200 birds (Sowls and Slothower 1987). Numbers of cormorants in most places appear to be stable, but red-faced cormorants may have declined in the Pribilofs during the past decade (Troy and Baker 1985). Monitoring trends requires counting over a wide area because cormorants move between colonies more than other seabirds. Cormorants build nests on or near cliffs overlooking the sea. Red-faced and pelagic cormorants nest on ledges of steep cliffs; the smaller pelagic cormorant is able to use smaller ledges than the red-faced. Double-crested cormorants nest on slopes at the top of cliffs, and sometimes also in trees. Brandt's cormorant uses wide cliff ledges and flat tops of isolated "stacks" or offshore towers. All lay several eggs per clutch. Breeding success, as for most northern seabirds, varies greatly each year.

Cormorants obtain their food in shallow water, usually less than 1.5 miles from shore (Hunt et al. 1981a). They dive to obtain various fish on or near the bottom. Double-crested cormorants feed in protected bays and estuaries; the others feed primarily along rocky coasts. All take surface fish to some extent, especially the Brandt's cormorant. In several areas, they depend on herring and sandlance, species of potential commercial importance (Ainley and Sanger 1979, Schneider and Hunt 1984, Sanger 1983). In years when prey is scarce, young cormorants often starve or are exposed to weather and predators while the parents are away foraging (Baird and Gould 1983). Cormorants are especially sensitive to disturbance by humans during nesting (Baird and Gould 1983). Colonies accessible to tourist viewing or near development should be monitored.

Jaegers - Small numbers of parasitic jaegers nest off the Alaska Peninsula and in the Aleutians. These predatory relatives of gulls feed on birds' eggs, fish (primarily capelin and sandlance), and rodents, and steal a portion of their food from other birds (Gabrielson and Lincoln 1959, Sanger 1983). They obtain more food from land during the breeding season than most seabirds, but spend the winter months at sea.

Gulls - Four species of gulls are common in coastal Alaska. The mew gull nests in marshes, and is found on a few large islands although most breed on the mainland (Figure 14). They probably number about 40,000 on the coast (Sowls and Slothower 1987). Herring gulls are much more common inland than on the coast, where there may be 1,000 birds (Sowls and Slothower 1987). The principal gulls on the Alaskan coast are glaucous and glaucous-winged gulls. Both gulls use a variety of habitats:

plateaus on top of islands, steep vegetated slopes, rocky ground near the shore, and sand or gravel bars. Pairs of glaucous gulls are often widely scattered, and some nest inland on river flats, whereas glaucous-winged gulls tend to form small colonies on the coast (Gabrielson and Lincoln 1959, Nysewander et al. 1982). The glaucous-winged gull breeds from the Bering Straits through the Aleutians and southward (Figure 15). There are approximately 500,000 in Alaska. Glaucous gulls breed from Bristol Bay northward across the arctic and number about 40,000 (Figure 16)(Sowls and Slothower 1987). Populations of gulls are stable, although numbers may be lower in some areas than before foxes were introduced. They may be increasing in local areas where artificial food is abundant, probably because this enhances survival of juveniles during their first winter (Patten and Patten 1982).

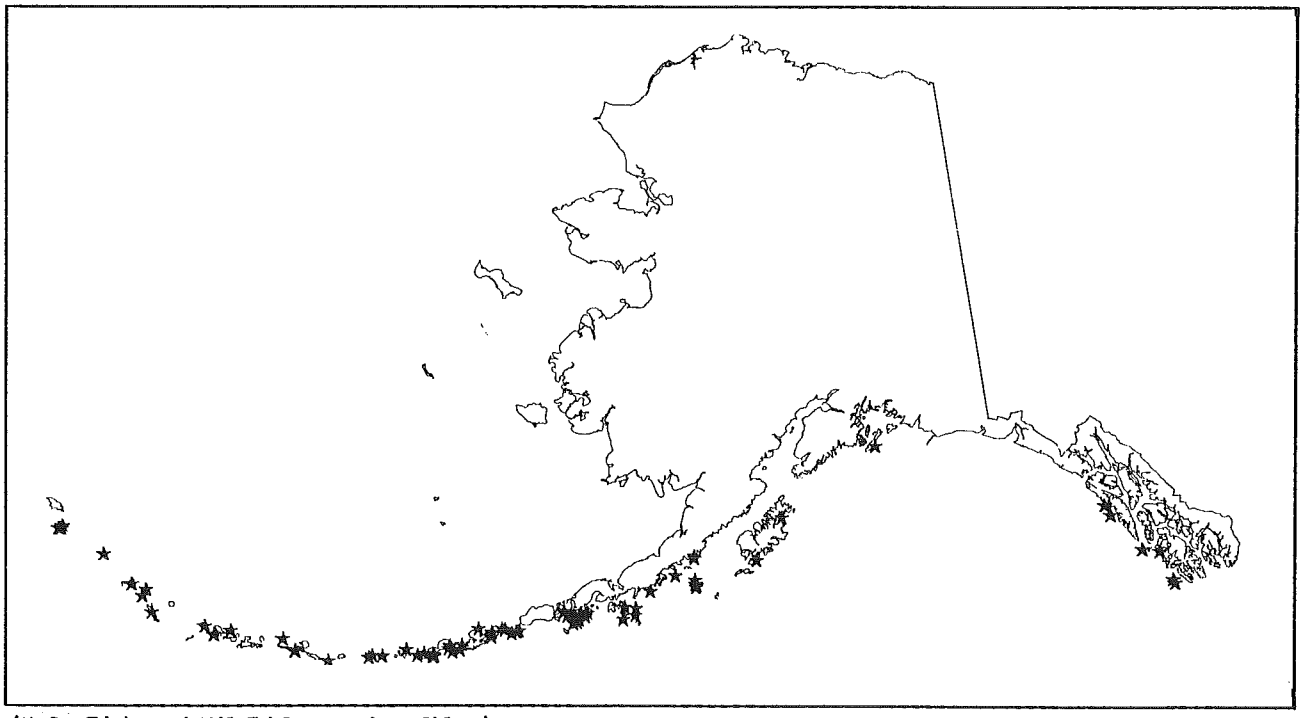
Gulls are opportunistic feeders. They take a variety of crustaceans and molluscs from the shoreline, prey on eggs and chicks of other birds if these are left unprotected, scavenge from areas where seals are giving birth, and visit dumps and fishing boats where available (Patten and Patten 1982, Baird and Gould 1983). Fish taken from the surface of waters near shore are also important in the diet (Baird and Gould 1983, Sanger 1983). These fish include herring, capelin, and sandlance, species with potential commercial importance. Indeed, despite their reputation as scavengers, gulls depend heavily on fish, particularly when they are feeding young. Breeding success of both mew and glaucous-winged gulls can be very poor in years when an important species of fish is scarce (Baird and Gould 1983, Murphy et al. 1984).

Kittiwakes - Kittiwakes are small gulls that are highly adapted to nesting on sheer cliffs. Of the two species in Alaska, the red-legged kittiwake is found nowhere else except nearby islands in Siberia. There are approximately 250,000 red-legged kittiwakes, which nest in only five colonies in the state (St. George, St. Paul, Otter, Buldir, and Bogoslof islands)(Figure 17). The black-legged kittiwake is widespread in the northern hemisphere and breeds in Alaska from the Chukchi Sea southwards (Figure 18); its population numbers about 2 million (Sowls and Slothower 1987). Numbers of breeding kittiwakes can be reliably determined because of their conspicuous nests. Both species build nests of grass and seaweed that are stuck on tiny ledges, although the black-legged kittiwake also uses soil slopes in a few places where there are no ground predators. Some colonies number in the hundreds of thousands.

Black-legged kittiwakes forage offshore over the outer shelf and shelf break. Red-legged kittiwakes go farther offshore than black-legged, over the shelf break and beyond (Hunt et al. 1981a). Both take prey from the surface or by shallow dives. Fish are the prinicpal prey. Black-legged kittiwakes depend on walleye pollock, capelin, and sandlance (all commercially important or potentially so); red-legged kittiwakes also take myctophids, a deepwater species that is not of commercial interest (Ainley and Sanger 1979, Hunt et al. 1981a, Schneider and Hunt 1984, Baird and Gould 1983, Sanger 1983, Murphy st al. 1987). Both also feed on zooplankton, chiefly at night when these prey rise nearest the surface (Sanger 1983; D. Forsell, pers. comm. 1986). Kittiwakes gather in dense flocks when they discover a rich patch of prey such as a school of fish, and these flocks are often joined by other seabird species which benefit from the kittiwakes' discovery (Hoffman et al. 1981, Hunt et al. 1981b, Baird and Gould 1983). The species thus play an important role in the ecology of other seabirds.

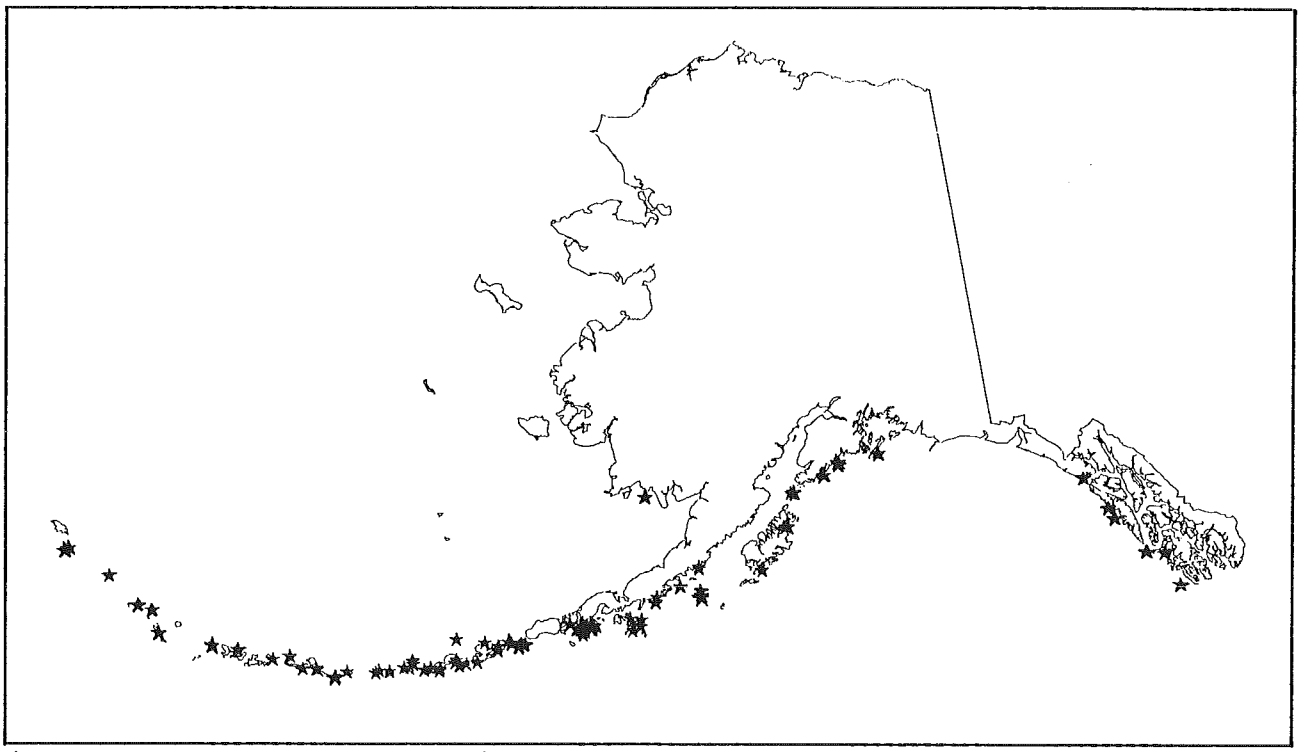
Populations of kittiwakes vary in ways that are not yet understood. Numbers in the Pribilof Islands may have declined by about 50 percent during the 1970's (Troy and Baker 1985), although they are stable in the Chukchi Sea and the Gulf of Alaska (Springer et al. 1985, Baird and Gould 1983). Reproductive success varies drastically in both the Bering Sea and the Gulf of Alaska, ranging from excellent success in some years to nearly total failure in others (Troy and Baker 1985, Baird and Gould 1983). Ground predators are not a problem for these species due to their protected nest sites, but gulls, ravens, and other predatory birds take young and adults in some areas (Baird and Gould 1983). The primary cause of nesting failure is probably fluctuations in principal prey species, to which kittiwakes are highly sensitive. In years when few surface-schooling small fish are available, the birds lay fewer eggs and chicks

Figure 9. Distribution of Leach's storm-petrels in Alaska.



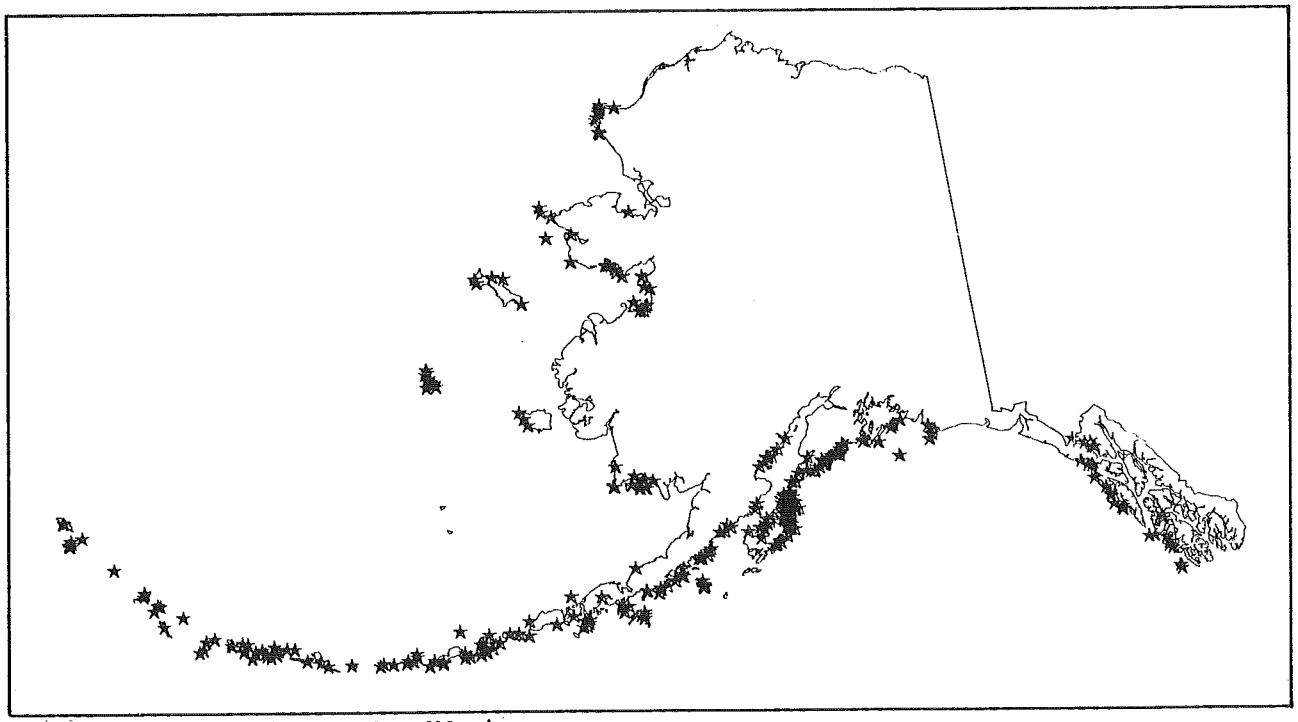
(U.S. Fish and Wildlife Service files)

Figure 10. Distribution of fork-tailed storm-petrels in Alaska.



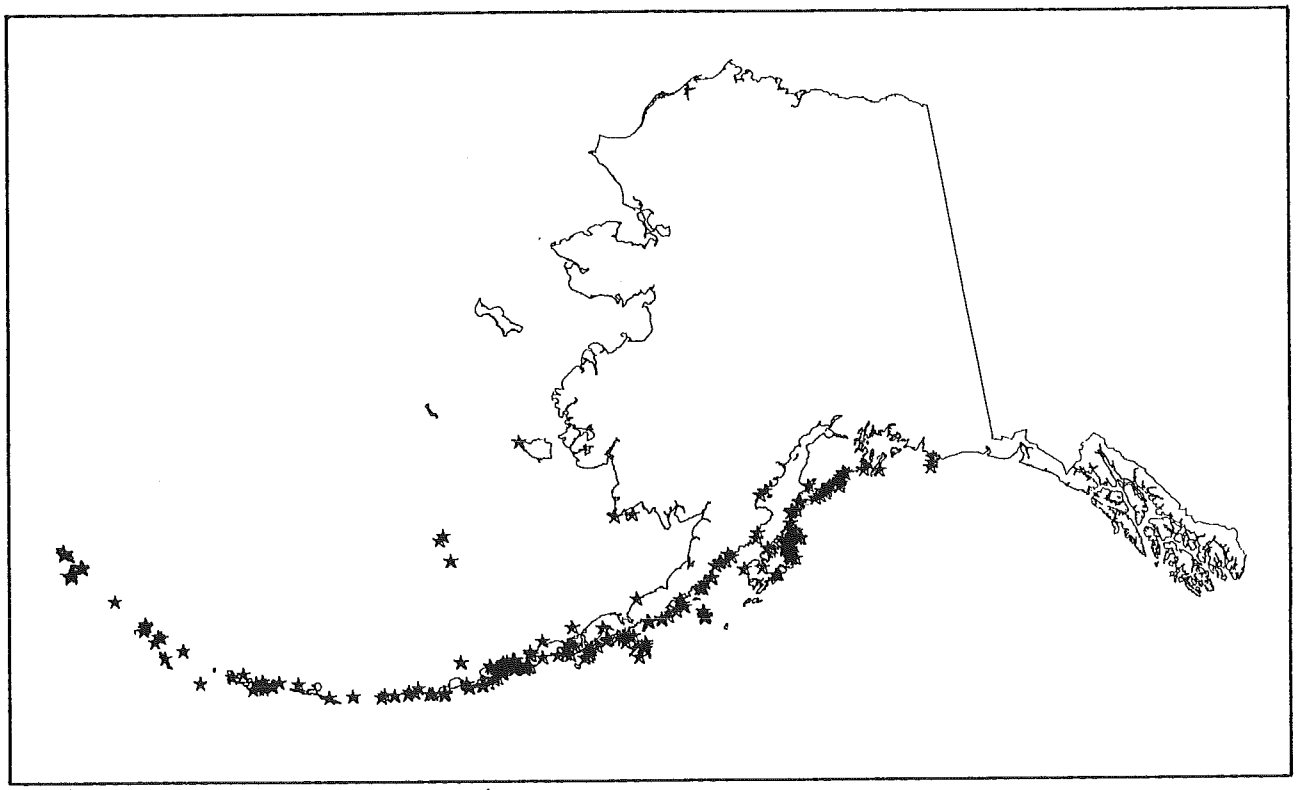
(U.S. Fish and Wildlife Service files)

Figure 11. Distribution of red-faced coromorants in Alaska.



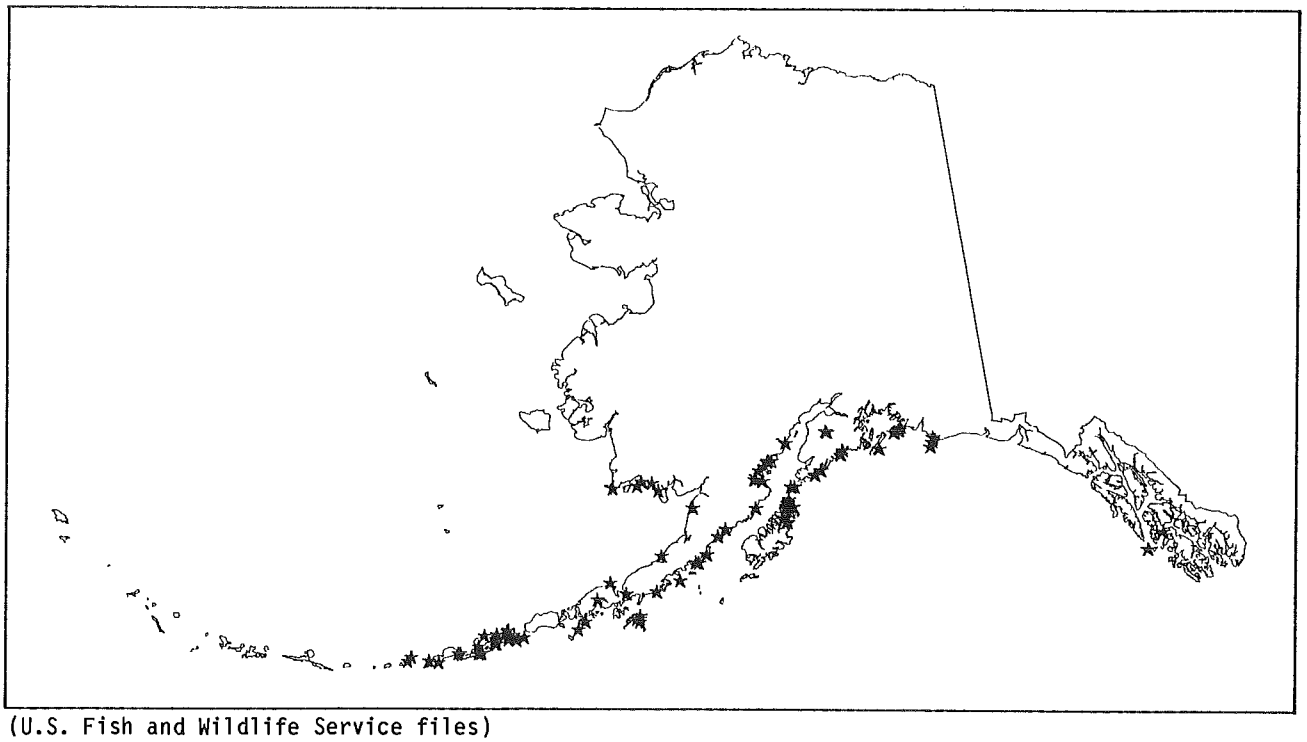
(U.S. Fish and Wildlife Service files).

Figure 12. Distribution of pelagic cormorants in Alaska.



(U.S. Fish and Wildlife Service files).

Figure 13. Distribution of Double-crested cormorants in coastal Alaska*.



(U.S. Fish and Wildlife Service files)
*island sites are not shown

Figure 14. Distribution of mew gulls in coastal Alaska.

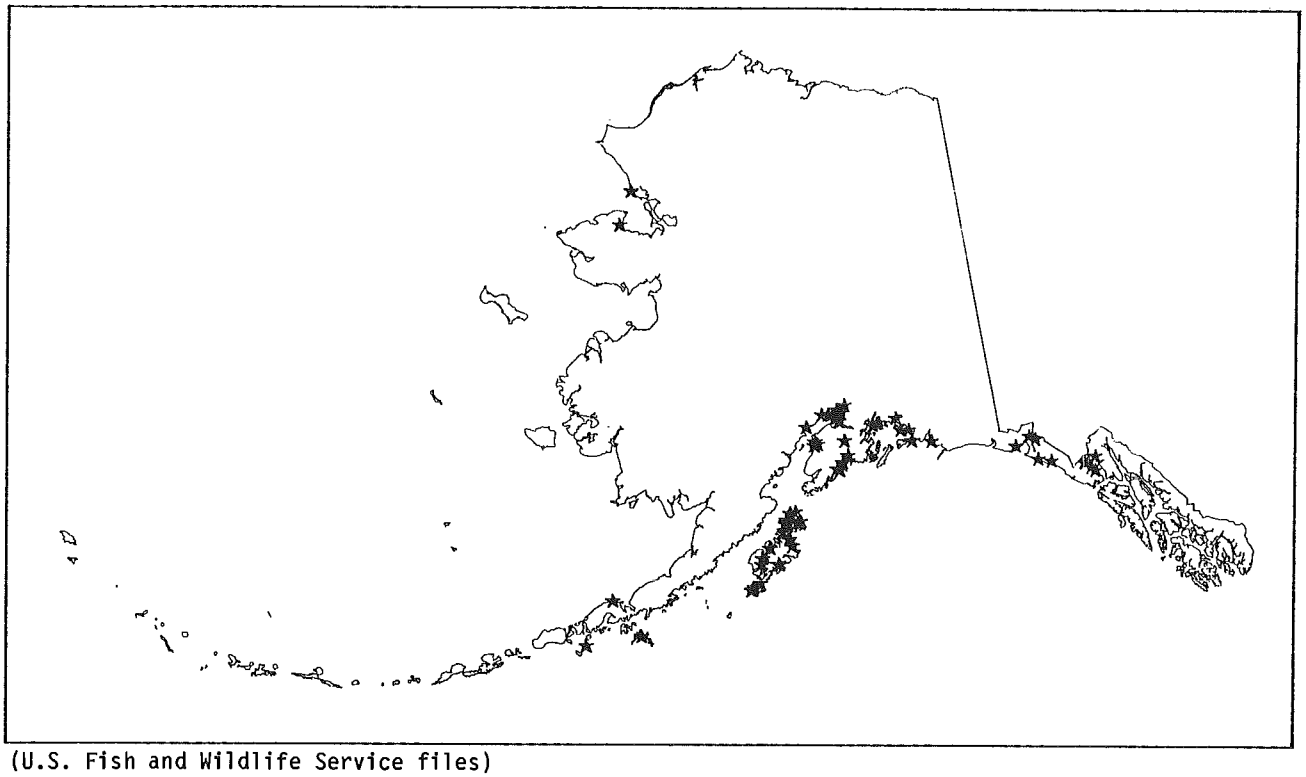


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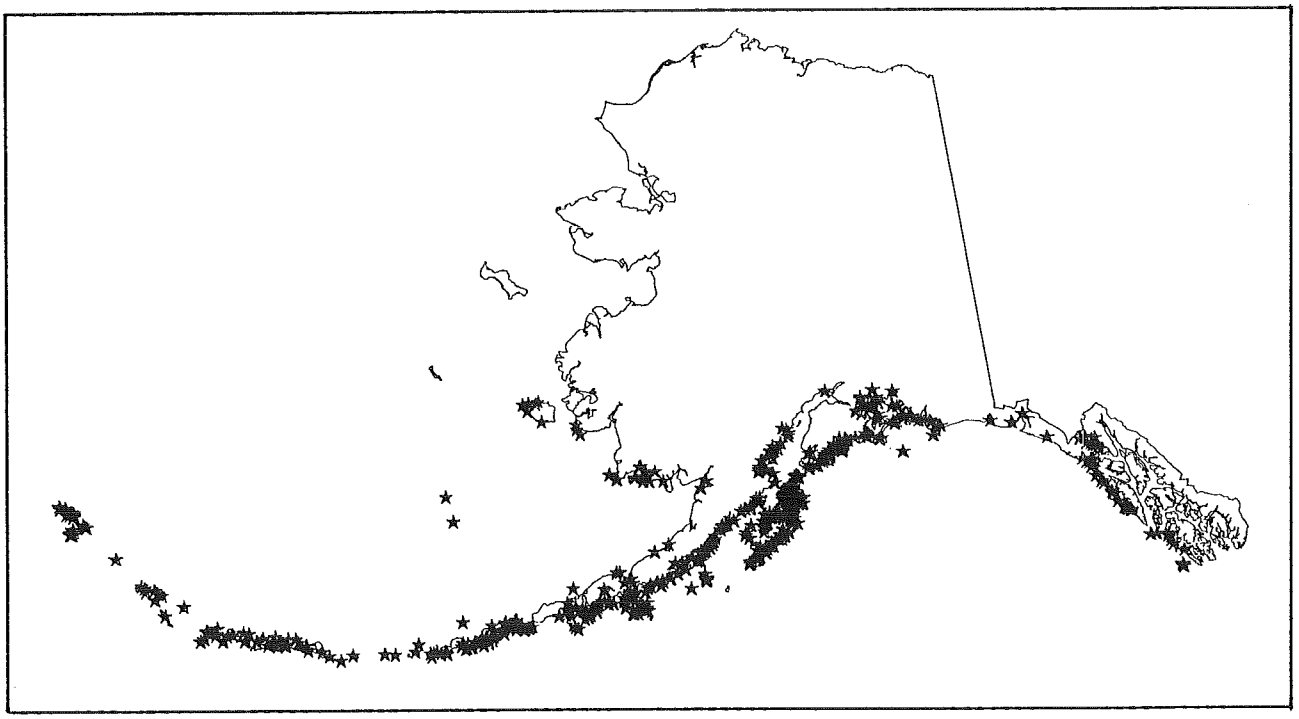
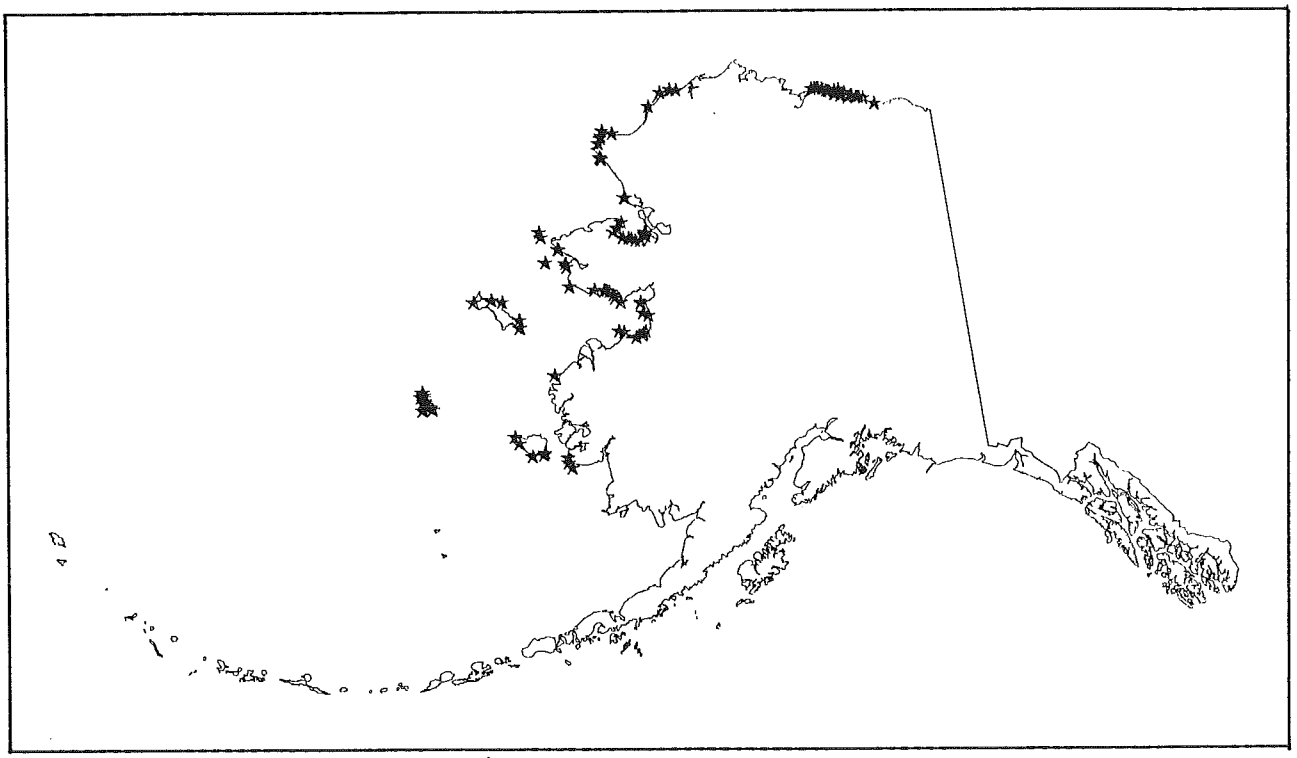
Figure 15. Distribution of glaucous-winged gulls in Alaska.



(U.S. Fish and Wildlife Service files)

Figure 16. Distribution of glaucous gulls in coastal Alaska*



(U.S. Fish and Wildlife Service files)
*island sites are not shown.

Figure 17. Distribution of red-legged kittiwakes in Alaska.

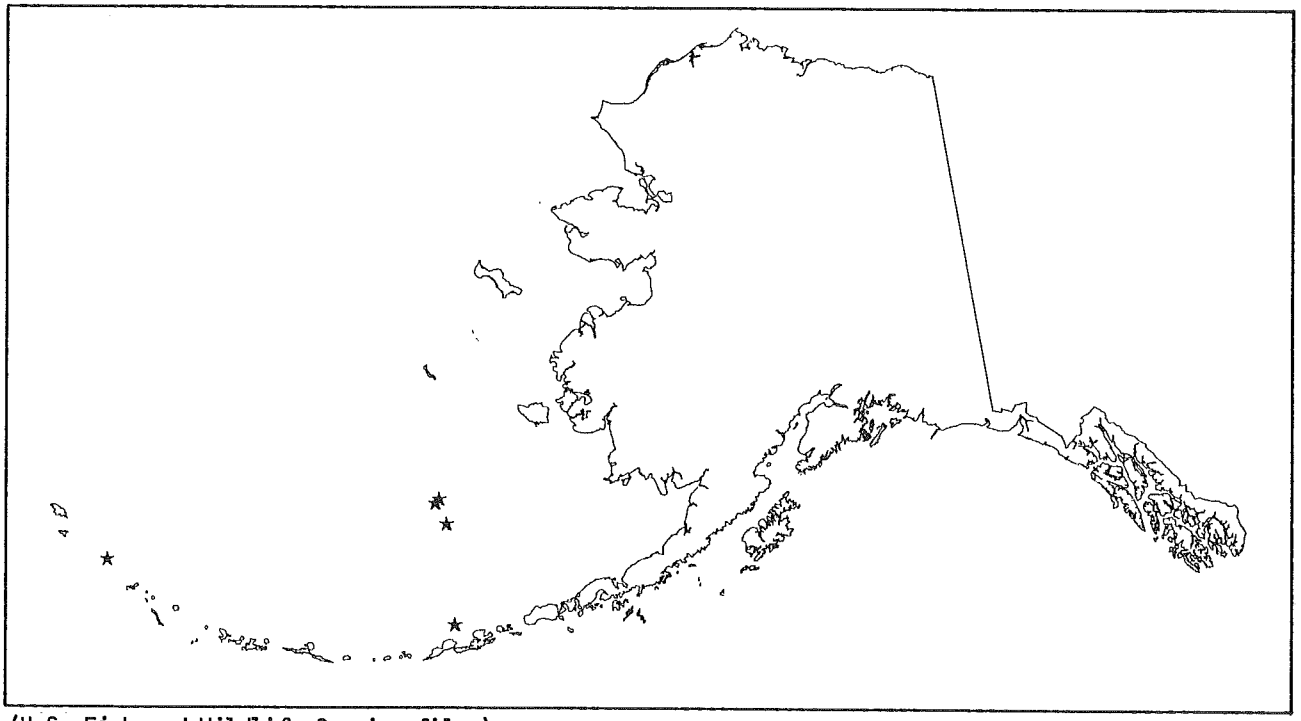


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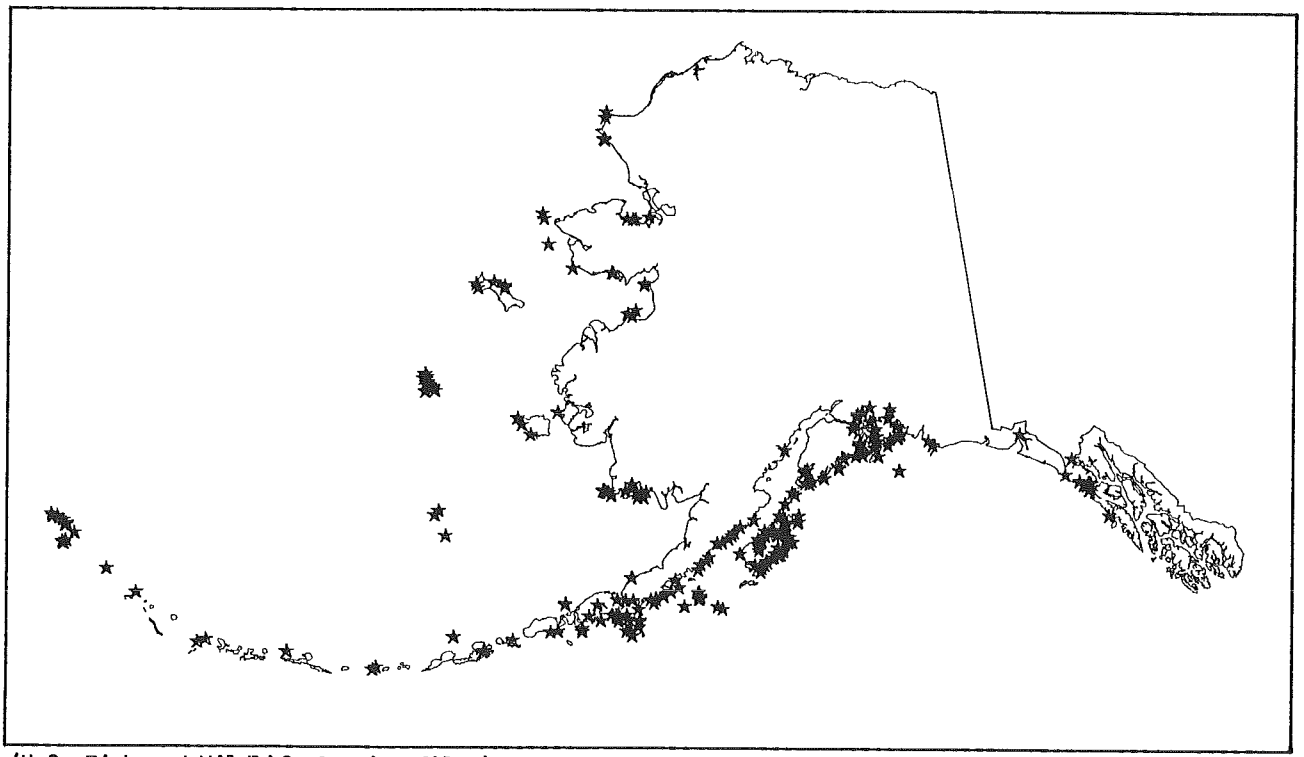
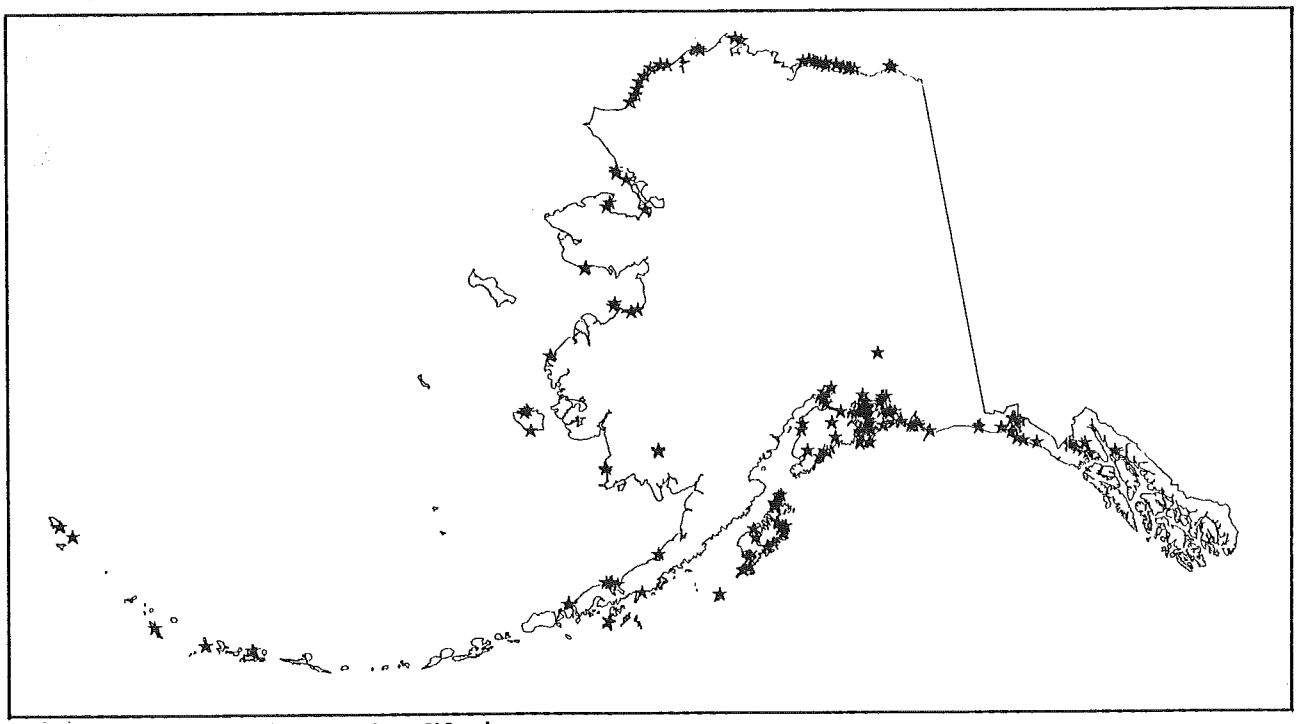
Figure 18. Distribution of black-legged kittiwakes in Alaska.



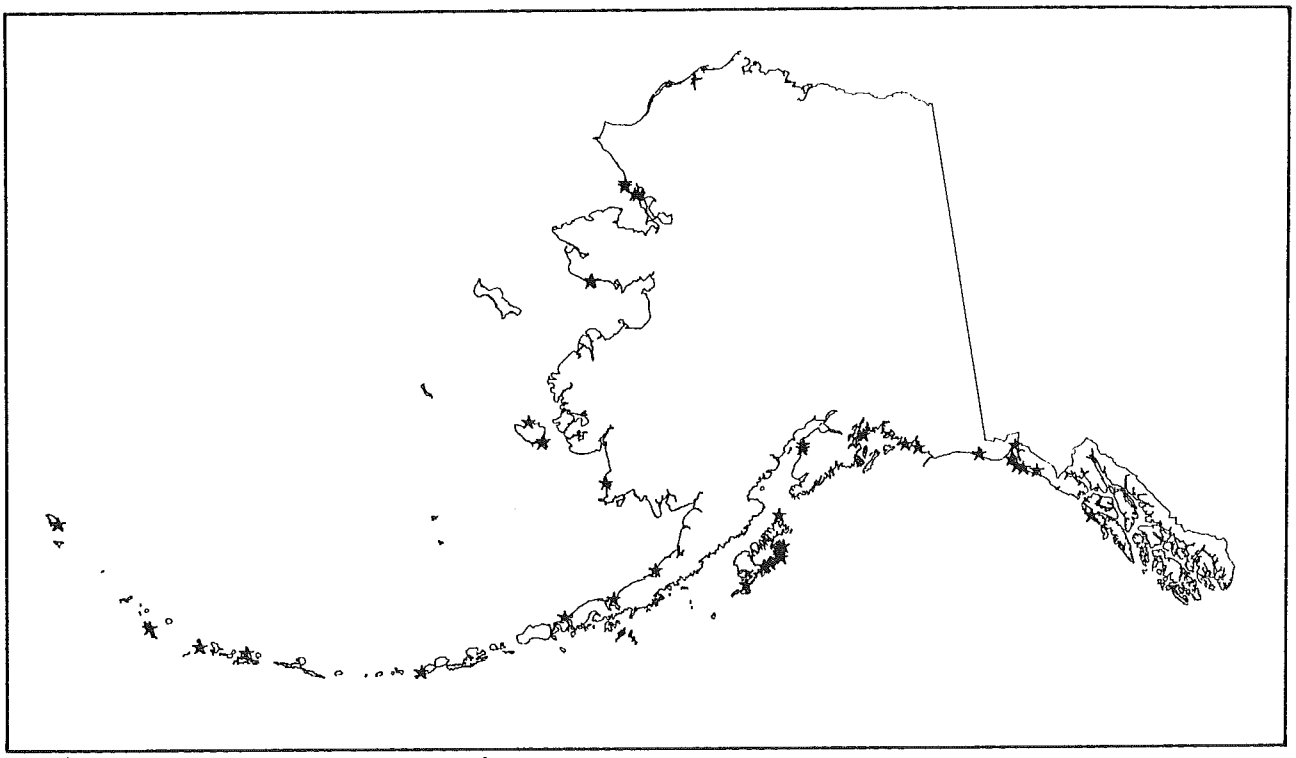
(U.S. Fish and Wildlife Service files)

Figure 19. Distribution of arctic terns in coastal Alaska.



(U.S. Fish and Wildlife Service files)

Figure 20. Distribution of Aleutian terns in Alaska.



(U.S. Fish and Wildlife Service files)

starve. Eggs and chicks are also lost in bad years because if adults are away from the nest for long periods while searching for food, predators or bad weather take a large toll (Baird and Gould 1983). Survival of adults is seldom affected by scarcity of food because they can forage farther when they are not rearing young, but even adults starve in the worst summers (Nysewander and Trapp 1983).

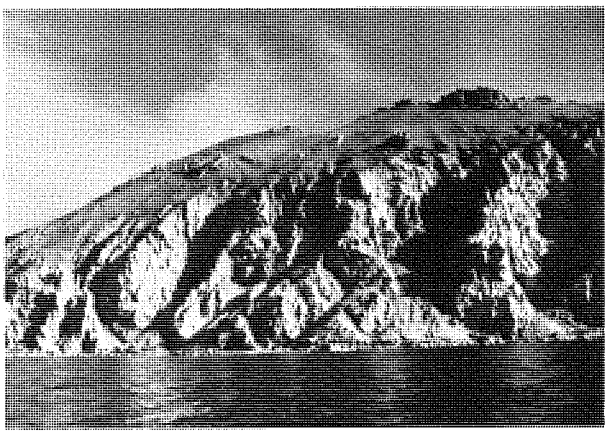
Terns - The arctic and Aleutian terns breed on the coast of Alaska. The arctic tern is widespread at high latitudes in the northern hemisphere, and is found around the entire coast as well as on lakes and rivers of the interior (Figure 19). Approximately 50,000 breed on the coast of Alaska. The Aleutian tern is found only on the coast of Alaska and adjacent part of Siberia; about 20,000 breed from the Chukchi Sea through the Gulf of Alaska (Figure 20)(Sowls and Slothower 1987). Both species breed in colonies in meadows of short grass on islands; the arctic tern also nests on sand or gravel flats. Terns feed on small fish and some zooplankton by hovering above the water and diving in, generally in protected bays close to the colony. Capelin and sandlance are the primary prey in some areas, although arctic terns at sea also take zooplankton (Hunt et al. 1981a, Baird and Gould 1983, Sanger 1983). The breeding success of terns is highly vulnerable to yearly variations in prey (Baird and Gould 1983).

Terns are severely affected by disturbance from human visitors while nesting, since nests are closely spaced on open ground. Introduced cattle on several islands also eliminated terns there. Predators such as foxes cause severe losses of adults and young, and the birds often stop nesting in affected areas.

Murres - Two species of murres breed in Alaska. Both common and thick-billed murres nest around the coast (Figure 21); common murres predominate in the south and east, thick-billed murres in the north and west. There are approximately 6 million of each species, comprising together one fifth of all seabirds in the state (Sowls and Slothower 1987). Single colonies can number in the hundreds of thousands. Censuses are moderately reliable, except where observers fail to distinguish between species.

Murres breed on ledges on sheer cliffs, common murres on broad ledges and thick-billed murres on ones only 6-12 inches wide. Birds line the ledges packed as closely as possible, each incubating a single egg laid on the bare rock. The species occasionally use steep vegetated slopes or, in the case of common murres, flat tops of islands where predators are not a threat.

Murres dive deeper than 300 feet (100m; Piatt and Nettleship 1985), the deepest of any seabird, and often travel 30 to 60 miles from the colony to feed, or sometimes farther in the case of thick-billed murres (Hunt et al. 1981b, Hunt et al. 1981d, Schneider and Hunt 1984). Common murres forage over the inner and middle continental shelf, and thick-billed murres over the outer domain if it is close enough to the colony (Hunt et al. 1981d, Kinder et al. 1983, Schneider and Hunt 1984). They are especially found at the "front" between the inner and



The rocky, precipitors cliffs where the Brooks Range meets the sea at Cape Lisburne provide habitat for the northernmost colony of cliff nesting seabirds in the state.

middle domains (Kinder et al. 1983) or where currents or upwellings concentrate their food (Tuck 1960). Both eat zooplankton and small fish. Common murres take somewhat more fish throughout the year, whereas the thick-billed murre also eats squid, zooplankton and some bottom-dwelling invertebrates at most times, but carries fish to its young (Hunt et al. 1981a, Murphy et al. 1987). Capelin, sandlance, walleye pollock, arctic cod, and shrimp are crucial prey in one or more areas (Ainley and Sanger 1979, Straty and Haight 1979, Sanger 1983, Schneider and Hunt 1984, Murphy et al. 1987).

Populations of murres are apparently stable in most areas, but have declined at one of two colonies in the Chukchi Sea (Springer et al. 1985), in Norton Sound (Murphy et al. 1986), and in the Pribilofs (Troy and Baker 1985). Reasons for this are uncertain. Murres are well protected from ground predators by their cliff nests and have persisted on many islands where foxes were introduced. They are highly vulnerable to disturbance at the colony; human visitors or sounds of development may cause large numbers to fly suddenly from the ledges, and eggs or chicks are kicked off in the panic. Disturbance is unlikely to have been the cause at most colonies where murres have declined, however. Potential reasons for a decline in murre numbers include a reduction in fish availability near the colonies due to unfavorable sea conditions or heavy commercial fishing, or a combination of these factors (Springer et al. 1985, Murphy et al. 1986).

Murrelets - three species of murrelet (marbled, Kittlitz's, and ancient) breed in Alaska. The Kittlitz's murrelet breeds nowhere else. It is, however, the most widespread in Alaska, from the Chukchi Sea to Southeastern, whereas the marbled and ancient murrelets breed only in the Gulf of Alaska and Aleutians. Kittlitz's and marbled murrelets nest inconspicuously in scattered locations, so their numbers are unknown. Their nesting habitat is the scree of barren mountain slopes, sometimes several miles from water. Marbled murrelets also nest on branches of mature coniferous trees in southeastern Alaska. Ancient murrelets nest in burrows in loose soil near the water. In some places they are more colonial than the other two species, but in the Aleutians they are also solitary, perhaps as a response to predation by foxes (D. Forsell pers. comm. 1986). They number about 800,000 in Alaska (Sowls and Slothower 1987), and are one of six nocturnal seabirds here (Figure 22).

Murrelets forage close to shore and in bays and inlets, though the ancient murrelet is also found at sea over the continental shelf. All feed on zooplankton, and on small fish including sandlance, capelin, and walleye pollock (Ainley and Sanger 1979, Gould et al. 1982, Sanger 1983).

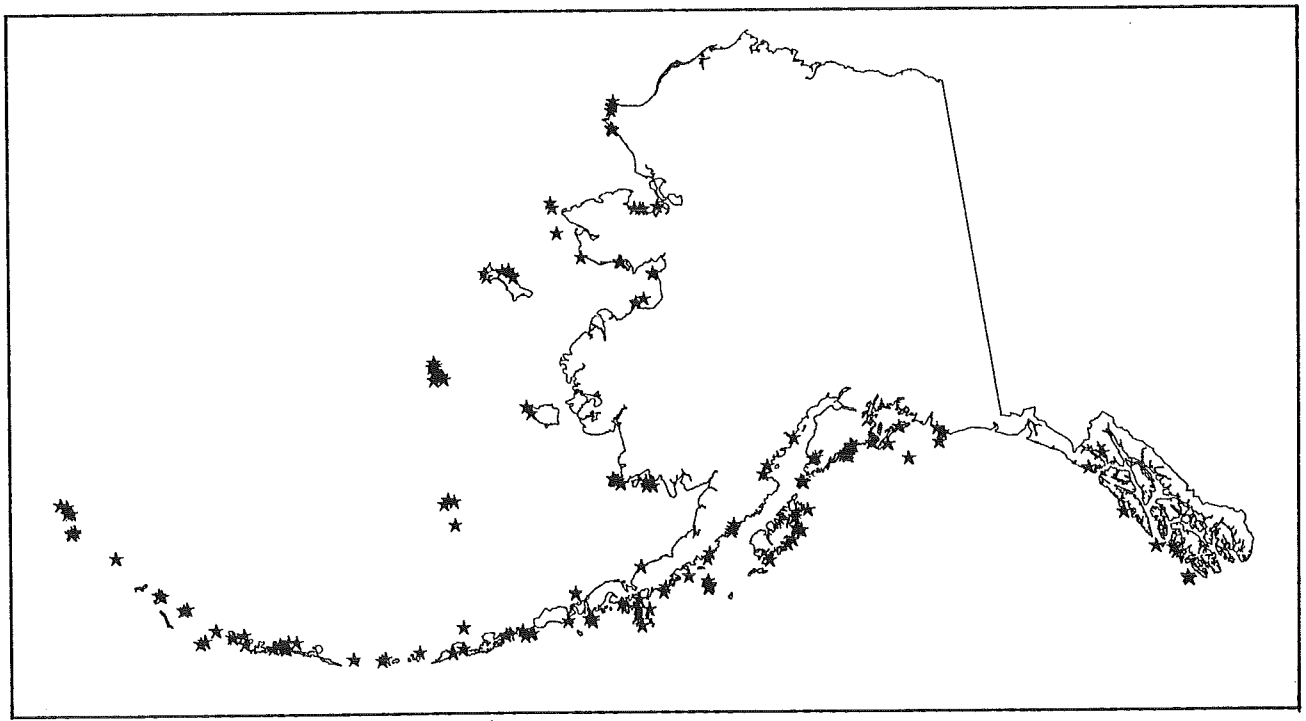
Ancient murrelets were severely reduced where foxes were introduced (Nysewander et al. 1982). They appear to coexist with introduced rodents better than many burrow-nesting species, perhaps because chicks normally leave their burrows for the sea only a few days after hatching.

Guillemots - These auks breed along the coast of Alaska, the pigeon guillemot south of Cape Thompson in the Chukchi Sea and the black guillemot north of it (Figures 23-24). Both nest near the shoreline in crevices under boulders, driftwood, or artificial objects such as boxes. Guillemots are dispersed in small numbers rather than concentrated in colonies. There are few data on their numbers because of their scattered and concealed nests, but there are approximately 200,000 pigeon and less than 2,000 black guillemots in the state (Sowls and Slothower 1987). Guillemots forage in shallow water (less than about 75 feet or 25 m deep) near the shore, both in protected bays and off rocky coasts, and travel less than 8 miles (5 km) from the colony (Kuletz 1983). Pigeon guillemots feed on capelin, cod, bottom-dwelling fish such as sculpins, and some crabs and shrimp (Ainley and Sanger 1979, Kuletz 1983).

Auklets - The six species of auklets breed only in the North Pacific, and four are thought to breed only in Alaska and a few nearby Siberian islands. Together with the murrelets, these species provide Alaska with the most diverse community of small auks anywhere in the world.

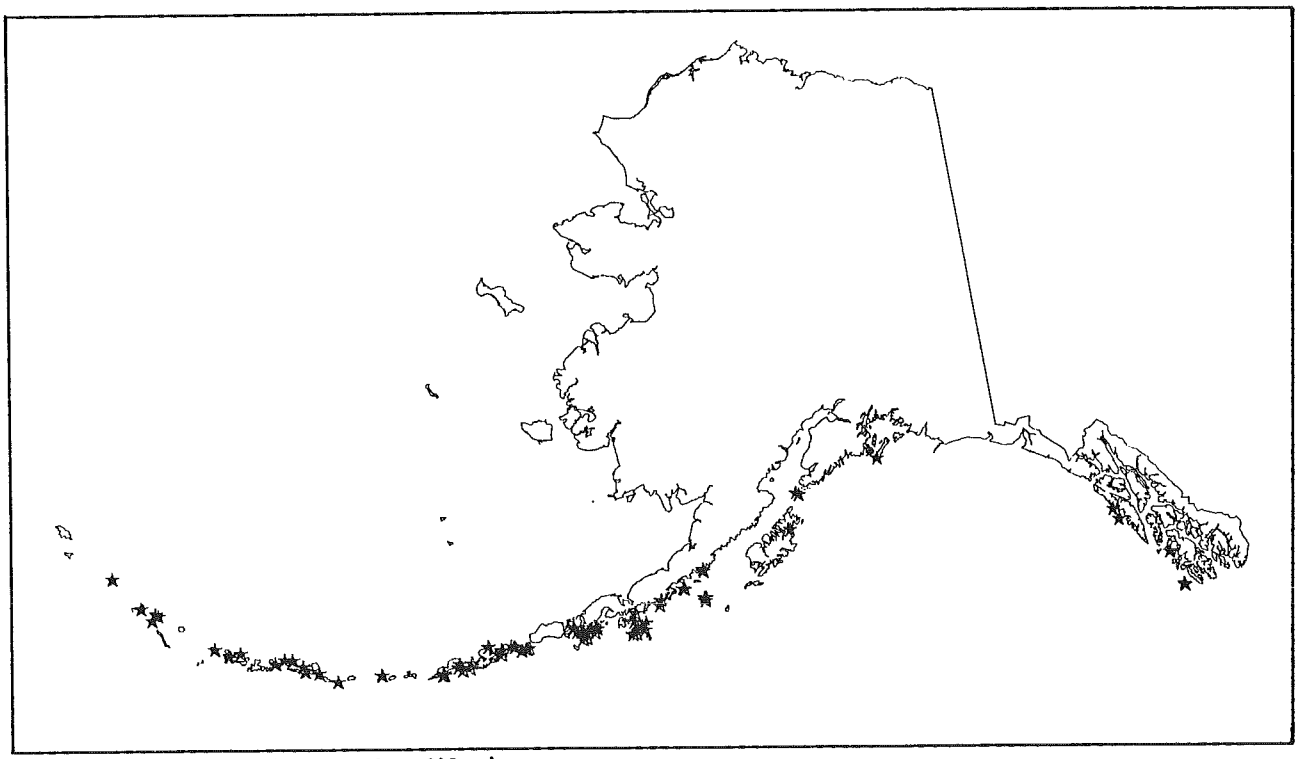
Least and crested auklets are found in Alaska and eastern Siberia, and number approximately 9 million and 3 million respectively (Sowls and Slothower 1986). The least auklet is the most abundant seabird in Alaska; this species alone

Figure 21. Distribution of murres in Alaska.



(U.S. Fish and Wildlife Service files)

Figure 22. Distribution of ancient murrelets in Alaska.



(U.S. Fish and Wildlife Service files)

comprises one fifth of the state's total. Both breed from the Bering Straits to the Alaska Peninsula and the Aleutians, and form colonies of thousands (Figures 25-26). Parakeet auklets (1 million) breed in Alaska and the Komandorski Islands off Siberia (Figure 27). All three species nest in crevices in boulder fields, lava flows, talus, and similar habitats. Counts of these auklets are approximate, since the birds nest out of sight; birds sitting on rocks outside the nests do not reflect total numbers unless movements are studied carefully (Byrd et al. 1983). More work is needed on methods for reliable estimates of auklet numbers.

The whiskered auklet has smallest population and range of any Alaskan seabird. The species breeds only in the Aleutians and the Soviet Kurile Islands (Figure 28); its population may number only 30,000, although estimates need to be improved (Nysewander et al. 1982, Sowls and Slothower 1987). Its life history is still very poorly known, although nesting habitat is similar to the preceding three. Passes between the islands are apparently important for feeding, which makes the whiskered auklet highly vulnerable to oil spills in these locations. The Service will strive to improve its ability to monitor and protect this unique seabird.

These four species of auklets are able to coexist with foxes, although the predators take some birds at the nest entrance.

Cassin's and rhinoceros auklets range more widely in the North Pacific, and breed in Alaska from the Gulf of Alaska to scattered locations in the Aleutians (Figures 29-30). Both nest in burrows in soft soil and are nocturnal. They are difficult to count, but probably number about 1 million and 200,000 respectively (Sowls and Slothower 1987). These species may have been severely reduced by introduced fox and rodents (Murie 1959, Nysewander et al. 1982).

Auklets feed within 15 miles of the colony, except that parakeet auklets may go farther. All are attracted to zones where upwellings or converging currents create concentrations of food (Ainley and Sanger 1979, Hunt et al. 1981b and 1981d, Gould et al. 1982). Auklets dive for food to moderate depths, some as deep as 250 feet (90 m) (Gould et al. 1982). All feed on zooplankton almost exclusively, with two exceptions. The parakeet auklet, the second largest, consumes some fish (Hunt et al. 1981c). The rhinoceros auklet, the largest, feeds primarily on fish such as herring, sandlance, and capelin (Sanger 1983, Hatch 1984, Vermeer and Westrheim 1984).

Puffins - Horned and tufted puffins are widespread in the North Pacific, but both have their centers of distribution (densest populations) in Alaska. Both breed from the Chukchi Sea southwards, though the horned puffin is the more abundant in the north (Figures 31-32). They number 1.5 million and 4 million respectively (Sowls and Slothower 1987), although these figures are approximate because of the birds' concealed nests. Some colonies number in the hundreds of thousands. Tufted puffins nest in burrows in the soft soil of steep grassy slopes, usually above cliffs. Horned puffins occupy crevices in the cracks of cliffs or between talus blocks. Each species sometimes builds nests in the manner of the other. Horned puffins regularly nest in burrows in a large part of the Semidi Islands (Alaska Peninsula Unit) and in a few other islands on the refuge (Gabrielson and Lincoln 1959, Hatch and Hatch 1983).

Puffins forage for food by diving. Breeding horned puffins are usually close to the colony in sheltered bays, while tufted puffins forage farther over the shelf or beyond it (Hunt et al. 1981b, Gould et al. 1982, DeGange et al. 1985). Principal prey is small fish such as juvenile walleye pollock, capelin and sandlance. Tufted puffins also take squid, and adults of both species eat zooplankton, shrimp, molluscs and worms. They replace invertebrate foods with fish or (tufted puffin) squid when feeding their young (Ainley and Sanger 1979, Straty and Haight 1979, Hunt et al. 1981a, Wehle 1982, Baird and Gould 1983).

Population trends of puffins are unknown because they are difficult to census accurately. Puffins are probably fewer in some regions than before foxes were placed on islands, but impacts may have been less severe than on some species.

Other birds - Many groups of birds are found on Alaska Maritime Refuge, but in contrast with seabirds, only a few species from most groups breed on the refuge. This probably reflects the

Figure 23. Distribution of pigeon guillemots in Alaska.

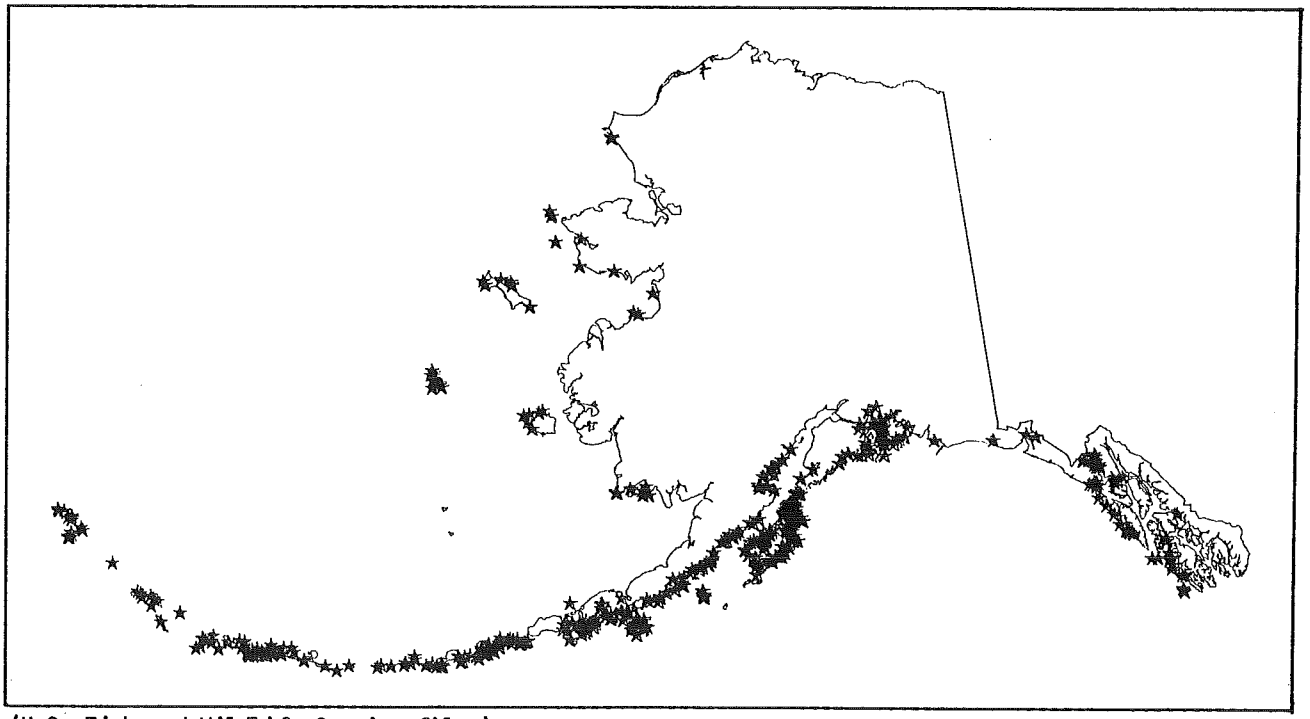


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Figure 24. Distribution of black guillemots in Alaska.

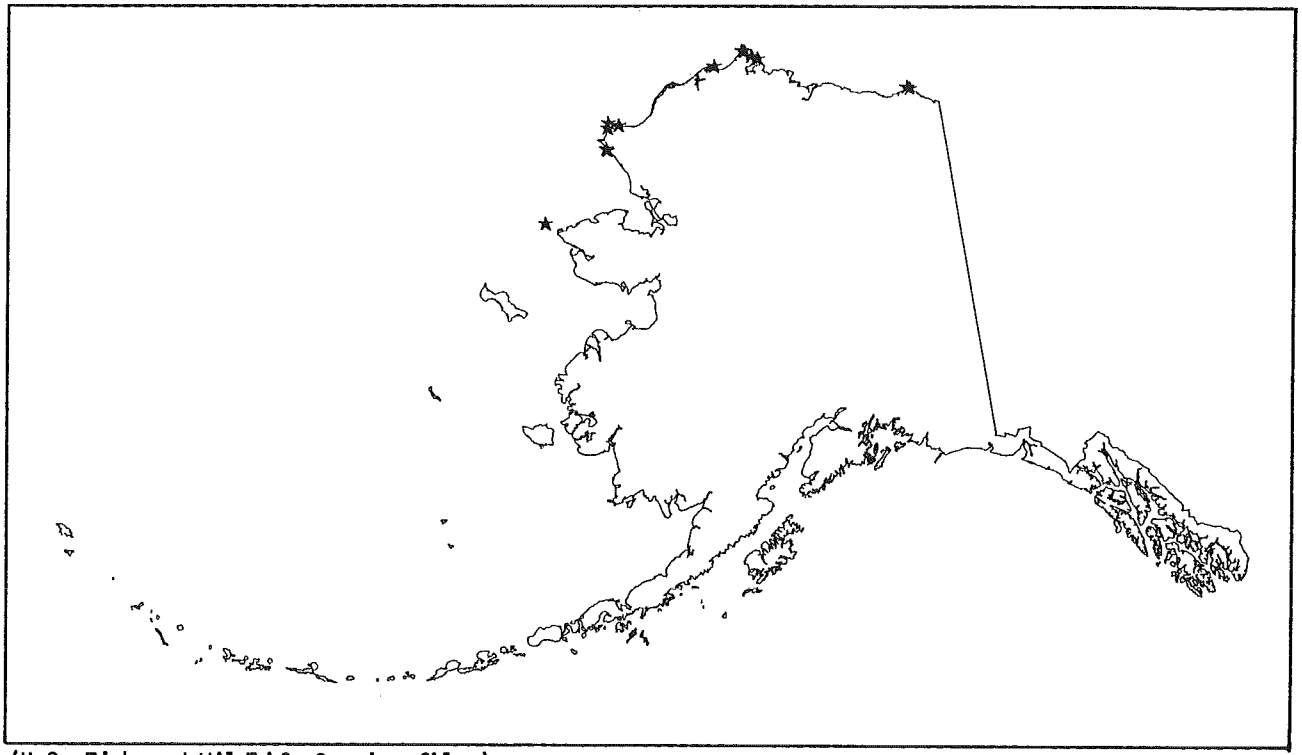

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Figure 25. Distribution of least auklets in Alaska.

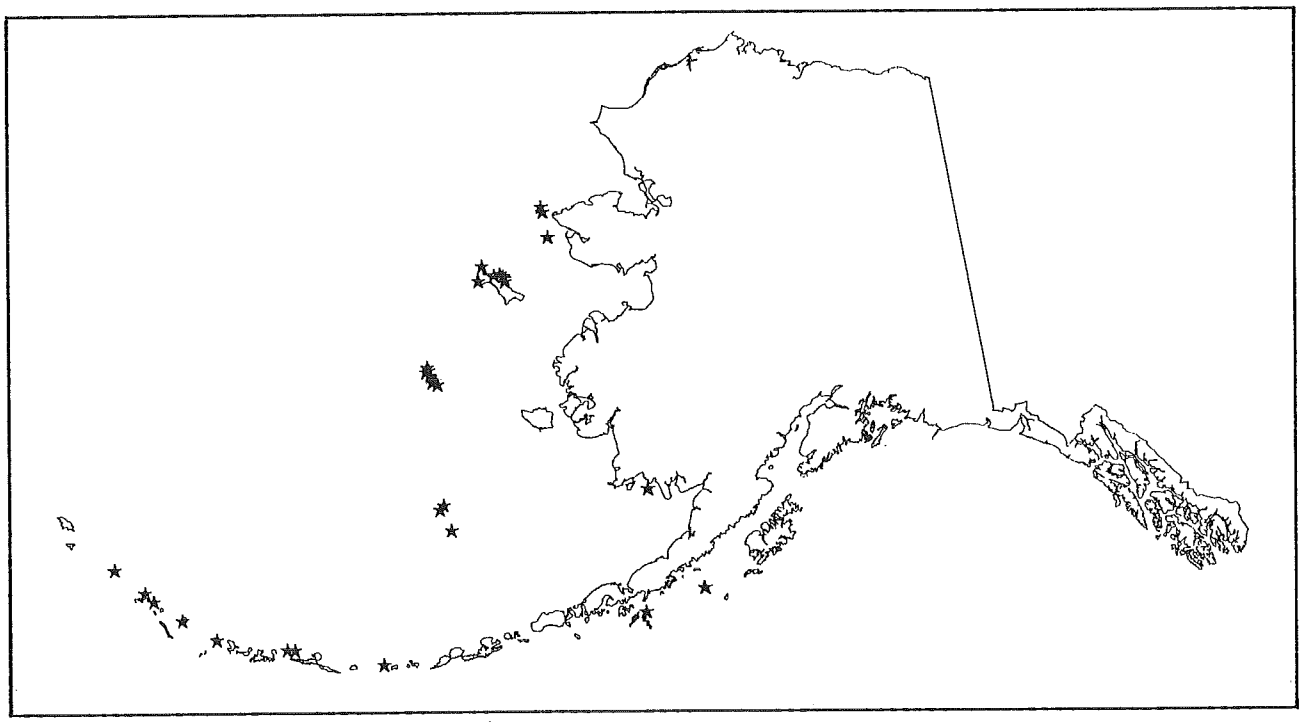

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Figure 26. Distribution of crested auklets in Alaska.

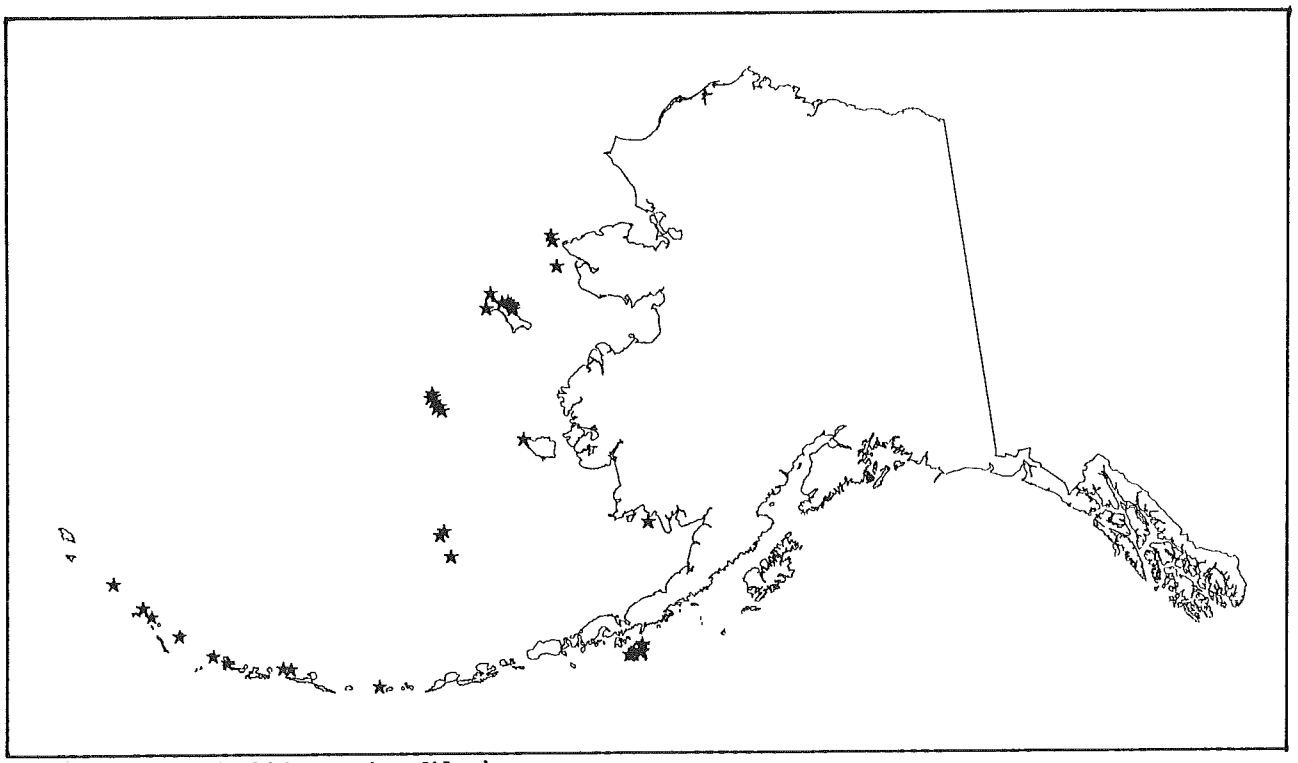

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Figure 27. Distribution of parakeet auklets in Alaska.

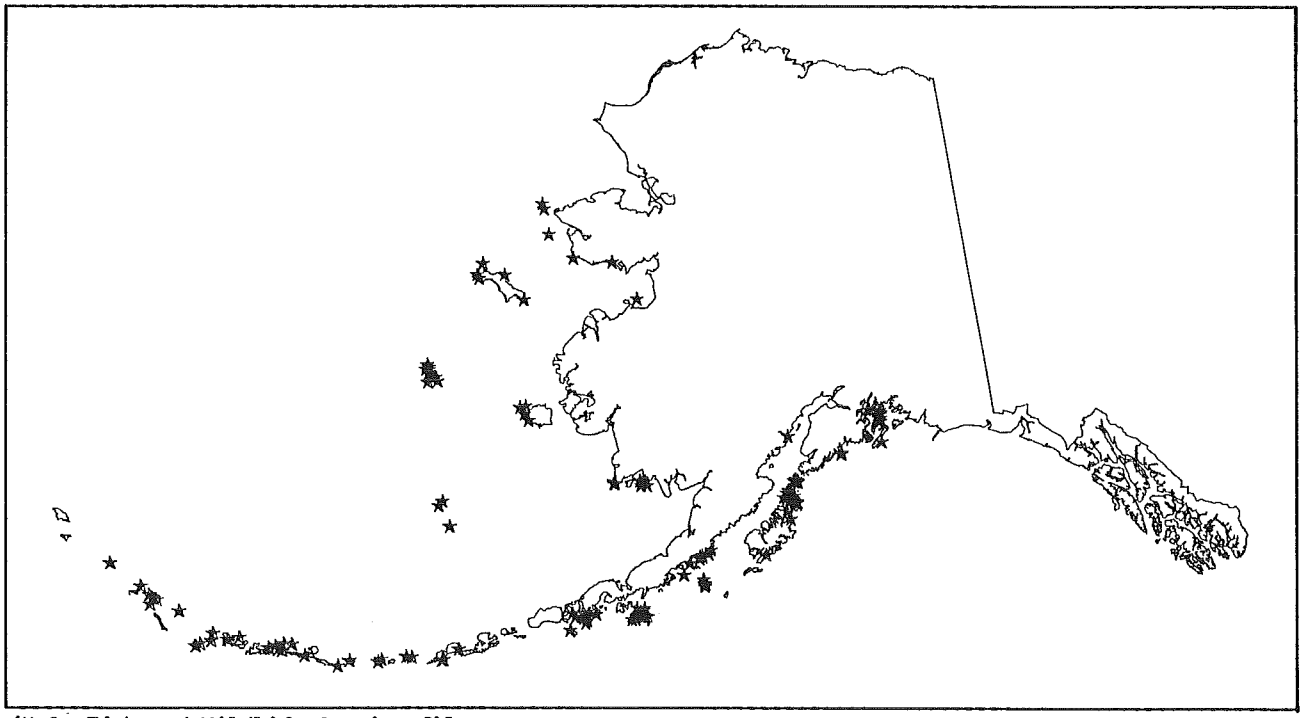

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Figure 28. Distribution of whiskered auklets in Alaska.

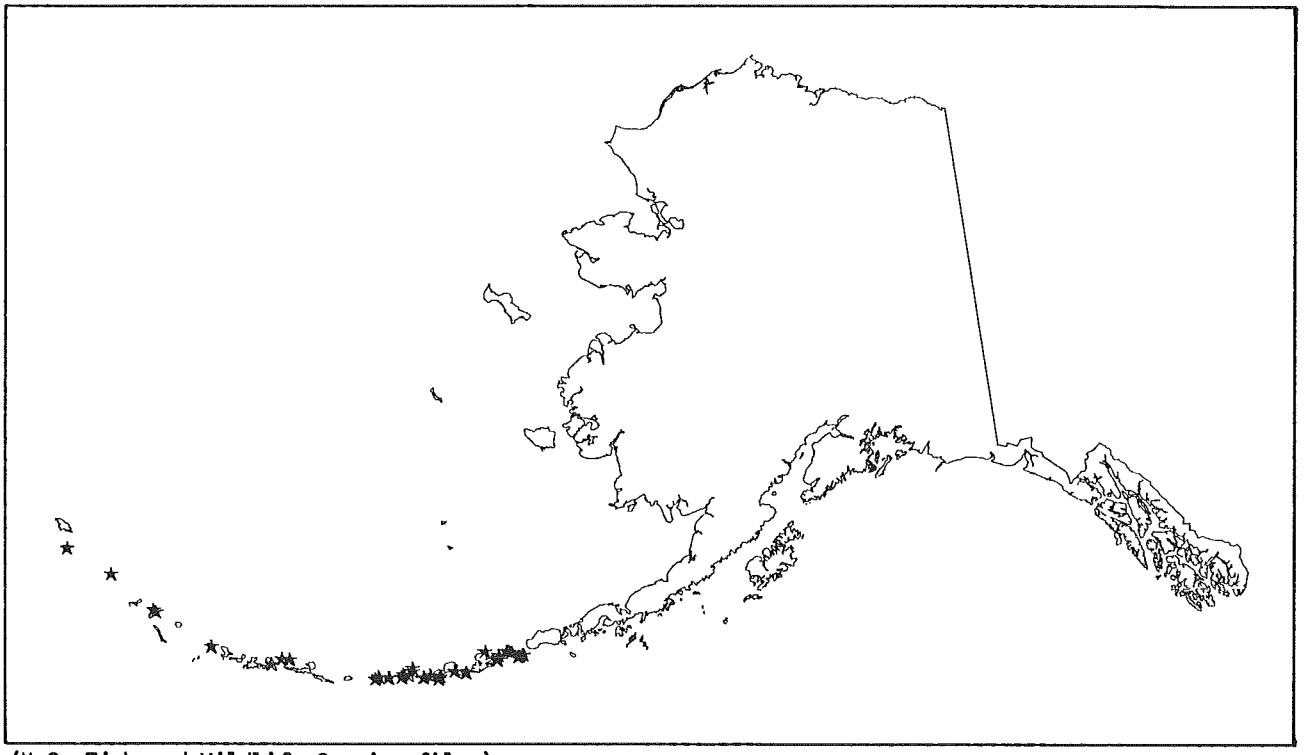

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Figure 29. Distribution of Cassin's auklets in Alaska.

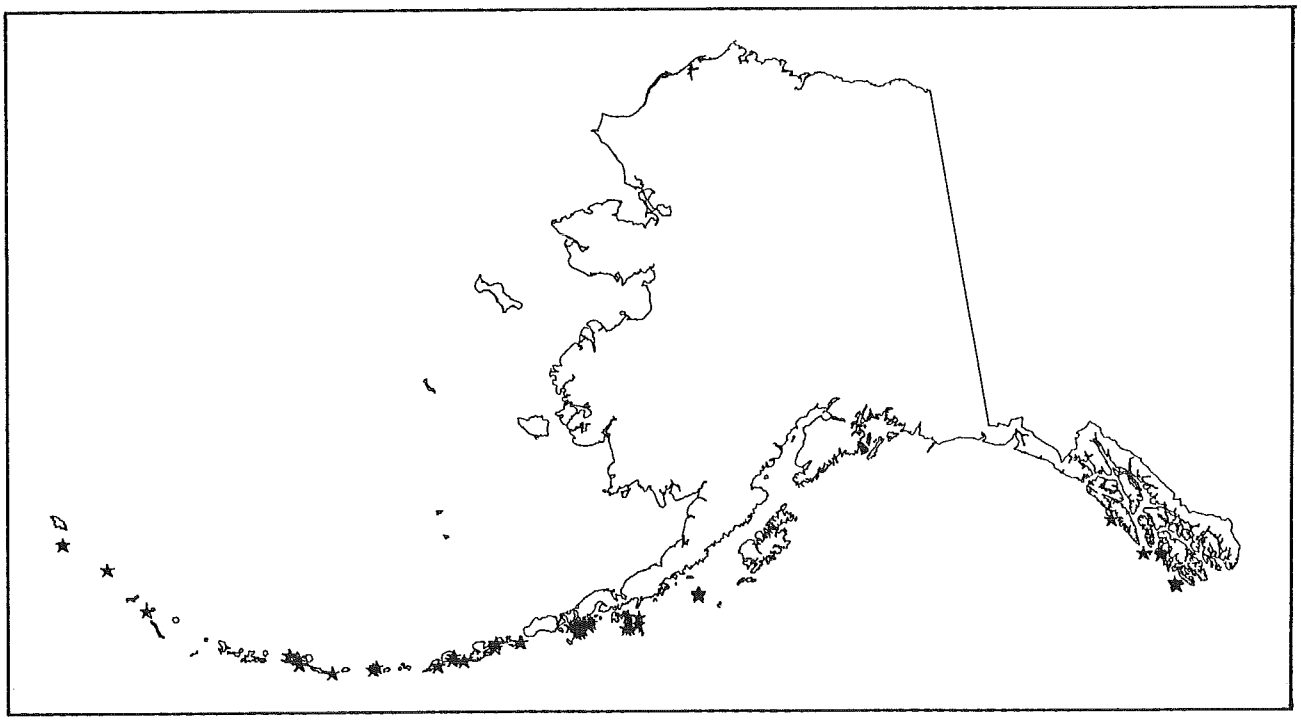
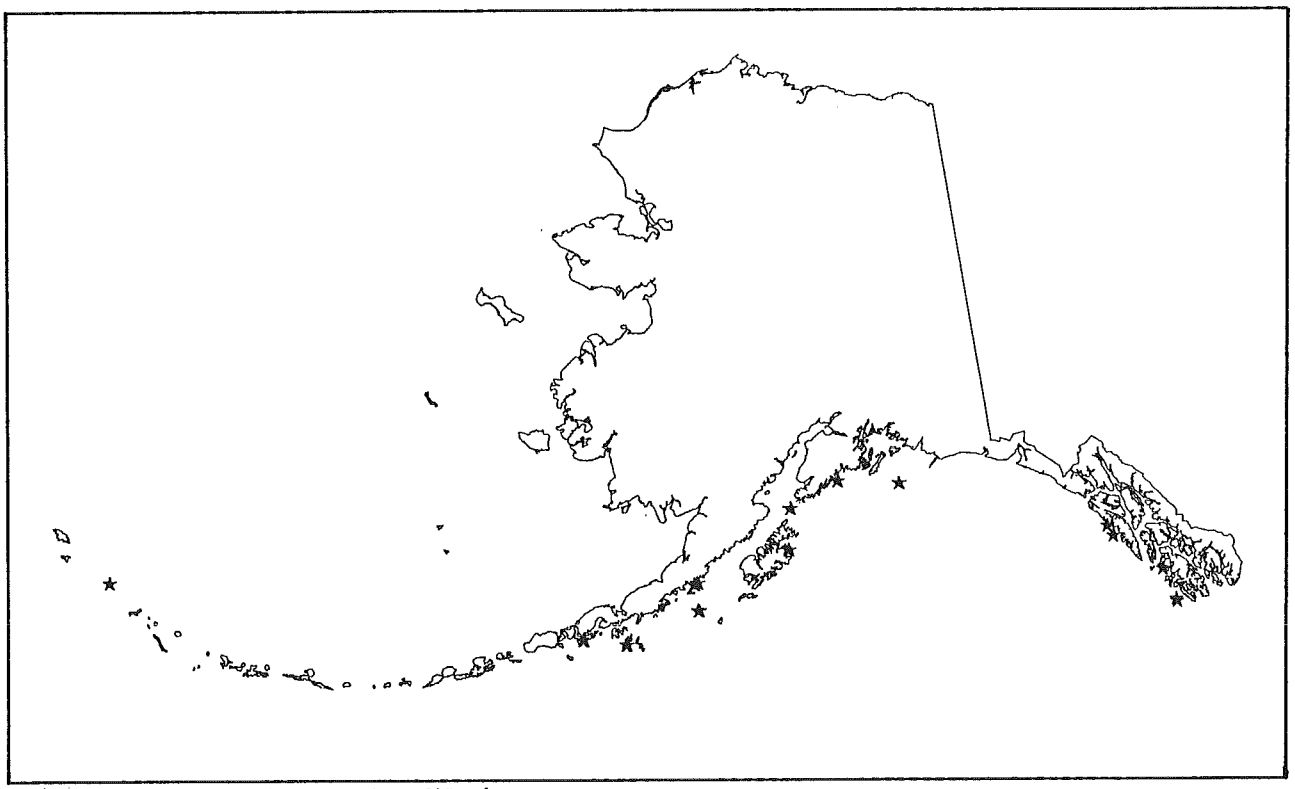


Figure 30. Distribution of rhinoceros auklets in Alaska.



(U.S. Fish and Wildlife Service files)

harsh environment and isolation of refuge lands. On the other hand, the refuge supports an extraordinary diversity of birds during the nonbreeding season, particularly during migration, because of the proximity of the Aleutian Islands and Bering Sea Units to Siberia. Many birds from both continents stop on these islands to rest. The Alaska Peninsula and Gulf of Alaska units receive only North American migrants, but many bird species not found farther north make their homes there. Geographic affinities of birds of the Alaska Maritime Refuge are given in Appendix D.

Waterfowl - Swans, geese, and dabbling ducks raise their young on ponds and marshes on the larger islands of the refuge, and nest in uplands near these waterbodies. Tundra swans nest on a few islands of the Alaska Peninsula Unit (Bailey and Faust 1981), and on Unimak. Dabbling ducks of the refuge include the green-winged teal, mallard, northern pintail, and (in the Alaska Peninsula Unit) northern shoveler and gadwall. The teal is an example of a bird with affinities to Asia; east of the central Aleutians the bird is North American form, but the Eurasian subspecies replaces it in the western Aleutians. These birds feed on aquatic vegetation, and their young also eat insects and aquatic invertebrates. The Aleutian Canada goose is described under "Endangered Species" below.

A few diving ducks also breed on ponds of the refuge, including oldsquaw (in the Bering Sea and Chukchi Sea units), and greater scaup and red-breasted merganser (in the Aleutians and eastward). Common eiders nest close to the shoreline of fox-free islands in every unit of the refuge, as well as on tundra of the arctic coastal plains. About 20,000 are estimated to nest in Alaska (Sowls and Slothower 1987). Eiders rear their young in protected inlets of the sea. Large numbers of nonbreeding harlequin ducks spend the summer along shores of the Aleutian Islands Unit. Diving ducks feed on various molluscs and crustaceans from the sea bottom.

On many islands waterfowl are almost unable to nest because fox prey on them. Ducks nest in large numbers on a few fox-free islands with good habitat (Bailey and Faust 1980). Other islands provide enough cover for a few ducks to nest successfully despite the fox, but populations would be much higher in suitable habitat if introduced fox were eliminated, for instance on Ushagat Island (Gulf of Alaska Unit) and some of the Shumagins (Alaska Peninsula Unit). This problem is discussed further under "Mammals" and "Endangered Species".

Populations of waterfowl are much higher during migration and winter than the breeding season in most of Alaska Maritime Refuge. Ducks and geese of western and northern Alaska visit offshore islands en route to Pacific coast wintering grounds, and the western Aleutians provide a rest stop for Asiatic species such as Eurasian wigeon, common pochard, and spot-billed duck. Brant assemble before migration on barrier islands in the Chukchi Sea Unit (Lehnhausen and Quinlan 1981, Gill et al. 1985). All ice-free shores of the refuge support large wintering populations of waterfowl. A few Asiatic whooper swans usually winter in the western Aleutians. Nearly all of the world population of emperor geese, which breed in southwestern Alaska and the Soviet arctic, winter along Aleutian shorelines. Some brant from the same area winter in the Alaska Peninsula Unit. Sea ducks such as greater scaup, scoter, goldeneye, bufflehead, eiders, harlequin, and oldsquaw winter throughout southern Alaska, including sheltered inlets of the Aleutian Islands, Alaska Peninsula and Gulf of Alaska units.

Other marsh and waterbirds - Loons and grebes are preeminently diving birds, loons using fish and grebes capturing invertebrate prey. They breed on lakes and spend the winter winter on sheltered marine coasts. Red-throated and Pacific (formerly called arctic) loons commonly nest on mainland portions of the Chukchi Sea Unit. Red-throated and common loons breed on larger ponds and lakes in the Aleutian Islands and eastward. Ice-free inlets of the refuge provide wintering grounds for red-throated and Pacific loons and for red-necked and horned grebes, including many birds from mainland Alaska. Sandhill cranes breed in the Chukchi Sea Unit, and some birds migrating from the western mainland stop in meadows and marshes on larger islands of the Alaska Peninsula Unit. Belted kingfishers are found in the Alaska Peninsula and Gulf of Alaska Units.

Figure 31. Distribution of horned puffins in Alaska.

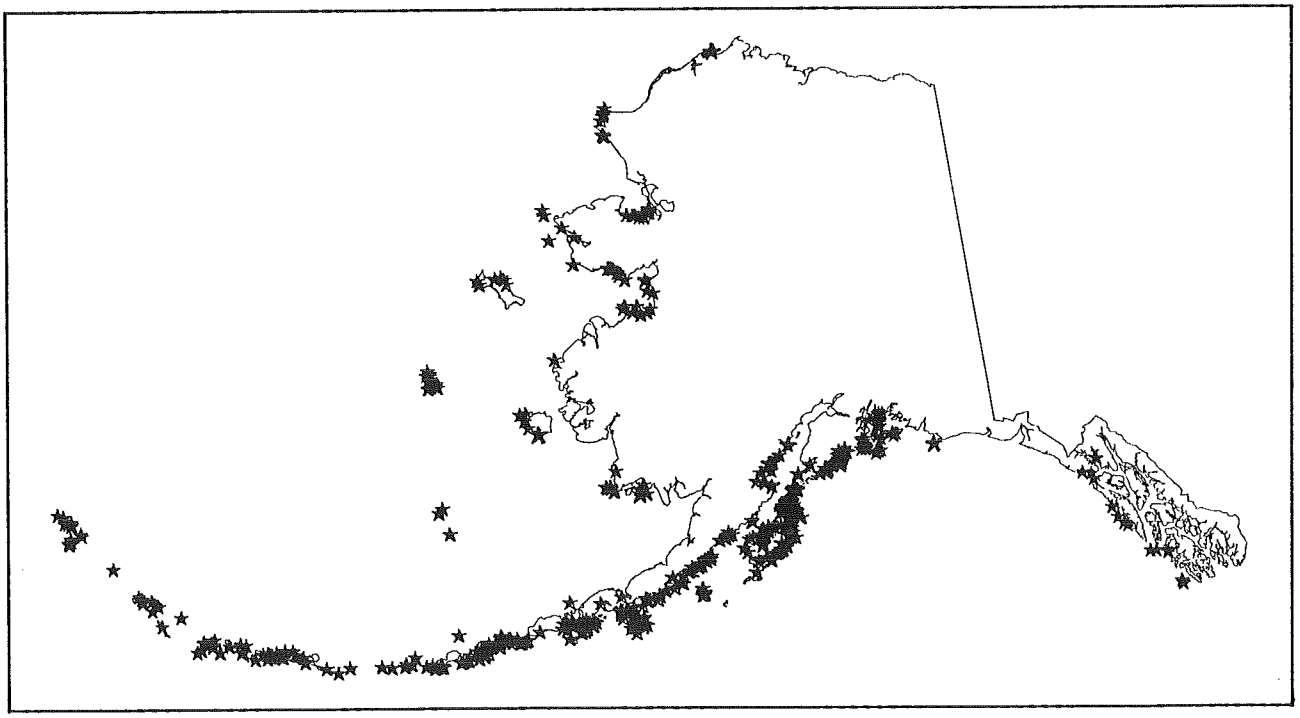
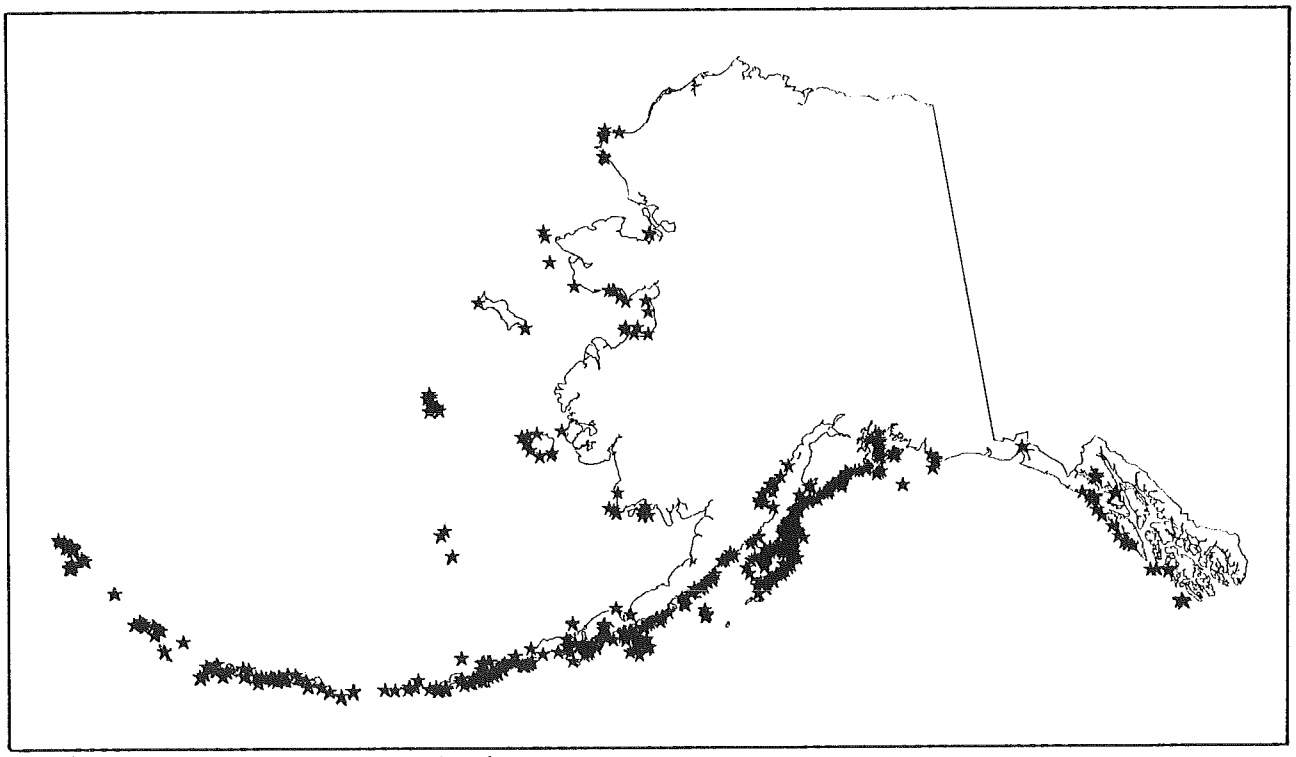


Figure 32. Distribution of tufted puffins in Alaska.



(U.S. Fish and Wildlife Service files)

Shorebirds - These small wading birds generally nest on tundra or in marshes of the Arctic coastal plains, though some species prefer subarctic pond margins, alpine tundra, or river sandbars. Most species winter on coastlines far south of Alaska. They feed in summer on the abundant insect fauna of the tundra, and in winter on small intertidal molluscs, worms, and crustaceans. The most abundant shorebird species on Alaska Maritime Refuge are those that live on the islands at all times of year, the black oystercatcher (in the Aleutians and eastward) and rock sandpiper (in all units from the Bering Sea southwards). Both frequent rocky shorelines, except that rock sandpipers breed on dwarf shrub tundra. Numbers of the black oystercatcher in Alaska are estimated at 20,000 (Sowls and Slothower 1987). The versatile red-necked phalarope breeds in all units, especially from the Aleutians northwards, and the semipalmated plover in all except the western Aleutians. The Chukchi Sea Unit, because it contains more typical mainland habitats than the rest of the refuge, supports large numbers of breeding semipalmated and lesser golden plovers and semipalmated and western sandpipers (Williamson et al. 1966). The western Aleutians are the only North American breeding location for three Asiatic shorebirds: wood sandpiper, common sandpiper, and the Asiatic subspecies of the common snipe.

Migrants that pass through the refuge are diverse, especially in the Bering Sea and western Aleutians. These areas receive Asiatic species such as Eurasian dotterel, common greenshank, Terek sandpiper, and black-tailed godwit. Of 59 shorebird species recorded in these two units of the refuge, 28 are Asiatic migrants. The Pribilof Islands in the Bering Sea Unit are uniquely important to one species that breeds in both Siberia and North America, the ruddy turnstone. A large proportion of this species' regional population stops there on migration (Thompson 1983). Farther east, beaches of the eastern Aleutians, Alaska Peninsula Unit, and Gulf of Alaska Unit provide food and rest for North American migrants such as lesser golden plovers, western and least sandpipers, and dunlins. Early in the autumn migration many of the same species gather on barrier islands of the Chukchi Sea Unit (Gill et al. 1985). Beach and mudflat habitats for migrating shorebirds are widely scattered because most shorelines of the refuge are dominated by cliffs, so that no single place in the refuge is critical for immense numbers of shorebirds in the manner of the Copper River Delta or Izembek Lagoon. The refuge is important instead because it offers many small pieces of habitat, hosts an unusually large number of species, and is critical for a few.

Although most shorebirds spend the winter south of Alaska, the rock sandpiper and black oystercatcher remain near the breeding grounds all year. The Aleutians are also important to the sanderling, which breeds in the high arctic; part of the population winters in the island chain.

Raptors - The diversity of raptors on Alaska Maritime Refuge is limited by the small number of prey types found there. Nesting peregrine falcons are the most widely distributed on the refuge. They breed on seacliffs almost everywhere, including the entire Aleutian chain (Sekora 1973), but not remote islands of the Bering Sea Unit. Since the peregrine typically feeds on medium-sized birds, seabirds provide an abundant diet for it. Refuge peregrines are in the subspecies Falco peregrinus pealei, except that birds of the Chukchi Sea Unit include F. p. tundrinus (Williamson et al. 1966), and the peregrine that nests commonly on headlands of the Bering Sea Unit in Norton Sound is probably F. p. aratum. Only aratum is considered endangered at present; tundrinus is listed as threatened.

Bald eagles are the next most widespread raptor after the peregrine. They nest in trees in the Gulf of Alaska Unit, and on bushes or the ground in the Alaska Peninsula Unit and the Aleutians west to Buldir Island. They can subsist on a wide variety of foods including carrion, fish, and waterfowl. The white-tailed eagle, a Eurasian relative of the bald eagle, sometimes breeds in the western Aleutians, and several other Asiatic species migrate through the islands. Additional species of raptors are found on the mainland and nearby islands. Northern harriers (formerly called marsh hawks), golden eagles, and rough-legged hawks breed in the Chukchi Sea and Alaska Peninsula, and probably Aleutian Islands (eastern) and Gulf of Alaska units. Gyrfalcons nest in the Chukchi Sea Unit and the Norton Sound portion of the

Bering Sea Unit, and one nest has been observed in the Alaska Peninsula Unit (Swartz 1966, Springer and Roseneau 1977, Williamson et al. 1966, Bailey and Faust 1984). Gyrfalcons prey on large birds, particularly ptarmigan. Harriers, golden eagles, and rough-legged hawks feed on small mammals such as ground squirrels. Harriers nest on the ground, the other three on cliffs. The principal owl of the refuge is the short-eared owl, which nests on the ground in all units where low open tundra and small rodents are available. Snowy owls breed on tundra in the Chukchi Sea and Aleutian Islands units, and rarely in the Bering Sea Unit. The Gulf of Alaska Unit supports typical owls of the coniferous forest such as great-horned owls.

Grouse and ptarmigan - The rock ptarmigan occurs in all units of the refuge. It has evolved into a number of slightly different forms in the Aleutians due to the isolation of each island's population from the others. Some authorities recognize eight different subspecies of rock ptarmigan in the Aleutians chain (Johnsgard 1983). This is an unusual number of subspecies in a relatively small geographic area for a bird, but similar diversity is also found in a few songbirds of refuge islands. Rock ptarmigan live in low scrub and eat shoots of these plants. Willow ptarmigan are found in the taller scrub of the Chukchi, Alaska Peninsula, and Gulf of Alaska Units, and white-tailed ptarmigan on alpine tundra of the Gulf of Alaska Unit.

The only other member of this group on the refuge is the spruce grouse, which occupies spruce-hemlock forest on islands of the Gulf of Alaska Unit.

Songbirds and other species - A few species of songbirds, all of them adapted to breeding on tundra or in rocky habitats, are widespread on the refuge. The Lapland longspur is abundant in grassy meadows and tundra during the summer. This species is common everywhere except in the eastern Gulf of Alaska, where most islands are forested. The species spends the winter in the northern "Lower 48" and southern Canada. Snow buntings breed where prostrate tundra is interspersed between rock outcrops. This habitat is scattered throughout the refuge, near sea level in the north but mostly at higher elevations in the Aleutians and southeastern units (Murie 1959, Bailey and Faust 1984). The water pipit and savannah sparrow breed on tundra with low scrub or prostrate plants in the Chukchi Sea Unit and at higher elevations in the Alaska Peninsula and Gulf of Alaska Units. Both species are rare in the more isolated Bering Sea and Aleutian Islands Units. Rosy finches are widespread in rocky habitats from the Bering Sea Unit southwards; these birds prefer deep crevices for nesting, and therefore are concentrated around sea cliffs. They also make use of abandoned buildings in former military zones of the Aleutians. Bank swallows construct colonies of nest holes in sandy banks in all areas except the outer islands. The common raven breeds everywhere in cliff habitats on the coast and inland. Rosy finches, common ravens, and some snow buntings in southeastern areas are present throughout the year.

Three songbird species of Alaska Maritime Refuge are of special interest. McKay's bunting is a species whose world population in summer is almost entirely restricted to one island in the Bering Sea Unit, St. Matthew Island. The song sparrow and the winter wren are widespread in North America, where they occupy many scrub habitats, but in most of Alaska the birds depend on coastal beaches and cliffs and the adjacent tundra (Byrd and Day 1986). Both species are much larger on Alaskan islands than anywhere else, and both have evolved into several races there (Gabrielson and Lincoln 1959). The song sparrow lives in the Aleutian Islands and eastward. The winter wren is common from St. George Island (Bering Sea Unit) through the Aleutians and eastward. The song sparrow and winter wren are resident throughout the year.

Most small birds that are widespread on the refuge subsist on seeds and other vegetation, supplemented by insects and intertidal crustaceans during summer. The winter wren eats only insects and crustaceans, and the bank swallow catches insects in flight. Ravens prey on seabirds, their eggs, and small mammals, and also eat carrion.

The mainland and islands near it support a greater variety of songbirds than remote islands because areas near or on the mainland provide more types of habitat. Low and medium scrub (willows and alders) are found in sheltered places in the Chukchi Sea Unit and the Norton

Sound portion of the Bering Sea Unit, and are widespread at lower elevations in the Alaska Peninsula and Gulf of Alaska Units and on Unimak Island. Birds of these habitats in all units include gray-cheeked thrush, fox sparrow, tree sparrow, redpoll, and white-crowned sparrow (Williamson 1966, Bailey and Faust 1980, Byrd 1984). Additional scrub species breeding in the milder climate of the southern units include the black-billed magpie, golden-crowned sparrow, yellow warbler, hermit thrush, and black-capped chickadee. Spruce-hemlock forest is a habitat found only in the Gulf of Alaska Unit from the Barren Islands eastward. This forest supports birds such as golden-crowned kinglet, varied thrush, Townsend's warbler, red crossbill, pine siskin, and several woodpeckers.

Some songbird species that are widespread in Eurasia but are not normally found in North America breed in Alaska Maritime Refuge. Several are rather common in northern and western Alaska, including the Chukchi Sea Unit, such as the arctic warbler, bluethroat, northern wheatear, and yellow wagtail. One species, the Siberian rubythroat, breeds only in the western Aleutians as well as Siberia.

As with other groups, migrating songbirds are far more diverse than the breeding birds in the Bering Sea and Aleutian Islands Units. Species from northern Alaska that stop in these units include the yellow wagtail, Bohemian waxwing, orange-crowned warbler, and hoary redpoll. A much larger number of Siberian species stop during migration: Eurasian skylark, eye-browed thrush, olive tree-pipit, rustic bunting, brambling, and many others.

Vagrants - The above sections describe birds that regularly breed, stage during migration, or winter on the refuge, even though some are rare. Many other bird species sometimes appear on the refuge, especially the Aleutian Islands and Bering Sea Units, when they wander far from their normal migration routes. Some are seen irregularly in most years, others once every few years, and some have made a single appearance in the century since records have been kept. Of 275 bird species reported in the Bering Sea or Aleutian Units or both, 62 were seen only as vagrants. All sightings of vagrants are included in the list in Appendix D for the Chukchi Sea, Bering Sea, and Aleutian Islands Units. Detailed information is not yet available for other units.

Mammals

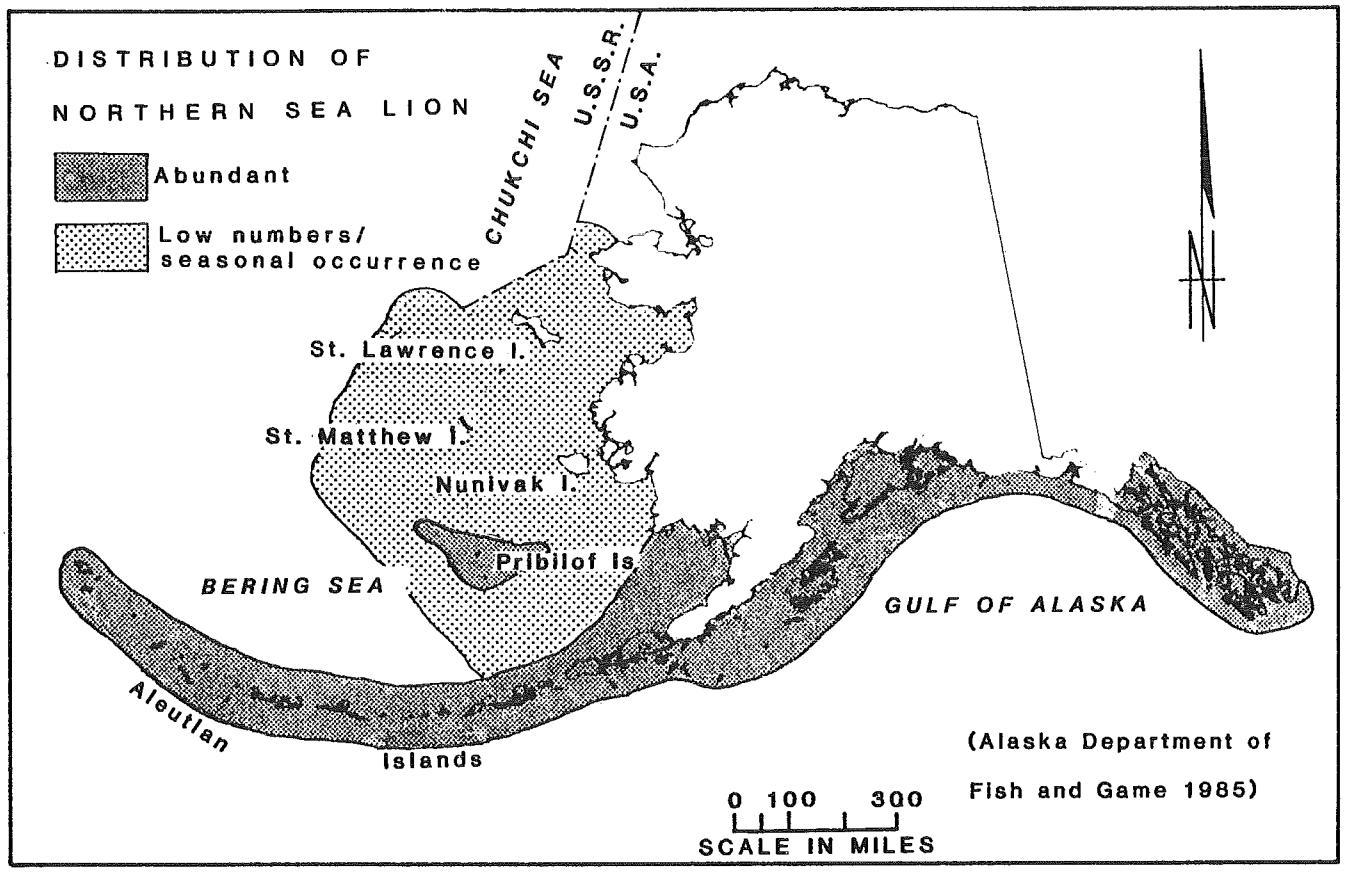
Marine mammals

Northern (Steller) sea lion - In Alaska, northern sea lions occur over the continental shelf in the Gulf of Alaska, the Aleutian Islands, and the Bering Sea (Figure 33). In summer, they range as far north as St. Lawrence Island (McAlister 1981). In winter, most sea lions are thought to move south to the Aleutians and the northwestern Gulf of Alaska, although some haul out on ice floes near the ice front.

The world population of northern sea lions has decreased over a ten year period more than 50 percent from the 230,000 once present (Braham et al. 1980, Loughlin et al. 1984). Approximately half the Alaskan population resides in the Bering Sea and Aleutian Islands and the remainder in the Gulf of Alaska. Many coastal areas used by sea lions are occupied year-round, with the greatest numbers occurring between May and October during breeding and molting seasons (Gusey 1979). Northern sea lions are not noted for undertaking well-defined migrations, but their extensive movements during the year result in substantial seasonal shifts in distribution.

Sea lions generally use well-defined breeding and haulout areas throughout their range. Over 100 regularly used rookeries and haulout sites have been identified and censused in the Bering Sea and Gulf of Alaska (Kenyon and Rice 1961; Alaska Department of Fish and Game 1973; Braham et al. 1977; Calkins and Pitcher 1977, 1978, 1979; Braham et al. 1980; Loughlin et al. 1984; Merrick et al. 1987). However, many of these are subject to change in use since areas previously identified as haulout sites are now considered as only stopover areas (Calkins and Pitcher 1977). Additionally, many of the rookeries are used as haulout areas throughout the rest of the year, and nonbreeding individuals may occupy haulout areas on these same islands during the breeding season. In May, mature males begin arriving at the rookeries and establish territories preceding the arrival of pregnant females (Calkins and Pitcher 1979). Pupping begins in mid-May and lasts until early to mid-July. Females mate on

Figure 33. Distribution of northern (Steller) sea lions in Alaska.



the rookery one to two weeks after giving birth, or elsewhere if not parturient (Braham et al. 1977). By mid-July, most breeding activity has ceased. Young animals disperse from the rookery of birth after their first summer (Calkins and Pitcher 1982). There is a southward dispersal from Gulf of Alaska rookeries to Chirikof and the Semidi Islands and Puale Bay, as well as to haulouts in Southeast Alaska.

Sea lions usually forage in water less than 300 feet (91 meters) deep and within 15 miles (24 km) of shore; however, they have been observed as far as 85 nautical miles offshore (Kenyon and Rice 1961). The sea lions' diet consists mainly of fish, octopus, and crustaceans (Pitcher 1981). A great variety of fish species are taken, including pollock, capelin, and Pacific cod. Pollock is the most important item, comprising over 50 percent of total prey identified. In Unimak Pass, capelin was found to be the dominant prey item by Fiscus and Baines (1966).

Since the Marine Mammal Protection Act of 1972, only harvest by Natives has been allowed. The total number taken in these harvests is probably small, but Native harvests are not reported and therefore the numbers are not known. Offshore oil and gas development may also potentially affect sea lions.

In the last 10 years sea lion populations have been declining (Braham et al. 1980; Merrick et al. 1987). The estimated numbers of animals in the central and eastern Aleutian Islands and central and western Gulf of Alaska have declined from 140,000 in 1956-60 to 68,000 in 1985 (Merrick et al. 1985). The number of animals in the western Aleutians has declined 60 percent from 1978 to 1988 (Vern Byrd, pers. comm. 1988). Factors suggested as potential causes of the decline include:

1. Reduced prey availability due to increased commercial fishing on important prey (e.g., pollock, herring, cod, salmon, and flatfishes)

2. Direct kills of sea lions as a result of previous commercial harvests, continued subsistence harvest, and intentional and incidental kills by fisheries
3. Entanglement in marine debris
4. Disease
5. Disturbance

Important management issues relating to Steller sea lions can be grouped into six interrelated subjects (in priority order) (Hoover 1986):

1. Determine and minimize the cause and significant contributing factors of the current population decline.
2. Evaluate and mitigate interactions between sea lions and fisheries.
3. Periodically evaluate the status of sea lion populations.
4. Evaluate and regulate mortality levels directly related to fishing and hunting.
5. Evaluate and minimize, if necessary, the impact of human-related disturbance.
6. Evaluate and minimize the effects of environmental contaminants.

Population status should be evaluated every five years to monitor rate and spread of decline, detect regions where populations are stable or recovering, and evaluate the status of populations.

Pacific harbor seal - Pacific harbor seals are common residents of coastal areas throughout the Aleutian Islands, the Alaska Peninsula, the Gulf of Alaska, and Bristol Bay (Everitt and Braham 1979, 1980) and, to a lesser extent, the Pribilof Islands (Figure 34)(Braham and Dahlheim 1981). They are found as far south as Baja California and north into the Kuskokwim Bay. Within Bristol Bay during winter and spring, the harbor seal's distribution overlaps with a closely related species, the ice-breeding spotted seal. North of Bristol Bay, the spotted seal is more plentiful than the harbor seal. The harbor seal population in the Bering Sea was estimated to be 30,000 to 35,000 (Everitt and Braham 1980). About 20 percent of these inhabit the eastern Aleutians; most of the remaining 80 percent occupy a few major haulout areas along the north side of the Alaska Peninsula (Braham et al. 1977). Surveys conducted in 1985 suggested that the number of harbor seals along the north side of the Alaska Peninsula has decreased by perhaps as much as 50 percent since 1975-77 (Pitcher 1986). Large declines were noted near Port Moller, and Cinder River. Approximately 1,500 harbor seals inhabit the Pribilof Islands (Braham and Dahlheim 1981). Five major haulout/breeding areas have been identified on the north side of the Alaska Peninsula (Braham, Fiscus, and Rugh 1977; U.S. Dept. of the Interior, Bureau of Land Management 1981; North Aleutian Shelf Synthesis Meeting Proceedings 1982). These areas, and the number of seals estimated to use them as of 1980 are: Port Moller 6,100 to 8,000; Izembek Lagoon 4,500; Port Heiden and the nearby Seal Islands 14,000; Cinder River 4,500; and the Isanotski Islands within Bechevin Bay 400. More recently, Pitcher (1986) estimates: Port Moller 4,010; Port Heiden 6,196; Seal Islands 1,521; and Cinder River 2. Significant efforts should be made to determine the causes of this decline. Concentrations are reported in Ugashik Bay and west of Egegik Bay near the head of Bristol Bay. In the Aleutians, important haulout/breeding areas occur in numerous areas, for example on Amchitka Island. Accurate population estimates are not available for the Gulf of Alaska and the Alaska Peninsula, but harbor seals are common throughout these areas. Calkins, Pitcher, and Schneider (1975) estimated a Prince William Sound population in excess of 13,000 seals, and Pitcher (1977) estimated 3,000 on the Copper River Delta. In addition, approximately 25,000 harbor seals are believed to reside in the northeastern Gulf of Alaska (U.S. Department of Commerce, National Oceanographic and Atmospheric Administration 1980).

Although primarily coastal inhabitants, harbor seals have been observed up to 62 miles (100 km) offshore (Fiscus et al. 1976), as well as upstream in coastal rivers. Typically, they are found where water depths are less than 180 feet (55 m) (McAlister 1981). They occupy a wide variety of habitats in fresh and saltwater and along protected and exposed coastlines. They prefer gently sloping or tidally exposed habitats including reefs, offshore rocks and islets, mud and sand bars, sand and gravel beaches, and floating and shorefast ice (Pitcher 1977). Movements of harbor seals are poorly understood; they appear to be a sedentary species with strong fidelity to traditional haulout sites, although limited migrations are

Figure 34. Distribution of harbor seals in Alaska.

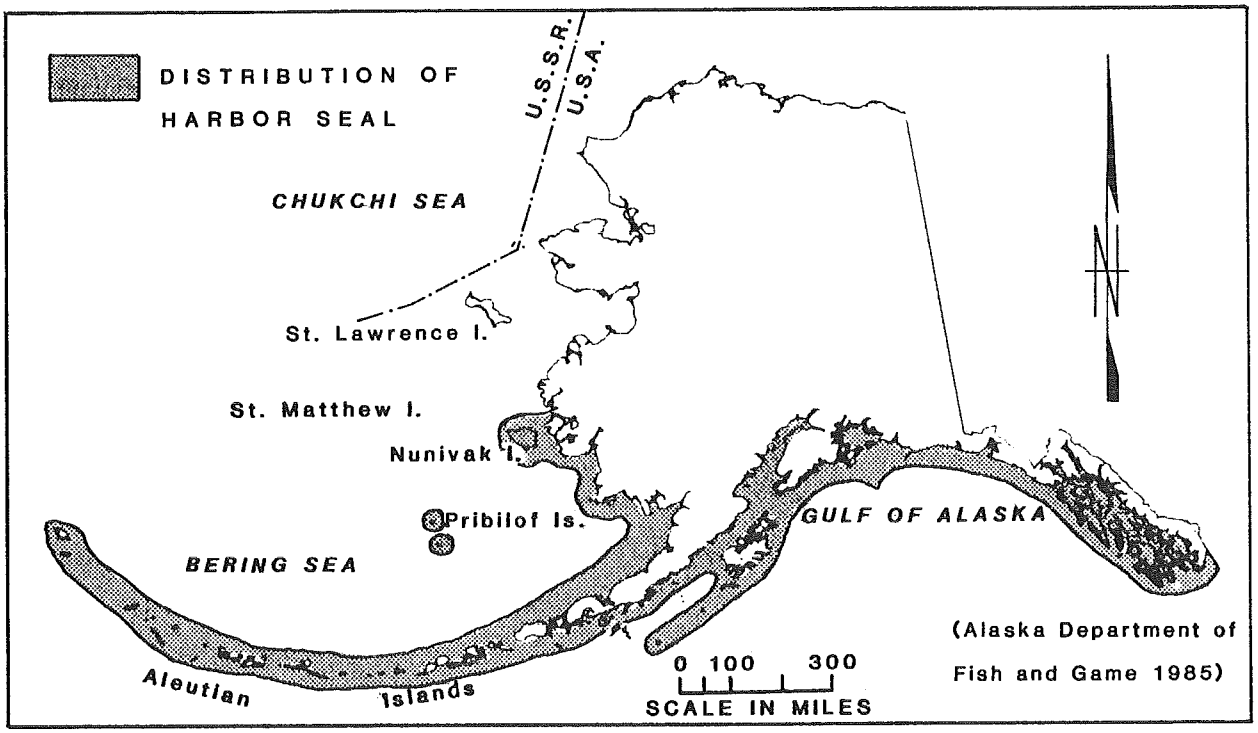
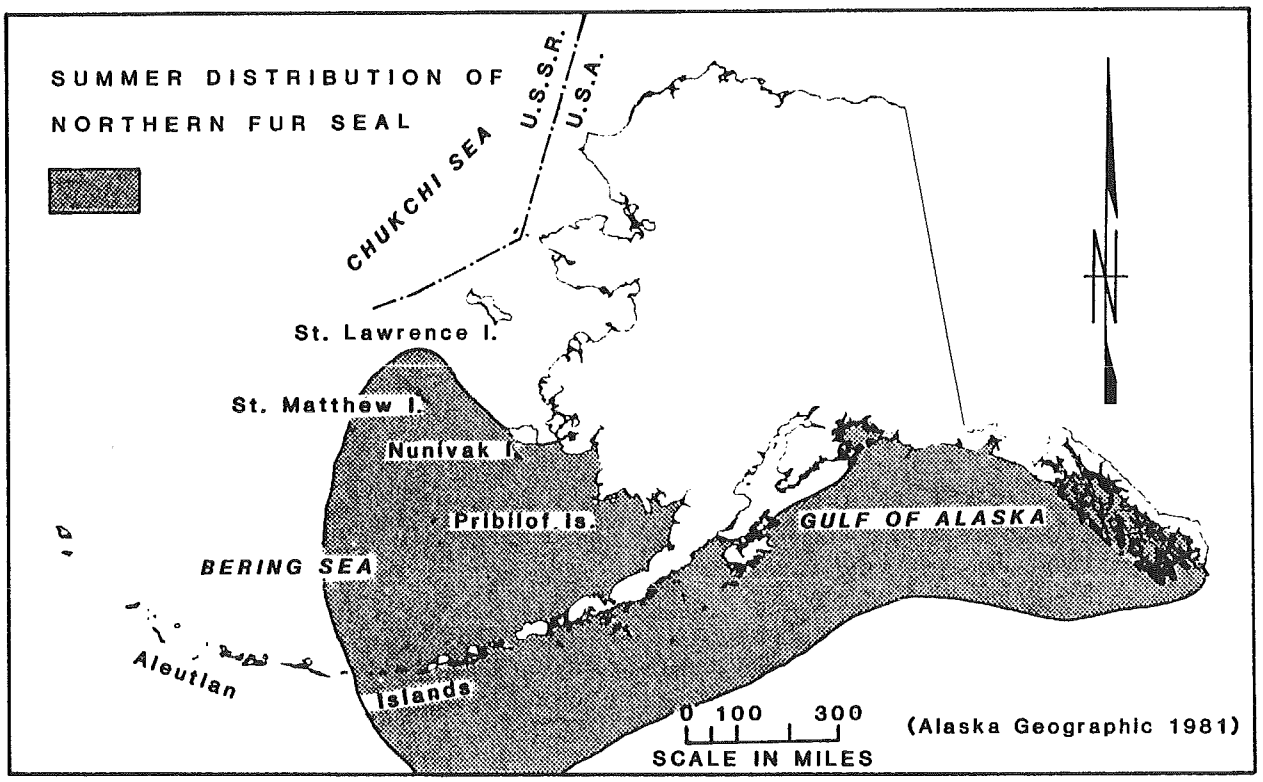


Figure 35. Distribution of northern fur seals in Alaska.



known to occur in response to spawning runs of smelt. Movements of up to 120 miles (194 km) have been documented by radio-tagging (Pitcher and McAllister 1981). In heavy ice years, when the bays freeze over and shorefast ice is extensive, seals are prevented from hauling out in the usual winter areas in parts of the Bering Sea. Some individuals disperse to the pack ice in winter, especially in severe winters when the pack ice extends farther into the southern Bering Sea (Braham et al. 1977). Pupping grounds range from sandy beaches to remote reefs and rocks to glacial ice. Births occur from late May through mid-July and mostly in June (Pitcher and Calkins 1977). Pups are precocious and swim at the next high tide if the birthing area becomes submerged. Breeding usually occurs in July. Pupping appears to take place at most haulouts, and several of these areas contain large numbers of animals. The world's largest breeding area is located on Tugidak Island, southwest of Kodiak Island. Nearly 14,000 individuals were observed there in September 1976 (Pitcher and Calkins 1979). However, the highest count made in 1982 was only 2,323, suggesting that a major decline in abundance may have occured (Calkins and Pitcher 1982). Other areas where many pups are born include Disenchantment Bay (Yakutat Bay), Icy Bay, Copper River Delta, Aialik Bay (Kenai Peninsula), Harris Bay (Kenai Peninsula), McCarthy Arm (Kenai Peninsula), Augustine Island, Seal Island (northeast Afognak Island), and Ugak Island (east Kodiak Island). Most pups are born June 5-25 on Tugidak Island and from May 20 to early July in Prince William Sound (Pitcher and Calkins 1979).

Harbor seals are opportunistic feeders, their diet varying with season and location. In the Gulf of Alaska, Pitcher and Calkins (1979) found that fish, chiefly pollock and capelin, comprised about 74 percent, cephalopods about 22 percent, and crustaceans about 4 percent of total prey volume.

Since 1972, the annual statewide harvest has been estimated at 3,500 seals, 500 of these were harvested by natives for subsistence, as many as 170 were taken for research and public display, and the remaining 2,800 were taken incidental to commercial fishing operations.

At haulouts, harbor seals are wary and easily disturbed. Large seal aggregations appear the most seriously affected. Seals' responses to disturbance and the effects of haul out utilization should be studied.

Northern fur seal - Northern fur seals range throughout the North Pacific (Figure 35). Fur seals are highly migratory and, with few exceptions, are found in nearly all months of the year throughout their range. They lead a pelagic existence and rarely come ashore except during the breeding period. Most are dispersed over the continental shelf and slope from 16 to 160 kilometers (10-100 mi) offshore, with greatest numbers from 48 to 113 kilometers (30-70 mi) (Baker, Wilke, and Baltzo 1970). Some older males overwinter in the southern Bering Sea near the Aleutians or in the Gulf of Alaska, but most of the population moves farther south to occupy waters off western Canada and the United States.

Currently, the North Pacific population is estimated to contain 1.2 million individuals (North Pacific Fur Seal Commission 1984). This number includes about 871,000 from the Pribilof Islands, 265,000 from the Commander Islands (Soviet Union), 220,000 from Robben and Kurile Islands (Soviet Union), and 2,000 from San Miguel Island off California (Kajimura et al. 1980; Kozloff 1982; U.S. Dept. of Commerce 1980; McAlister 1981; Morris 1981). A small breeding population has formed at Bogoslof Island in the eastern Aleutians since 1980.

In general, the chronology of the fur seals' return to their breeding grounds on the Pribilof Islands reflects the wintering distance of various age classes, and whether or not they will comprise part of the breeding population in a given year. The northward migration of older females from California waters begins in March, and from April to mid-June large numbers of males and females of all ages are found throughout the coastal Gulf of Alaska (Kenyon and Wilke 1953; Swope 1979). Breeding-age males (10-15 years old) that overwinter in the southern Bering Sea south of the Aleutian Islands or in the Gulf of Alaska are first to return to the Pribilofs, establishing their territories in late April and May. Older pregnant females arrive starting in mid-June, followed by younger pregnant and nonpregnant

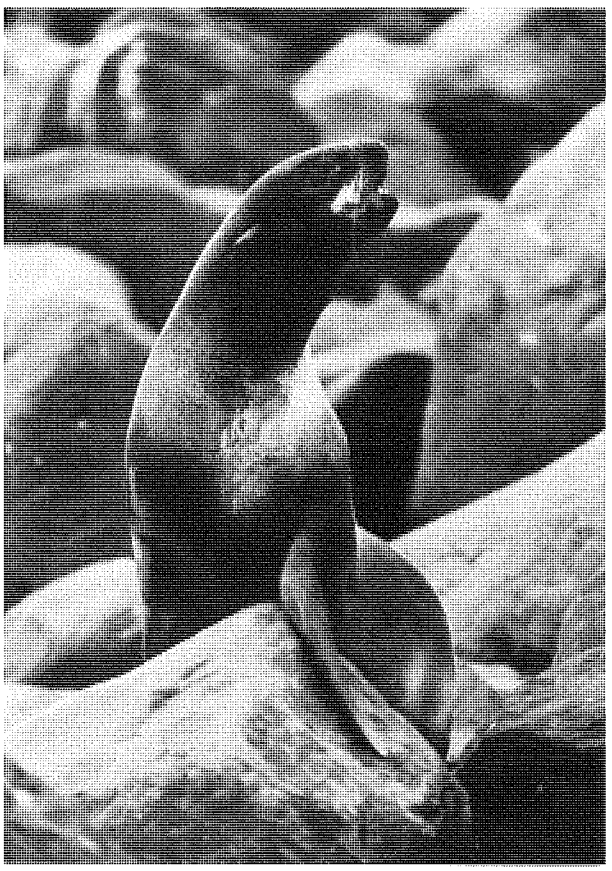
females. Pregnant females usually bear a pup within 3 days and breed again within a week. Over 200,000 pups are born annually on the Pribilof Islands. As many as 50 percent of the pups die during the first year.

Younger males, mostly three to five years old, arrive at the breeding grounds in late June and haul out on areas adjacent to the rookeries. Young nonbreeding females, less than four years old, arrive from August to October (Kenyon and Wilke 1953). The southward migration of fur seals of both sexes and all ages begins in October, with peak departure occurring in early November. Most mature males overwinter either in the Bering Sea, in waters just south of the Aleutians, or in the Gulf of Alaska (Kenyon and Wilke 1953; Fiscus 1978). However, females, young, and subadults undertake their extensive southward migrations beginning in October and continuing through November.

Fur seals also congregate in offshore areas where nutrient upwelling results in an abundant food supply, such as over the shelf break and outer continental shelf. During migration, foraging seals also congregate on offshore banks such as Portlock and Albatross Banks east of Kodiak Island. In the Bering Sea from June to November, important prey species include walleye pollock, squid, capelin, Pacific herring, Atka mackerel, and Bathylagid smelt (Harry and Hartley 1981; McAlister 1981)--the relative importance varying with season and location. The first three species comprise over 80 percent of the total prey taken by fur seals.

A serious problem for northern fur seals is declining populations. Overall, population figures for all North Pacific fur seals werelestimated at two million in the 1950's and have declined to 827,000 in 1987 (S. Zimmerman pers. comm. 1987). Because of this decline, on May 18, 1988, the Pribilof Island population was listed as depleted under the terms of the Marine Mammal Protection Act. The National Marine Fisheries Service has set standards and controls on the number of seals taken in the harvest and should strengthen efforts to identify to eliminate or mitigate the cause or causes of the ongoing Pribilof Islands fur seal population decline.

The increase in estimated mortality rates at sea for juvenile fur seals (up to 20-22 months) is the most apparent cause for the downward trend in fur seal population numbers. These mortality rates for juveniles averaged 66 percent in the 1950's, 63 percent in the 1960's, and 70 percent in the 1970's. Entanglement in fishing debris and plastic packing bands may be an important cause for increased mortality rates. Fur seals are attracted to the material and purposely insert their heads in it. It is believed to be primarily a problem of animals younger than three years. Death may result from the impairment of their ability to swim and catch food, choking, or infection.



One fur seal rookery is found on Bogoslof Island in the eastern Aleutians, although most of these animals breed in the Pribilof Islands. Fur seals lead a pelagic existence and rarely come ashore except during the breeding period.

Figure 36. Distribution of ringed seals in Alaska.

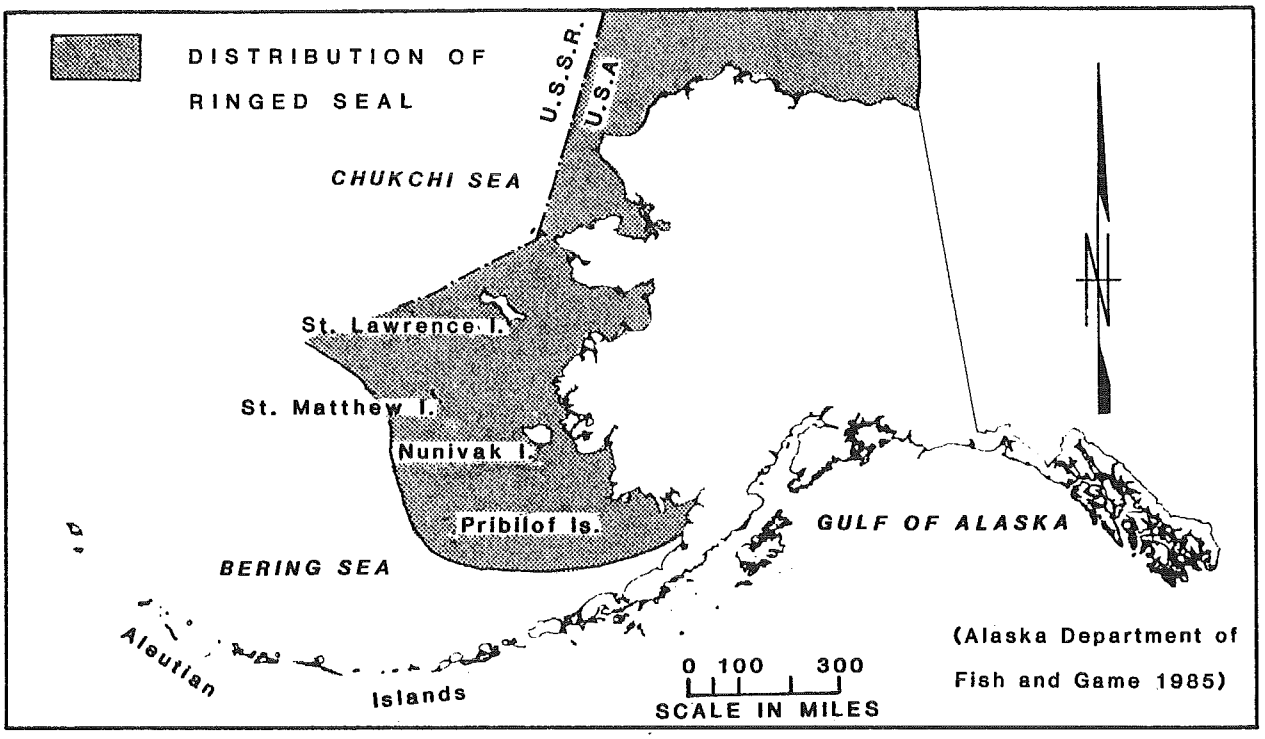
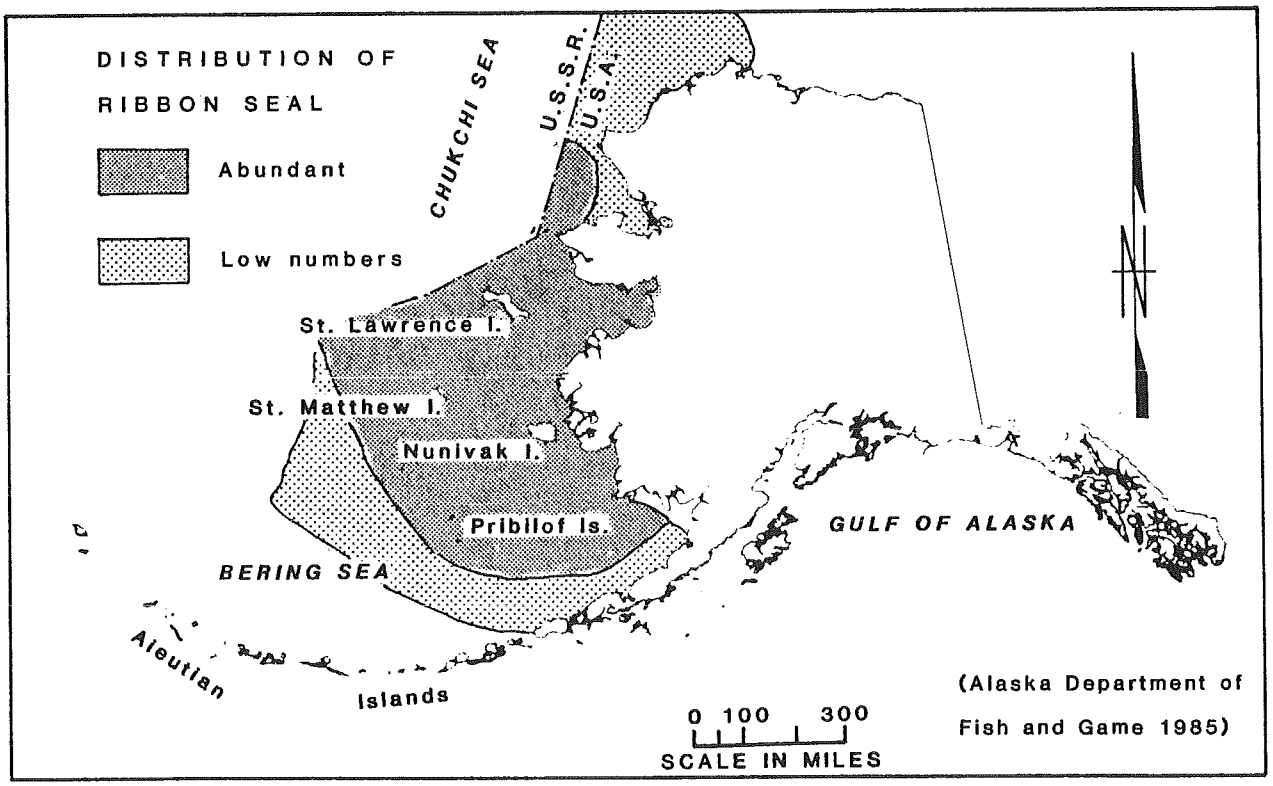


Figure 37. Distribution of ribbon seals in Alaska.



Statistical analysis of entanglement data gained primarily from the observed entanglement rate among harvested males, indicated it is probably a major cause of the decline (Roppel 1984). Considering the current rate of decline of the population, five percent or more of the fur seal population may die each year due to the direct effects of fisheries. At current levels for the Pribilof Islands, this would be over 50,000 seals per year.
Soviet scientists however, do not believe entanglement is the cause of the fur seal decline because their herd is increasing in numbers and they see the same entanglement rates as do U.S. researchers (S. Zimmerman 1986). At the very least, the information presented above identifies the need to undertake further research concerning the importance of entanglement and incidental taking. It should underscore the need to curtail the discarding of debris into the ocean.

Other factors that may be contributing to the decline include increased levels of toxic substances, increased predation, diseases, changes in the physical environment, changes in carrying capacity, and harvest caused factors. More research is needed in these areas to determine the extent these factors may be influencing the fur seal population.

Ringed seals - Ringed seals are circumpolar in distribution and are the most common and widespread seals in the arctic. In Alaska, ringed seals inhabit the northern Bering, Chukchi, and Beaufort Seas, and have been found as far south as the Aleutian Islands (Figure 36). The ringed seal population in these areas is estimated to be 1.5 to 2 million individuals.

Ringed seals are usually found close to shore in the shorefast ice zone. Some ringed seals are seen during ice-free periods in the Bering and Chukchi Seas. Ringed seals appear along the coast with the formation of shorefast ice in the fall and then in more offshore areas in the spring with the ice breakup. The density of ringed seals on the shorefast ice varies with the area and the season, but chiefly depends on the stability of shorefast ice.

Females give birth to a single, white-coated pup in ice dens and on either shorefast or drifting pack ice during March and April. Ringed seals are opportunistic feeders. Prey consumed depends on season and location and include cod, amphipods, mysids, euphausids, and small pelagic fish (Lowry et al. 1980a).

Ribbon seal - Occurring only in the North Pacific, this species has centers of abundance in the Okhotsk and Bering Seas (Figure 37)(Burns, 1978; Brooks 1979). The ribbon seal is the least abundant of the ice-associated species, with estimates of the Bering Sea population ranging from 60,000 to 114,000 (Braham et al. 1977b; Burns 1978; Brooks 1979). Ribbon seals are associated with sea ice from March through June when birth, lactation, mating, and molting occur (Alaska Department of Fish and Game 1973). Their distribution during this period is confined to the ice front along the southern terminus of the pack ice. During ice-free periods, ribbon seals are pelagic and remain mostly in the Bering Sea (Burns 1970). Recent data indicate that some also go north into the Chukchi Sea. They are rarely found in nearshore environments and are not known to haul out on land (Fay 1974).

Pupping occurs on the ice from late March to mid-April. Breeding occurs from late April to mid-May as the sea ice begins to disintegrate and the icefront moves northward. While associated with sea ice, ribbon seals feed on shrimps, amphipods, mysids, crabs, cephalopods, and various fishes (Frost and Lowry 1980). Lowry, Frost, and Burns (1979) found that seals taken southwest of St. Lawrence Island in May and June fed primarily on pollock. Ribbon seals forage in water depths of from 200-330 feet (60 to 100 m) (Braham et al. 1977).

Bearded seal - The bearded seal is circumpolar in its occurrence. It is found throughout the arctic and generally prefers areas where seasonal broken sea ice occurs in water less than 660 ft (200 m) deep. The majority of the bearded seal population in Alaska is located in the northcentral Bering and Chukchi Seas, where an estimated 300,000 to 450,000 individuals occur (Figure 38) (Braham et al. 1977). In the northeastern Bering Sea, the winter-spring population is estimated at 120,000 seals (Burns 1981a).

In Alaska, bearded seals are strongly associated with ice, and the north and southward movements of this species are in general synchrony with those of the icepack. The northward spring migration begins in early April, with a peak being reached in the northern Bering Sea during late May-early June (Burns 1980).

Bearded seals are not known to haul out on land (Burns 1980). Although this species is associated with ice habitats throughout the year, some subadult seals occur in the open water and enter bays and ascend rivers through the summer season (Burns 1981b).

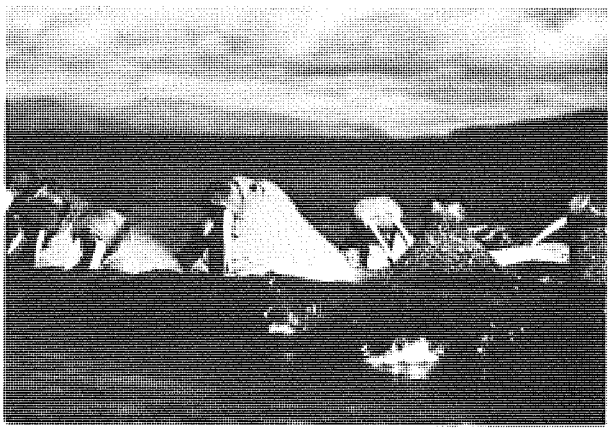
Pupping occurs on top of the ice from late March through May, primarily in the Bering and Chukchi Seas, although some pupping occurs in the Beaufort Sea. Bearded seals feed on a variety of invertebrates that live on the seafloor, including shrimps, crabs, bottomfishes, octopus, worms, clams, and tunicates (Lowry et al. 1980).

Spotted seal - The distribution of spotted seals is confined to the waters of the North Pacific Ocean, primarily in the Bering, Okhotsk, and Chukchi Seas (Shaughnessy and Fay 1977; Burns 1978). In Alaskan waters, the spotted seal ranges from Bristol Bay during the winter to the Beaufort Sea during the summer (Figure 39). The Bering-Chukchi population is estimated to be 280,000 to 330,000 spotted seals, with 20,000 to 75,000 occurring year-round in the Alaskan northern and central Bering Sea (Burns 1981a).

The spotted seal is distinguished from the harbor seal by its seasonal dependence on sea ice for breeding, pupping, and molting, whereas harbor seals breed and molt on land. In late winter and spring, the entire Bering-Chukchi population is distributed in or near the pack-ice front in a band 15-80 miles (24 to 130 km) wide in the central and eastern Bering Sea. As the ice disintegrates and recedes in May and June, spotted seals generally move north and toward islands or the coast (Burns and Harbo 1977; Burns 1978; Alaska Department of Fish and Game 1981). In summer and fall, spotted seals are widely distributed along the northern Bering and Chukchi Sea coasts. They enter bays and rivers, especially those where concentrations of spawning anadromous fish are found. Near these locations, spotted seals often haul out on land. Prior to the southward advancement of the pack ice, the spotted seals again move south.

At least three major pupping and breeding concentrations usually occur (Shaughnessy and Fay 1977; Frost 1981; McAlister 1981): from Bristol Bay to the southcentral Bering Sea and east of the Pribilof Islands, at Karaginoki Bay, and in the Gulf of Anadyr. Pairing takes place at the icefront in March, and pups are born on drifting ice floes from March to April. Recently weaned pups feed on amphipods, shrimp, and sandlance (Lowry, Frost, and Burns 1979). Adults eat a variety of schooling fish and bottomfish, including walleye pollock, herring, smelt, eulachon, saffron cod, arctic cod, greenling, and flatfishes, as well as octopus and shrimp.

Walrus - The Pacific walrus ranges primarily from the Chukchi Sea/far western Beaufort Sea (summer) to the northern and southeastern portions of the Bering Sea (winter)(Figure 40). With the southern advance of the pack ice in the Chukchi Sea during the fall (October-December), most of the walrus population migrates south of the Bering Strait.



The annual removal of Pacific walrus from the population, including catches and losses, apparently has been as high during the 1980's as it was during the peak of Soviet exploitation in the 1930's and 1940's. The population is larger now, but it is probably older and less productive.

Figure 38. Distribution of bearded seals in Alaska.

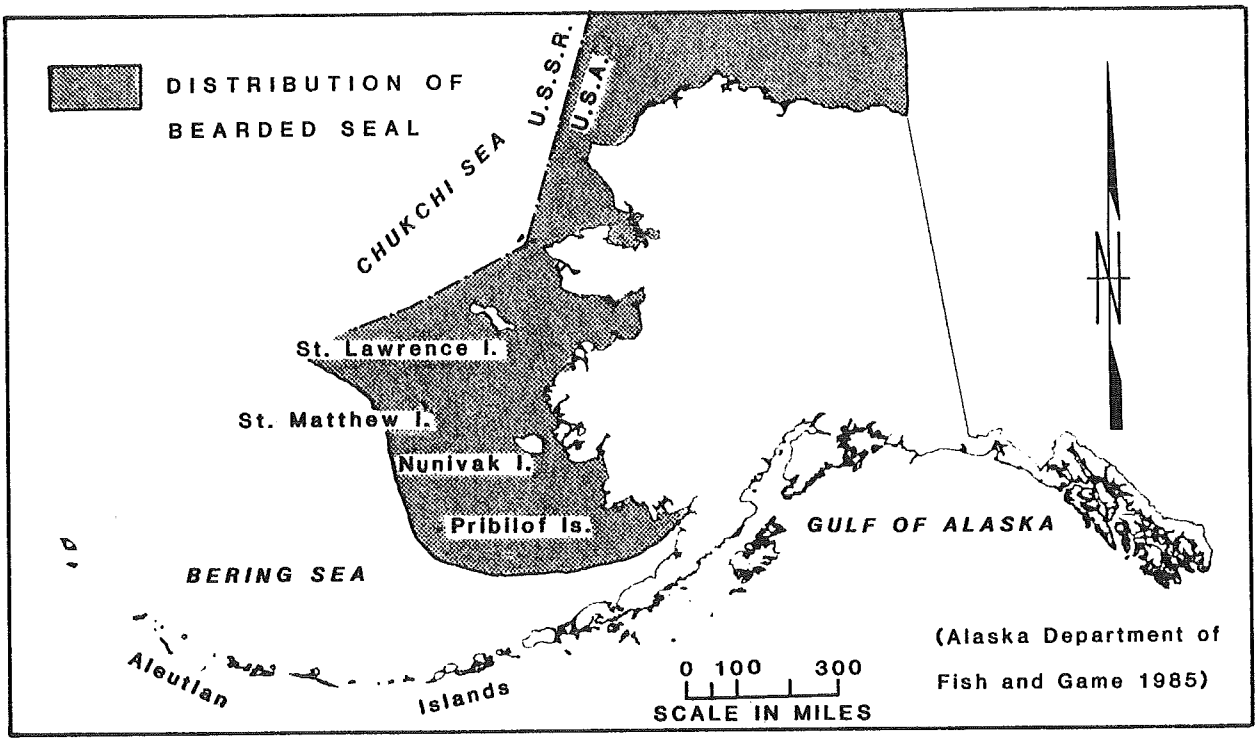


Figure 39. Distribution of spotted seals in Alaska.

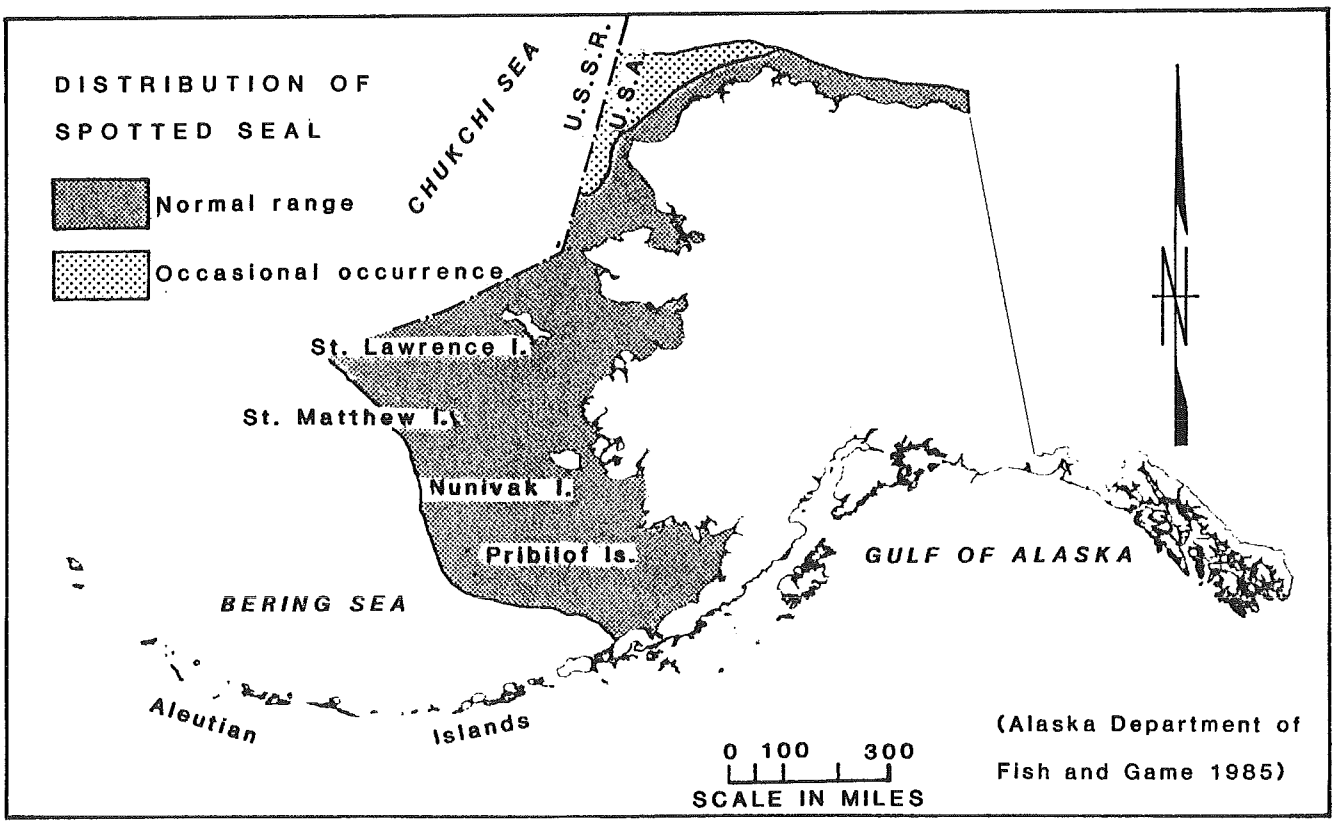


Figure 40. Distribution of Pacific walrus in Alaska.

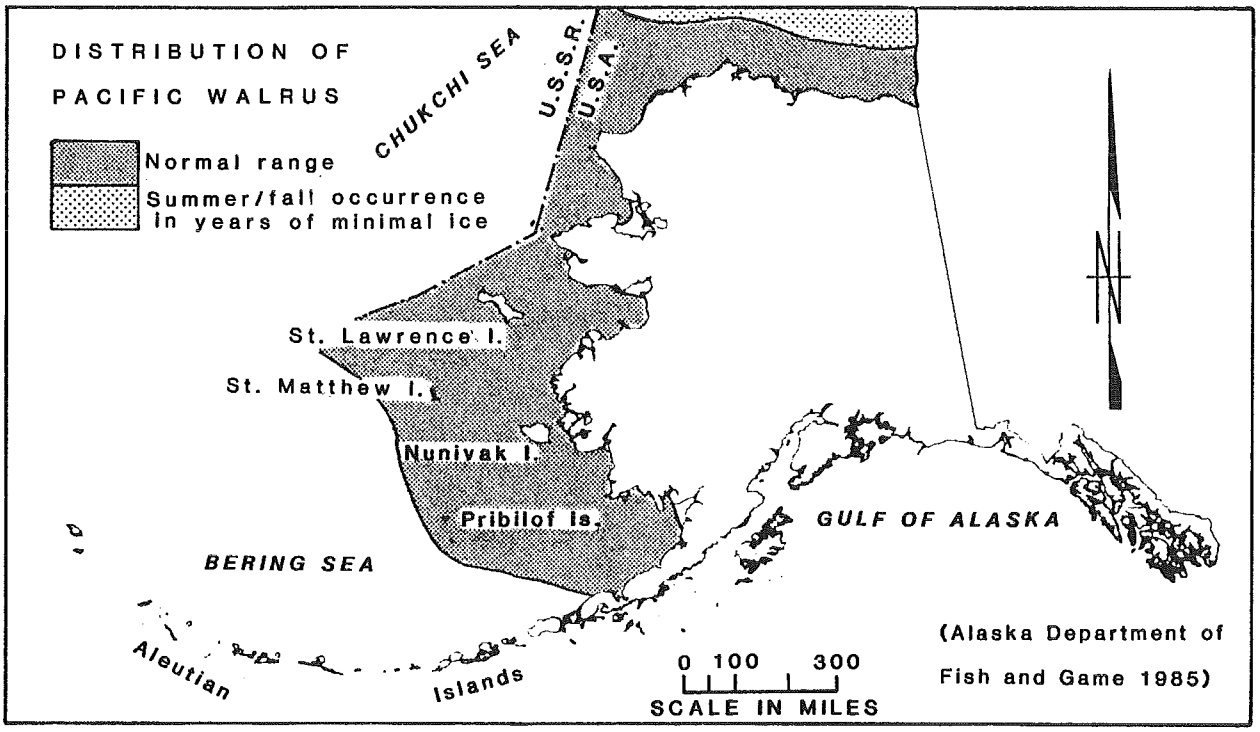
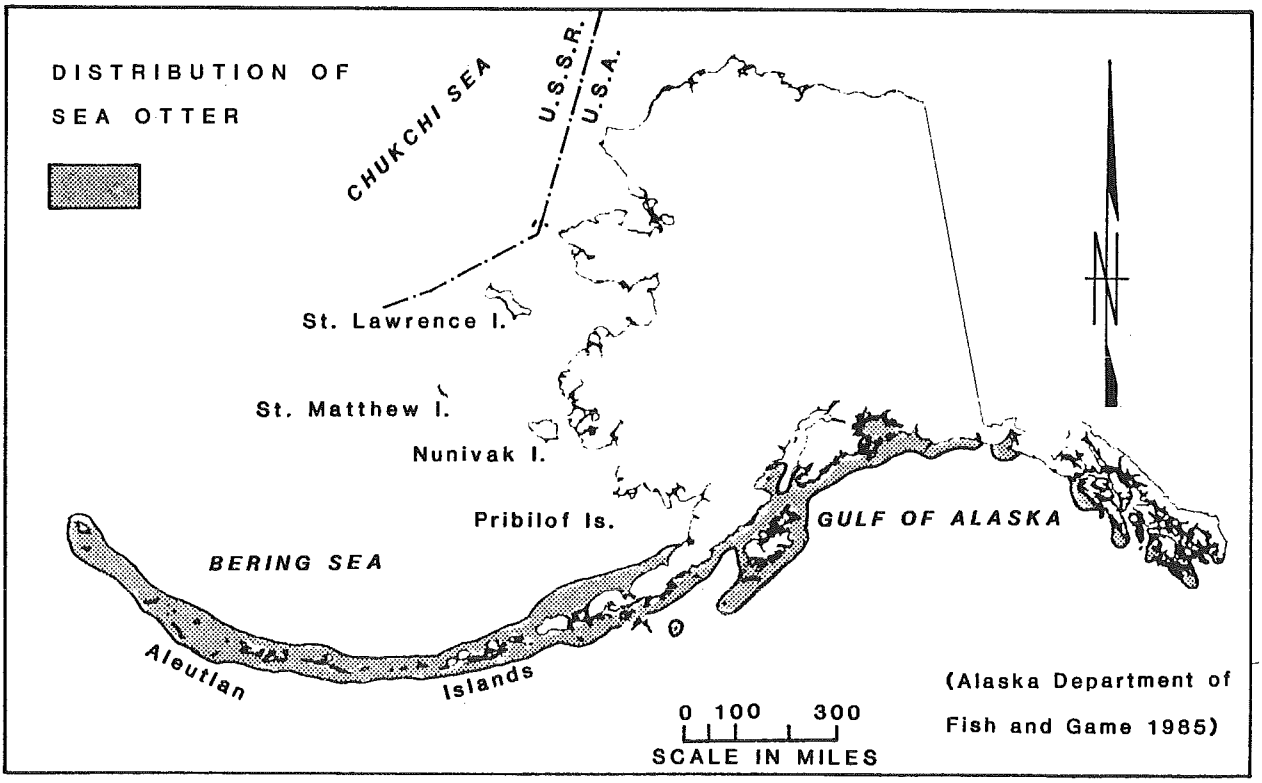


Figure 41. Distribution of sea otters in Alaska.



Solitary animals may occasionally overwinter in the Chukchi Sea and in the eastern Beaufort Sea (Fay 1982). Following their southward migration, walruses are widely distributed in the seasonal pack ice overlying shallow water in the Bering Sea. About 80 percent of the world's population (250,000-300,000) occur seasonally in the Bering Sea. During winter months (December-March), most animals are found where leads and polynyas in the Bering Sea pack ice are numerous (Burns, Shapiro, and Fay 1981). As the seasonal pack ice melts and recedes northward in spring, usually beginning in April, most of the walruses (particularly females and pups) move north with it, leaving behind a portion of the population of adult and subadult males in Bristol Bay. By far, the greatest number of these males haul out on Round Island in the Walrus Islands State Game Sanctuary in northern Bristol Bay. Significant numbers also haul out at Cape Pierce and Cape Seniavin. Walrus that migrate north into arctic waters for the summer occupy two primary areas--from the Bering Strait west to Wrangell Island and along the northwest coast of Alaska from about Point Hope to north of Point Barrow. The size of the Pacific walrus population, based on a joint U.S.-U.S.S.R. aerial survey conducted in 1985, was estimated to be about 234,000 (Gilbert 1986).

Breeding takes place in January and February west of Bristol Bay where females congregate prior to migration (Fay 1981). Calving occurs between March and early June on the ice. Females produce one calf every two to three years rather than one every year as with other pinnipeds. Walrus are benthic feeders and rely to a large extent on clams. Other foods include polychaetes, snails, crustaceans, and seals.

Annual removal of walrus from the population, including catches and losses, apparently has been as high during the 1980's as it was during the peak of the Russian exploitation period in the 1930's and 1940's (Sease, Chapman 1986). The population is much larger now, but it is probably older and less productive than it was in the 1930's and 1940's. Documentation of the numbers of walrus taken and the loss rate associated with walrus harvests are the most pressing research needed, along with development of methods to reduce the loss rate. In addition, the size, age composition, and sex composition of the whole Alaskan harvest should be determined on a regular basis.

Sea otter - Prior to commercial exploitation, sea otters inhabited the coastal waters of the North Pacific Ocean from central Baja California, Mexico, north along the coasts of California, Oregon, Washington, British Columbia, and southern Alaska, west around the Aleutian, Pribilof, Commander, and Kuril Islands, and south along the Kamchatka Peninsula and the islands of northern Japan (Kenyon 1969). Commercial hunting of sea otters began soon after the 1741 discovery of the Commander Islands by Vitus Bering. Hunting was largely unregulated, and by 1911, when sea otters were afforded protection under the North Pacific Fur Seal Convention, the species was nearly extinct throughout its range. Johnson (1982) estimated there were more than 200,000 sea otters in Alaska alone, before commercial exploitation.

Small groups of sea otters survived the era of commercial exploitation in several remote areas and during the last 75 years otters from these remnant groups have repopulated substantial parts of their former range. From data collected through 1976, Calkins and Schneider (1985) estimated 55,100 - 73,700 sea otters in the Aleutian Islands; 22,000 - 30,000 along the south side of the Alaska Peninsula; 4,000 - 6,000 in the Kodiak area including the Barren Islands; 2,500 - 3,500 along the Kenai Peninsula and Cook Inlet; 4,000 - 6,000 in Prince William Sound; 100 along the coast from Yakutat to Cape St. Elias; and 600 - 800 in southeast Alaska. Although sea otters have repopulated most of their former range in Alaska (Fig. 41), they probably have not yet reached carrying capacity in some areas, including parts of Kodiak Island, the northeast Gulf of Alaska, parts of southeast Alaska, and perhaps small areas along the Alaska Peninsula and the Aleutian Islands. (Simon-Jackson and Rotterman, in prep.).

Sea otters inhabit clean coastal waters less than 300 feet (91 m) deep; highest densities usually are found within the 130 feet (40 m) isobath where young animals and females with pups forage. Preferred habitat includes rocky reefs, offshore rocks, and kelp beds. Sea otters do not migrate and seldom travel far

unless an area has become overpopulated and food is scarce. They are gregarious and may become concentrated in an area, but they do not normally form herds. In most areas, sea otters reside close to shore, concentrating in areas with offshore rocks and kelp beds. However, otters (predominantly males) on the north side of the Alaska Peninsula range widely in offshore waters, and are frequently found as far as 30 miles (48 km) from shore in the vicinity of the 440-foot curve (Schneider 1976).

Sea otters breed at all times of the year, and their young may be born at any time; however, more appear to be born in late spring and in summer than any other time of year. Like other marine mammals, they have only one pup during each breeding cycle. When otters are traveling, sleeping, or preening, the pup usually rides on its mother's chest as she floats on her back. The pup may weigh 25 pounds (11 kg) when weaned and looks almost as big as its mother. Recent studies suggest that females will not breed while they have pups with them.

To maintain their high metabolic rate, sea otters consume 20 to 25 percent of their weight in food each day, 8-15 pounds (4-7 kg). Their food consists primarily of invertebrates from the ocean floor such as bivalves, sea urchins, crabs, and octopus. Where invertebrate populations have been depleted, they also eat demersal fishes. Sea otters usually dive to the bottom and return with several pieces of food, roll on their backs, place the food on their chests, and use their forepaws to eat it piece-by-piece. Occasionally, an otter will crack clams by hitting them together or even by placing a rock on its chest and pounding the clam against it. In the wild, sea otters never eat on land. Since there is no indication that sea otters can obtain pelagic food items, long migratory movements in the open ocean are precluded (Kenyon 1969).

Present and foreseeable conservation issues regarding sea otters in Alaska involve: 1) increasing conflicts with commercial, subsistence, and recreational fisheries. In the absence of sea otters, populations of food items such as sea urchins, clams, mussels, and crabs thrived in certain areas. This situation formed the basis for many human uses. Now that the sea otter has expanded its range and is reoccupying areas from which it has long been absent, sea otter/shellfishery conflicts appear to be increasing; 2) incidental take in gillnet and other fisheries. Until recently, sea otter numbers had been low in areas of major fisheries in Alaska. Even though sea otters have not been accused of feeding on fish or gear damage as other marine mammals, their large numbers are creating problems. Both incidental and deliberate killing have apparently increased (Simon-Jackson 1986); 3) hunting by Alaska Natives. The Act allows the nonwasteful take of nondepleted marine mammals by coastal Alaska Natives for certain purposes. Vulnerability of sea otters to overharvesting is well-documented historically. There is a growing concern for unregulated harvest; and 4) coastal and offshore development. These may include, but are not limited to:

1. Site specific disturbance by boats and aircraft;
2. Port construction;
3. Boat harbors;
4. Log transfer facilities;
5. Coastal and offshore oil and gas activities;
6. Coastal and offshore mining;
7. Mariculture;
8. Seafood processing and associated dumping of organics into ocean waters creating biological deserts;
9. Non-organic waste;
10. Urban sewage and waste-water disposal directly into coastal waters and possible disease potential to sea otters; and
11. Proposed land-based aerial gunnery range for the military as the Pacific fleet continues to build.

Because sea otters rely on air trapped in their fur for warmth and buoyancy, they are among the marine mammals most likely to be adversely affected by oil spills.

According to Rotterman and Simon-Jackson (1988), the highest priority management and research needs for sea otters are:

1. Resolve issues concerning the traditional uses of sea otter for Native subsistence and handicraft purposes, and more accurately assess and monitor the number of sea otters being taken by Native hunters.

2. Establish procedures whereby the incidental take of sea otters in commercial fisheries can be authorized and, as necessary, more accurately assess, monitor, and reduce the number of sea otters being caught and killed by fishermen.
3. Assess the feasibility of zonal management by formulating and conducting studies such as: a) evaluation of the genetic and geographic relationships of sea otters within selected management units; b) completion of environmental, fishery, and other data needed to delineate possible management zones; and c) the assessment of the effectiveness and cost of various methods to manipulate sea otter distribution and abundance.

Polar bear - Polar bears are circumpolar in distribution and are found throughout the arctic offshore and nearshore environment. Populations in the Alaskan arctic include the western Alaska population occurring primarily in the Chukchi Sea and the northern Alaska population occurring north and east of Barrow in the Beaufort Sea (Figure 42)(DeMaster and Stirling 1981; Lentfer 1972). The Beaufort Sea population (from Point Barrow to Tuktoyaktuk Peninsula) is estimated to be 2,000 bears (Amstrup 1983a), and the total Alaskan population is estimated at 3,000 to 5,000 bears (Amstrup 1983b). There is substantial annual variation in the seasonal distribution and local abundance of polar bears in Alaska. Polar bears are most abundant near the southern edge of the ice, but do occur throughout most of the polar basin. They make extensive north-south movements related to the seasonal position of the southern edge of the ice. In winter, bears off Alaska commonly occur as far south as the Bering Strait and St. Lawrence Island. During the summer, polar bears occur on the pack ice in the Chukchi and Beaufort Seas. Average density appears to be one bear every 30 to 50 square miles, with much lower densities occurring farther than 100 miles (160 km) offshore (Amstrup 1983a).

The two most important natural factors affecting polar bear distribution are sea ice and food availability.

Polar bears breed in late March, April, and May. At this time, males (which are otherwise solitary) actively seek out females. Pregnant females seek out denning areas in late October and November. Most denning occurs on land (offshore islands and nearshore coastal areas) except in the Beaufort Sea, where most dens occur on the sea ice. Young are born in the den in December. The female and cubs break out of the den in late March or early April, when cubs weigh about 15 pounds (7 kg). The main food of polar bears adjacent to Alaska is the ice-inhabiting ringed seal. Bears capture seals by waiting for them at breathing holes and at the edge of leads or cracks in the ice. They also stalk seals resting on top of the ice, and catch young seals by breaking into pupping chambers in snow on top of the ice in the spring. Bears feed to a lesser extent on bearded seals, beluga whales, and carrion, including whale, walrus, and seal carcasses along the coast. They occasionally eat small mammals, bird eggs, and vegetation when other food is not available.

Polar bears are protected under the Marine Mammal Protection Act. Under this act, only Alaska natives are allowed to take polar bears for subsistence purposes. The Marine Mammal Protection Act removed restrictions on the taking of cubs and females with cubs and the mandatory reporting requirement that had been in place under state regulation. The only restriction on Alaska Native take is that it must be done in a non-wasteful manner for subsistence or for creation of authentic native handicrafts. The Federal government may restrict the take by Alaska Natives only if the polar bear population is determined to be depleted.

Conservation of polar bears in Alaska depends primarily upon two issues. First, to insure adequate space for critical life functions of feeding and reproduction, habitats of special significance to bears must be protected. Second, to maintain viable polar bear populations, human activities that directly or indirectly alter the numbers of polar bears occupying available habitat must be controlled. To determine the effectiveness of programs designed to protect critical habitats and to control human activities, monitoring programs must be developed and implemented. The most obvious and identifiable habitats important to polar bears are maternity denning areas because

Figure 42. Distribution of polar bears in Alaska.

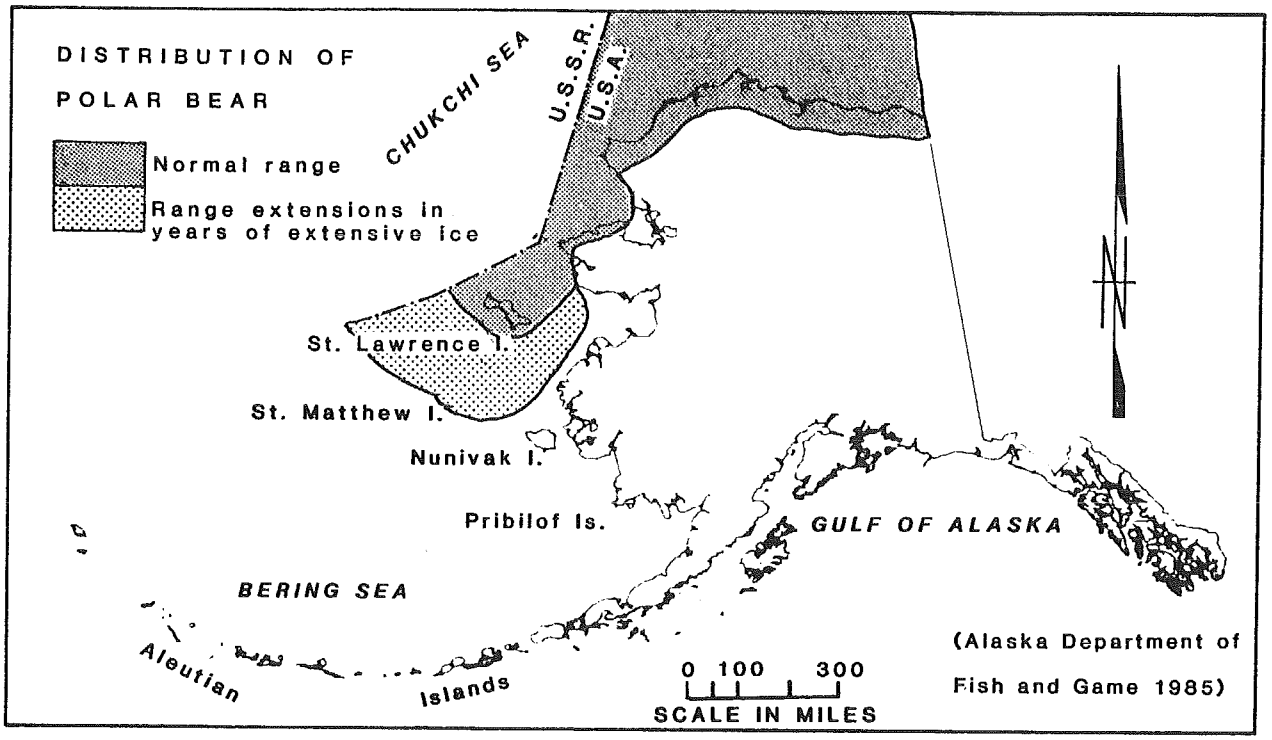
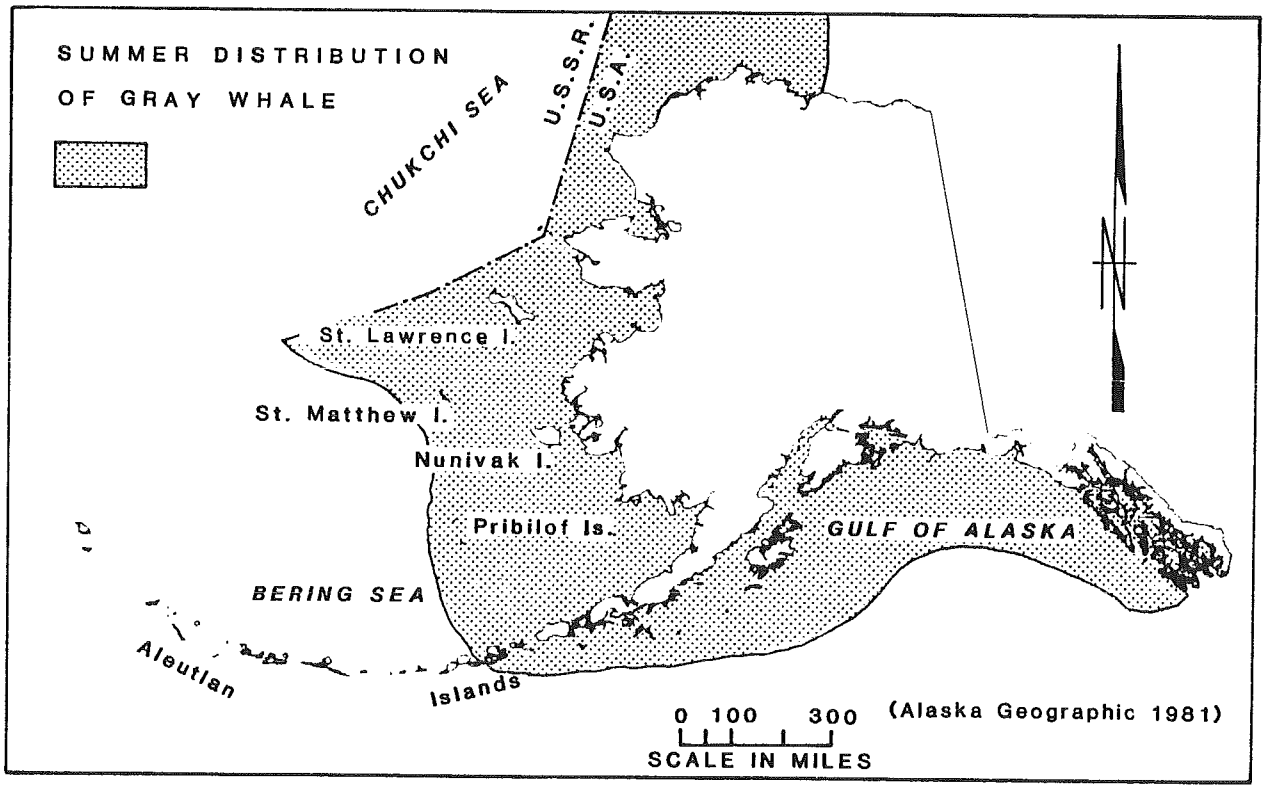


Figure 43. Distribution of gray whales in Alaska.



reproductive effort there can be most easily altered.

Whales - Both toothed and baleen whales occur in Alaska waters. Baleen whales include the blue, bowhead, northern right, fin or finback, humpback, sei, minke, and gray. Toothed whales include the sperm, beluga, killer, pilot, and beaked. All whales are essentially pelagic and spend the majority of their lives away from the shore. Only gray, beluga, and killer whales are known to periodically use intertidal areas adjacent to the refuge. Hence, only they will be considered further here.

Gray - Gray whales are considered to be an endangered species as a result of overexploitation during commercial whaling. They are now occur in the north Pacific and adjacent waters of the Arctic Ocean (Figure 43). The eastern north Pacific stock is estimated to be between 15,000 and 17,000 individuals. Gray whales begin their northbound migration from their calving grounds in Baja California around March. The northern migration route through Alaska waters between the Gulf of Alaska and Bristol Bay is usually within 0.6 mile (1 km) offshore (Morris 1981). Most of the north Pacific stock migrates through Unimak Pass, then northeast-ward along the west coast of the Alaska Peninsula and into Bristol Bay. From the waters near Nunivak Island they then move offshore to the major feeding areas near and north of St. Lawrence Island (Cowles 1981). Some whales continue north to nearshore feeding areas in the Chukchi and western Beaufort Seas. The southward migration in mid-October to late December apparently follows the same nearshore route through Unimak Pass and along the coast to Mexican waters (USDOI, BLM 1981). Within the Bering Sea, gray whales apparently do not closely follow the coast on their southward migration. In addition to their primary feeding grounds off St. Lawrence Island and along the Chukchi Sea coast, gray whales also have been observed feeding inside several lagoons and estuaries along the northern shore of the Alaska Peninsula. Gray whales, unlike other baleen whales, are predominantly benthic feeders. Their preferred prey is amphipods, although polychaetes, molluscs, and small fish are occasionally taken.

Beluga - Beluga whales are circumpolar in arctic and subarctic waters (Figure 44). At least two populations of beluga whales are generally recognized based on migration patterns, summer concentration areas, and size difference. They are the Cook Inlet/Gulf of Alaska and the Bering-Chukchi-Beaufort Sea stocks, which are estimated to contain 500 and 13,000-18,000 individuals, respectively (Burns 1981a; Davis and Evans 1982; Hazard 1988). Minimum population estimates total around 20,000.

Most of the Gulf of Alaska population inhabits Cook Inlet, where they are present year-round. Movement and seasonal distribution of belugas in Cook Inlet are strongly influenced by fish availability, especially smelt and salmon smolt, and are generally confined to shallow central waters. In winter, movements are limited by the combination of ice and strong tides.

Virtually all of the Bering-Chukchi-Beaufort stock overwinters in the central Bering Sea ice fringe and in cracks and leads within the ice (Seaman and Burns 1981). On their northward migration, a large segment of this stock moves through the open lead systems. In late June to August, many belugas congregate around the Mackenzie River estuary (Fraker 1980). The fall migration south begins in late August and September and takes several routes through the western, central, and eastern Bering Sea. An unknown proportion of the stock remains in the Bering Sea during the summer.

Belugas aggregate in groups of from two to several hundred individuals. Polygamous breeding takes place in April and May; calving has been reported from May through August in brackish lagoons and marine waters (Morris 1981; Seaman and Burns 1981). Belugas feed from midwater to the bottom, primarily on fish (such as salmon, smelt, flounder, and sole), often in shallow waters of the continental shelf at the mouths of major rivers, in estuaries, and in rivers (Seaman et al. 1982).

Killer - Killer whales have been observed in all major oceans and seas of the world and appear to increase in abundance shoreward and towards the poles of both hemispheres (Figure 45)(Mitchell 1975). In the Pacific Ocean, they are more closely associated with subarctic waters than polar or tropical

Figure 44. Distribution of beluga whales in Alaska.

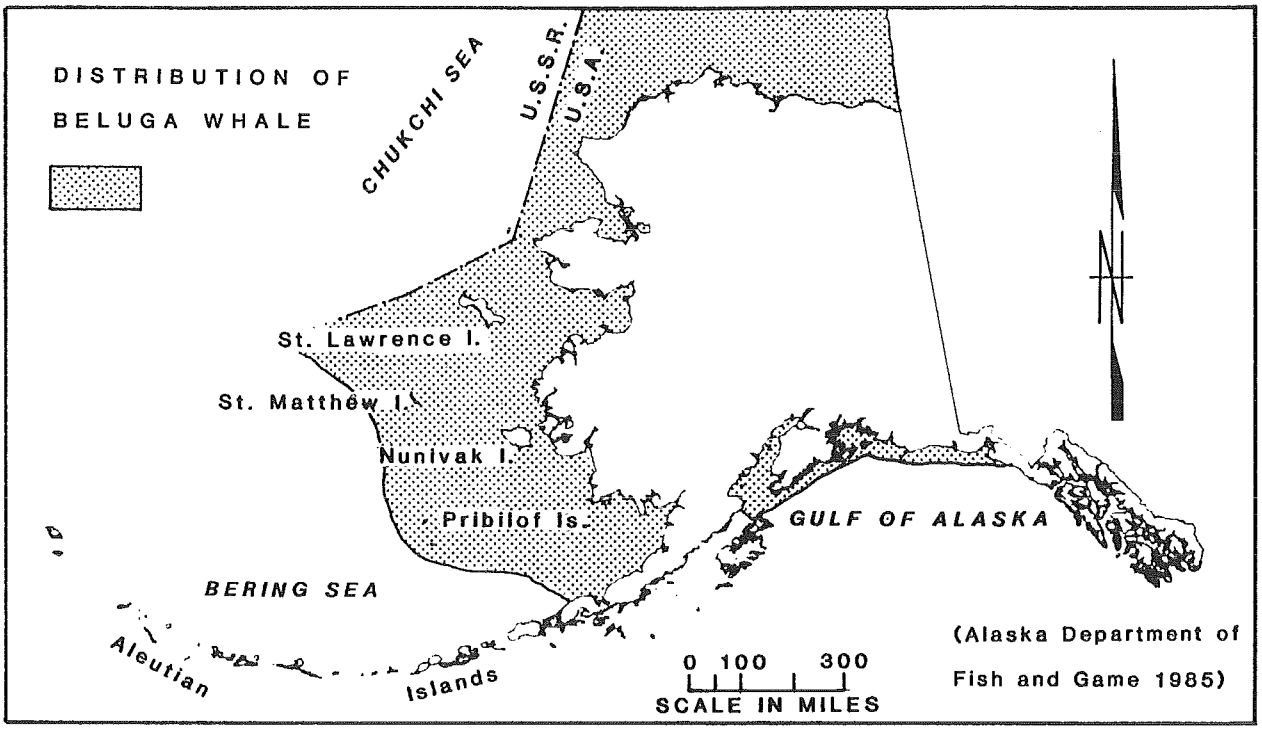
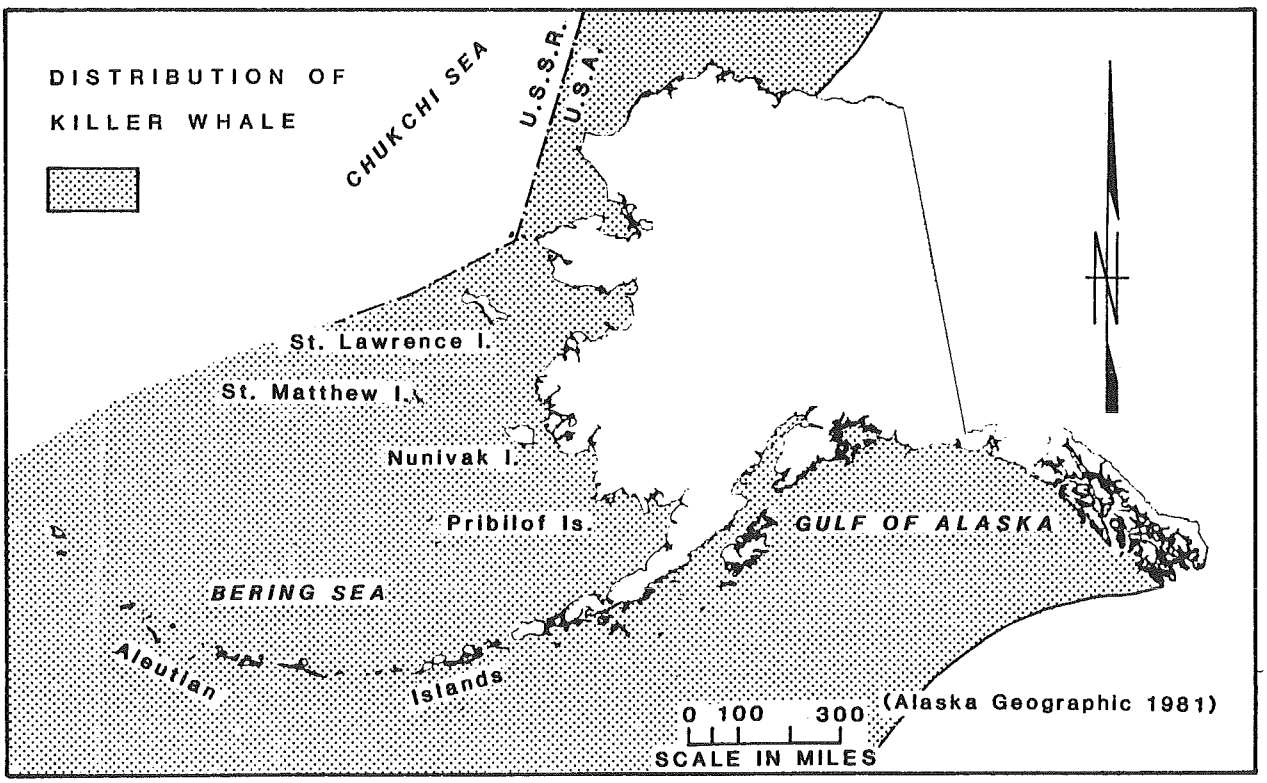


Figure 45. Distribution of killer whales in Alaska.



waters. Killer whales are believed to be year-round residents in Alaskan waters, but are most frequently observed between April and October (Braham and Dahlheim 1981; Lowry et al. 1987). Killer whales occur in waters up to 6,560 foot (2,000 m) deep, although they are more common in nearshore areas. Laevastu, Livingston, and Niggol (1980) report that the diet of killer whales from the central Bering Sea shelf consisted mostly of fish, especially pollock, but also of marine mammals, birds, and squid. Among the marine mammals, Bychkov (1967) stated that fur seals comprised a portion of the diet, and Tomilin (1957) indicated that walruses, sea lions, and minke whales were also consumed in the Bering Sea.

The predatory nature of killer whales have created problems with fishermen. The main problem involves interactions between killer whales and the black cod (sablefish) longline fishery. This problem has been occurring in the Bering Sea since the 1960's. A report from a contract study conducted in Prince William Sound indicated that an estimated twenty-five percent of the black cod catch was lost to killer whales. It also appeared a single pod was responsible for the deprivation, and that the responsible killer whale pod had a mortality rate twice that of all other pods, probably due to shooting by fishermen. There are no obvious solutions to this problem other than prohibiting longline fisheries at times and in places where killer whales are present (Marine Mammal Commission 1986).

Terrestrial mammals - The terrestrial mammals of Alaska Maritime Refuge are influenced by the remoteness of the refuge. On mainland subunits the mammals are similar to those in nearby areas. However, islands in the refuge have few species of mammals because they can rarely cross the sea from the mainland. No native mammals inhabit most of the Aleutian Islands or Alaska Peninsula Units. Some islands close to land can be reached by strong swimmers such as bears and river otters. Remote islands of the Bering Sea are a special case, having been joined to the mainland during the Pleistocene epoch when sea levels were lower. Small mammals were left on three of these islands when the sea rose, and each now has a unique species.

Many islands of Alaska Maritime Refuge have mammals that are not native there, but were introduced accidentally or intentionally by man. These alien residents include fox, several rodents, and hoofed animals. Introduced mammals have devastated their adopted homes in many cases, because the original ecosystem evolved without the pressures of predation, disturbance, or competition from land mammals. Most severely affected have been vegetation and birds that nest on the ground. These problems will be discussed below in subsections on introduced species.

A list of all mammals in Alaska Maritime Refuge is given in Appendix E, along with the refuge unit in which they occur. Scientific names of mammals are given in Appendix B.

Shrews - These diminutive animals spend their lives in the shelter of ground vegetation and fallen leaves and prey on insects. Three species are found on mainland parts of the refuge. The masked and dusky shrews are found on Unimak Island, and the dusky shrew also on a few islands south of the Alaska Peninsula (Murie 1959). One species is unique to St. Paul Island, where it is the only native land mammal besides the arctic fox (Preble and McAtee 1923). This shrew may have reached the island over 10,000 years ago via the Bering Land Bridge. It is relatively common in lush lowland meadows that are dominated by a mixture of grass and Angelica (Byrd and Mendenhall 1986). Such habitats are present in a few places on the refuge, but most belong to private landowners. No shrews are known to have been introduced where they do not occur naturally.

Rabbits and hares - Arctic hares occur naturally on mainland shores of the Alaska Peninsula and the Chukchi Sea, and are probably on the refuge in those areas. There are none on Unimak Island (Sekora 1971) or other islands of the refuge.

Snowshoe hares were introduced to Popof Island in 1955. There is no information on their impacts.

European rabbits were introduced to Middleton Island in the Gulf of Alaska Unit in 1952 (Rausch 1958) and to several small islands in the eastern Aleutians. On Middleton Island

grazing by rabbits has created scattered areas of short vegetation and erosion, but there are no major effects on vegetation or birds (Jones and Byrd 1979; D. Nysewander, pers. comm., 1986). Grass on Ananaluliak Island, near Umnak Island in the eastern Aleutians, was overgrazed and very short in places (Nysewander et al. 1982). Introduced rabbits have not seriously affected bird populations on the refuge, in contrast with rodents (see below). They have harmed birds in a few cases elsewhere, but had no effect in others (Jones and Byrd 1979).

Rodents - Most rodents on the refuge are native species on mainland areas and on a few large islands close to land. Several species that have been introduced onto remote islands have caused extensive damage.

Native rodents - Six species of vole, three lemmings, and the meadow jumping mouse are native to the refuge. These animals feed on grass and other green vegetation and live in burrows in the soil or in dense low vegetation. The red-backed and singing voles and the brown lemming are confined to mainland parts of the refuge. The collared lemming is found there and also in the Aleutians west to Umnak; the tundra vole is found on the mainland, eastern Aleutians, and also on several large islands south of the Alaska Peninsula (Murie 1959). The meadow jumping mouse is on Unimak Island and probably on mainland parts of the Alaska Peninsula.

Several islands of the refuge have small rodents that are found nowhere else. St. Matthew Island in the Bering Sea is inhabited by a vole which once belonged to the same species as a vole on the Alaska mainland, but which evolved into a unique species after the island was isolated by rising sea levels during the Pleistocene. St. Matthew voles are common in grass and forb meadows on the island, but not in marshes or dwarf shrub mat (Rausch and Rausch 1968). St. George Island has a unique lemming that is similar to the brown lemming of the mainland (Rausch and Rausch 1968). Almost nothing is known of the ecology of this animal. The Coronation vole is found on a few islands is southeastern Alaska (Burt and Grossenheider 1976), one of which, Forrester Island, is in the refuge.

The arctic ground squirrel is native to Unimak Island, several of the Shumagin Islands in the Alaska Peninsula Unit, and to mainland parts of the Bering Sea and Chukcki Sea units (Murie 1959, refuge files). The ground squirrel burrows into sandy, well-drained soil. The Alaska marmot lives in mainland areas of the Chukchi Sea and Bering Sea Units, and the hoary marmot may occur in the small mainland segments of the Alaska Peninsula Unit. Marmots live where boulders or rock outcrops provide dens of adequate size. Ground squirrels and marmots feed on grass and other green vegetation, and ground squirrels also eat some insects, berries, and animal food at times. Both hibernate in winter.

The muskrat and porcupine do not occur on Unimak Island (Sekora 1971), although they live in similar habitats on the mainland (Murie 1959).

Introduced rodents - The arctic ground squirrel was introduced to many islands in the Alaska Peninsula Unit starting in the 1890's, and to at least four islands in the Aleutians, to provide prey for introduced fox (Murie 1959, Sekora 1973, Refuge files). Collared lemmings and voles were placed on some islands in the Alaska Peninsula Unit for the same reason. The animals flourished in meadow habitats. Both ground squirrels and voles tend to reach very high densities at times, and at such times they can then have severe impacts on vegetation and other wildlife. Grasses and leafy plants have been overgrazed and reduced in abundance, so that large areas of lush meadow are sometimes converted to dwarf shrub mat or even bare soil (Bailey and Faust 1981, USFWS 1985a). Rodents can therefore reduce or eliminate the intertwined grass roots which stabilize the loose island soils. The result is severe erosion by rain and wind, and decline or elimination of burrow-nesting seabirds. Short vegetation also provides less protection for ground-nesting birds such as ducks and terns against bad weather and predators. Ground squirrels and voles can also have direct effects on island bird populations, since they are known to prey on eggs and young birds from nests on the ground or in burrows (Horn 1938, Cade 1951, Sealy 1982).

Marmots were introduced to Sud Island in the Barrens group of the Gulf of Alaska Unit in

1930. Their effect on island ecology is not known.

Rats and mice are common around human settlements next to refuge lands in the Aleutian Islands and Bering Sea Units. The Norway (brown) rat became established on Aleutian islands starting with Russian occupation, and was spread farther during World War II by military ships, so that at least 16 islands are now infested with them. Rats eat leafy vegetation, dig up root stocks, and prey on a variety of animal foods including birds and their eggs. They may have less effect on natural vegetation than voles or squirrels, but they are probably more aggressive predators; small birds nesting on the ground or in burrows have been eliminated by rats on islands in other parts of the world (Jones and Byrd 1979). House mice have been introduced to Unalaska and Kiska in the Aleutians (Murie 1959), and also to the Pribilof Islands. House mice, unlike rats, seem to remain in the vicinity of human settlements.

The effects of introduced rodents on seabird populations can be devastating. The most severely affected appear to be small seabirds that nest in dense colonies of burrows, and whose chicks grow slowly and thus are vulnerable for many weeks between hatching and fledging. Species such as Leach's and fort-tailed storm-petrels and Cassin's auklets are rare or absent on islands with rodents, even though nearby islands with similar habitat support dense populations of the birds (Bailey and Faust 1981, Hatch and Hatch 1983a). Horned and tufted puffins are much less abundant on islands with rodents, and the huge colonies of burrows that horned puffins build on a few flat islands are never found to be those with rodents (Hatch and Hatch 1983a). Some ground-nesting birds are less vulnerable to rodents; for instance, glaucous-winged gulls nest in their presence (Bailey and Faust 1981), probably because they are large and aggressive enough to drive the animals away. Ancient murrelets are able to breed on islands with rodents (Bailey and Faust 1981), although in reduced numbers, because their burrows are spaced well apart in such circumstances and because their chicks leave the burrow at an early age. Rodents can prevent some birds from nesting on an island even though it is free of predators such as fox or bears (Bailey and Faust 1981, Hatch and Hatch 1983a).

Weasels and related furbearers - All these animals are native to parts of the refuge where they are found. Two common small predators of tundra ecosystems, the ermine and least weasel, occur on mainland portions of the Chukchi Sea and Alaska Peninsula Units and on Unimak Island. The wolverine is found in the same areas; it uses all habitats on Unimak except the highest elevations (Sekora 1971). Weasels and ermines prey on mice and small birds, wolverines on a large variety of small to large game. Marten occupy some densely-forested islands of the eastern Gulf of Alaska Unit.

The river otter is common on the Alaska Peninsula and Unimak Island. Because the animal readily swims across several miles of sea, it has established itself on larger islands of the Alaska Peninsula Unit, primarily the outer Shumagins. Otters frequent sea coasts, streams, and lakes. Mink are common along coasts, marshes, and streams on Unimak Island (Sekora 1971), but swim less readily than otters and have not spread to other islands. Both eat fish, aquatic invertebrates, and some rodents and small birds; the otter uses fish in its diet more than does the mink.

Fox - Red and arctic fox are native to a few parts of the refuge, but they have been introduced to nearly all islands in the Aleutians and eastward, where they have caused some ecological damage.

Native foxes - Red foxes are native to mainland portions of the Alaska Peninsula Unit, and to the eastern Aleutians (known since Russian times as the Fox Islands). They are also native to some of the outer Shumagins in the Alaska Peninsula Unit (U.S. Fish and Wildlife Service 1985b). Red fox primarily prey on hares and small rodents, but also take a variety of other foods such as birds, berries, clams, crabs, carrion in winter, and even sand fleas from beaches (Murie 1959).

Arctic foxes ("blue fox") are native to mainland portions of the Chukchi Sea and Bering Sea Units. Although found there by early biologists, they are not believed to be native to the isolated island of Attu at the western end of the Aleutians. They are native to the Pribilof and St. Matthew Islands in the Bering Sea. They probably reached these places by way

of drifting ice in winter, since they wander far out on pack ice and may make unintentional trips on floes (Murie 1959, Rausch and Rausch 1968). Arctic foxes have diets similar to those of red foxes, except that on islands they can live entirely on intertidal organisms. Arctic foxes become relatively tame where they are not hunted or trapped; for instance, on the Pribilofs they make dens close to villages and constitute a minor tourist attraction.

Naturally occurring foxes on islands affect the bird fauna in ways similar to introduced ones (see below). On the Pribilof Islands, a few waterfowl nest in good cover and some songbirds are abundant, but all seabirds nest on sheer cliffs or in crevices. Foxes are often observed at the edges of seabird colonies, but are only able to obtain a few murre eggs (V. M. Mendenhall pers. obs.).

Introduced foxes - Red and arctic foxes were placed on over 200 islands in the Aleutian Islands, Alaska Peninsula, and Gulf of Alaska Units between 1836 and the 1930's to provide captive populations for fur farming (Jones and Byrd 1979). Introductions were begun by the Russian-American Company, continued under private entrepreneurs from the early 1900's, and accelerated until the 1930's, when fox fur prices were highest (Swanson 1982, Jones and Byrd 1979). Even after the Aleutian Islands National Wildlife Refuge was formed in 1913, permits were given for fox introductions and trapping throughout the chain. Many islands from the Alaska Peninsula to Southeast Alaska were also stocked during this period (Fish and Wildlife Service 1985b). Both red and arctic foxes were introduced, although on most islands only arctic foxes were retained in later years because of higher prices for this species. In 1936 alone, the Aleutian islands produced 25,641 pelts, worth over $1 million (Sekora 1973).

One reason for choosing islands for fox farming was availability of food. Islands with seabird colonies insured a high-quality diet and good fox production (Murie 1959, Swanson 1982). Rodents were also introduced to several islands by trappers to provide additional food for foxes (see "Rodents", above). Only in southeastern Alaska were introduced fox fed by the trappers; they received salmon.

Fox farming ended in the late 1930's. A 1930's fox study (Murie 1959) showed that 58 percent of arctic foxes' diets consisted of birds, which stimulated the Aleutian Islands Refuge to reduce fox farming for conserving birds (Sekora 1973). However, fox pelt prices fell at the same time and never recovered. Trapping was abandoned, and the foxes were left on the islands.

At present, at least 60 islands in the Aleutian Islands and Alaska Peninsula Units still have vigorous fox populations (U.S. Department of the Interior, Fish and Wildlife Service 1985b). However, foxes have died off from over half the islands where they were introduced. Many in Southeast Alaska starved when they were no longer fed salmon, and some eradicated the seabirds on which they depended (U.S. Department of the Interior, Fish and Wildlife Service 1985b). Small islands without beaches never sustained good fox production, and populations on many such islands went extinct. Other possible causes of fox disappearance included inbreeding on small islands, disease in Southeast Alaska where the climate is unsuitable for arctic fox, rabies brought by river otters, and a tsunami (Bailey and Faust 1980; U.S. Department of the Interior, U.S. Fish and Wildlife Service 1985b).

Impacts of introduced foxes on birds - Many bird populations were drastically reduced by introduced foxes, and some were eliminated. Evidence of these effects comes from comparing similar islands with and without foxes, records of bird numbers in early and recent times, and increases in birds on a few islands where foxes have been removed.

Waterfowl and terns, which nest on open ground, have been severely affected by fox introductions in Alaska Maritime Refuge . The Aleutian Canada Goose survived only on three islands where foxes were never introduced -- Buldir and Chagulak in the Aleutians, and Kaliktagik in the Alaska Peninsula Unit (Bailey and Trapp 1984, Hatch and Hatch 1983b). This subspecies was seriously endangered as a result (see also "Endangered Species"). Arctic terns and mew gulls in the Alaska Peninsula Unit nest only on fox-free islands. Ducks are common on fox-free islands, but a few successfully nest where there are fox, if good habitat is available (Murie 1959, Bailey 1978).

Nocturnal seabirds that nest in burrows, such as Cassin's and rhinoceros auklet and Leach's and fork-tailed storm-petrels, are among the most vulnerable to land predators. These birds were dug up and eaten in large numbers by foxes (Murie 1959). Cassin's auklets and ancient murrelets may be much less common in the Aleutians as a result of fox predation (Murie 1959, Nysewander et al. 1982). These birds form huge colonies on many fox-free islands, but were eliminated where foxes were introduced (Murie 1959, Bailey 1976, 1977, 1978, Bailey and Faust 1980, 1981, 1984, Nysewander et al. 1982).

Many other birds, although able to coexist with foxes on some islands, are reduced or eliminated on others. Pigeon guillemots, horned puffins, and several auklets nest in deep crevices among boulders or in lava flows or cliffs, and colonies persist on the Pribilofs and other islands with foxes. However, the predators manage to seize many birds as they enter or leave their nests (J. Andrew pers. comm.; Murie 1959; Fish and Wildlife Service 1985b). The least auklet may have been eliminated on some islands by the 1930's (Murie 1959), and a gradual decline of auklets and horned puffins has continued during the past few decades on several others (Fish and Wildlife Service 1985b). Pigeon guillemots and black oystercatchers nest in higher densities on islands without foxes (Nysewander et al. 1982). The only seabirds that are relatively unaffected by foxes are cliff-nesters (see below), and glaucous-winged gulls, whose size and aggressive nature allow some to succeed on islands with foxes (Bailey 1978).

Seabirds that nest on steep cliffs have escaped most impacts of fox predation. Nest sites of northern fulmars, cormorants, kittiwakes, and murres are largely inaccessible to land predators. These birds' populations have remained high on many islands despite the presence of foxes. Predation causes these species to abandon sloping bluffs and cliff margins, however, so some colonies may have been reduced or eliminated (Nysewander et al. 1982, Zeillemaker and Trapp 1986).

Many land birds escaped decimation by foxes because their nests are scattered or are distant from the coastal areas where predators concentrate (Murie 1959). Healthy populations of ptarmigan remain in the interior of islands with rugged mountains, such as Big Koniuji Island (Alaska Peninsula Unit) and Adak (Aleutian Islands Unit). By contrast, these birds were nearly eliminated on Amchitka Island where the hills are lower and closer to the coast, and disappeared on Amukta Island between 1936 and the 1980's (Fish and Wildlife Service 1985b).

Eradication of foxes - The Alaska Maritime Refuge (and the Aleutian Islands Refuge which preceded it) has removed introduced foxes from a few islands to promote the return of natural bird populations. Removal efforts started in 1949 on Amchitka, which was fox-free by 1965. Foxes on Alaid and Nizki Islands were removed by 1976 and those on Agattu by 1979. Nine islands, eight in the Aleutians (Amchitka, Agattu, Alaid, Nizki, Amukta, Bird Rocks, Skagul, and Ogliuga) and one south of the Alaska Peninsula (Bird Island in the Shumagins) are now fox-free. Current removal efforts are underway on Rat, Kasatochi, Kiska, Adugak, and Uliaga Islands in the Aleutians and on Big Koniuji in the Alaska Peninsula Unit.

The principal methods of fox eradication have been trapping and shooting, which require several years in each place and sometimes fail on large islands. Poisons were used until they were banned in 1972; future use of poisons is being evaluated for certain situations where conventional methods are ineffective (Aleutian Canada Goose Recovery Team 1982, Fish and Wildlife Service 1985b). Experiments are being conducted on two islands using a biological control method, the introduction of sterile red fox; these animals may eliminate arctic foxes, and they will necessarily die out themselves (West and Rudd 1983). All current fox removal efforts are conducted under careful guidelines so as to protect native non-target species such as river otters and predatory birds. An environmental impact statement has been written for the fox removal program (U.S. Department of the Interior, U.S. Fish and Wildlife Service 1985b).

The benefits of fox removal for bird populations have been very good, as shown by follow-up monitoring on several islands. The Aleutian Canada goose has re-established breeding populations on Agattu, Alaid, and Nizki islands

since foxes were removed. Ptarmigan recovered rapidly on Amchitka after fox were removed (Jones and Byrd 1979). On Alaid and Nizki Islands in the western Aleutians, where foxes were eliminated by 1976, many species that had survived only as small scattered populations had increased 500 to 1,500 percent by 1984 (Zeillemaker and Trapp 1986). Glaucous-winged gulls increased up to 800 percent, nesting ducks increased up to 1,000 percent, and pigeon guillemots and cormorants more than 1,500 percent. Cormorants also occupied more parts of the cliffs on Alaid and Nizki Islands since fox were removed. Sandpipers and songbirds increased two or three times. A few species such as kittiwakes and peregrine falcons, which nest on the steepest cliffs, probably had the same populations before and after fox removal (Zeillemaker and Trapp 1986).

Birds that have been completely eliminated from an island by foxes may take a long time to return. No species that were absent in 1976 were found nesting on Alaid and Nizki in 1984, although Aleutian Canada geese were present and will probably nest soon (Zeillemaker and Trapp 1986). Ancient murrelets that were exterminated by foxes on some islands in the eastern Aleutians, as shown by the remains of their burrows, have yet to reappear although the predators are gone (Nysewander et al. 1982).

Wolves and dogs - Wolves are found naturally on the mainland portions of the Chukchi Sea Unit, the Alaska Peninsula Unit, and on Unimak Island. Dogs were introduced and have gone wild on Korovin Island in the Alaska Peninsula Unit.

Bears - The brown (grizzly) bear occurs in low densities around mainland portions of the Chukchi Sea Unit, and is more common on the Alaska Peninsula mainland and Unimak Island. Bears frequently swim to islands of the Alaska Maritime Refuge close to the Alaska Peninsula mainland to prey on burrowing birds and small mammals. Islands off the Alaska Peninsula that are visited by bears are not used by breeding nocturnal seabirds that nest in burrows, whereas islands off a section of the coast with few bears support large colonies of these birds (Bailey and Faust 1981).

Polar bears - These bears may occasionally come onto refuge lands in the winter from the pack ice, but no regular use is known. A large population formerly occupied St. Matthew Island year-round, but hunters exterminated them before 1900.

Deer - The Sitka black-tailed deer has been introduced to Afognak Island in the Gulf of Alaska Unit.

Moose - No moose are known to use refuge lands. Suitable habitat apparently exists on Unimak Island, but moose apparently have not managed to swim across from the Alaska Peninsula.

Caribou and reindeer - These animals belong to the same species. Caribou are native to most of Alaska, including a few parts of Alaska Maritime Refuge. Reindeer are a domesticated form native to northern Eurasia; commercial herds were imported to Alaska during the last century. Both caribou and reindeer have been introduced to some refuge islands.

Native animals - Caribou occur naturally on mainland portions of the refuge, including the Chukchi Sea and Bering Sea Units (Western Arctic herd) and the Alaska Peninsula. There is also a resident herd on Unimak Island; at present it numbers 500 to 1,000 animals (Michael Blenden, pers. comm. 1987), but numbers have fluctuated in the past between about 200 and 9,000 (Sekora 1971). All caribou herds are important for subsistence hunting by local residents. Caribou occasionally swim from the Alaska Peninsula mainland to refuge islands offshore, but do not have any apparent effect on other wildlife or the vegetation there (Fish and Wildlife Service 1985a).

Introduced animals - Herds have been introduced to three islands in the Aleutians. Caribou from the Nelchina herd on the mainland were placed on Adak Island in 1958 to provide sport hunting and possible emergency food for Navy personnel. About 150 animals are harvested annually by permit, ensuring that the herd remains at about 250. Reindeer have been introduced to Umnak, Atka, and Unalaska. Much of the land used by these herds is privately owned, but they also graze on adjoining refuge lands.

Reindeer have been introduced to four islands in the Bering Sea Unit. Herds on St. George and St. Paul Islands in the Pribilofs are now privately owned; they primarily graze on private lands, but upland tundra owned by the refuge near seabird colonies is also used. The herd on Hagemeister Island grazes on refuge land under a commercial-use permit. The permit specifies that the herd will number no more than 450 in winter. Surveys are being conducted by the refuge with the assistance of the Soil Conservation Service to assess condition and potential of this range.

Reindeer were introduced to St. Matthew Island in 1944, when the Coast Guard released 24 cows and 5 bulls. The subsequent history of this herd is an extreme case of overpopulation in the absence of management, hunting, or predation. By 1957 the herd had grown dramatically to 1,350 and was in excellent condition, although the range showed signs of overgrazing. In 1963 there were 6,000 animals, but winter food plants (lichens) were becoming very scarce, and reindeer condition and calf production had declined. During the next winter, which was very severe, over 99 percent of the population died of starvation. Only cows and one abnormal bull were left, and the herd went extinct by 1985 (Klein 1968; Klein pers. comm. 1987).

Bison - This species has been introduced to Popof Island in the Alaska Peninsula Unit, and now numbers about 85.

Cattle - Domestic cattle were placed on seven islands south of the Alaska Peninsula, starting with Simeonof in the 1890's. Farmers resided on Simeonof for several decades, and thereafter the herd continued to be grazed under permit from the government, but the animals were allowed to increase to three times the number specified by the permit. The vegetation showed signs of overgrazing by the 1960's, and the lush grass typical of low island meadows was replaced by dwarf shrubs. In heavily-used areas, all vegetation was destroyed by grazing and trampling, which allowed severe erosion of the soft, sandy soil. Waterfowl, gulls, and terns ceased to nest on the islands because of cattle walking near their nests, and because the reduced vegetation could not protect them from the fox that had also been introduced. In 1985 the Service removed all cattle from three refuge islands, Simeonof, Chernabura, and Caton. It is hoped that the vegetation and eventually the bird populations will recover. Cattle will remain on four other islands where most of the range is now private land.

Marine Resources

Seabirds and marine mammals that use the islands and headlands of Alaska Maritime Refuge depend for their food on resources in the sea. Most waters that provide prey for these birds and mammals are not within the Refuge. Nevertheless the purposes of the refuge listed in the Alaska Lands Act include ". . .to conserve fish and wildlife populations and habitats in their natural diversity including . . . the marine resources on which they rely" [section 303(1)(B)(i)]. This section of the Affected Environment describes the principal prey species which birds and marine mammals of the refuge obtain at sea, and summarizes the issues that potentially affect the welfare of refuge wildlife. Table 4 includes a list of prey species and other marine resources in the Alaska Maritime Refuge.

Most seabirds and several marine mammals depend on fish during part or all of the year (see sections on each species). Some seabirds also use zooplankton or other invertebrates, and some mammals obtain molluscs and other prey from the bottom. Essential characteristics of prey include appropriate size for the predator, a location accessible from the colony, dense concentrations (such as fish schools) to make foraging worthwhile, proximity to the surface, and availability during the breeding season.

Prey resources of marine birds and mammals at high latitudes are characterized by extreme variability. Fish and small marine organisms that drift with the water are highly dependent on favorable sea temperatures, currents, nutrient supplies, and weather patterns. In good years when all these factors coincide, Alaskan seas are extremely productive. In years when conditions are unfavorable, some species are driven to areas not accessible to birds or mammals during the breeding season; other organisms may fail to reproduce and become scarce until a better year (Drury 1980, Hunt et al. 1981c, Springer et al. 1984). Natural fluctuations of a few years' duration can be

Table 4. Marine resources in the Alaska Maritime Refuge.

Group	Subgroup	Common and Species Name
Pelagic Fish	Salmon	Chinook salmon (*Oncorhynchus tschawytscha*)
		Pink salmon (*O. gorbuscha*)
		Chum salmon (*O. keta*)
		Coho salmon (*O. kisutch*)
		Sockeye salmon (*O. nerka*)
	Trout	Steelhead trout (*Salmo gairdeneri*)
		Dolly Varden/Arctic char (*Salvelinus malma*)
	Smelt	Longfin smelt (*Spirinchus thaleichthys*)
		Eulachon (*Thaleichthys pacificus*)
		Capelin (*Mallotus villosus*)
	Herring	Pacific herring (*Clupea harengus pallasi*)
	Other	Sandlance (*Ammodytes hexapterus*)
Groundfish	Roundfish	Walleye pollock (*Theragra chalcogramma*)
		Pacific cod (*Gadus macrocephalus*)
		Sablefish (*Anaplopoma fimbria*)
		Atka mackerel (*Pleurogrammus monopterygius*)
		Giant grenadier (*Albatrossia pectoralis*)
		Ling cod (*Ophiodon elongatus*)
		Saffron cod (*Eleginus gracilis*)
		Arctic cod (*Boreogadus saida*)
	Rockfish	Pacific ocean perch (*Sebastes alutus*)
		Thornyhead rockfish (*Sebastes aleutinianus*)
	Flatfish	Pacific halibut (*Hippoglossus stenolepis*)
		Arrowtooth flounder (*Atheresthes stomias*)
		Flathead sole (*Hippoglossoides elassodon*)
		Dover sole (*Microstomus pacificus*)
		Rex sole (*Lepidopsetta bilineata*)
		Rock sole (*Lepidopsetta bilineata*)
		Yellowfin sole (*Limanoa Aspera*)
		Starry flounder (*Platichthys stellatus*)
		Greenland turbot (*Reinhardtius hippoglossoides*)
		Alaska plaice (*Pleuronectes quadrituberculatus*)
Invertebrates	Crabs	Red king crab (*Paralithodes camtschatica*)
		Tanner crab (*Chionoecetes baird*)
		Dungeness crab (*Cancer magister*)
	Shrimp	Pink shrimp (*Pandalus borealis*)
	Mollusks	Weathervane scallop (*Patinopecten caurinus*)
		Razor clam (*Siliqua patula*)
		Butter clam (*Saxidomus gigantea*)
		Cockle (*Clinocardium nutalli*)
		Geoduck clam (*Panope generosa*)
		Pinto abalone (*Haliotis kamtschatkana*)
		Octopus (*Octopus dolfleini*)
		Squid (*Berryteuthis sp.*)

(U.S. Fish and Wildlife Service 1987)

withstood by most marine birds and mammals. However, long-term changes in prey due to climatic shifts or influences of man could alter bird and mammal populations.

The following species are among the most important prey of Alaskan seabirds and marine mammals. Location and characteristics of each species are summarized, and also their commercial and subsistence uses. Details of bird and mammal species that depend on each prey are given in accounts under "Birds" and "Mammals". Habitats where prey are found are described further under "Habitats". Scientific names of species in this section are listed in Appendix B.

Walleye pollock - Walleye pollock, a species of cod, are abundant in the Gulf of Alaska and the Bering Sea. They occur in dense schools at midwater depths, mostly over the continental shelf and slope. This species is the most important food resource of Alaskan seabirds and marine mammals. It is the principal prey during the breeding season of over half the seabirds of the Bering Sea (Hunt et al. 1981a), and of some seabirds such as tufted puffins in the Gulf of Alaska (Sanger and Hatch 1987). Pollock are also a principal food of numerous marine mammals. They constitute 58 percent of the diet of northern sea lions (Calkins and Pitcher 1982), 35 percent for northern fur seals (Fowler 1986), and 23 percent for harbor seals (Pitcher and Calkins 1979), and are also important to several other seals and whales. Seabirds consume fish hatched in the same year and those up to 2 years of age. Mammals eat fish of the same sizes, but can also take larger ones than can seabirds, up to 20 inches (50 cm) long in the case of sea lions (Frost and Lowry 1986).

Movements of pollock are better known than those of many Alaskan marine fish, but important aspects of their ecology are still unknown. Young fish eaten by seabirds occupy the continental shelf and shelf break of the Bering Sea, primarily in the upper 150 feet (50m) of water (Lynde 1984). In the Gulf of Alaska young pollock hatched earlier in the year move southwest along the Alaska Peninsula (Kendall et al. 1984, Walters et al. 1985), where they may be crucial in supporting large seabird colonies such as those in the Semidis. Fish older than two years are primarily found at the shelf break, where they are available to marine mammals, whose foraging range and diving depths are greater than those of most seabirds.

Walleye pollock presently support major commercial fisheries in the Bering Sea and the Gulf of Alaska. Catches in the Bering Sea peaked at nearly 2 million metric tons in 1972, then declined, and are now apparently stable at about one million metric tons per year. Opinions differ as to whether Bering Sea stocks are being overfished. Some fisheries biologists believe the stocks are in fair condition but declining slightly (Bakkala and Low 1985). In the Gulf of Alaska catches have increased dramatically during the past decade to 275,000 metric tons in 1985. Spawning stocks in Shelikof Straits have declined to about 20 percent of their former numbers in the past 5 years, probably due to a combination of natural fluctuation (Alton and Rose 1985) and fishing pressure.

There is concern among biologists that seabirds and marine mammals could suffer from reductions in pollock stocks. However, effects of any possible reduction in pollock on marine birds and mammals are uncertain at present. It has been argued that heavy commercial fishing might either reduce the numbers of young fish needed by marine mammals, or benefit the mammals by removing most of the adult fish and thus improving the survival of juvenile fish (Fowler 1986). Populations of northern fur seals, northern sea lions, and harbor seals have declined in Alaska during the past decade; since all three depend heavily on pollock, some biologists consider this indirect evidence that the prey is in short supply. On the other hand, breeding northern fur seals are in excellent condition, suggesting that pollock are highly available on their feeding grounds (S. Zimmerman and C. Foster, pers. comm., 1986). The most abundant seabirds of the Bering Sea, kittiwakes and murres, have suffered poor breeding success and probably population declines during the last few years (Murphy 1984, Troy and Baker 1985). Causes are uncertain, but seabirds are highly sensitive to sea conditions and abundance of prey, and either factor or a combination of both could explain the declines (Murphy 1984, Springer et al. 1985).

Saffron cod and arctic cod - Saffron cod are abundant in summer in shallow coastal waters of the Chukchi Sea, and in autumn near coastlines of the northern Bering Sea (Lowry et al. 1980). Arctic cod are common north of the Bering Strait, where they tend to be associated with sea ice, although a few remain south of the ice in summer. The fish reach 9 inches (23 cm) in length (Lowry and Frost 1981). These cods form a major component of seabird diets in the Chukchi Sea, apparently replacing the more southerly walleye pollock in the birds' diet there, and are also important to seals and beluga whales (Lowry et al. 1980). There is no commercial interest in northern cod at present.

Capelin - The capelin is a species of smelt that is common throughout the coast of Alaska, especially in the northern Gulf of Alaska, Norton Sound, and Bristol Bay (Paulke 1985), and in the Chukchi Sea (Springer et al. 1984). They form dense spawning schools near shore during early summer and deposit their eggs in the wave zone of beaches. Capelin reach 4 inches (10 cm) at maturity. They are the first or second prey of half the seabird species in the Gulf of Alaska, where successful breeding of some birds may depend on them (Baird and Gould 1983, Sanger 1983). They are also a major part of the diet of fur seals, sea lions, and harbor seals (Pitcher and Calkins 1979, Calkins and Pitcher 1982, Zimmerman 1985), and are particularly important to fur seals and other marine mammals during spring and fall in the Unimak Pass area (K. Frost, pers. comm., 1986). Seabirds eat juvenile fish, from zero to one year old; marine mammals also eat larger fish.

Capelin are harvested for subsistence use in Norton Sound and Kodiak Island. There has been a small and sporadic commercial fishery for roe in Bristol Bay. The largest yearly harvest was 139 metric tons in 1986 (R.C Lebida, pers. comm. 1986), but none was attempted in 1985 (Lebida et al. 1985). Large-scale commercial fishing for capelin has been carried out in the North Atlantic since 1970, and international interest has been expressed in starting a fishery here.

The ecology of capelin is poorly known in Alaskan waters, particularly the habitats and distribution of juveniles.

Pacific sandlance - Sandlance are a family of small schooling fishes that are abundant in coastal waters on both sides of the North Pacific and North Atlantic (Macy et al. 1978). The Pacific sandlance is common throughout the coast of Alaska, including north of the Bering Strait and on the entire Aleutian chain (Dick and Warner 1982, Drury et al. 1981, Wehle 1983). They are distributed in patches rather than evenly, however (Harris and Hart 1977). Sandlance are most abundant in summer in waters shallower than 150 feet (50 m), and need sand or fine gravel in which to burrow. Juvenile sandlance, from 2 to 6 inches (60 to 160 mm), are important in seabird diets throughout the coast of Alaska (Swartz 1966, Baird and Gould 1983, Sanger 1983). Larger fish are a seasonal component of the diet of several seal species and the northern sea lion (Pitcher and Calkins 1979, Calkins and Pitcher 1982). Sandlance are not currently fished commercially in Alaska, but there is a major fishery in the North Atlantic, and international interest has been expressed in starting one here. The ecology of sandlance in Alaska is virtually unknown.

Pacific herring - Pacific herring are found off the coast of North America from southern California north to the Beaufort Sea (Hart 1973). The fish form spawning schools in spring (southeastern Alaska) to midsummer (Chukchi Sea). Spawning takes place in sheltered bays where eggs are laid on seaweed and other vegetation. Herring spend late summer through winter in bays and near the coast in the Gulf of Alaska and southeastern Alaska. From Bristol Bay, however, they migrate far offshore in winter to the shelf break and are probably unavailable thento seabirds and most marine mammals. Herring up to 2 or 3 years old are important in diets of some seabirds. Fish of all ages are taken by marine mammals, particularly the northern sea lion, beluga whales, and seasonally by the spotted seal (Lowry et al. 1980, Calkins and Pitcher 1982, Lowry 1985).

There are major fisheries for herring in Alaska. In Southeast Alaska, over 150 million pounds were landed in 1930, but harvests declined subsequently. Since 1980 the fishery has become intensive again. There was a flourishing fishery for herring in Bristol Bay and the Aleutians before the 1940's; it

stagnated due to changes in demand, but recently has been expanding again there and in Norton Sound. Seines are set close to shore when schools gather there to spawn. There is also a small commercial harvest of the roe (eggs) from kelp in Bristol Bay. Herring are an important traditional subsistence species throughout coastal western Alaska.

Pacific salmon - Five species of salmon migrate seaward from Alaska's streams each summer to mature at sea, and adults return to their native streams two to six years later to spawn. This rich resource supports a world-class fishery, particularly in Bristol Bay. The Aleutian Islands Unit and the Alaska Peninsula Unit of the Alaska Maritime Refuge in particular support immense salmon runs, as indicated by commercial harvest figures (See Table 23 in the Aleutian Islands Unit section of the Affected Environment Chapter). Salmon are an important seasonal component of the diets of northern sea lions, harbor seals, and beluga whales (Pitcher and Calkins 1979, Lowry 1985, Fowler 1986). By contrast, juvenile salmon are seldom found in diets of Alaskan seabirds (Drury et al. 1981, Hunt et al. 1981a, Wehle 1983, Springer et al. 1984). This is despite the fact that pink and chum salmon smolts stay close to the coast as they migrate to sea (Hart 1973, Straty and Haight 1979), where they would seem to be vulnerable to marine birds that forage near shore. Juvenile sockeye salmon also migrate within flying range of seabird colonies, but are rarely eaten (Ogi and Tsujita 1977). In British Columbia, young silver, chum, and sockeye salmon have been documented in rhinoceros auklet diets (Vermeer and Westrheim 1984).

Atka mackerel - The Atka mackerel is a member of the greenling family that occurs in subarctic waters of the North Pacific and Bering Sea (Macy et al. 1978). It is primarily a species of deep waters far offshore, but it moves into shallow waters in passes between islands to spawn. Newly hatched fish may drift away from the coast, but juveniles apparently spend the summer close to the coast, and fish up to the age of one year are found in diets of a few seabird species (G.A. Sanger, unpublished data). Atka mackerel support a fluctuating commercial fishery off the Aleutian Islands; yield has varied from 11 to 38 million metric tons in the past decade.

Other fish - Fish with commercial value that form a minor part of the diets of Alaskan seabirds include juvenile pleuronectid flatfishes, rockfishes, and black cod or sablefish. Sea lions consume various flatfishes (Calkins and Pitcher 1982). A variety of species with no commercial value constitute minor items in diets of seabirds and marine mammals and are predominant for a few predators. Seabirds feeding over the edge of the continental shelf take myctophids, a deep ocean species. Those that dive to the bottom near shore take fish such as sculpins and gobies, as do several species of seals.

Pelagic Invertebrates - Invertebrates of various types are an important secondary component of most seabirds' diets. They are the major component for several species, and a lesser component for many birds outside the breeding season.

Pandalid shrimps are approximately two inches (50 mm) long. They are a minor to moderate part of the diet for at least 10 seabirds in the Gulf of Alaska. They support important commercial and subsistence fisheries in coastal waters of the state. Several seal species depend on various shrimp and other crustaceans, particularly during their first few years.

Squid are common in all regions of the open ocean, including those off Alaska. Squid up to two inches long are consumed by seabirds that feed far offshore, and they predominate in the diet of several species. They are also an important food of some seals and whales, especially the fur seal (Fowler 1986) and sperm whale. Very little is known about the biology of squid in Alaskan waters. They are the object of a well-established fishery in offshore waters of Alaska, primarily by Japan but also by Taiwan. Squid are fished both for their own sake and opportunistically during harvest of other species (Bakke 1985). The bottom-dwelling octopus is also important in the diets of marine mammals such as the harbor seal and sea lion (Pitcher and Calkins 1979, Calkins and Pitcher 1982).

Zooplankton is the collective term for small invertebrates (under approximately one inch in length) that are an abundant and crucial part of the food web in the sea, from the open ocean to the shore. Zooplankton generally feed on phytoplankton (one-celled algae). In turn they are crucial in the diet of approximately a third of Alaskan seabirds and most of the baleen whales, and a secondary food of some seals. They are also the mainstay of small fish and juvenile forms of large fish, and therefore indirectly support all other birds, mammals, and the fishing industry. Zooplankton include groups such as the euphausids, amphipods, copepods, small shrimps, and larval forms of many fish, molluscs, and crabs.

Bottom-dwelling invertebrates - The seabed from the low-tide line to a depth of approximately 300 feet (100 m) is rich in crustaceans, molluscs, and worms. A few species from each group of birds and mammals are adapted to concentrate on this benthic resource. Small crustaceans and worms are occasionally found in diets of diving seabirds (Baird and Gould 1983, Kuletz 1983). These and molluscs are important to sea ducks that breed and winter on the refuge (Sanger 1983). Molluscs, primarily clams, and sometimes worms and snails are the principal food of the walrus (Fay et al. 1984), and bearded seals prey on various benthic fauna such as clams, crabs, shrimps, and some fish (Burns and Frost 1979). Sea otters eat a wide variety of sessile and slow-moving benthic invertebrates, including sea urchins, clams, mussels, cockles, scallops, abalone, crab, snails, octopus, squid, and, in some parts of Alaska, sluggish epibenthic fishes (Estes and Van Blavicom 1985). Gray whales feed on various fauna from the shallow sea bottom, particularly small crustaceans.

Major commercial fisheries harvest several species of crabs, whose populations fluctuate in part due to harvest pressures and environmental conditions.

Intertidal invertebrates - Shorelines between the high and low tide lines support a variety of invertebrates in areas south of the winter ice pack, which scours most such organisms off the shoreline. Mussels, worms, crabs, amphipods and other fauna are important to waterfowl, shorebirds, and one group of seabirds (gulls).

Threatened and endangered species

Aleutian Canada goose - This small goose, which is listed as endangered, once nested on most of the Aleutians and part of the Alaska Peninsula Unit, but was completely eliminated by fox predation except on three islands where foxes were never introduced, Buldir, Chagulak, and Kaliktagik. Even the relict populations on these islands became sparse because of overhunting in the winter range south of Alaska (Murie 1959, Byrd and Woolington 1983, Hatch and Hatch 1983, Bailey and Trapp 1984). The total population in 1975 was estimated at only 700 (refuge files).

Flat lowlands with numerous ponds may especially have been favored by nesting geese before foxes invaded this habitat. Nests are now placed on hummocks in the lush meadow on lower island slopes. Later in the summer while rearing goslings, molting, and storing energy for migration the geese use dwarf shrub vegetation at higher elevations. Foods are the shoots or fruits of grasses, sedges and crowberry. A few goslings are preyed upon by gulls and jaegers, but in the absence of foxes or other terrestrial predators, breeding success is extremely high (Murie 1959, Byrd and Woolington 1983).

Measures to promote recovery of the Aleutian Canada goose began with removal of foxes from the islands (see "Mammals - Foxes"). Efforts to re-introduce geese to fox-free islands began in 1971, when 75 birds that had been taken from Buldir Island as goslings and reared in captivity were released on Amchitka. Subsequent releases were made there and on Agattu and Nizki Islands from 1976 through 1982, sometimes including wild ganders paired with captive-reared females. Many of the birds reached the wintering grounds, but few were ever seen again in the Aleutians and none bred there. Beginning in 1980, some introductions were made using fully-wild families of geese captured on Buldir in summer when both goslings and adults are unable to fly. Since 1983 all introductions have used wild-reared geese instead of captives. The new technique has proved successful: in 1984, nests and goslings

of the Aleutian Canada goose were discovered on Agattu Island for the first time since the 1930's (Murie 1959, Aleutian Canada Goose Recovery Team 1982, refuge files.)

Increase of the population has also been promoted by protection from hunting on migration and wintering areas beginning in 1975, as shown by growing numbers on nests even on Buldir Island (Aleutian Canada Goose Recovery Team 1982, Byrd and Woolington 1983). Numbers had increased by 1986 to about 4,500 birds (refuge files).

Projects underway at present include monitoring of existing populations, removal of foxes on Kiska Island, and continued reintroduction of geese to selected fox-free islands. The goal is to ensure healthy breeding populations in at least three widely-separated parts of the Aleutian chain (Aleutian Canada Goose Recovery Team 1982).

Aleutian shield fern - This plant was determined to be endangered in 1988. A total of 20 clumps at two separate sites on Adak were located in 1987 and 1988. Historically, it was also found on Atka.

Short-tailed albatross - This endangered species breeds in the Japanese archipelago and spends the summer in the North Pacific near the refuge. It is not known to use refuge lands or waters; Service personnel record any sightings of the bird as part of the international effort to document its status.

OFF-REFUGE ENVIRONMENT

The Alaska Maritime Refuge is required to consider all factors that may affect marine resources on which seabirds and marine mammals depend, even though most of these resources are located at sea and not within the refuge. Nevertheless the purposes of the refuge as listed in the Alaska Lands Act include ". . .to conserve fish and wildlife populations and habitats in their natural diversity including . . . the marine resources upon which they rely" [section 303(1)(B)(i)]. Marine resources in northern latitudes can fluctuate greatly due to natural causes, and we anticipate no effort to change these fluctuations. But major problems for marine birds and mammals can be caused in some circumstances by human activities such as fisheries, oil exploration and extraction, mining, and general shipping. This section describes situations and developments occurring off of refuge lands and beyond Service jurisdiction which may impact refuge resources.

Interactions Between Commercial Fisheries and Wildlife

When commercial fisheries as well as seabirds and marine mammals harvest a resource, there is potential for overfishing with adverse impacts on all consumers. Subsistence and small-scale commercial fisheries seldom take enough fish to create conflicts with wildlife. However, wildlife and major fisheries both use a significant proportion of yearly fish production. Together they can severely deplete those stocks. This has led to population crashes in seabird populations in some parts of the world, and concern about declines in marine mammal populations. Certain seabird populations may also have increased as a direct or indirect consequence of fisheries. There is concern among biologists that the important and growing Alaskan fisheries be managed so that artificial effects on wildlife are avoided or minimized.

Scientific names of Alaskan species are listed in Appendix B. Those of non-Alaskan species are included in the text.

Vulnerability of seabirds to reduced prey populations - Seabirds are most vulnerable to a decline in their prey during the breeding season, generally because only a few prey species are suitable within range of the nest site. Prey fish must fill several criteria to be useful to the birds. (1) They must fall in a narrow size range (commonly 60 to 160 mm in length). Even where prey differs between geographic areas, the fish selected by a seabird tend to be very similar in size, shape, and ecology (Hunt et al. 1981a). (2) They must be available within the birds' flying range from the nesting colony. Some birds can go 50 miles from the colony, others less than five. (3) They must be concentrated, for instance by currents or in schools, so that food can be obtained efficiently enough to supply growing young. (4) They must be relatively near the surface. Some seabirds can dive more than 100 feet, others feed only within inches of the

Fulmars forage farther offshore than most seabirds during the breeding season, sometimes gathering in large flocks behind foreign fishing vessels to consume any offal dumped there.

surface. (5) They must be available during the brood-rearing season. (6) Some species are able to rear young only on certain prey, although the adults can use a larger variety. These limitations mean that, in many areas of the world, seabird colonies depend on only one to three species of fish. If an alternate prey is available and sufficiently nutritious to support breeding, the bird community is likely to be exploiting it already (Hunt et al. 1981a).

For seabirds that must feed at the surface, the alternatives to preferred prey are limited. In some regions there is only one species of small surface-schooling fish in seabird diets, such as walleye pollock in the the Bering Sea (Hunt et al. 1981a, Schneider and Hunt 1984). Capelin abundance in seabird diets in the Gulf of Alaska was correlated with breeding success of gulls, kittiwakes, and terns. Sandlance were also consumed in some years but were apparently a poor alternative (Baird and Gould 1983).

Diving seabirds are more flexible during prey shortages in areas where alternate species exist at depth. In Siberia, when kittiwakes were unable to feed their young, the deep-diving murres still bred successfully (Belopol'skii 1957). Pigeon guillemots in Prince William Sound raised the most young on capelin but maintained moderate breeding success on bottom-dwelling fish (Kuletz 1983). Atlantic puffins (Fratercula arctica) in Scotland bred successfully when the diet consisted mainly of either sandlance or sprat; when either was scarce the birds took more of the other (Hislop and Harris 1985). In a different colony, however, when the diet mainly consisted of a third fish, the whiting, the puffins raised few chicks (Harris 1980). Tufted puffins in the Gulf of Alaska bred successfully using a variety of fish (Baird and Gould 1983).

Adult seabirds seldom suffer as severely from changes in prey as their young, since most are able to subsist on a greater variety of fish and invertebrates. Adults also range over a much wider area when foraging for themselves than when they must return frequently to the nesting colony. Extreme prey shortage does occasionally cause mortality among adults as well (Nysewander and Trapp 1984).

Competition between seabirds and fisheries in other regions - The Humboldt Current off Peru is extremely rich in nutrients and has high fish populations. This region supported dense populations of seabirds. Populations of these birds crashed from 28 million in 1955 to only 1.1 million in 1969. At the same time, commercial catches of the birds' principal prey, the anchovetta (Engraulis ringens) which were near zero in 1955, increased steadily and exploded to over 10 million metric tons by 1969. The fishery crashed in turn and has stabilized at about one million metric tons in recent years. Guano bird populations have recovered to about four million. Although periodic "El Nino" currents contributed to the disastrous drop in fish stocks and guano bird populations, overfishing of the anchovetta stocks is thought to have been the main cause (Schaeffer 1970, Furness 1982, Furness 1984).

In several other temperate regions an intensive fishery on schooling fish of the open ocean has resulted in population declines of seabirds. Off the west coast of South Africa in the Benguela Current, overfishing of anchovies and pilchards (Sardinops ocellata) in the 1960's was followed by declines in populations of Jackass penguins and other seabirds (Crawford and Shelton 1978, Furness and Cooper 1982). Along the southern California coast populations of the

brown pelican (Pelecanus occidentalis) fluctuate inversely with commercial catches of northern anchovies (E. mordax) (Anderson and Gress 1984).

Cases with the most bearing on the situation in Alaska occur on both sides of the North Atlantic. Off the coast of Newfoundland, capelin spawning on the beach have been fished on a small scale for bait, fertilizer, and food for decades (Carscadden 1984). In the early 1970's, however, the fishery expanded, taking previously unfished stocks that spawn over offshore banks. Catches continued to increase, peaked in the mid-1970's, then went into a steady decline through 1980. The overall status of seabird populations in Newfoundland is uncertain, but productivity of black-legged kittiwakes, common murres and Atlantic puffins is significantly less when capelin are unavailable near the colonies (Brown and Nettleship 1984, Carscadden 1984).

In the eastern North Atlantic off Britain and in the North Sea, data on both fishery catches and seabird populations are better than in any other region, having been collected since the late 1800's. Commercial fisheries have concentrated on a series of schooling fish during this period. The larger species and sizes of fish were successively overfished, and the current trend is toward increased landings of the industrial fisheries for sprat and sandlances. At the same time, populations of northern fulmars, shags (Phalacrocorax aristotelis), and common murres have increased steadily. Fulmar increases are attributed in part to fish waste and unwanted whole fish that were discarded by boats and were consumed by northern fulmars.

Populations of the other seabirds actually benefited when small fish on which they fed (sprat, sandlance, and juvenile herring) increased as the larger fish that preyed on them were overfished and declined. Seabirds are estimated to eat 29 percent of sprat and sandlance produced annually within foraging distance of their colony (Cramp et al. 1974, Bailey and Hislop 1977, Furness 1978, Furness 1981, Furness 1984). It is not known what effect the new fishing pressures on sprat and sandlance will have on bird populations. Sandlance stocks off the coast of Norway have been fished heavily since the 1960's, with the harvest increasing to 150,000 metric tons by 1980. Herring stocks have been depressed since the late 1960's, and mackerel have also been overfished. Atlantic puffins in Norway have experienced very poor breeding success since 1968, which is attributed to the low stocks of herring and sandlance (Lid 1980). Common murre populations in northern Norway crashed in the winter of 1986-87 and many adult birds starved in conjunction with a severe drop in stocks of capelin due to overfishing (Vader et al. 1988).

Interactions of marine birds and mammals with fisheries in Alaska - There are several major fisheries in Alaska (see "Marine Resources," above). No changes in seabird or marine mammal populations of Alaska have been shown so far to have been caused by interactions with commercial fisheries, but potential problems can be identified on the basis of available information. Recent work in the eastern Bering Sea has shown that kittiwake reproduction has been very poor and that kittiwakes and murres in the Pribilofs have decreased in numbers since 1976 (Craighead and Oppenheim 1982, Troy and Baker 1985). One possible reason for these problems could be reduced availability of the juvenile pollock on which the birds depend (birds from the Pribilofs while rearing their young, murres from Bluff during the winter). Pollock harvests in the Bering Sea have decreased coincident with heavy fishing pressures (see "Marine Resources," above). Breeding failures could also be caused by natural factors such as differences in weather or water temperature between years, which can render food species difficult to obtain even if they remain abundant (Murphy et al. 1986)(see "Vulnerability of seabirds to reduced prey populations").

Northern fur seals in the Bering Sea are apparently able to find plenty of their prey, which are primarily large pollock. Although the fur seal has been declining recently, there are some indications that food is abundant (S. Zimmerman and C. Fowler, pers. comm. 1986). Severe declines in northern sea lions in several hundred areas are also unexplained but may be due in part to reduced food resources (Braham et al. 1980). Population dynamics of seals, sea otters, and seabirds in the Bering sea clearly require more study. Interactions between marine

mammals, particularly sea otters, and commercial fisheries along the the Alaska Peninsula also need further study.

There is a potential for more adverse interactions between seabirds and fisheries in the future. Commercial fisheries for capelin and sandlance have been proposed, similar to those in the North Atlantic. Capelin are common in the diet of northern fur seals collected in Unimak Pass (Macy et al. 1978), and presumably this fish is important to seabirds nesting in the area as well. Wehle (1983) studied the diets of nestling horned puffins and tufted puffins at Buldir Island in the western Aleutians. He found that the Pacific sandlance was the main prey species. Capelin fisheries may be feasible in the future in the Kodiak area (Paulke 1985). This is the most important prey of seabirds of the northern Gulf of Alaska (Baird and Gould 1983), and the fishery and seabirds should be monitored closely.

Interactions between seabirds and walleye pollock in the northern Gulf of Alaska have been studied to a limited extent, and no adverse effects have been found (Wehle 1983, Hatch 1984). However, a potential problem lies in the rapidly-expanding pollock fishery. Juvenile pollock are primary prey of seabirds along part of the Alaska Peninsula (Sanger 1987), in the area where juvenile pollock are most abundant (Walters et al. 1985). Interactions between sea otters and the commercial salmon gill net fisheries, and other fisheries, in several areas of Alaska appear to be increasing. The salmon fishery of the Copper River-Prince William Sound district appears to be one such area (Simon-Jackson 1986).

More information is needed on interactions between seabirds and the herring fishery in southeastern Alaska. There is no indication at present that seabirds prey heavily on juvenile herring there, but very few data are available on which to base any conclusions. Some dependence on herring seems likely from circumstantial evidence. There are large seabird colonies on a few islands in southeastern Alaska, and young of at least one species are fed juvenile herring (DeGange and Possardt 1978, Sanger 1984). Pacific sandlance also appears to be important food for seabirds in southeastern Alaska, and any future development of Pacific sandlance fisheries in the area should be monitored closely.

Nets and wildlife mortality - The fishery for salmon on the high seas west of Alaska poses a particular hazard to seabirds. This fishery operates in the North Pacific and Bering Sea between 46 and 59 degrees north latitude, and is concentrated south of the Aleutian Islands. Boats deploy gill nets approximately 10 miles (16.5 km) long that hang from the surface to a depth of 25 feet (8 meters). Nets are set loose to drift overnight and are retrieved the next morning, when fish are removed and delivered to the "mother ship" for processing (DeGange et al. 1985). Some nets get lost and are never retrieved; these continue to float for months or years, still catching fish and seabirds.

Seabirds that dive for prey are caught by high seas gill nets and drown. The species caught in the largest numbers are short-tailed shearwaters, followed by tufted puffins, horned puffins, crested auklets, thick-billed murres, and northern fulmars. The impact on seabird populations may be most significant south of the outer Aleutian chain, the only part of the fishing zone where boats are near breeding colonies. Birds that are rearing young forage mostly within 60 miles of these islands. The breeding species caught by nets here are primarily tufted and horned puffins and ancient murrelets. All of these, and especially the tufted puffin, may be suffering significant adult mortality from the drift-net salmon fishery (DeGange et al. 1985). Regulating fishing locations and gear types would help mitigate seabird losses. The Driftnet Impact Monitoring Assessment and Control Act of 1987 (P. L. 100-200, Title IV) requires observations and reports of seabird mortality by the Department of Commerce, in cooperation with the Service. The act contains no restrictions on fishing. Nets may not intentionally be discarded under the Plastic Pollution Research and Control Act of 1987 (P. L. 100-220, Title II). It is not known whether populations of breeding seabirds in the outer Aleutians are stable or decreasing, since no regular monitoring currently takes place.

Sea otters are caught incidentally in salmon gill net fisheries in several areas of Alaska. Until recently, sea otters have been absent or

present only in low numbers in the vicinity of the most intensive fisheries in areas such as Prince William Sound, the Kodiak Archipelago, and the Alaska Peninsula-Aleutian Islands. As sea otters have repopulated and increased in these areas, both incidental take and deliberate killing have apparently increased. Matkin and Fay (1980) reported 70 sea otters entangled in gill nets and released alive during fishing operations in Prince William Sound and on the Copper River delta in the spring of 1978. Sea otter-fisheries interactions in this area were also monitored in 1986 (Simon-Jackson 1986). Sea otters are also being taken in commercial fisheries in the Kodiak Archipelago and the numbers are likely to increase as sea otters increase. At least 10 sea otter pups were taken in the set-net fishery near Raspberry Island in 1984 (Rotterman and Simon-Jackson in prep.). Even less is known about sea otter-fisheries interactions in other parts of Alaska (Simon-Jackson 1985).

Dall porpoises, seals, and sea lions are also caught in salmon gill nets and bottom-trawl nets in the groundfish fishery. This problem is being addressed by the National Marine Fisheries Service (Loughlin et al. 1983; National Marine Fisheries Service 1986).

Fish Processing

Fish and shellfish must be processed before transportation to market. Waste products such as soft meat, bones, and shells can affect the marine environment unless disposed of properly. Fish caught on the high seas that are destined for foreign markets are generally processed on "mother ships" and organic wastes are disposed over the side. They attract large flocks of scavenging birds, mainly northern fulmars; the impact of this is discussed under "Interactions with commercial fisheries," above. The wastes usually have no adverse effect on aquatic communities because they are greatly diluted by the sea.

Fish and shellfish caught in waters near shore are sold to canneries and processing plants at communities such as Dutch Harbor, Kodiak, and Petersburg. These plants are located in protected shallow bays, and organic wastes disposed in these water can accumulate much faster than natural decay processes can remove them. The result in some places was that thick layers of foul debris built up on the bottom of the bay or channel, oxygen in the water was depleted, anaerobic decay produced foul-smelling gases, and bottom-dwelling organisms were killed. Natural marine communities were eliminated, and the worst examples created a public nuisance (Mendenhall 1971). Federal and state water quality regulations now prohibit the discharge of decayable wastes into marine waters near shore. However, some problems may still be affecting the Womens Bay portion of the refuge (U.S. Fish and Wildlife Service 1986).

Mariculture

Another type of development that may affect the Alaska Maritime Refuge is mariculture. Mariculture is the farming for profit of shellfish, finfish, and sea vegetables in the marine environment. This development is most likely to occur in the Gulf of Alaska Unit because of its nutrient rich currents, relatively warm climate, abundance of sheltered inlets, and proximity to major commercial markets such as Anchorage. Aquaculture is a more encompassing term which includes mariculture, ocean ranching, and fresh water farming of species such as shrimp and trout.

There are proposals for several mariculture projects in the Gulf of Alaska during the next decade. The state, a Japanese fisheries foundation, and the Kodiak Area Native Association are cooperators in a project to test the feasibility of scallop farming in the Kodiak area. Shellfish projects are proposed at Kempf Bay near Akhiok, Sitkalidak Island, Anton Larsen Bay, Onion Bay, and near Woody Island; these projects are in the permit process at this time. Only one experimental project, in Raspberry Strait, is within the Alaska Maritime Refuge. In the past, mariculture projects have been developed in the Port Lions area and, in 1892, the entire Afognak area was identified as an aquaculture preserve by President Benjamin Harrison. Two other possible projects are a salmon hatchery that has been discussed for Afognak Bay and a Kodiak Mariculture Association project that may involve enclosed cultivation pens in Trident Basin (Woody Island area). A small fish hatchery is located at Kitoi Bay on Afognak Island.

There are no mariculture projects proposed in the Alaska Peninsula, Aleutian Islands, Bering Sea, and Chukchi Sea units of Alaska Maritime Refuge at this time. Unalaska Mayor Paul Fuhs is developing a proposal for a joint study with the Chinese on shrimp mariculture, including possible uses of geothermal energy. If geothermal projects are developed in these units, small aquaculture projects may eventually be designed using the heated effluent.

The possible effects of aquaculture projects on wildlife in Alaska Maritime Refuge may result from increased use of remote areas by people, discharges and wastes, conflicts with marine wildlife, importation and transmission of exotic diseases, genetic effects on wild stocks due to interbreeding with cultured organisms, physical obstacles in the water (rafts and pens), and construction along the shoreline.

The results of increased use of remote areas by people will probably be minor because the preferred aquaculture sites are typically near established commercial markets and settlements. Aquaculture projects would probably result only in a slight increase in the population of existing communities rather than the creation of new remote ones. The physical presence of many mariculture rafts and pens could restrict recreation near and/or water access to refuge lands. However, only a small number of projects are being considered, so they would more likely become tourist attractions, as are the aquaculture projects in Hawaii.

Some discharges and wastes from aquaculture projects may affect the marine community. Wastes may come from discarded shells and diseased organisms of cultivated bivalves. These may attract scavenger species like gulls, whose increased populations can prey upon or displace local bird communities. Toxic discharges may come from enclosed cultivation tanks in which the growth of undesirable organisms is controlled with chemicals. Overall, both discharges and wastes may result in only infrequent effects on the local abundance of natural wildlife.

Mariculture potentially creates a conflict with refuge wildlife because sea otters and sea ducks habitually feed on shellfish, and they are likely to prey heavily on such a concentrated source of shellfish. Mariculturists could suffer serious losses from wildlife, and would be required to explore measures to exclude predators from their crop. Effective exclosures that did not harm the animals would benefit wildlife also. However, harm to wildlife could result from some efforts, such as nets that could entangle and drown ducks or otters.

Importation of exotic diseases and potential dissemination of indigenous aquatic animal diseases by movement of mariculture species would probably be adequately controlled by existing state regulations. Environmental contamination may be caused by therapeutic drugs or chemicals used in mariculture practices. Escapes of cultural organisms could lead to interbreeding with wild stocks and cause genetic problems. The state is currently developing a policy on genetics to address this potential problem.

The construction of facilities that cover and stabilize shorelines may indirectly eliminate shoreline habitat for shorebirds and intertidal organisms. Any substantial construction of aquaculture facilities that affects "navigable waters" will require environmental review and permitting by the U.S. Army Corps of Engineers.

Oil and Gas Exploration and Development

The exploration and development of oil and gas resources could affect wildlife in Alaska Maritime Refuge where this activity occurs on coastal lands and the outer continental shelf, on both state of Alaska and federal lands. Exploration has already occurred near refuges in the Alaska Maritime Refuge Gulf of Alaska Unit; for example, during the past decade there was exploration in the northern Gulf of Alaska near the refuge on Middleton Island and in lower Cook Inlet near the refuge on the Barren Islands. Exploration has also occurred near refuge lands in the Bering Sea and Aleutian Islands units; for example, there has been exploration in the Norton Basin near Stuart Island, and the Navarin and St. George sedimentary basins near Unalaska, the Pribilof Islands, and St. Matthew Island (See Figure 46). The past exploration activity in Alaska is summarized in the Alaska Summary Report from the Outer Continental Shelf Oil and Gas Information Program (Minerals Management Service 1986). See Table 5 for a listing of

outer continental shelf planning areas and their estimated reserves and Table 6 for a summary of active leases near the refuge.

The exploration process involves preliminary geophysical (seismic) exploration with vessels. Typically, exploration involves jackup drill rigs in shallow coastal water, such as Norton Sound; drillships and semisubmersible drill rigs in deep water, such as the Gulf of Alaska and Bering Sea; and drill ships and mobile gravity structures in the Chukchi Sea. Additionally, off-shore drill rigs are serviced by supply boats and helicopters that operate out of established harbors and airports.

Oil and gas exploration in a few areas has led to discoveries and subsequent development. Discoveries have been made in upper Cook Inlet, north of Chisik Island, and along the central Beaufort Sea coast. The latter is an area in which there are no Alaska Maritime Refuge lands, but the oil from the Beaufort Sea coast is transported via the Trans-Alaska Pipeline to Valdez and shipped by tanker past the Alaska Maritime Refuge on Middleton Island. Some Trans-Alaska Pipeline crude is shipped by tanker through Prince William Sound to Cook Inlet refineries. State royalty oil (1.8 million barrels per year) is being sold to Taiwan and is tankered out of Cook Inlet and through the Gulf of Alaska. The Canadian oil industry will be shipping 2.5 million barrels of crude per year starting in 1988 and at least through 1995, from the Canadian Beaufort Sea, through the Beaufort, Chukchi, and Bering seas, through Unimak Pass, past the Aleutians, to Pacific Rim markets.

It is estimated that it will take 10-12 years to go from exploration to production phase in the Outer Continental Shelf if commercial quantities of oil are found.

Aside from the production and transportation of oil, development typically involves extensive construction such as offshore platforms and pipelines. The construction phase usually requires many workers. The typical duration of the development or construction phase is about five years, but the life of a field or the production phase is usually about 25 years.

During the next decade, more coastal and Outer Continental Shelf areas near Alaska Maritime Refuge may be offered for lease for oil and gas exploration. Aside from the above-mentioned sedimentary basins, offshore federal lands in the Chukchi Sea near the refuge on Icy Cape and Cape Lisburne may be leased. Leasing of state and federal lands are based on five-year programs. The current five-year program (1987-1992) for federal offshore lands in Alaska calls for 12 sales in the Arctic, Bering, and Gulf of Alaska planning areas (see Figure 46 for location of all planning areas). Typically, there is low probability of finding enough oil resources to be developed in most of the new lease area (U.S. Dept. of the Interior, Minerals Management Service 1987c).

For example, there is only a 20 percent chance of sufficient oil and gas resources for development in the North Aleutian Basin, which is near Unimak Island (U.S. Dept. of the Interior, Minerals Management Service 1987c). This means that many areas may be affected by exploration activity, but only a few may be affected by intensive development, construction, and production activity. Currently, there are no exploratory drilling activities and no oil discoveries in Chukchi Sea, Bering Sea, or Gulf of Alaska waters. Any Outer Continental Shelf production, and consequently significant risk of oil spills, is most likely more than a decade away, even if oil is discovered.

Effects on wildlife in Alaska Maritime Refuge of oil and gas exploration and possible development may come from oil spills, drilling muds, logistics, construction activity, disturbance from noise and increased activity, and socioeconomic changes. Oil spills are considered to pose the greatest risk to the marine environment from offshore oil and gas activities. Spills may occur from fuel or crude oil lost during transfer between vessels, loss of well control, or a tanker accident. The consequences of small spills are ameliorated by oil spill contingency plans that must be prepared and implemented by operators. The most potentially damaging spill for wildlife would probably result from a tanker accident where large amounts of essentially fresh oil might be released near or on the shoreline, particularly near a seabird colony or a concentration of marine mammals. Some areas at sea are also used by dense flocks of birds in certain seasons, for instance in Unimak Pass, near major colonies,

and along the edge of the continental shelf. Risk to birds from a spill in one of these areas would be much higher than in other parts of the sea (Eppley and Hunt 1985, Eppley et al. 1986). A few instances of major bird mortality from oil spills at sea are known in Alaska; hundreds of oiled birds washed ashore near Homer in November 1967 (U.S. Fish and Wildlife Service files), and evidence of a large kill of seabirds was discovered on Middleton Island in June 1987 (Mendenhall pers. comm. 1987). A major spill in Cook Inlet in July 1987 killed only a few birds because the oil stayed away from the large seabird colonies of the Chisik Island area of the refuge.

Drilling muds and cuttings are less likely to have significant adverse effects on the marine environment than are oil spills. Though more certain to occur during the exploration phase than oil spills, releases of these substances are quickly diluted to low levels as distance from the release increases. These discharges would not likely be detected in either the water column or in sediments beyond one kilometer (0.6 mi) from the source except in poorly flushed embayments. Furthermore, the constituents are generally relatively benign in moderate to low concentrations (Ayers et al. 1980; Northern Technical Services 1981), except that certain heavy metals in drilling muds are quite toxic and could be harmful if concentrated.

The noise from logistical activity has affected wildlife in some refuges. For example, aircraft that carried supplies and drilling crews from offshore rigs to Cold Bay near the Izembek Refuge on the Alaska Peninsula were disturbing the waterfowl. Recently, a flight corridor was established to alleviate the problem.

Tanker transportation routes for oil and gas production in these planning areas are still speculative; however, three basic scenarios have been identified:

- One possible scenario involves oil and gas transportation from the Chukchi Sea and Hope Basin planning areas. Produced crude oil would be transported through subsea and overland pipelines to the Trans-Alaska Pipeline System where it would be routed to the Valdez tanker terminal. Marine transportation could potentially be required

Table 5. Outer Continental Shelf planning areas and estimated reserves.

Outer Continental Shelf planning areas	Estimates of undiscovered non-renewable resources		
	Acres	Oil (barrels) [billions]	Gas (cubic feet) [trillion]
Aleutian Arc		Negligible	Negligible
Beaufort Sea	49,372,531	1.28	13.13*
Bowers Basin		Negligible	Negligible
Chukchi Sea	29,450,991	2.68	15.10*
Cook Inlet	5,298,402	.21	.35
Gulf of Alaska	132,375,053	.54	8.34*
Hope Basin	11,821,634	.17	1.81*
Kodiak	88,983,255	.15	2.92
Navarin Basin	37,106,680	1.16	5.84*
North Aleutian Basin	32,451,934	.36	2.62
Norton Basin	25,011,224	.64	2.94
Shumagin	83,174,702	.05	1.42
St. George Basin	70,236,924	1.69	15.76
St. Matthew		Negligible	Negligible

* noneconomic at this time
(Minerals Management Service 1987)

Figure 46. Outer Continental Shelf planning areas in the Alaska Maritime Refuge.

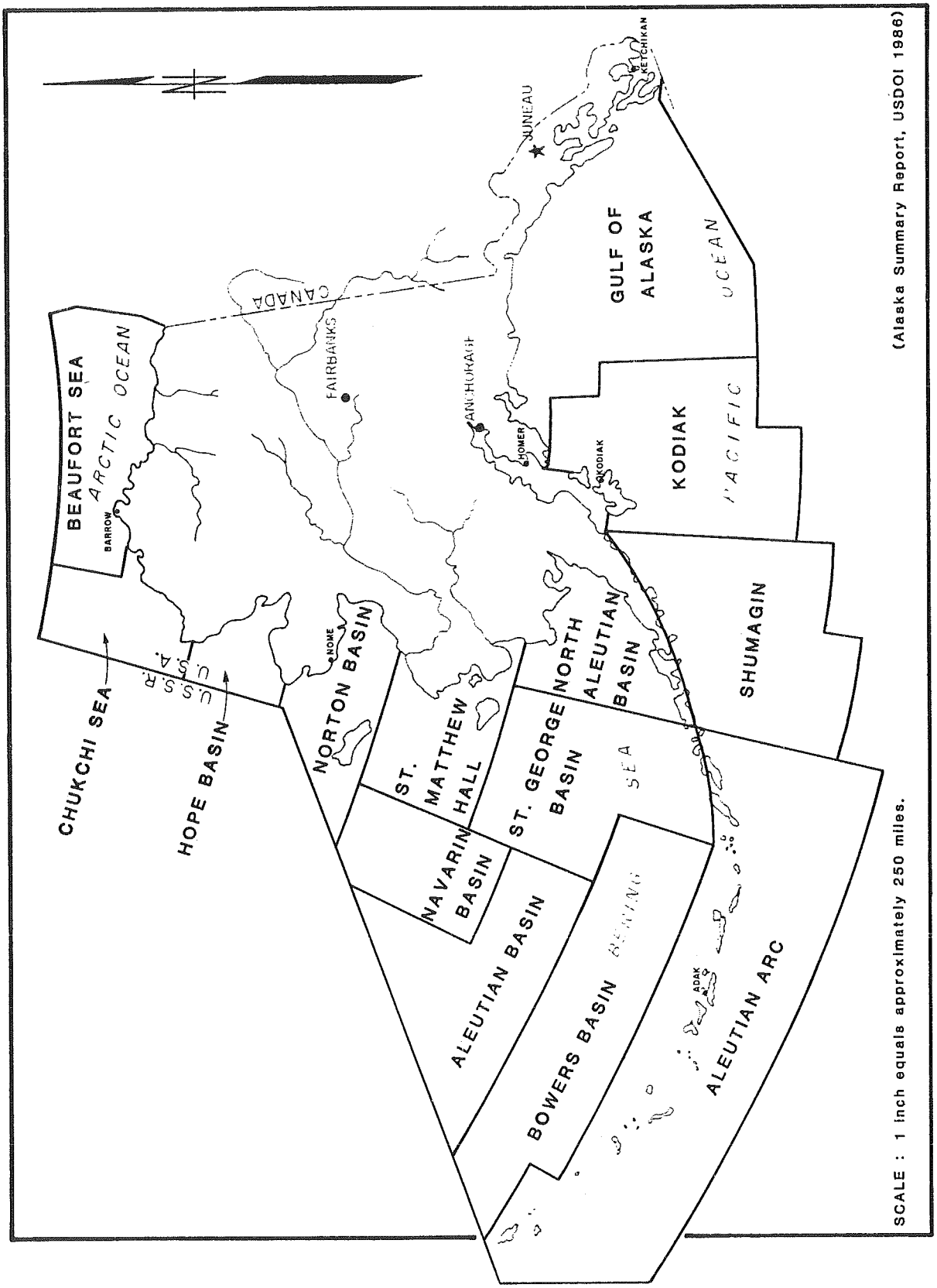


Table 6. Active leases on Alaska Outer Continental Shelf adjacent to units of Alaska Maritime Refuge.

Lease	Hectares leased	# of leases
Sale 57 - Norton Basin	34,561	15
Sale 70 - St. George Basin	87,554	38
Sale 83 - Navarin Basin	182,020*	79*

* Does not include 17 blocks (39,168 hectares) affected by a Soviet claim of jurisdiction.

Note: All Outer Continental Shelf leases in the Gulf of Alaska or Cook Inlet have expired or been relinquished (Cook Inlet sales: Sale CI, Sale 60; Gulf of Alaska sales: Sale 39, Sale 55, Sale RS 1).

(Minerals Management Service 1987)

in place of offshore pipelines to move oil from these two planning areas to the Trans-Alaska Pipeline System. Shipment of oil via the pipeline would not pose an increased oil spill risk to the Gulf of Alaska Unit, such as on Middleton Island, because the pipeline is currently operating at maximum capacity.

- A second oil transportation scenario (for production within the St. George Basin, Norton Sound, Navarin Basin, North Aleutian Basin, Aleutian Basin, St. Matthew Hall, and Bowers Basin planning areas) includes a series of trunk lines feeding into a central terminal. Icebreaking shuttle tankers would be used to move the crude oil to an ice-free deepwater port on the southern Alaskan peninsula or in the eastern Aleutians for transshipment. This oil transportation scenario poses an increased risk to Alaska Maritime Refuge lands in the Alaska Peninsula and Aleutian Islands units particularly in the vicinity of Akun Pass and/or Unimak Pass. However, a recent Minerals Management Service study by Han-Padron Associates (1984) indicates that oil development in the Bering Sea would likely occur with offshore loading onto tankers at the point of production. The loaded tankers would exit the Bering Sea through Unimak Pass. The Minerals Management Service now considers that oil development in at least the Navarin Basin would most likely utilize offshore loading.
- A third transportation scenario includes the Shumagin Basin, Kodiak, Cook Inlet, and the Gulf of Alaska planning areas. If more production from these areas was to occur, it would likely be moved through subsea pipelines to nearby coastal storage facilities before being tankered directly to market. One example of this is the transportation of upper Cook Inlet oil to the west side of Cook Inlet near Chisik Island.

The effects of spilled oil on a coastline or the marine environment is quite dependent on local and seasonal environmental variables. The oil may (1) maintain its integrity as a surface slick, (2) form tar balls, (3) emulsify and dissolve in the water column, or (4) be absorbed on suspended particulate matter and possibly deposited on the ocean bottom. Groups of organisms that may be most affected include those that are shallow-bottom dwelling (intertidal and benthic organisms) and coastal wildlife such as sea otters and shorebirds. Benthic organisms are particularly vulnerable to the effects of spilled oil since they are relatively immobile and live in or on the substrate that may accumulate oil. Shorebirds and coastal seabirds are highly susceptible to lethal effects if contact with oil occurs because it easily coats their feathers leading to hypothermia and death. Lightly-oiled birds can also ingest enough to reduce breeding success. Oil droplets are alxo toxic to eggs if carried there on the feathers of parent birds (Albers 1980). The birds most susceptible to oiling are those that spend much time resting on the water and diving for food, such as murres and puffins (King and Sanger 1979). Among marine mammals, sea otters are highly vulnerable to oil contamination because soiled fur allows rapid chilling, hypothermia, and death; fur seals are less vulnerable, and other seals and whales would suffer severe impacts only if they could not readily avoid the oil (Hansen 1985). An oil spill, which would substantially reduce benthic organisms as food for sea otters, would result in a considerable die-off of sea otters. Generally, populations and/or communities of plankton and pelagic fish are considered to be at low risk in terms of susceptibility to the

effects of oil because they are highly mobile or widely dispersed, but localized damage could occur if oil contaminated productive shallow-water communities.

The type and extent of effects that could occur in sensitive coastal estuaries and tidal wetlands from an oil spill are numerous and potentially severe because of the complexity or biologically fragile nature of these ecosystems.

Should an oil spill enter or occur in a bay or estuary, the immediate result would be a temporary drop in water quality that would have the greatest effect on planktonic organisms in the water column. Oil would probably strike the shoreline and become incorporated into bottom sediments. Incorporation of oil into the sediments would retard degradation of the oil and cause contamination to remain for a number of years, which could cause serious effects on benthic organisms. Water-flow patterns in estuaries tend to make estuaries act as nutrient and pollutant traps and may limit spilled oil from being flushed from the system. This could increase the amount of exposure to spilled oil for many estuarine plants and animals. The effects of an oil spill on the many organisms that use the areas such as birds, fish and shellfish, and other aquatic invertebrates may be severe.

The exploration, development, and production of oil and gas as well as the development of service and processing facilities both on and offshore may result in short- and/or long-term increases in the population of communities near the refuge. In general, fewer workers are required during exploration than during the development and production stages. Population increases would vary by development scenario. In general, communities near the refuge that have been the center of oil and gas activities in the past and that might host these activities again in the future include Barrow, Nome, St. Paul, Unalaska, Cold Bay, Kodiak, Kenai, and Yakutat. With respect to Alaska Maritime Refuge, increases in the population of nearby communities could result in (1) wildlife disturbance due to increased visitation to Alaska Maritime Refuge areas and/or additional boat and aircraft traffic in or near the refuge, and (2) competition with existing residents for wildlife resources through participation in subsistence activities or through sport hunting and fishing.

Logging

Another type of activity that may affect the Alaska Maritime Refuge is logging. Some logging currently occurs in the central and southeastern Gulf of Alaska, the only areas near the refuge with suitable forests. A great deal of logging takes place in extensive and old-growth forests on private lands. Wildlife in Alaska Maritime Refuge would be affected directly by logging primarily on Delphin and Discoverer islands at the north side of Afognak; although both islands are refuge land, logging rights are held by the Afognak Joint Venture. Logging on shores directly above water that belongs to the refuge could also alter it through deposition of wood wastes or sediment; such a project is proposed near Whale Pass on Afognak Island (Cuccarese et al. 1986). There is also an increased threat of fire during logging activities because of accumulated woody debris and increased presence of people and machinery, although this may not be significant in areas of wet climate; forest fires can lead to widespread sedimentation of nearby waters.

Debris from offshore log dumps may sink and accumulate on the sea bottom, possibly accumulating to a depth of several feet.

Barge type log transfer facilities, like this one at Discoverer Bay, keep the logs out of the water thereby minimizing the amount of woody debris that can sink to the sea bottom.

Accumulation of so much material could kill the benthic organisms near the log dumps, which indirectly affects the distribution of benthic feeders such as sea otters. The magnitude of this effect depends on several site-specific and operational variables (Cuccarese et al. 1987). Site-specific variables are primarily oceanographic variables such as the speed of water currents and the depth of water where the logs are dumped. Operational variables include the size of the log dump and the length of time the logs remain at the site. The effects of log dumps can be minimized by restricting them to onshore areas or to offshore areas with deep water and/or currents which disperse the debris from the logs.

Marine Debris

A problem that has recently been recognized as potentially critical for seabirds and marine mammals is the plastic debris that has been routinely discarded by ships. These materials last for decades and continue to float on the sea, drifting to all parts of the world with the currents. They often become concentrated in the same locations where food species are most available. Marine wildlife eat plastic junk or become entangled in it, and cannot free themselves of the materials. The result is impairment or death.

Almost every activity on board a vessel creates a potential for plastic pollution. Fish nets are lost, especially those intentionally set adrift overnight (see "Gill nets"). Fishing floats and lines add to the total. Transport ships discard strapping materials and the small plastic particles that cushion the shipments. Galleys on all boats toss garbage bags and soft drink containers overboard, and plastic cigarette lighters are disposed of at sea by many people.

Marine mammals are affected primarily by the larger debris, strapping and pieces of fishnet. Over 80 percent of plastic debris (by weight) on Aleutian beaches is trawl web (Merrell 1980, 1984, 1985). Fur seals and northern sea lions are often seen with these articles wrapped around their necks, usually embedded deeply in the flesh. Most fur seal net mortalities are from trawl web (Fowler 1982; Fowler and Merrell 1986). Sea lions are not as susceptable as fur seals. The mortality rate from entanglement is still being studied, but some biologists believe it is a major cause of the current severe population declines of these species (Loughlin et al. 1986; Loughlin and Nelson 1986). Trawl web is not a serious problem for seabirds.

Seabirds are caught and drowned in gill nets, including abandoned ones, as described above. They also ingest small particles of plastic floating on the sea, apparently under the impression that these are food. Once in the birds' stomachs, the plastic tends to stay there and accumulate. A large enough quantity can impact the gut and cause death. The species most at risk in Alaska are those that feed on small plankton. In the breeding season these are auklets, but a large variety of other seabirds also take plankton outside the breeding season. The impact of plastics on seabird populations on the refuge is not yet known.

The Plastic Pollution Research and Control Act of 1987 makes it illegal to dispose of any plastic materials at sea, and requires disposal facilities at ports. Marine litter should decrease, but actual improvement will depend on the effectiveness of enforcement and public education; funds have not been appropriated for either of these activities.

HUMAN ENVIRONMENT

Cultural Resources

Prehistory - The lands now managed as part of the Alaska Maritime National Wildlife Refuge have known human occupation for millennia. The earliest known sites from the Aleutian Islands, for example, appear to date to around 6,000 B.C. (Dumond 1977:43). It is possible that much earlier sites exist that have not yet been discovered, since a site on the nearby Seward Peninsula may date to between 11,000-13,000 B.C. (Anderson 1984:81). Further, some sites in the Yukon Territory appear to be more than 25,000 years old (Dumond 1984:72). However, geological change (such as the shifting of river courses and changes in sea level--as much as 100 meters overall since the last ice age) may have obscured many such older sites, possibly beyond recovery.

The first occupants of North America were most likely adapted to a full-time hunting lifestyle on the tundra; large game animals were present in abundance, including both extinct forms and species that are still present (such as caribou and muskox). Attempting to discuss the sequences of cultural development over such a large area in a condensed form would not be particularly useful here; Figure 47 sketches the overall patterns. The reader interested in more detail is directed to The Eskimos and Aleuts by Don E. Dumond (Dumond 1977) for a recent summary. Additional material, both on prehistory and on contemporary and historic subjects is available in Volume 5, Arctic, of the Handbook of North American Indians (Damas 1984).

Native Peoples - The coastal areas of Alaska (and hence, the lands managed by the refuge) were inhabited by a variety of Native groups at the time of European contact; these are discussed in more detail in sections under each of the units. In general, the Chukchi Sea Unit was occupied by Eskimos speaking Inupiaq; the Bering Sea Unit by Eskimos speaking Yupik and Siberian Eskimo dialects; the Aleutian Islands Unit by Aleuts (people closely related to Eskimos); and the Gulf of Alaska Unit by Eskimos speaking Sugpiaq (a Yupik dialect). The Alaska Peninsula Unit was intermediate between the Gulf of Alaska and Aleutian Islands Unit. Additionally, the portions of the Gulf of Alaska Unit in extreme southeastern Alaska were within the area used by the Tlingit Indians. Although other Indian groups may have made occasional visits to the coastal areas, all of the other routine residents at the time of contact were Eskimo or Aleut.

Archaeologist Glenn Sheehan conducting a test excavation in the old Eskimo village of Pingasagruk near Pt. Franklin.

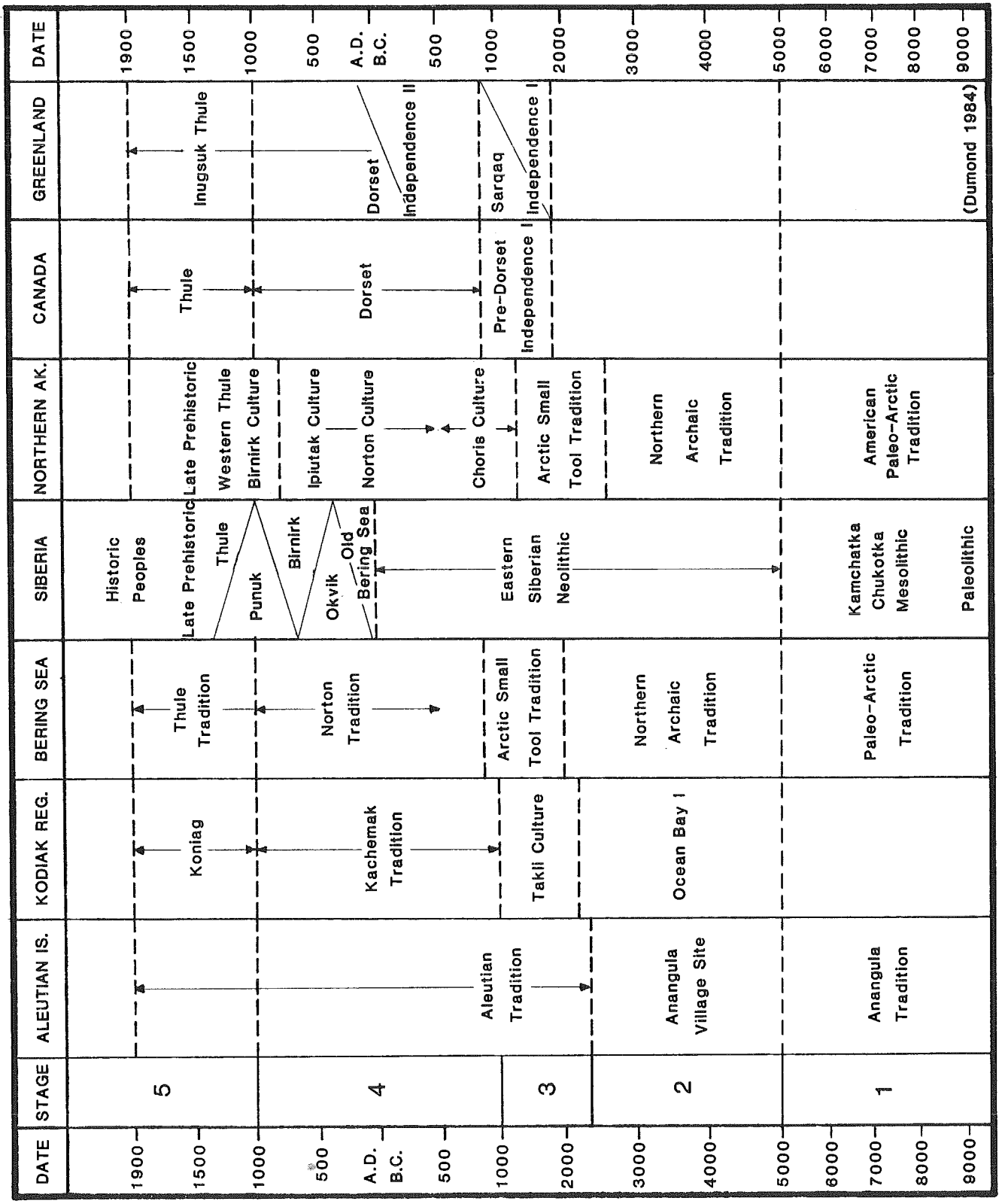
History - Certain elements of the history of the lands managed by the refuge are discussed further under the individual units. It is significant to note here that most of the earliest contacts, including the first, between Europeans and Alaska Natives took place along the coasts, and that much of the early commercial development of the land was in this narrow strip as well.

Sites - Some specific sites will be mentioned later. Overall, there are nearly a thousand known archaeological sites, and a large number of historic sites, on the refuge. A map of the distribution of these sites would show concentrations in some areas, and in others, equally large or larger, a near or total absence of such sites. This does not reflect the true distribution or such sites, but would rather be a good indication of the locations of past archaeological work. It is likely that at least as many additional sites (and possibly many more) remain to be discovered.

Sociocultural and Socioeconomic Systems

General and pervasive forms of environmental change have occurred at the same time that actual human utilization of many of the faunal and floral resources of the refuge have declined. The harvesting of bird eggs and taking of game birds within refuge areas, based on the appraisal of local authorities, has declined appreciably over the last decade alone. Field interviews in Homer, Juneau, Seward, Sitka, Nome and Barrow also revealed an almost uniform misconception regarding acceptable (i.e., legal) uses of refuge lands. That is, in many cases those local residents who were familiar with the refuge status of a particular site believed that they were prohibited from harvesting refuge products believing that it was "illegal to take anything from the refuge." Where traditional values regarding use of refuge resources remain strong, local users have tended to act covertly in order to avoid potential apprehension and prosecution.

Figure 47. Summary of the prehistoric occupations of the Arctic.



These ecological differences, in turn, have tended to promote the specialization of particular sites as breeding grounds for specific bird and marine mammal species. Second, the resources, with the exception of certain areas in relatively high recreational areas (e.g., Homer, Seward and Kodiak), are protected from non-local use by the very high cost of actual access to refuge lands and the relatively low cultural and economic value attached to the resources available (e.g., birds, eggs, access to seal, walrus, polar bear, etc.).

To add to the problems posed by the diversity of the different units, significant differences exist between resource use patterns of different communities within the same refuge unit. For example, city of Kodiak residents concentrate their effort on particular ungulate resources on very specific areas of nearby refuge islands, while some of the small Native villages on Kodiak Island make extensive use of all of the resources of very specific coastal portions of the refuge.

The most profound differences in resource utilization patterns characteristically result from existing cultural differences. These differences, in general, range from the more urbanized perception of the resource base as an important source of "recreational" activity to that of the more isolated, traditional Native view of the resource base as the central component of ethnic identity. This is one of the important reasons why considerable attention must be paid to distinguishing between the resource patterns of the two cultural populations. Point Hope, for example, is clearly a better model for the kinds of resource issues affecting the seven Native communities of Kodiak Island than is the city of Kodiak. One of the unique features of Alaska, as compared with the other states, is the existence of several distinct sociocultural systems. While supporting urban centers with sociocultural systems comparable to those in the "lower 48," rural areas of Alaska are home to many Native and "frontier" sociocultural systems. Coastal areas support a broad range of rural-oriented systems, many of which depend to a large degree on direct access to natural resources for their livelihood and spiritual sustenance. The cultural pattern of the people must be understood, including the basis of social organization of the communities (typically based upon locally-patterned kinship relations in the smaller settlements), intra-community relations (which determine patterns by which resources are distributed within population), and inter-community relations (which provide data on regional utilization and movement trends).

The Ascension of Our Lord Chapel at Karluk, Kodiak Island, is a reminder that the Orthodox faith brought to Alaska by Russian missionaries remains a prominent element in the lives of many Natives of the Alaskan coast.

The infrastructure of selected communities is described for each unit. These include the support system and local government of each community. The support systems of the communities are important to the understanding both the lifeways of the communities and their susceptibility to, and ability to accommodate, change. Present levels of infrastructural development have had a significant effect on community impacts generated by oil exploration activities. Local government structures also have a large influence on the direction of change within a community. Government by "traditional council," organized under federal IRA laws, may be more resistant to change than are city governments organized under Alaska state law. Direction of local government policy can quickly change with population increases under the city government form, whereas traditional councils have much broader-based powers over community life and individual residents. Traditional councils have the

ability to be much more resistant to pressure to change (either through legal challenges or merely popular opinion shifts) than are city government forms. The relations of the local governments to both the local Native corporations (or other major local land owners) and the commercial complex of the communities are also important, as this will have a significant influence on the direction of community change.

For many of the communities involved, the commercial economy is founded upon utilization of marine resources. This use may or may not compete with subsistence use. Documentation of the public use of the Alaska Maritime Refuge will improve management. Major public use factors include access and transportation, subsistence use, recreational use, and economic use.

Recreational uses of refuge lands themselves are relatively rare. Refuge sites are generally inaccessible by commercial, scheduled transportation services, and those sites that do receive scheduled transport services are remote even by local standards. The use of waterways near these sites is far more common than coastal or inland uses of the sites themselves. For instance, tourists may sightsee against a refuge island backdrop while enroute to a community of interest. Nonetheless, refuge sites are considered scenic attractions in their own right by some viewers.

WILDERNESS REVIEW

Background and Legal Requirements

Section 1317 of the Alaska Lands Act requires the Service to study the refuge and determine which areas are suitable, and subsequently recommend areas, for inclusion in the National Wilderness Preservation System. Section 4(a) of the Wilderness Act states "The purposes of this Act are hereby declared to be within and supplemental to the purposes for which national forests and units of the national park and national wildlife refuge systems are established and administered."

After completion of the plan, the Service's recommendations for wilderness will be sent to the Secretary of the Interior. The Secretary's wilderness recommendation then will be forwarded to the President. Only Congress can designate part or all of the refuge as wilderness.

Criteria for Wilderness Review and Evaluation

Most of the criteria for evaluating the wilderness qualities of refuge lands are based on the Wilderness Act of 1964 which defines wilderness as follows:

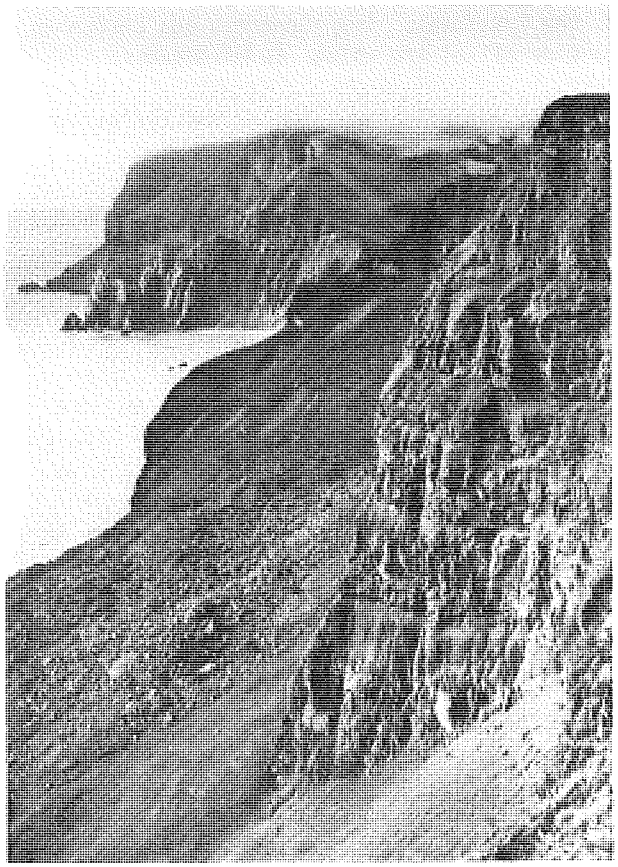
> A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

Since most of the federal land in Alaska qualifies as wilderness, the Service has developed additional policy guidelines to determine the preferred wilderness proposal.

These are:

- The addition of selective areas with outstanding resource values that may have been inadvertently overlooked during the original wilderness review and subsequent designations undertaken by Congress;

- The need for wilderness unit boundary adjustment.



Hall Island, 120 miles from the nearest human habitation, was designated wilderness in 1970 as part of the former Bering Sea National Wildlife Refuge which also included St. Matthew and Pinnacle islands.

Nine criteria based on the Wilderness Act and Service policy, were developed for evaluating the wilderness qualities of the wilderness review units. These criteria are described below.

1. Size - The Wilderness Act requires that a wilderness be 5,000 acres or be large enough to allow for its preservation and use in an unimpaired condition. Islands, no matter how small, are considered to be large enough since they are by definition isolated from other land.

2. Land ownership - Only areas where the federal government owns both surface and subsurface rights are suitable for wilderness designation. Specifically, conveyed lands and lands with encumbrances in the refuge are unsuitable for wilderness designation.

   Selected lands may or may not be suitable for designation depending on the final determination of the land status. Selected lands will not be included in the wilderness proposals contained in this plan since eventual ownership is uncertain. Eighty percent of refuge lands which meet the Wilderness Act criteria have been selected as shown in Table 7. Overselection is very common on this refuge particularly in the eastern Aleutians and the Alaska Peninsula Unit. Much of this land will remain in federal ownership. When selections are relinquished on areas which meet the wilderness criteria, they could be considered for wilderness. (Current land status is discussed at the beginning of this chapter.)

3. Natural integrity - This criterion refers to the degree to which an area retains its primeval character and influence from an ecological perspective.

4. Apparent naturalness - This is the extent to which an area appears natural and unaffected by human activities.

5. Outstanding opportunities for solitude - Solitude refers to the degree of isolation from the sights, sounds, and presence of others. According to the Wilderness Act, a wilderness must provide either "outstanding" opportunities for solitude or "outstanding" opportunities for primitive recreation.

6. Outstanding opportunities for primitive recreation - To experience primitive recreation visitors should perceive a vastness of scale, feel they are a part of the natural environment, and experience a high degree of isolation, challenge, and risk. Primitive recreation requires outdoor skills and meeting nature on its own terms without comforts or convenience facilities.

7. Special or unique features - This criterion refers to special ecological features (e.g., threatened or endangered species, wilderness

dependent species, unusual plant or animal communities), landforms that represent significant examples of geological processes (e.g., natural bridges, mass movement areas, caves, lava flows, glaciers), scenic values, and cultural features. Special features are optional in wilderness areas. The Wilderness Act states that wilderness areas "may" have these features.

8. Outstanding resource values - This criterion ensures that areas proposed for wilderness have truly unique and outstanding features not found within the wilderness system. Outstanding values could be biological, physical, or human values.

9. Wilderness unit boundary adjustment - Approximately 56 percent of the refuge is already congressionally designated wilderness. On some of the wilderness islands, part of the island was left out of the designation because of the presence of military debris which has since been cleaned up or is scheduled for clean-up. Other islands were not considered for inclusion in the Aleutian Wilderness Area because they were not part of the refuge at that time or were subject to land claims which have since been resolved. Adding these areas to the existing wilderness area may improve manageability or add diversity of habitat and recreational experiences.

Evaluation of Wilderness Review Units

The refuge will be evaluated on an island by island or in the case of mainland on an area by area basis. The evaluations are contained in the affected environment chapters for the individual units.

Table 7. State and Native selected lands suitable* for wilderness designation in the Alaska Maritime Refuge.

Refuge Unit	Size (acres)	Naturalness	Opportunities for solitude/recreation	Special features	Outstanding Resources	Existing wilderness boundary adjustments
Chukchi Sea Unit						
Ann Stevens/ Cape Lisburne	33,261	X	X	X	X	
Cape Thompson	49,244	X	X	X	X	
Ekichuk Lake Islands	250	X	X			
Bering Sea Unit						
Sledge Island	700	X	X	X		
Besboro Island	620	X	X	X		
Egg Island	60	X	X			
Aleutian Islands Unit						
Amchitka Island	214	X	X	X	X	X
Tanaga Island	9	X	X	X	X	X
Atka Island	6,720	X	X	X	X	X
Unimak Island	23,680	X	X	X	X	X
Adugak Island	140	X	X	X	X	X
Umnak Island	212,000	X	X	X	X	X
Unalaska Island	481,500	X	X	X	X	X
Sedanka Island	20,900	X	X	X		X
Akutan Island	21,100	X	X	X		X
Akun Island	5,800	X	X	X	X	X
Tigalda Island	23,067	X	X	X	X	X
Alaska Peninsula Unit						
Sankin Island	15	X	X			
Amagat Island	285	X	X	X	X	
Sozavarika Island	45	X	X	X		
Buyan Island	5	X	X	X		
Patton Island	15	X	X	X	X	
Sarana Island	65	X	X			
Rona Island	20	X	X	X	X	
Deer Island	29,000	X	X			
Fox Island	300	X	X			
Outer Iliasik Island	2,240	X	X			
Goloi Island	1,920	X	X			
Poperechnoi Island	3,390	X	X			
Ukolnoi Island	11,520	X	X			
Wosnesenski Island	7,500	X	X			
Unga Island	18,520	X	X			
Gull Island	10	X	X			
Egg Island	20	X	X			
Popof Island	6,700	X	X			
Henderson Island	5	X	X			
Korovin Island	14,500	X	X			
Guillemot Island	700	X	X			
Andronica Island	3,605	X	X			
The Whaleback	2	X	X	X		
The Haystacks	35	X	X	X	X	
Nagai Island	52,740	X	X	X	X	
John Island	150	X	X			

Table 7. State and Native selected lands suitable* for wilderness designation in the Alaska Maritime Refuge, continued.

Refuge Unit	Size (acres)	Naturalness	Opportunities for solitude/recreation	Special features	Outstanding Resources	Existing wilderness boundary adjustments
Alaska Peninsula Unit Continued						
Near Island	520	X	X	X	X	
Twin Islands	50	X	X	X	X	
Turner Island	1,395	X	X	X		
Bendel Island	3,088	X	X	X	X	
Spectacle Island	1,860	X	X	X		
Peninsula Island	400	X	X	X		
Big Koniuji Island	21,256	X	X	X	X	
Castle Rock	50	X	X	X	X	
Murre Rocks	15	X	X			
Hall Island	85	X	X	X		
Herendeen Island	192	X	X	X		
Little Koniuji Island	14,055	X	X	X		
Atkins Island	608	X	X	X	X	
Bird Island	4,300	X	X	X	X	
Chernabura Island	7,440	X	X	X	X	
Jacob Island	2,790	X	X			
Chiachi Island	4,495	X	X			
Chiachi Islets	100	X	X			
Petrel Island	10	X	X			
Shapka Island	100	X	X			
Pinusuk Island	200	X	X			
Brother Islands	122	X	X	X	X	
Spitz Island	86	X	X	X	X	
Mitrofania Island	11,100	X	X	X	X	
Chankliut Island	930	X	X			
Gull Island	5	X	X			
Nakchamik Island	4,960	X	X	X		
Unavikchak Islands	750	X	X	X		
Unnamed Islands S. of Cape Kumlik	40	X	X			
Kumlik Island	700	X	X			
Garden Island	40	X	X			
Eagle Island	10	X	X			
Sutwik Island	21,219	X	X	X	X	
Hydra Island	25	X	X	X		
Long Island	225	X	X			
Central Island	95	X	X	X		
Ugaiushak Island	485	X	X	X		
Chiginagak Bay Islets	200	X	X	X		
Derickson Island	120	X	X			
David Island	465	X	X	X		
Poltava Island	300	X	X	X		
Navy Island	30	X	X			
Ashiiak Island	35	X	X	X		
Agripna Bay Islets	100	X	X			
Kilokak Rocks	10	X	X			
Imuya Bay Islets	60	X	X			
Titcliffe Island	500	X	X			
Hartman Island	500	X	X			
Terrace Island	500	X	X			

Table 7. State and Native selected lands suitable* for wilderness designation in the Alaska Maritime Refuge, continued.

Refuge Unit	Size (acres)	Naturalness	Opportunities for solitude/recreation	Special features	Outstanding Resources	Existing wilderness boundary adjustments
Alaska Peninsula Unit Continued						
West Channel Island	200	X	X			
East Channel Island	100	X	X			
Unnamed Wide Bay Islands	300	X	X			
Gulf of Alaska Unit						
Sundstrom Island	300	X	X	X		
Geese Islands	700	X	X			
Flat Island	15	X	X	X		
Sitkalidak Island	7,680	X	X			
Fox Island	80	X	X			
Womens Bay Islets						
Mary	30	X	X	X		
Viesoki	5	X	X			
Blodgett	6	X	X			
Zaimka	30	X	X			
Cliff	2					
Puffin	5	X	X			
Ushagat Island	7,000	X	X	X	X	
West Amatuli Island	1,720	X	X	X	X	
East Amatuli Island	1,065	X	X	X	X	
Bruin Island	240	X	X			
Mushroom Islets	1	X	X	X		
White Gull	1	X	X			
Turtle Reef	1	X	X			
Iniskin Rock	1	X	X			
Vert Island	1	X	X			
Scott Island	5	X	X			
Iniskin Island	1	X	X			
Pomeroy Island	2	X	X			
Big Rock	1	X	X			
Oil Reef	1	X	X			
Gull Island	2	X	X			
Perl Rock	1	X	X			
Naguhut Rocks	1	X	X	X		
Ragged Island	4,900	X	X			
Rugged Island	990	X	X	X		
Pilot Rock	1	X	X			
Moraine Islands	150	X	X			

Total - 1,165,523 selected acres

*In order to be considered suitable an area must meet the size criteria (an island with no private inholdings, an area over 5,000 acres, or a size manageable as wilderness), the naturalness criteria, and have outstanding opportunities for solitude or primitive recreation.

CHUKCHI SEA UNIT

PHYSICAL ENVIRONMENT

Geography

Lying mostly north of the arctic circle, the Chukchi Sea Unit includes nearly 300,000 acres and extends nearly 500 miles from west of Point Barrow to just north of the Bering Strait near Cape Prince of Wales (Figure 48). Unlike other units in the Alaska Maritime Refuge, this unit includes sizeable acreages of mainland areas. Topography varies from low, sandy barrier islands in the Arctic Ocean to high, rocky spires in the western Brooks Range. The unit includes the former Chamisso National Wildlife Refuge which was established in 1912.

A barrier island coast predominates in the northern portion of the unit from Peard Bay to Cape Lisburne. The Kuk, Utukok, and Koklik rivers drain this region and deltas and dune fields are common. The coast from Cape Lisburne to Cape Thompson is bounded by a wall of high rocky sea cliffs, an extension of the Brooks Range. South of Cape Thompson to Cape Epsenberg, the coastline has little relief and is characterized by short barrier beaches backed by low cliffs, scattered high cliffs, and a few lagoons. Kotzebue Sound has a delta shore on the east coast and discontinuous rolling hills and lowlands on the south coast. From Cape Epsenberg to Cape Prince of Wales, the coast is dominated by lagoons and barrier islands (Gatto 1980).

Most of the unit is accessible by boat. Amphibious planes can provide access in some areas.

See Table 36 in the management alternatives chapter for a complete listing of lands and offshore waters located within the unit.

Land Status

The land status of the unit changes constantly as selected lands are conveyed, exchanged, or relinquished. Table 8 summarizes land status within the unit as of 11/1/87. Figures 50 A-F show the arrangement of ownership.

Of the approximately 300,000 acres within the congressional refuge unit boundary, about 37 percent has not been selected and will remain in federal ownership. The remaining 63 percent has been selected by or conveyed to regional or village corporations or the state of Alaska. Much of the selected land is overselected and will also remain in federal ownership. Less than one percent or 440 acres of the unit is congressionally designated wilderness.

Table 8. Land status within the Chukchi Sea Unit as of 11/1/87.

Ownership	Acres	% of unit
Nonselected	132,419	45%
Selected (village, regional, state)	66,581	22%
Conveyed	92,000	31%
Native Allotment	5,000	2%
Total	296,100	

(U.S. Fish and Wildlife Service 1987)

Climate

The climatic conditions in this unit are characterized by strong winds, fog, cold temperatures, and little annual precipitation. During the winter, the region is dominated by Arctic anti-cyclone pressure systems. The winter regime produces intense cold, low cloudiness, and light snow. Low pressure systems prevail in summer during ice-free periods and are characterized by cloudy skies, frequent precipitation, and southwesterly winds (Minerals Management Service 1987).

The coastline is windy year-round with an average wind speed of 10 - 13 m.p.h.. Prevailing winds are from the northeast and winds of 100 m.p.h. have been reported (Pewe et al. 1958)

In the Cape Lisburne - Cape Thompson area, the average winter temperatures range from -28°F

to 21°F, and in summer range from 28°F to 54°F. Average annual precipitation is about 13 inches with an average annual cumulative snow depth of about 50 inches.

Geology

The Chukchi Sea Unit is an active tectonic area, a region with great crustal movement, situated on the margin of the following structural provinces; from north to south are the: Barrow Arch and Arctic Platform, Foreland Fold Belt of Colville Foredeep, Herald Arch Overthrust Belt, and Hope Basin. During the late Tertiary period, a deep sub-basin developed in central Hope Basin, north of Kotzebue Arch, the longest of the basement ridges. The northern boundary of the sub-basin is comprised of monoclines and normal faults that bring older rocks to the surface on the Herald Arch Overthrust Belt. Between Point Hope and Cape Krusenstern, the sub-basin is bounded by normal faults parallel to the coast that also form the western boundary of the De Long Mountains and the western Brooks Range (Wilson et al. 1983).

Much of the unit is located at the foothills of the Baird and De Long mountains, a westward extension of the Brooks Range. Here the bedrock is comprised of sediments ranging in age from middle Paleozoic to Cretaceous with some Mesozoic age intrusives (Ehm 1981). In the southern portion of the unit near Kotzebue Sound, rocks range from Precambrian to Recent and include sedimentary, metamorphic, and igneous rock types.

The unit has historically low seismic activity, however, earthquakes with magnitudes of 6.9 to 7.3 have been recorded in the southeastern Chukchi Sea and in Kotzebue Sound (Minerals Management Service 1987).

Bedrock - In the northern areas, from Peard Bay to Cape Sabine, the region is underlain by sandstone, shale, and conglomerates. The Cape Lisburne - Cape Thompson area is comprised of granite, schist, limestone, and gneiss. The southern region, with its shallow relief, is underlain by hard, crystalline rock which is overlain by up to 150 feet of frozen sand, silt, and gravel (Pewe 1959). Bedrock in the region is mantled by unconsolidated Quaternary sediments, which also form the beach and offshore bar deposits.

Surficial deposits - Although there are no glaciers present in this unit today, some areas are characterized by glacially deposited material including sand and gravel of till and outwash.

The most widely distributed deposits are wind-blown silt and colluvium (silt, sand, and gravel moved downslope by mass-wasting processes such as creep, solifluction, rockfall, and landslide, etc.). Silts, which originated in glacial valleys east of the unit, are redeposited by winds to ridgetops, slopes, and valley bottoms in a westward thinning blanket. Surficial deposits on barrier islands and coastal refuge lands can attain thicknesses of over 20 feet (Alaska Planning Group 1973).

Soils - Generally, soils include sand, sandy loam, and loam. Thin, gravelly to loamy well-drained soils occupy areas on upper slopes where permafrost occurs. Well-drained soils of mid-slopes have an organic surface mat with moderately thick permafrost. Soils of lower slopes and depressions are characterized by a high permafrost table, impeded drainage and a thick organic mat on the surface. Coastal areas that are dominated by sedges, mosses, and low growing shrubs are comprised of sand or sandy loam. Sands dominate low dune areas, such as barrier islands, where low growing shrubs are found. Level areas on the mainland dominated by sedges and mosses are comprised of sandy loam or loam (Michaelson 1974).

Mineral occurences - Potential belts of gold, silver, copper, lead, zinc, iron, platinum, and unranium have been identified in inland areas near the refuge on the Seward and Lisburne peninsulas. A belt of bituminous and subbituminous coal approximately 16 miles wide has been identified is located along the west flank of the Lisburne Hills. Coal prospects are located along the coast including three on the Cape Lisburne parcel and one on the Cape Thompson parcel. Gold and chromite prospects have been located near Kivalina.

The Red Dog deposit, 80 miles north of Kotzebue, is one of the world's largest zinc and lead

Figure 48. Location of the Chukchi Sea Unit.

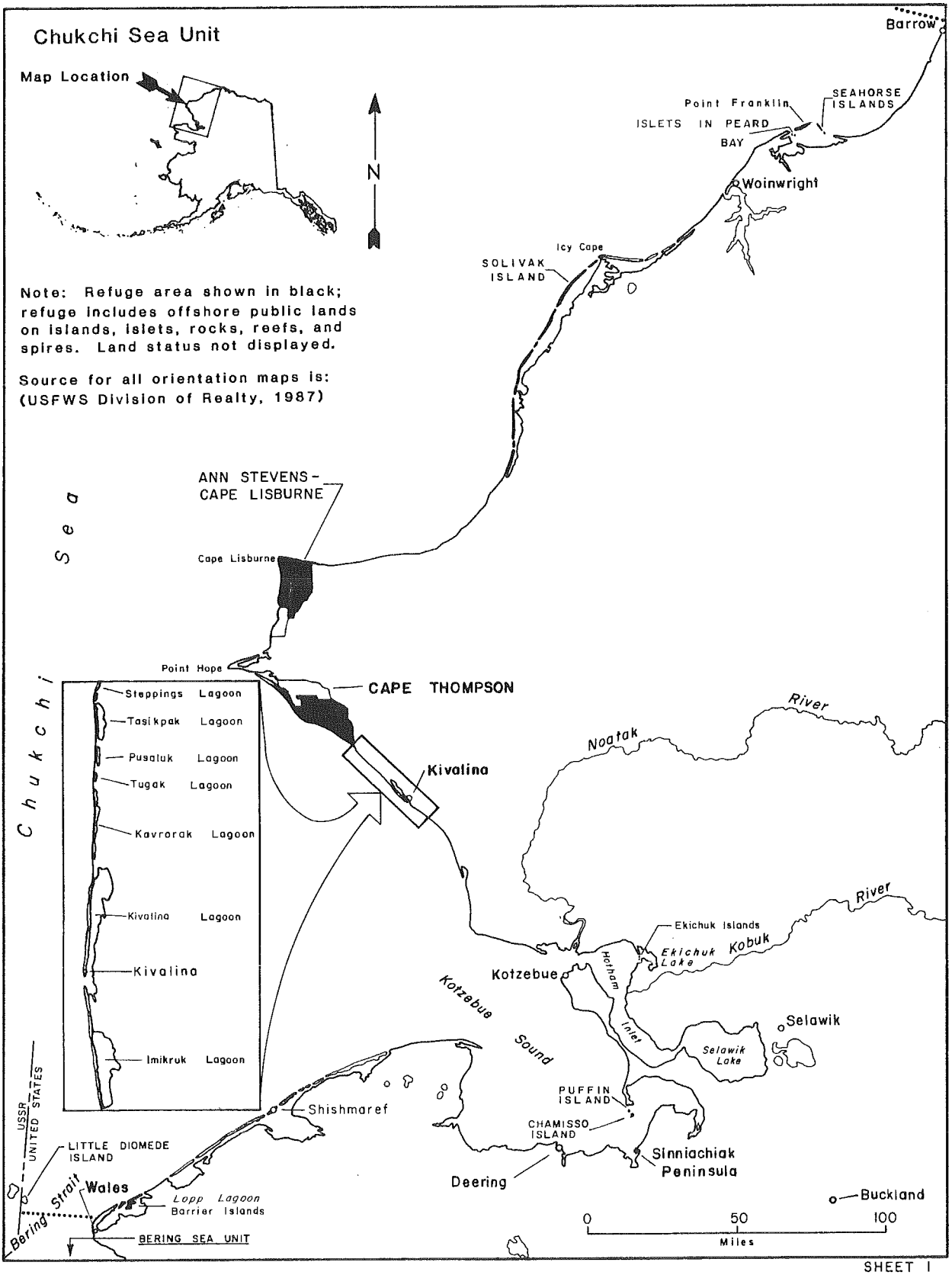
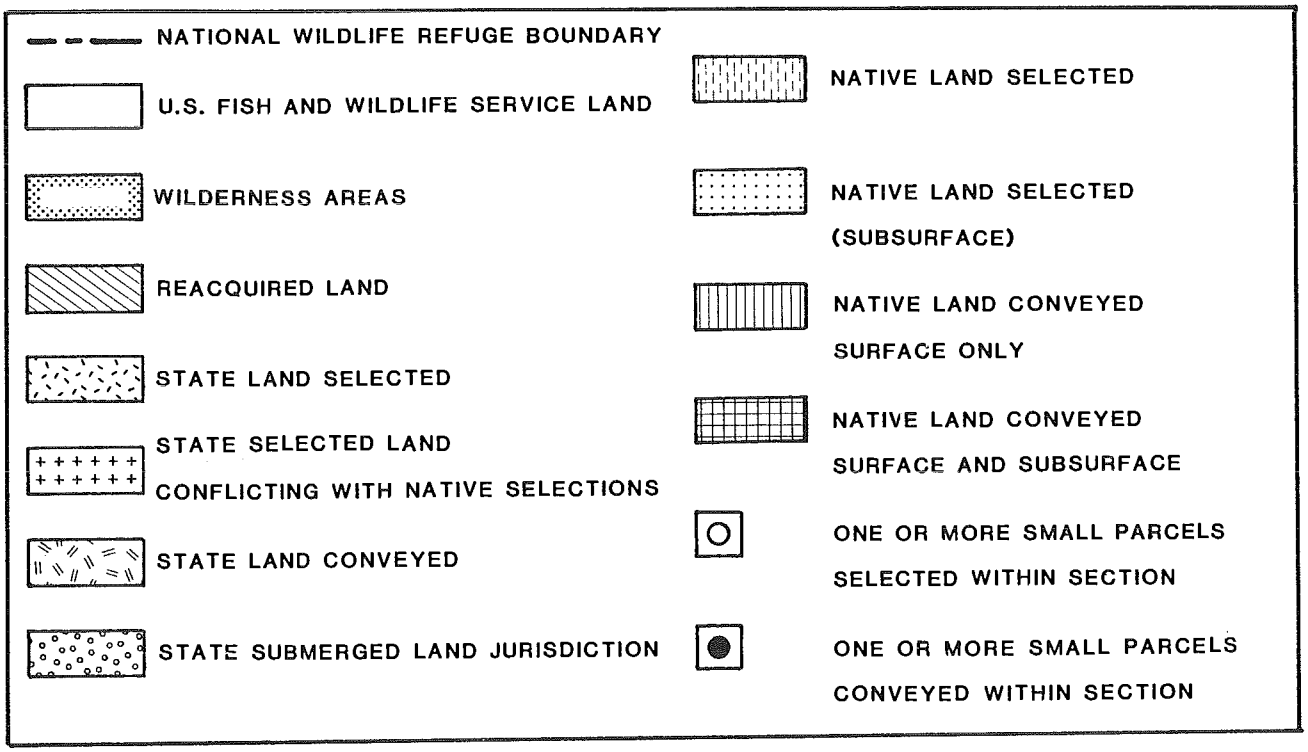
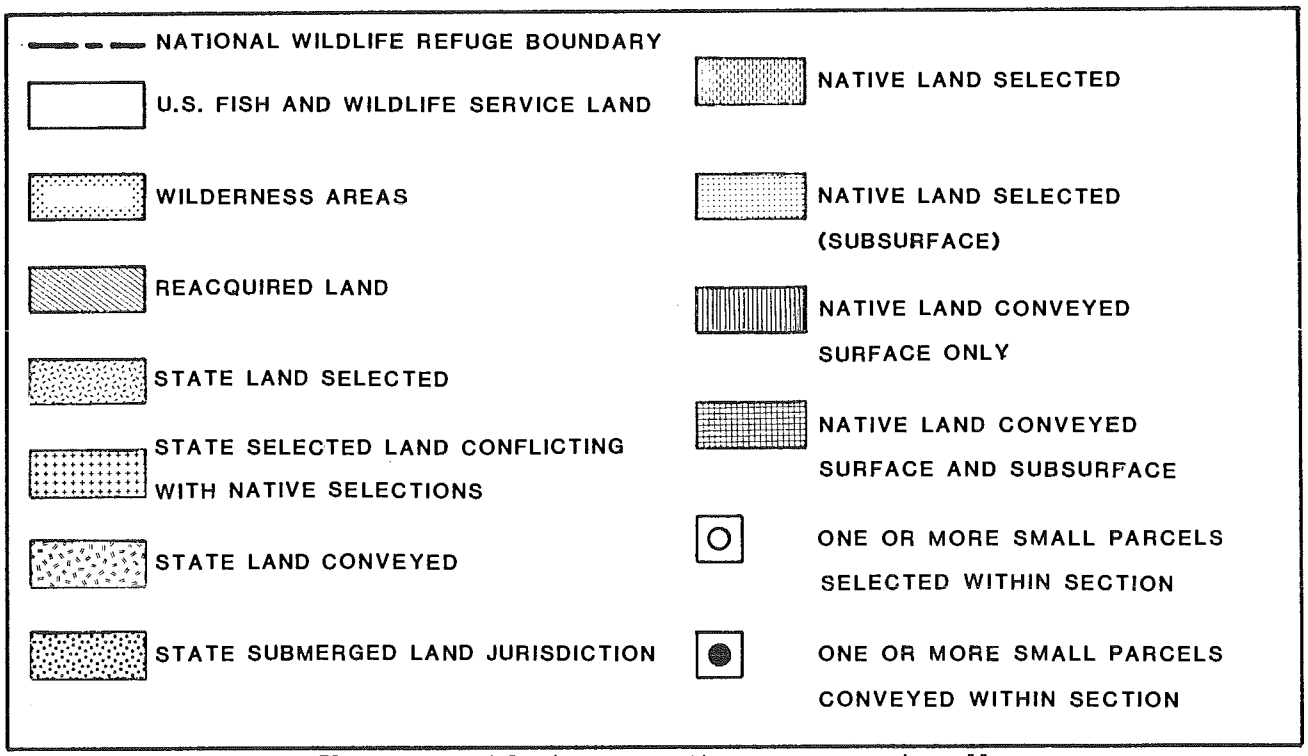


Figure 49. Legends for land status in the Chukchi Sea Unit.
Legend for Figures 50A, 50B, 50D, 50E, and 50F.



Legend for Figure* 50C.



*This figure is reduced 50 percent and land status patterns appear much smaller.

Figure 50 A. Land status in the Chukchi Sea Unit as of November 1987.

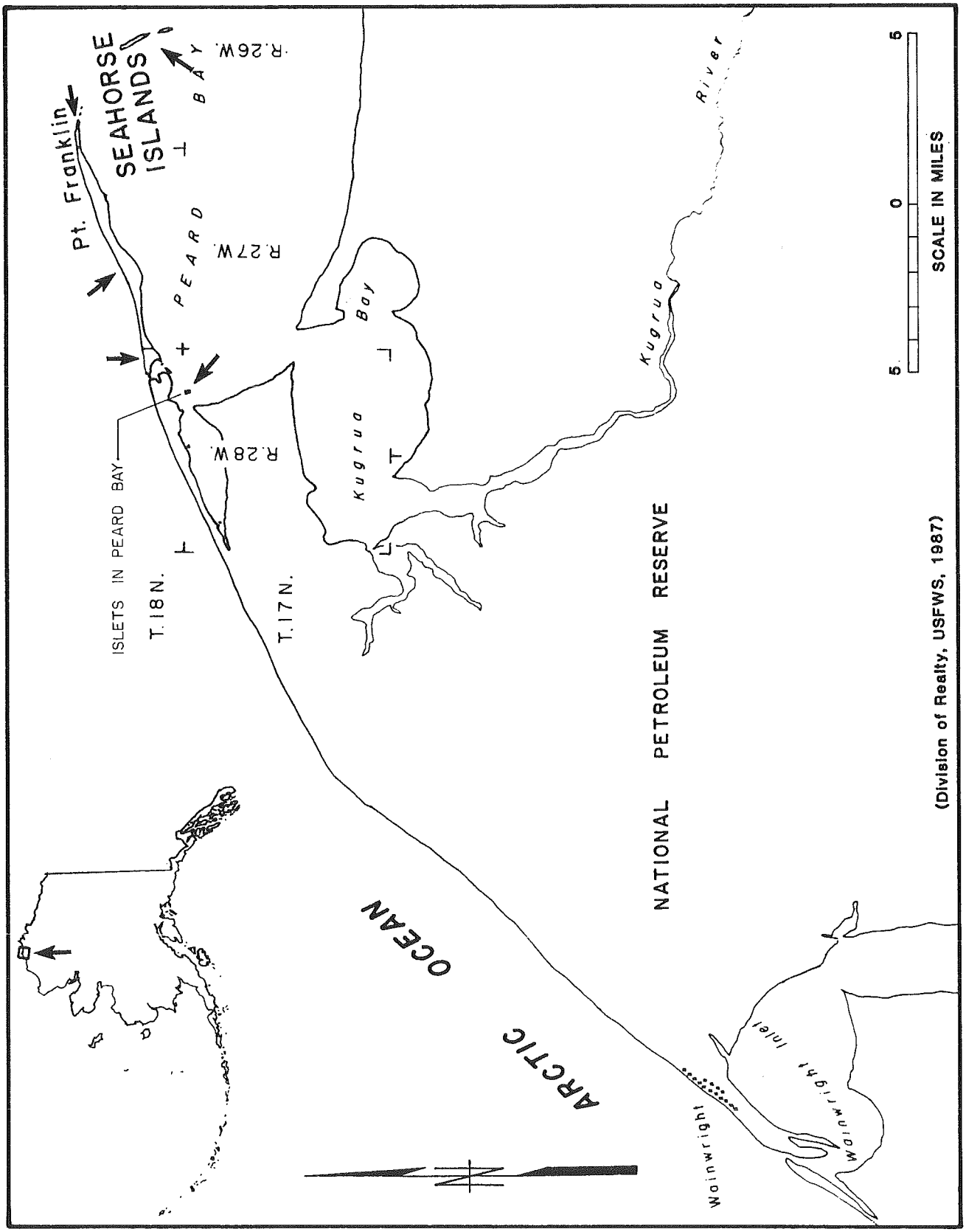


Figure 50 B. Land status in the Chukchi Sea Unit as of November 1987.

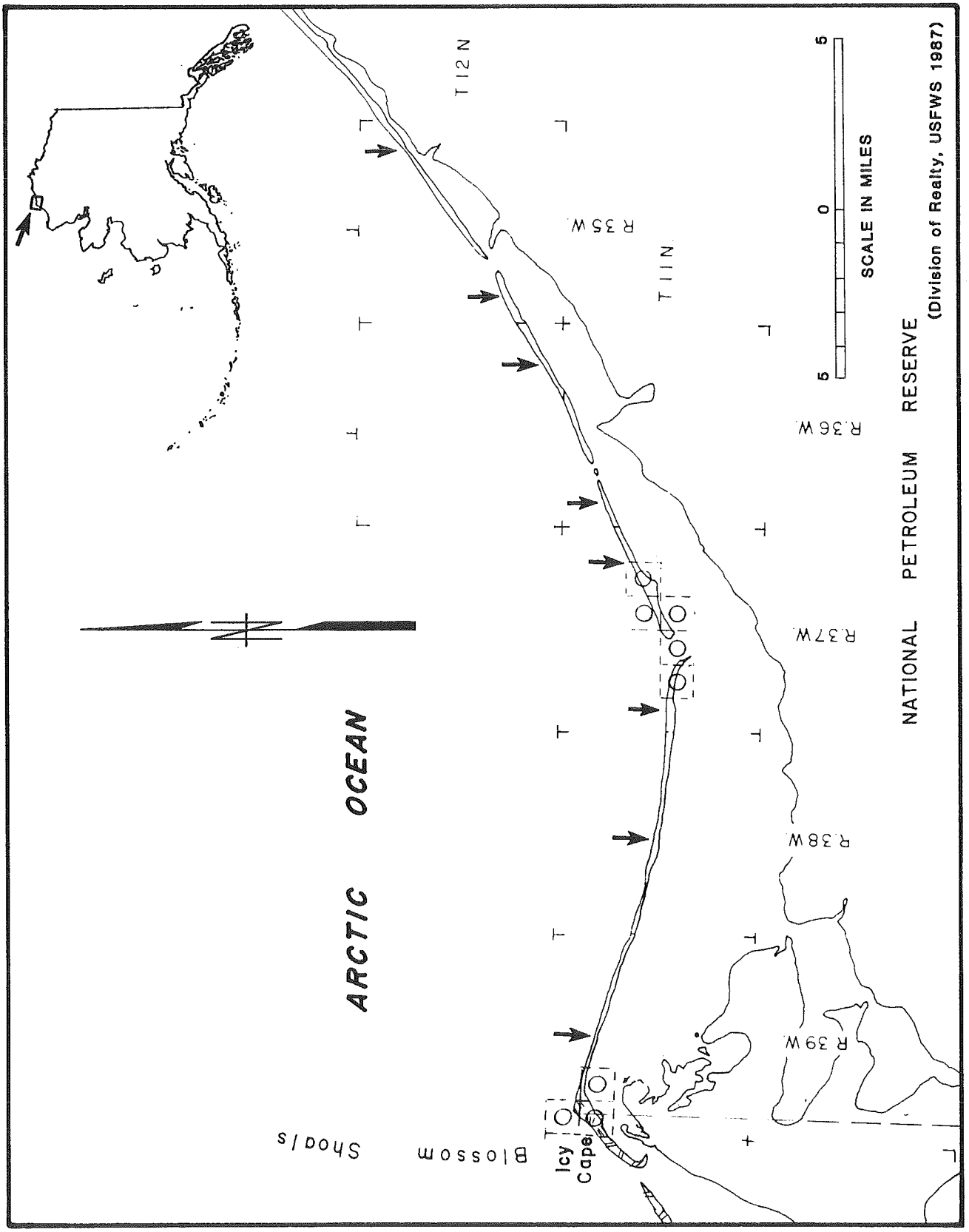


Figure 50 C. Land status in the Chukchi Sea Unit as of November 1987.

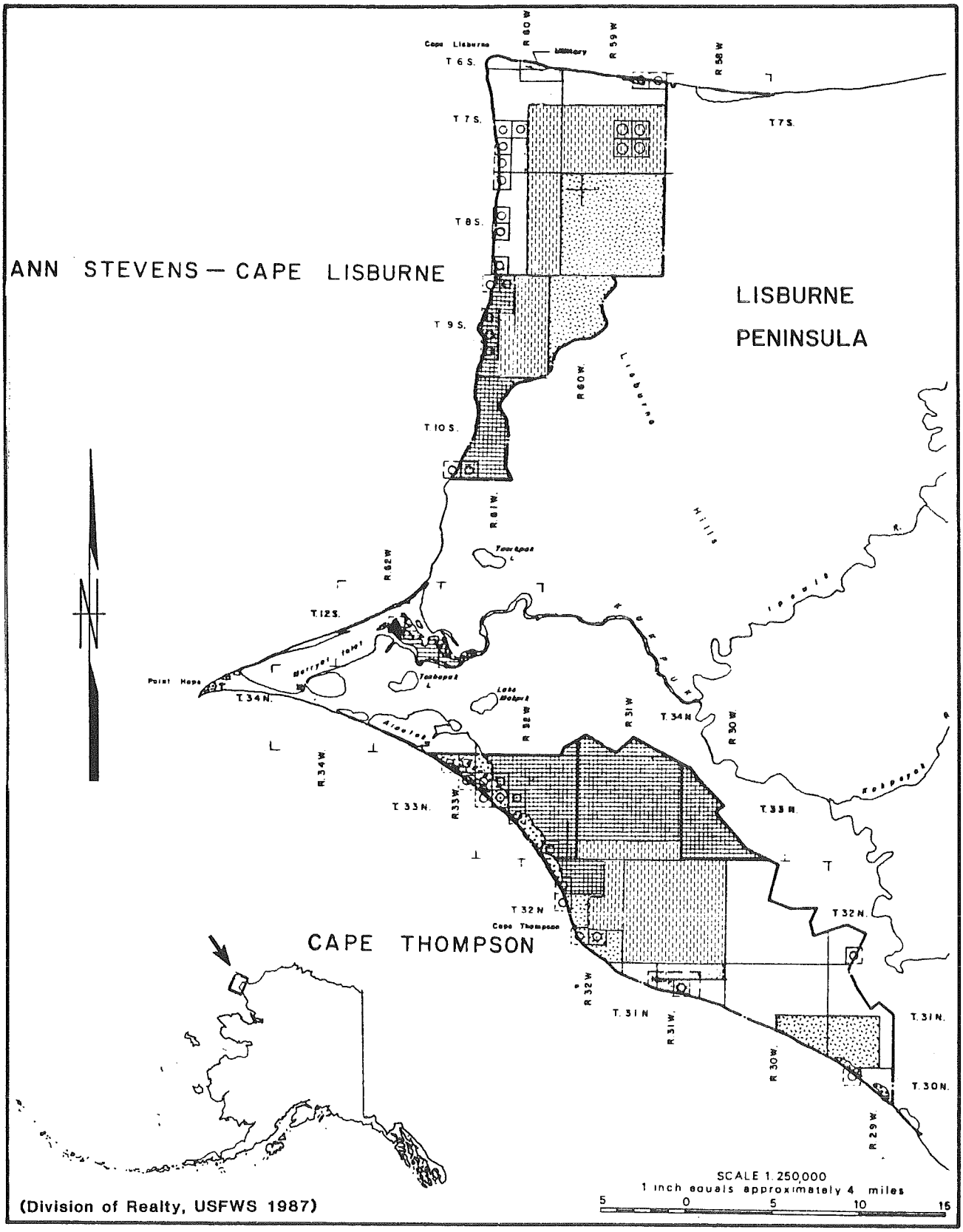


Figure 50 D. Land status in the Chukchi Sea Unit as of November 1987.

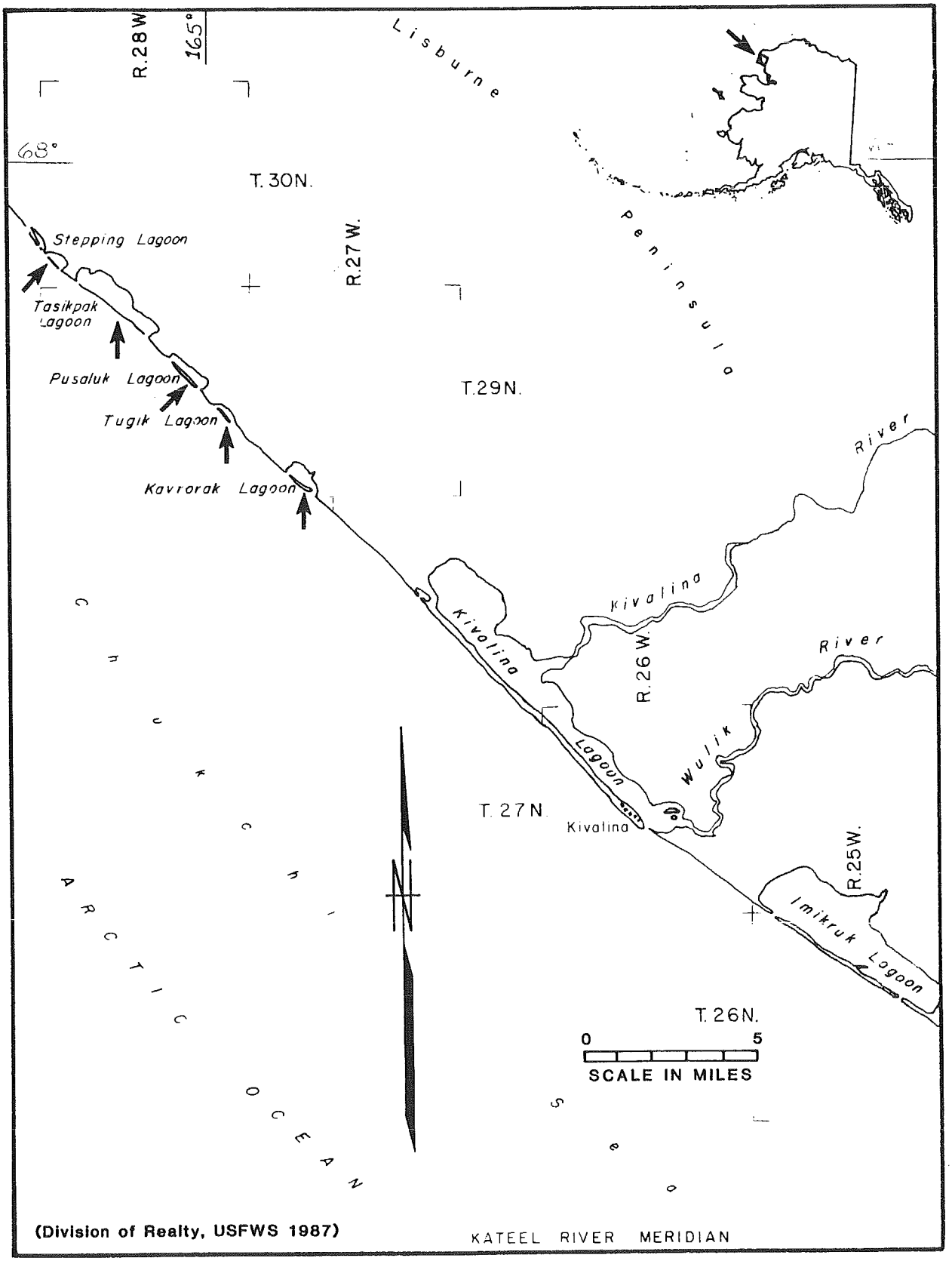


Figure 50 E. Land status in the Chukchi Sea Unit as of November 1987.

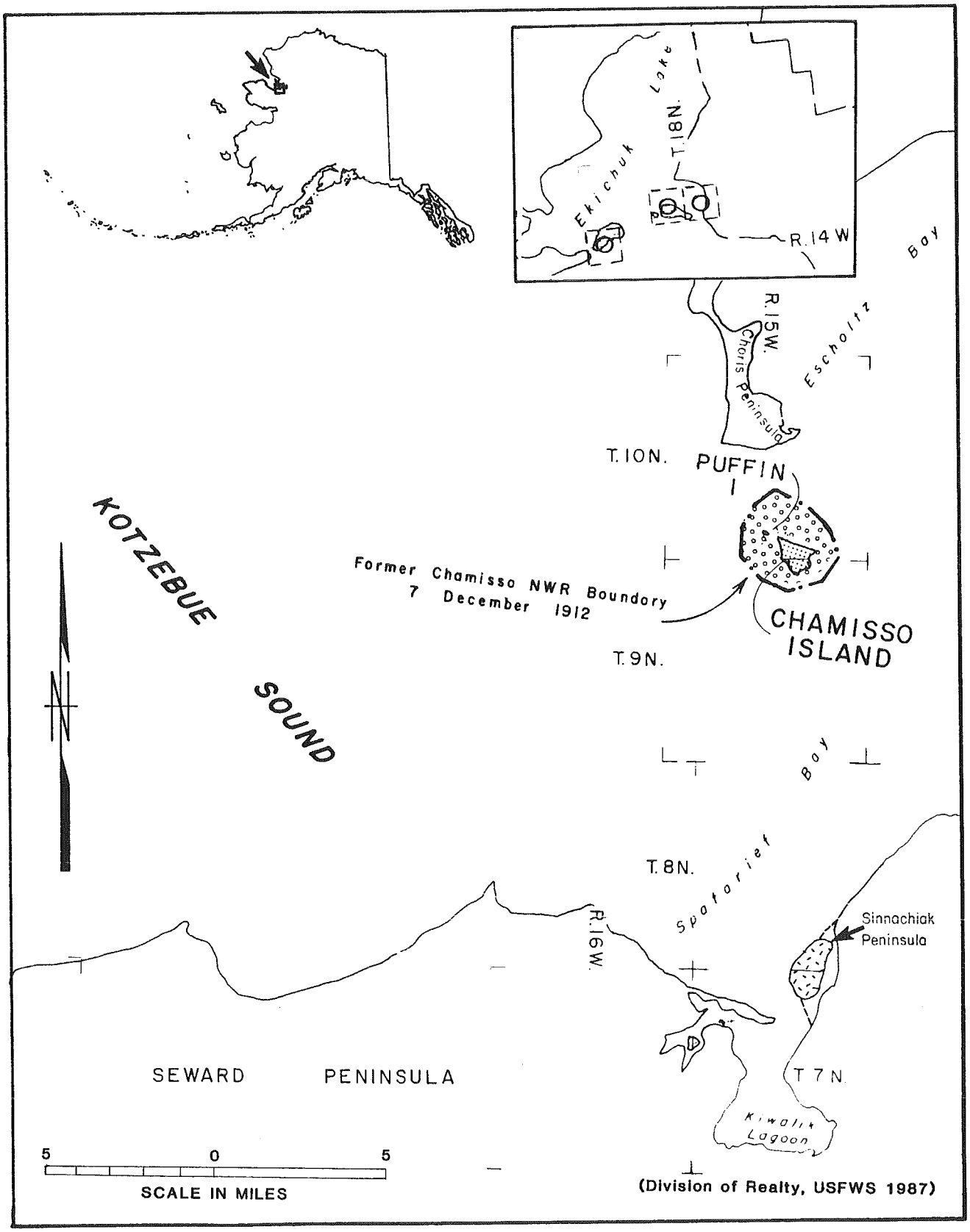
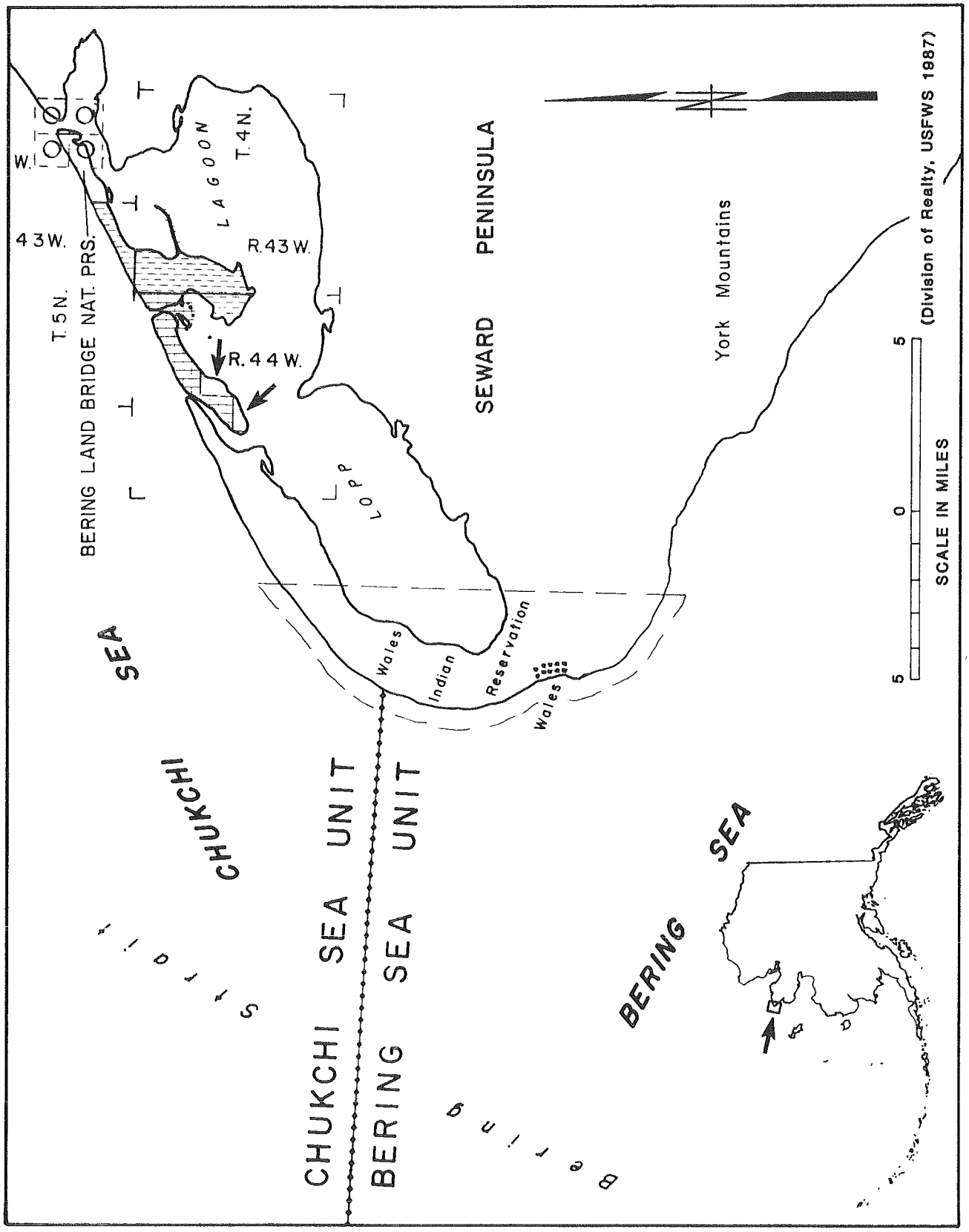


Figure 50 F. Land status in the Chukchi Sea Unit as of November 1987.



mining areas. This deposit is approximately 50 miles from the nearest refuge lands. The Red Dog Mine port site is approximately 6 miles south of the Imikruk Lagoon barrier islands which are refuge lands. Shipping traffic would move south from the port, away from these refuge lands.

No mining claims are known to exist on this portion of the refuge.

Oil and gas - The Chukchi Sea and Hope Basin Outer Continental Shelf planning areas are situated in this unit (See Figure 46). The Chukchi Sea Outer Continental Shelf Planning Area, formerly known as the Barrow Arch Planning Area, encompasses over 29 million acres and has been identified as favorable for petroleum prospects (U.S. Department of the Interior, Minerals Management Service 1987). The recoverable oil and gas volumes are estimated at 5.06 billion barrels of oil, and 15.10 trillion cubic feet of gas with marginal probabilities of 0.29 trillion cubic feet of gas and 0.51 billion barrels of oil. The Minerals Management Service originally scheduled Outer Continental Shelf Sale 85 for February, 1985, but it was deferred in response to State of Alaska concerns regarding operation in heavy ice conditions. Sale 109 is currently scheduled for May, 1988 and Sale 126 for November, 1990 (U.S. Department of the Interior, Minerals Management Service 1987).

The Hope Basin Outer Continental Shelf Planning Area, about 12 million acres, has potential for petroleum reserves. The recoverable oil and gas volumes are estimated at 0.17 trillion barrels of oil and 1.81 trillion cubic feet of gas. In May, 1982 the Department of the Interior deferred leasing in Hope Basin in response to concerns expressed by the State of Alaska. Sale 133 is scheduled for May 1991 (U.S. Department of the Interior, Minerals Management Service 1987).

See Table 5 for a listing of Outer Continental Shelf planning areas and their estimated reserves and Table 6 for a summary of active leases near the refuge.

Although the geologic potential for hydrocarbons is high in some areas of the Chukchi Sea Unit, the potential for development is rated as low (Teseneer, Seidlitz, and Borkoski 1988). This assessment is based on the small size of the parcels, lack of appropriate infrastructure, and lack of industry interest.

Geothermal resources - Although Serpentine Hot Springs has been identified on the Seward Peninsula mainland, no geothermal resources have been identified on refuge lands in the unit.

Water Resources

Refuge lands in the northern region of the unit are primarily barrier islands and include some small ponds and marshy areas in the central and southern region refuge lands are situated on the mainland and within lagoons and include many ponds, and marshes. The Cape Lisburne - Cape Thompson area contains 33 freshwater ponds and three brackish-water lagoons.

BIOLOGICAL ENVIRONMENT

Vegetation

The Chukchi Sea Unit contains a variety of vegetation communities which vary from open coast marshes to coastal bluffs. Classes in the unit include cotton sedge tundra, watersedge tundra, Dryas and barren meadows, and alder thickets (Kuchler 1966). Vegetation types are listed by region.

Arctic coastline - There is a mosaic of plant species along much of the Alaskan Arctic coastline; the distribution and age of plant groups is determined by the frequency of disruptive ice action (MacDonald 1977). These open coastal marshes, often only a few meters in extent, occur frequently between Cape Bathrust and Point Barrow (Jefferies 1975). Where conditions are more sheltered and the action of pack ice reduced, more extensive marsh communities are present. Sedge is the dominant species in these marshes. Eelgrass occurs in soft sediments of protected bays and lagoons (McRoy 1970).

Chukchi Sea - A study of the shoreline vegetation along the Chukchi Sea (Taylor 1981) identified four habitat types: salt marsh; gravelly beach; raised beach; and coastal bluff. Within each habitat type the plant communities were similar in distribution and

composition. Salt marsh vegetation was mostly restricted to lagoons and estuaries along the Chukchi Sea.

Salt marsh - Four salt marsh communities have been described. Tidal mudflats and low, sandy shorelines are dominated by salt-tolerant alkali grass. Sedges dominate mid-tidal and upper tidal communities. The strom zone salt marsh is characterized by a mix of grasses, sedges, and willows (Taylor 1981).

Gravelly beach - Lyme grass communities predominate on gravelly beaches.

Raised beaches - Raised beaches or coastal beaches are composed of coarse-textured gravel and sand and are often very dry. The vegetation of raised beach communities tend to include species from both the lyme grass community and adjacent tundra plains. Willows are often the dominant species.

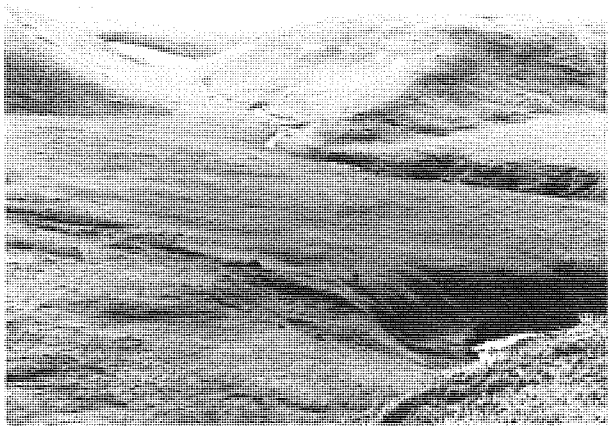
Coastal bluffs - On coastal bluffs, vegetation is sparse because of the widespread coastal erosion. Characteristic sparse plants are composites, grasses, horsetails, and willows.

Icy Cape - The mainland tundra just south of Icy Cape consists of elevated sites with upland tussock tundra and frost boils interspersed with flooded tundra, low center polygons, and other freshwater wetlands.

Point Lay - The lower parts of the banks along the Kukpowruk River at Point Lay support saxifrage, horsetail, and grass communities. The upper portions support a scrubby growth of willows and dwarf birch which is usually two to three feet high (Thomas 1951).

Cape Thompson area - The vegetation at Cape Thompson appears to be some of the richest in the arctic. There are three major vegetation types in the area. the most abundant is Eriophorum tussock, followed by Dryas fell-field, and Eriophorum - Carex wet meadow.

Kotzebue lowlands - The vegetation of the Kotzebue lowlands is a mosaic of communities that reflect numerous ponds and poorly drained areas, shallow permafrost, and severe frost action. Salt-tolerant sedges are the most abundant plant in low areas adjacent to tidal inlets, channels, and ponds.



Cape Lisburne is one of the few large refuge areas in the Chukchi Sea Unit. Its hills support grizzly bears, caribou, moose, wolves, and muskox.

Chamisso and Puffin islands - The vegetation of Chamisso and Puffin islands is classified into three broad classes: beach zone, tundra, and marsh/bog. Thirty-nine species from Chamisso Island were identified and assigned to these three classes.

The vegetation of Puffin Island is not very diverse, and probably numbers fewer than 15 species. Grass dominates the species (Nelson and Sowls 1985).

Fishery Resources

Marine fishes of primary importance in this unit include starry flounder, capelin, sandlance, herring, and saffron and Arctic cod. Anadromous species include broad whitefish, sheefish, pink and chum salmon and anadromous char. Little commercial fishing occurs in the Chukchi Sea Unit.

Birds

The seabird colonies at Cape Thompson and Cape Lisburne contain the largest concentrations of birds in the Chukchi Sea Unit, each with over 150,000 breeding birds (Appendix D). Smaller,

but still substantial, colonies occur at Cape Lewis and Chamisso Island and Puffin Island. Breeding success of seabirds in the Chukchi Sea Unit of the refuge is variable from year to year, due to fluctuations in sea ice conditions and availability of sandlance, their principle forage fish (Springer et al. 1985).

Inland from the sea cliffs at Cape Thompson and Cape Lisburne are several hundred square miles of refuge lands which are part of the Arctic Foothills Province of the western Brooks Range. Approximately 120 species of birds, 65 of them breeders, have been recorded in this region (Appendix B).

The Chukchi Sea Unit also includes low coastal barrier islands, mostly on the seaward side of coastal lagoons, scattered along the Chukchi Sea between Cape Lisburne and Pt. Barrow. The most prominent breeding birds are common eiders. The coastal lagoons and the refuge islands are important in fall to over 30 species of migrant birds. Particularly abundant are brant, eiders, oldsquaw, phalaropes, dunlins, pectoral sandpipers, glaucous gulls, and arctic terns (Gill et al. 1985).

Nocturnal seabirds (e.g. storm petrels, ancient murrelets) do not nest in the Chukchi Sea Unit. It has been suggested that the lack of sufficiently long periods of darkness in summer limits nocturnal species at these latitudes.

Although they are not present in large numbers, guillemots are of interest in the unit. Pigeon guillemots reach the northern edge of their breeding range near Cape Thompson. This area is also the southern edge of the range of black guillemots. Both species breed at Cape Thompson (Swartz 1966), a situation that may not occur anywhere else (although there is an occasional sighting of pigeon guillemots at Cape Lisburne where black guillemots are common). Black guillemots also nest on some of the barrier islands of the unit (e.g. Seahorse Islands,) (Divoky et al. 1974).

Waterfowl - The barrier islands, especially those at Kaseguluk Lagoon, provide nesting habitat for hundreds of common eiders (Sowls et al. 1978). Particularly large "colonies" of eiders occur near Icy Cape at Solovik Island and an unnamed island east of the Cape. These areas, along with Peard Bay, are important staging areas for brant, eiders, and oldsquaws which molt in the area (Lehnhausen and Quinlan 1981, Gill et al. 1985).

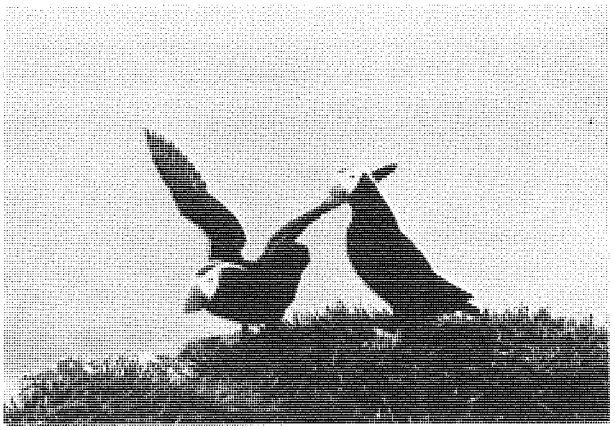
Raptors - The main nesting species in the Cape Thompson and Cape Lisburne areas are gyrfalcon and golden eagle (Swartz 1966, Springer and Roseneau 1977, Williamson et al. 1966). Peregrine falcons and rough-legged hawks have nested at Cape Thompson (Swartz 1966) and snowy and short-eared owls probably breed there (Williamson et al. 1966).

Shorebirds - The most common breeding shorebirds at Cape Thompson and probably Cape Lisburne, are semipalmated and western sandpipers, and semipalmated and lesser golden plovers (Williamson et al. 1966). Twelve other species of shorebirds are uncommon or rare breeders. Of the 10 species of shorebirds that occur at Point Franklin, Peard Bay, only dunlin, pectoral sandpiper, and red phalarope are common or abundant.

Passerines - At Cape Thompson, the only site on the unit where breeding passerines have been studied (Williamson 1966), medium shrub thickets support the highest diversity of species. Common redpoll and white-crowned sparrow are most abundant, but yellow wagtail, Lapland longspur, and savannah sparrow are also common. The latter two species are the only common breeders in wet meadows at Cape Thompson and near Point Franklin (Gill et al. 1985).

Seabirds - Murres account for over 80 percent of roughly 350,000 breeding seabirds on the Chukchi Sea Unit. Thick-billed murres are more numerous than common murres at Cape Thompson and Cape Lisburne, but the reverse is true at Chamisso Island. In 1960 Cape Thompson had nearly 400,000 murres present (Swartz 1966), but the population there has declined markedly.

By 1982 only 132,000 birds remained (Springer et al. 1985). Possible explanations for this tremendous decline include food shortages near the breeding grounds causing low reproductive success, food shortages in wintering areas causing adult and juvenile mortality, or a combination of the two. Interestingly, populations of murres at Cape Lisburne, less than 100 miles north of Cape Thompson, have



Tufted puffins, like these on Chamisso Island, were called sea-parrots by early sailors. The refuge protects nesting colonies for several million tufted and horned puffins.

remained relatively stable from 1976 to 1985 (Springer et al. 1985, Byrd 1985). There is no definite explanation yet for these population trends. One suggestion is that birds breeding at Cape Lisburne may be the birds that winter in open leads in sea ice in the southern Chukchi Sea and northern Bering Sea, while birds breeding at Cape Thompson may winter with the mass of murres wintering in the southeastern Bering Sea. These birds depend on walleye pollock, a fish that may have declined recently (Murphy et al. 1985, Springer et al. 1985).

Black-legged kittiwakes are the second most common species of nesting seabird in the Chukchi Sea Unit. Although annual reproductive success has varied from a high of 1.7 eggs or chicks per nest during the first week of hatching to nearly complete nesting failures, populations at Cape Lisburne and Cape Thompson have apparently not declined (Springer et al. 1985). Horned puffins are fairly common on the unit, but the lack of a suitable monitoring technique for this species has precluded any determination of population trends or changes in reproductive success.

Mammals

Cape Thompson is the only site on the Chukchi Sea Unit where the terrestrial mammal community has been studied intensively (Pruitt 1966). A total of 21 species were recorded there, and many of them probably also occur at Cape Lisburne. Four other species are found in the general vicinity and probably occur on the unit. Dall sheep and muskoxen were not seen during Pruitt's study, but have been recorded in recent years.

Caribou - The western arctic caribou herd has been increasing in recent years, and now stands at 230,000 or more animals (Alaska Dept. of Fish and Game 1986 photo census). The annual patterns of migration vary somewhat (J. Trent pers. comm.), but in most recent years the post-calving aggregation of the herd migrates through the Lisburne Peninsula (L. Craighead pers. comm.). In some years the herd winters on both the Lisburne and Thompson sub-units (see Lent 1966 for historical information).

Bears - Brown bears are fairly common near Cape Thompson and Cape Lisburne. Pruitt (1966) observed them out of hibernation between mid-April and early November, a period that coincided with the active period for ground squirrels, one of the major food items for the bears. As freeze up occurs and brown bears go into hibernation, polar bears appear in the region. Although these marine mammals are usually observed on sea ice, a few observations of polar bears have been made some miles inland (Pruitt 1966).

Furbearers - Wolverines were considered "remarkably common" by Pruitt (1966) at Cape Thompson, and they are probably also common near Cape Lisburne. Red foxes are not often observed near the seabird cliffs, but they are probably common further inland. Arctic foxes also occur in inland areas at Cape Thompson and Cape Lisburne. Arctic foxes prey heavily on eiders when they use the barrier islands during nesting season (Quinlan and Lehnhausen 1982). Ermine and least weasels also occur at Cape Thompson (Pruitt 1966).

Arctic ground squirrel - This animal is common at Cape Thompson and Cape Lisburne, where it is an important food item for larger mammals (e.g. bears and wolverines) and birds of prey (e.g. golden eagles).

Small rodents - Three species of vole and two species of lemming occur in the Cape

Thompson area. Pruitt (1966) found that while all species were subject to marked fluctuations in populations, they were not in phase with each other.

Seals - The two most common seals seen near Cape Thompson are ringed seals and bearded seals. The animals are probably present year-round, but they are usually taken by Eskimos from Pt. Hope when the sea ice is present (Johnson et al. 1966).

Walrus - These animals usually remain near the ice pack, but several hundred sometimes haul out at Cape Lisburne in late summer when the ice has receded farther north (Frost et al. 1983).

HUMAN ENVIRONMENT

Cultural Resources

The residents of the Chukchi Sea Unit at the time of European contact were Inupiaq-speaking Eskimos, closely related to other Eskimo populations from Norton Sound to Greenland. They depended heavily on marine mammals for subsistence, with substantial use of available fish and land mammal resources as well. Much of the social organization, as well as a major portion of the yearly subsistence effort, went into the hunting of large whales. Whaling boat captains were the leading individuals, with their prestige carrying over from whaling to all other aspects of community life. They occupied permanent winter villages with well-constructed semi-subterranean houses, but also hunted and trapped from smaller camps at various times during the year.

The first European exploration of this area came during the voyages of Captain James Cook during the late 1770's. Cook reached as far north as Icy Cape. Russian parties ventured nearly as far north in 1820, and boat crews from the party of Captain Frederick Beechey of the Royal Navy reached Barrow in 1826 (VanStone 1984). Whaling, however, was the impetus that led to the majority of contact during the nineteenth century; in addition to opportunities for trade, chance events such as the New Bedford whaling fleet disaster of 1871 provided tremendous windfalls of raw materials, especially metal (Allen 1973). Whaling methods of the Yankees in the trade were soon adopted, and have continued essentially unchanged up to the present. Very little archaeological work has been done on lands administered as part of this unit, although adjacent areas (Barrow, Point Hope, Cape Krusenstern) have sites of tremendous importance in interpreting the prehistory of northern Alaska. One recent project undertaken by the Service (Sheehan et al. 1987) at Point Franklin may lead to a better understanding of precontact whaling villages.

Subsistence Uses

The communities in and near the Chukchi Sea Unit are rural and are highly dependent on subsistence activities. Subsistence activities include fishing, hunting, trapping, egging (collecting bird eggs), and gathering wood, berries, and other plant materials. Although most refuge lands in the unit are used only for egging, the larger mainland tracts at Cape Thompson and Cape Lisburne are used for other land-based subsistence as well.

The greater participation in a cash economy has caused some changes in subsistence lifestyles. Increased use of mechanized equipment has caused a shift in the goals of subsistence activities. For example, the use of snowmachines has lessened the need for meat for sled dogs. The winter hunt has shifted from the sea toward land resources, such as caribou. Three-wheelers are used extensively for subsistence. They are particularly important for marine mammal hunting in the spring and are used extensively in the summer to check fishing nets as well. The use of these machines allows more game to be harvested in a shorter period of time, and at greater distances from the community (Alaska Consultants et al. 1985).

Recreational Uses

Recreational use of refuge lands in the Chukchi Sea Unit is limited by the remote location and lack of facilities. Refuge lands are extremely isolated, and the closest recreational centers are over 100 miles to the south (Kotzebue) and almost 300 miles to the northeast (Barrow) of the major refuge lands. Passive sightseeing, wildlife observation, and sporadic sport hunting and fishing are probably the key recreational uses in this unit. Some local sightseers may occasionally travel to refuge sites in the

Waldo Bodfish, Sr. of Wainwright told archaeologist Greg Reinhardt how the site of Pingasagruk was used as a seasonal camp when he was a child. Local elders can provide valuable information concerning historical uses of refuge lands.

Kotzebue Sound area. Non-resident recreational uses in this unit are minimal.

At Cape Lisburne, people working at the U.S. Air Force station are the main users of the unit. They use the refuge primarily for short walks, beachcombing, and some hunting. During 1984 they reportedly took five caribou, one wolverine, and ten red foxes. Grizzly bears and polar bears are common and human encounters occur.

Tourists rarely visit the Cape Lisburne and Cape Thompson bird cliffs by boat. In 1987 two sea kayakers traveled from Kotzebue to Barrow. The Cape Lisburne and Cape Thompson seabird colonies were highlights of their trip. Sea kayaking would probably increase in the area as the outstanding opportunities become better known.

One guide operates hunting and non-hunting trips in the Cape Thompson-Cape Lisburne area. He guides approximately 25 people a year that might enter refuge areas. Their use of refuge lands varies depending on the desires of particular clients and the location of migratory wildlife species. Hunting efforts, particularly for brown bear, are expected to increase 20 to 30 percent over the life of the plan.

Economic Uses

One guide operates trips, either hunting or non-hunting, in the Cape Thompson/Cape Lisburne areas, as discussed above.

Special use permits were issued to Standard Alaska Production Company to conduct surficial geological reconnaissance at Cape Lisburne and Cape Thompson within the Chukchi Sea Unit.

Military Uses

The U.S. Air Force operates a station adjacent to refuge lands at Cape Lisburne. Although there were as many as 100 people stationed there in recent years, the staff has been reduced to a crew of eight. During the summer, numbers increase to about 20 with the addition of temporary maintenance crews. The Air Force operates a rock quarry on refuge lands under special use permits. The quarry rock is used for maintenance of the runway and other base facilities.

Communities

Portions of the Chukchi Sea Unit are within the jurisdictional boundaries of the North Slope Borough and the Northwest Arctic Borough. The North Slope Borough, incorporated July 1, 1972, encompasses 88,281 square miles had an estimated population of 8,308 in 1986. The Northwest Arctic Borough, incorporated June 2, 1986, includes 36,000 square miles had a 1986 population of 6,696.

The communities in this area are primarily small and isolated. The residents of these communities are predominantly Inupiat Eskimo and have a strong cultural identity. Much social change has occurred in the region since the infusion of revenues into the communities from onshore oil development. In addition, the Alaska Native Claims Settlement Act of 1971 created land-holding village and regional corporations.

There are twelve communities in the vicinity of Chukchi Sea Unit lands. These communities and their populations are listed in Table 9. Although each community is individual in its character, they share many attributes. Two

communities, Barrow and Pt. Hope are discussed as examples of communities in the area.

Table 9. Communities near the Chukchi Sea Unit.

Community	1986 Population
Barrow	3,075
Wainwright	549
Pt. Lay	104*
Pt. Hope	600
Kivalina	272
Noatak	NA
Kotzebue	3,594
Noorvik	517
Buckland	259
Deering	148
Shishmaref	444
Wales	150

(Alaska Department of Community and Regional Resources, *Alaska Department of Labor 1985)

Barrow

Barrow is located on the Chukchi Sea coast about 7.5 miles southwest of Point Barrow, the northernmost point of land in the United States. The community lies 330 miles north of the Arctic Circle and 200 miles to the northwest of Prudhoe Bay, Alaska's major producing oilfield. Barrow's corporate limits take in a 21 square mile area which includes three distinct areas of settlement - the traditional Inupiat community of Barrow, the former Naval Arctic Research Laboratory military reservation, and portions of the POW-Main Distant Early Warning Line station. The Barrow townsite itself is divided by two lagoons into Barrow proper and Browerville.

Population trends and composition - A summary of the population characteristics of Barrow is provided in Table 10. The city of Barrow accounts for a large proportion of the total population of the North Slope Borough. Between the years 1970 and 1980, two major population trends were evident in Barrow. The Inupiat population decreased by approximately 10 percent. Much of this decline was attributed to movements to resettle three traditional areas in the region: Nuiqsut, Atqasuk, and Point Lay. In addition, the non-Inupiat portion of the population increased substantially (Alaska Consultants et al. 1985). The city grew rapidly in the early 1980's as a result of capital improvement project spending's effect on employment.

Sociocultural systems - There are several organizations around which social interaction revolves. The dominant religious group in Barrow is the Presbyterian church. The Alaska National Guard and the local Alaska Eskimo Whaling Commission have long been important organizations as well . All whaling captains are members of the local commission, with one member also serving on the full commission (Chilkat Institute 1985).

Community infrastructure - Barrow first formally organized as a village in 1939 under the Indian Reorganization Act. It incorporated as a city (under Territorial law) in 1958 and was raised to first-class status in 1973. The North Slope Borough was incorporated in 1972 and many city powers have been transferred to the Borough since then. Barrow retains a high degree of local independence, and has resisted several proposals to merge with the Borough. Funds for the city's operation are derived from a three percent local sales tax, State shared revenue, land purchases or lease agreements with the North Slope Borough and by occasional State or federal grants (Chilkat Institute 1985). Police protection services are provided by the North Slope Borough Department of Public Safety. Primary health care services in Barrow are provided through the Alaska Area Native Health Service and the North Slope Borough Health and Social Services Agency. The U.S. Public Health Service operates the Barrow hospital. There are two schools in Barrow, an elementary school and a junior/senior high school. Both are operated by the North Slope Borough School District.

The Ukpeagvik Inupiat Corporation is the village corporation under the terms of the Alaska Native Claims Settlement Act. The Arctic Slope Regional Corporation and the Inupiat Community of the Arctic Slope are headquartered in Barrow and are also important political forces in the community.

Garbage is picked up regularly by the Borough. Electric power is generated with gas from the South and East Barrow gas fields. Telephone service is available in Barrow as is public and cable television.

Economy - Barrow, as a regional center, has a more diversified economy and a higher proportion of non-seasonal employment than other communities in the area. Recent employment data for individual communities are not available; therefore, the following discussion on employment can be used to indicate the trend generally expected in the communities.

Total resident employment for the North Slope Borough in 1985 was estimated at around 2,600, with about 57 percent of the jobs held by Natives. Approximately 96 percent of Native employment in 1985 was related to borough expenditures. Most of the employment (65 percent) was either with borough operations (generally lower paying but less seasonal) or capital improvements projects (generally higher paying but more seasonal).

Subsistence - Subsistence resources are widely used in Barrow as they are in smaller communities. Barrow's large population contributes to the large size of the overall harvest area used by its residents. The areal extent of Barrow residents' marine harvest extends from Peard Bay in the west to Pitt Point in the east and as far as thirty miles offshore. Coastal activities do occur outside this area but usually in conjunction with trips to other coastal communities.

A projection of population changes is contained in Table 11. Barrow is not expected to grow appreciably because of the projected downturn in the economy. Current population characteristics of a predominantly young, male, and Native population are expected to remain relatively constant.

Bowhead whale is one of the preferred foods of the majority of Barrow residents (Alaska Consultants and Stephen Braund & Associates 1983). Beluga is considered to be of secondary importance among Barrow residents and few are taken. Ringed, spotted, and bearded seals, walrus, and polar bear also are harvested by Barrow residents. Marine fishing is not as important in the subsistence economy of Barrow as inland freshwater fishing.

Table 10. Population characteristics of Barrow.

Population		Growth Rate	Percent Native
1960	1,314		
1970	2,1040	.6 (1960-70)	
1980	2,207	0.05 (1970-80)	78
1986	3,075	0.4 (1980-86)	

Source: U.S. Dept. of Commerce, Bureau of the Census, Alaska Dept. of Labor.

Table 11. Population projections for Barrow.

	1990	1995	2000
Barrow	3,138	3,310	3,492

Point Hope

The community of Point Hope is located approximately 140 miles northwest of Kotzebue and 315 miles southwest of Barrow. The community is located on a triangular spit which extends about 15 miles west from the Lisburne Peninsula, making it the westernmost extension of Alaska into the Chukchi Sea. Point Hope is in an area that supports a wider variety of life forms than is typically the case for Arctic waters. Warm currents from the Bering Sea pass northward through the Bering Straits into the Chukchi Sea before encountering the coast a few miles south of Point Hope. The gravel bars which form the Point Hope spit enclose several lagoons, and the major river system in the area, the Kukpuk river, flows into one of these lagoons. The westernmost foothills of the Brooks Range abut the Point Hope spit on the edge of the mainland. The Point Hope area supported a population that was historically the largest in the Alaskan Arctic.

Population trends and composition - A summary of the population characteristics of Point Hope is provided in Table 12. During the 1930's several small outlying settlements consolidated with the larger village of Point Hope for several reasons, including the decline of fur trapping and reindeer herding. An increase of 118 people between 1980 1986 was due largely to expanded employment opportunities, new housing, and improved government services, all of which provide strong incentives for people to move to or back to the community.

Point Hope is expected to grow at a faster rate than Barrow because of the influx of former residents and Natives from Barrow. Current population characteristics of a predominantly young and Inupiat population in each community are expected to remain in effect throughout the forecast period.

Table 12. Population characteristics of Point Hope.

	Population	Growth Rate	Percent Native
1960	324		
1970	386	0.2 (1960-70)	
1980	464	0.2 (1970-80)	93.5
1986	600	0.3 (1980-86)	

A projection of population changes is contained in Table 13. Point Hope is expected to grow at a faster rate than Barrow because of the influx of former residents from Barrow. Current population characteristics of a predominantly young, male, and Native population are expected to remain relatively constant.

Table 13. Population projections for Point Hope.

	1990	1995	2000
Point Hope	653	718	790

Sociocultural systems - There are several organizations around which social interaction revolves. The dominant religious group in Point Hope is the Episcopal church. As in Barrow the National Guard and the local Alaska Eskimo Whaling Commission are important organizations.

Community infrastructure - Funding for the city government comes from a local two percent sales tax, state shared revenue, and state and federal grants. First incorporated as a fourth class city in 1966 and reclassified as a second class city in 1972, Point Hope has few municipal powers, since most have been assumed on a regional basis by the North Slope Borough. The city's present corporate limits take in approximately 1,260 acres. However, since the relocation of the village in the 1970s, about half of the village has been outside Point Hope's corporate limits (Alaska Consultants et al. 1984).

The North Slope Borough, in addition to being a major employer in the community, has an appointed village coordinator in the community to act as a liaison, and the Borough has considerable influence on local affairs.

Point Hope also has a formal tribal government. There is a local representation on the regional tribal government as well (the Inupiat Community of the Arctic Slope).

Primary health care services in Point Hope are provided by the Mauneluk Association Health Division and the North Slope Borough. Point Hope residents use either the Public Health Service hospital in Kotzebue or the Alaska Native Medical Center in Anchorage.

The North Slope Borough School District provides education services from early childhood education through the 12th grade. Point Hope has one school facility with 16 teachers and administrators and a 1982-83 school year enrollment of 131 students. Enrollment has remained relatively constant for the past ten years.

Utilities in Point Hope are managed by the North Slope Borough Department of Public Utilities. The community has developed water and sewage systems, although honeybuckets continue to be

widely used. All electrical power is diesel generated with a current capacity of 930 kw. Telephone service and television are available via sattelite.

The Tigara Corporation is the major landowner in the Point Hope area, with surface rights to 138,240 acres of land in the general vicinity of the community under the terms of the Alaska Native Claims Settlement Act. In addition to owning land resources, the corporation owns the local fuel distributorship, a local store, and a local construction company, and has invested in business ventures outside the community, particularly those which generate employment opportunities for the corporation's stockholders (Alaska Consultants et al. 1984).

Subsistence - Because of the greater amount of refuge land near Point Hope, the use of refuge resources is more important there than in Barrow (Alaska Consultants et al. 1985). Considerable marine mammal harvesting occurs in the open leads of pack ice which surround the Point Hope spit for an average of seven to eight months each year. Because of its location on a narrow spit extending out into the Chukchi Sea, local hunters have access to suitable leads which open on either the north or south side of the spit, depending on wind direction. Almost all of the marine mammal harvesting which takes place in the spring is initiated from camps along the south shore. These camps stretch from just in front of the village along the coast to Akoviknak Lagoon. The barrier beaches in the Point Hope area are natural roadways and villagers can travel from Cape Thompson in the south to Sinuk in the north without interruption.

Of all the marine resources harvested by Point Hope hunters, the bowhead whale is the most important in the subsistence economy, accounting for 22.3 percent of the subsistence harvest of any wildlife resource over the past 20 years. Ringed and spotted seals, and bearded seals, walrus, beluga, and polar bear also are harvested by Point Hope residents. Villagers use set nets and beach seines to catch Arctic char and pink, coho, and chum salmon located along the shore from Cape Thompson north to Kilikralik Point.

Migratory birds, especially geese and eider, are important supplements to the meat supply for both communities. In addition, Point Hope residents harvest murre eggs from the cliffs at Cape Thompson and Cape Lisburne.

WILDERNESS REVIEW

This evaluation will determine what lands, if any, in the Chukchi Sea Unit meet the criteria necessary for wilderness designation. Those criteria are explained in the wilderness review section of the Overview.

Pt. Franklin, Sinnachiak Peninsula in Spafarief Bay, and Lopp Lagoon Barrier Islands will not be evaluated for wilderness designation, because they do not meet the minimum size criterion of 5,000 acres or a size manageable as wilderness. Ekichuk Lake Islands have been selected. Although these islands meet the other wilderness criteria, they can not be proposed for wilderness at this time, because their eventual ownership is uncertain. Chamisso Island and Puffin Island are already designated wilderness. Refer to Table 7 for a complete listing of selected lands in this unit which are suitable for wilderness but are not being proposed.

Seahorse Islands and the Peard Bay Islets

These low, sandy islands in the Arctic Ocean off of Pt. Franklin change shape with sea conditions. They are utilized by nesting arctic terns, black guillemots, and horned puffins. Peard Bay is an important staging area for migrating brant, eider, and oldsquaw.

1. Size - The islands total approximately 150 acres.
2. Land ownership - They are in federal ownership and have not been selected.
3. Natural integrity - Nothing has affected the integrity of the islands' ecosystems.
4. Apparent naturalness - There are no known human improvements.
5. Outstanding opportunities for solitude - The islands are in a very remote and unpopulated area of the state. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Bird watching, camping,

photography, and other activities are available but are less than outstanding.

7. Special or unique features - Polar bears sometimes concentrate in the Peard Bay area in October and November.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - Although the islands meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation, they are not adjacent to an existing wilderness and do not meet the Service's criterion of outstanding resource values.

Icy Cape - This area is made up of low sandy barrier islands and extensive mudflats which separate Kasegaluk Lagoon from the Arctic Ocean. These are active barrier islands and change in size, shape, and location depending on storm tides. The lagoon is a very important area for numerous shorebirds and waterfowl. Common eiders are the most common breeding birds.

During migration, several hundred thousand birds representing over 30 species utilize the lagoon. Common species include brant, eiders, oldsquaw, semipalmated sandpipers, rudy turnstones, black bellied plovers, lesser golden plovers, red phalaropes, and arctic terns. Nearly all of the king eider population in Alaska moves through this area. Mammals in the area include polar bear, arctic fox, and walrus, beluga, bowhead, gray and killer whales, and spotted seals.

1. Size - About 5,130 acres remain in federal ownership. However, the size of the islands change in response to storm tides.
2. Land ownership - The islands remaining in federal ownership have not been selected. The active nature of these islands could complicate land status as the islands change in size, shape, and location.
3. Natural integrity - The integrity of the islands' ecosystems remains intact. Waterfowl hunting and egging have not affected the bird populations.
4. Apparent naturalness - There are no known human improvements.
5. Outstanding opportunities for solitude - Solitude is outstanding due to the remote location of the islands.
6. Outstanding opportunities for primitive recreation - Opportunities for bird watching and wildlife photography are outstanding.
7. Special or unique features - Kasegaluk Lagoon has been proposed as a regional shorebird reserve.
8. Outstanding resource values - Kasegaluk Lagoon does have outstanding resource values, because its shorebird habitat is regionally significant. Even though, Service land which meets the size criterion makes up less than 10 percent of the shoreline of the lagoon, this area has outstanding resource values.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - This area meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It also meets the Service's criterion of outstanding resource values. It is not adjacent to an existing wilderness.

Ann Stevens/Cape Lisburne - In this area, the Brooks Range meets the Arctic Ocean forming rocky, precipitous cliffs which are home to over 150,000 seabirds. Five cliff sites are inhabited by common and thick-billed murres, cormorants, glaucous gulls, horned puffins, tufted puffins, black guillemots and black-legged kittiwakes. Fifteen species of marine mammals utilize the waters off the Cape and up to several hundred walrus are known to haul out on the shore (U.S. Department of the Interior 1974). Polar bears come on land in the winter.

Away from the coast, the area is dominated by the rounded summits of the Lisburne Hills. Deep permafrost underlies the slopes some of which are barren rock and others tundra covered. Braided streams drain the hills and spread out to form flat alluvial fans between the sea cliffs along the coast. In recent years, Cape Lisburne has been a post-calving concentration area for the Western Arctic caribou herd. Grizzly bear, moose, and arctic fox are fairly common in the unit, and muskox and dall sheep are occasionally seen.

1. Size - About 88,200 acres remain in federal ownership.
2. Land ownership - Over one half of the area, 49,244 acres, has been selected by Native corporations or the state. Although the selected parcels meet the other wilderness criteria, they can not be proposed for wilderness at this time, because their eventual ownership is in doubt. Should the selections be relinquished, the parcels should be considered for inclusion in a wilderness proposal for Cape Thompson.
3. Natural integrity - The natural systems have not been affected by the hunting and egging occurring in this area.
4. Apparent naturalness - The Atomic Energy Commission's Project Chariot, a proposal to excavate a deep-water port using nuclear devices, was located at the mouth of Ogotoruk Creek. The project has since been abandoned, and the area is scheduled for cleanup by the Army Corps of Engineers. A few buildings and the airstrip will remain after cleanup. Approximately 200 acres surrounding this site are unnatural. The remainder of the area appears natural.
5. Outstanding opportunities for solitude - Solitude is outstanding due to the large size of the area, the topographical screening provided by the Lisburne Hills, and the remote location.
6. Outstanding opportunities for primitive recreation - Bird watching, sea kayaking, hiking, camping, and hunting are available in the area. Very little use has occurred because of its remoteness, but opportunities are outstanding.
7. Special or unique features - Pigeon guillemot at the northern edge of its range and black guillemot at the southern edge of its range both nest in this area. The murre colony is significant, because it has endured a drastic decline from 400,000 birds in 1960 to the estimated 125,000 today. The Western Arctic caribou herd can also be considered a special feature. Archaeological sites have been found at Ipnot and Chariot.
8. Outstanding resource values - Resource values in this area are outstanding due to the combination of important seabird habitat and inland terrestrial habitat.
9. Boundary adjustment - Not applicable.

Conclusion - Most of Cape Thompson, 88,000 acres, meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It also has optional special features and meets the Service's criterion of outstanding resource values. However, the selected portion, 49,244 acres, can not be proposed for wilderness at this time. The 200 acres affected by the Chariot site do not meet the naturalness criterion and are not suitable for wilderness designation. Cape Thompson is not adjacent to an existing wilderness.

The Barrier Islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavrorak lagoons - South of Cape Thompson in the vicinity of Kivalina, a series of lagoons are separated from the Chukchi Sea by low sandy barrier islands. These islands provide habitat for shorebirds and waterfowl including common eiders, arctic terns, Aleutian terns, mew gulls, and glaucous gulls.

1. Size - Approximately 150 acres, total.
2. Land ownership - They are in federal ownership and have not been selected.
3. Natural integrity - The egging and hunting which probably occurs on these islands have not affected the integrity of the ecosystems.
4. Apparent naturalness - There are no known human improvements.
5. Outstanding opportunities for solitude - Although these islands are within 15 to 25 miles of Kivalina (pop. 240), use is very light. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Birdwatching, camping, photography, and other activities are available but are less than outstanding.
7. Special or unique features - There are no known special features.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - Although the islands meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation, they are not adjacent to an existing wilderness and do not meet the Service's criterion of outstanding resource values.

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2. Land ownership - Over one half of the area, 49,244 acres, has been selected by Native corporations or the state. Although the selected parcels meet the other wilderness criteria, they can not be proposed for wilderness at this time, because their eventual ownership is in doubt. Should the selections be relinquished, the parcels should be considered for inclusion in a wilderness proposal for Cape Thompson.
3. Natural integrity - The natural systems have not been affected by the hunting and egging occurring in this area.
4. Apparent naturalness - The Atomic Energy Commission's Project Chariot, a proposal to excavate a deep-water port using nuclear devices, was located at the mouth of Ogotoruk Creek. The project has since been abandoned, and the area is scheduled for cleanup by the Army Corps of Engineers. A few buildings and the airstrip will remain after cleanup. Approximately 200 acres surrounding this site are unnatural. The remainder of the area appears natural.
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The Barrier Islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavrorak lagoons - South of Cape Thompson in the vicinity of Kivalina, a series of lagoons are separated from the Chukchi Sea by low sandy barrier islands. These islands provide habitat for shorebirds and waterfowl including common eiders, arctic terns, Aleutian terns, mew gulls, and glaucous gulls.

1. Size - Approximately 150 acres, total.
2. Land ownership - They are in federal ownership and have not been selected.
3. Natural integrity - The egging and hunting which probably occurs on these islands have not affected the integrity of the ecosystems.
4. Apparent naturalness - There are no known human improvements.
5. Outstanding opportunities for solitude - Although these islands are within 15 to 25 miles of Kivalina (pop. 240), use is very light. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Birdwatching, camping, photography, and other activities are available but are less than outstanding.
7. Special or unique features - There are no known special features.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - Although the islands meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation, they are not adjacent to an existing wilderness and do not meet the Service's criterion of outstanding resource values.

BERING SEA UNIT

PHYSICAL ENVIRONMENT

Geography

The Bering Sea Unit extends over 600 miles from Norton Sound to the Pribilof Islands and comprises about 1.4 million acres in western Alaska (Figures 51 A-C). It includes over 25 islands, islets, rocks, and capes. The unit is divided into five groups. North to south are: Norton Sound islands and capes; Sand Islands; St. Matthew Island group; the Pribilof Islands; and Hagemeister Island. The northern portion of the unit includes islands, islets, and capes situated in Norton Sound. Many of the islands in this region have elevations approaching 1,000 feet. In Norton Sound, beaches occur along 75 percent of the coast, often at the base of near vertical bluffs and cliffs. Bluffs and cliffs occur along more than one-half of the coast. Barrier islands and spits occupy about 16 percent of the shoreline. Low sandy barrier islands south of Norton Sound off the Yukon Delta are located in Scammon and Kuskokwim bays.

The St. Matthew Island group, with elevations exceeding 1,500 feet, is situated about 375 miles southwest of Nome. St. Matthew Island, the largest island in the group with over 77,000 acres, appears to be 10 to 12 separate land masses but actually these are connected by low spits of sand and gravel (Cobb et al. 1968).

These least auklets breed in a colony near the Grotto on St. Matthew Island.

The Pribilof Islands, about 300 miles southwest of the Yukon-Kuskokwim Delta, have a topography characterized by volcanic cones, irregular masses of volcanic rock, and plateaus. The shorelines consist of layered volcanic cliffs edged by rocky beaches.

Hagemeister Island, located in northern Bristol Bay about 20 miles southwest of Togiak, consists of rolling hills, sandy beaches, and low cliffs.

Most of the unit is accessible by boat but access can be difficult on some islands due to the rocky, rugged shoreline. Commercial aircraft flights serve St. Paul and St. George islands. Light aircraft often make beach landings on Hagemeister Island.

See Table 36 in the management alternatives chapter for a complete listing of lands and waters located within the unit.

Land Status

The land status of Bering Sea Unit changes constantly as selected lands are conveyed, exchanged, or relinquished. Table 14 summarizes land status within the unit as of 11/1/87. Figures 53 A-H show the arrangement of ownership.

Of the approximately 1.4 million acres within the congressional refuge unit boundary, about 11 percent has not been selected and will remain in federal ownership. The remaining 89 percent has been selected or conveyed. Overselections are extensive throughout the refuge and much of the selected land will also remain in federal ownership. Of the land currently in federal ownership, approximately 49 percent, or 81,000 acres is congressionally designated wilderness.

Climate

The climate in this unit is greatly influenced by arctic and continental air masses in the winter, and maritime air masses during the summer (Overland 1981). An important factor in the climatology of this unit is the frequency, seasonal change in position, and tracks of storm centers across the Bering Sea and Northern Gulf of Alaska. Winter is characterized by low pressure systems and results in four to five

Table 14. Land status within the Bering Sea Unit as of 11/1/87.

Ownership	Acres	% of unit
Nonselected	147,564	11%
Selected (village, regional, state)	14,000	1%
Conveyed	1,232,000	88%
Native Allotments	6,000	1%
Total	1,399,465	

(U.S. Fish and Wildlife Service 1987)

storms per month. During the summer, pressure systems are more variable but are dominated by low pressure which results in three to four storms per month (Minerals Management Service 1985).

In Norton Sound, the winter temperatures range from -1°F to 23°F, and the summer temperatures range from 32°F to 50°F. In the Pribilof Islands, the winter temperatures usually range from 20°F to 30°F, and summer temperatures range from 33°F to 51°F. One unique characteristic of the Pribilof Island region is the lack of difference between the day and night temperature. This lack is caused by the surrounding ocean acting as a heat sink, absorbing heat during the day and releasing it at night. At St. Paul for example, the difference between the daily high and low is usually only seven degrees.

Annual precipitation, including snowfall, ranges from 10 to 17 inches in Norton Sound; in the Pribilof Islands it ranges from 20 to 27 inches. Wind speeds are usually high and fog can be present year-round throughout the unit.

Geology

The Bering Sea Unit lies on the Bering Shelf, a broad continental platform 100 - 500 feet deep, that is underlain by Mesozoic and Cenozoic rock (Marlowe et al. 1979). Due to uplift, followed by extensive rifting and regional subsidence, a series of basins and ridges were formed parallel to the Bering Sea margin. The Chirikov and Norton basins are situated in the northwestern Bering Sea between St. Lawrence Island and Norton Sound. The St. George Basin and Pribilof Ridge are centered near the Pribilof Islands.

Faulting has occurred throughout the unit. Seismic studies indicate the presence of many deep-seated and near-surface faults in Norton Sound, and boundary or major faults outline the north side of the Pribilof Ridge and St. George Basin. In St. George Basin, major faults display offset as great as 60 meters (Minerals Management Service 1985).

The Bering Sea Unit is seismically active. In the last several years, earthquakes in Norton Sound have reached magnitudes of 4.0. Earthquakes with magnitudes of 6.0 and 6.5 have occurred on the Seward Peninsula. Near the Pribilof Islands, earthquakes with a magnitude of 7.2 have occurred and are expected to occur again (Davis 1981).

Bedrock - Fairway, Sledge, and Egg islands consist chiefly of granitic or volcanic bedrocks. The Bluff area is underlain by silicaceous meta-sedimentary rocks that locally are overlain by thrust sheets of marble. Coastal barrier islands near the Yukon Delta are underlain primarily by sand and glacial silt. Basalt flows and pyroclastic debris interbedded with some sediments underlay the St. Matthew Island group and the Pribilof Islands (Wahrhaftig 1965).

Surficial deposits - Although there are no glaciers present in this unit, glacially deposited materials are found in some areas. Much of the unit is overlain by unconsolidated deposits such as alluvium and colluvium and sand and gravel of beaches and bars.

The Yukon River is responsible for deposition of fine sands, silts, and clays which compose the barrier islands in Norton Sound and islands off the Yukon Delta. Sand is the major material deposited in the St. Matthew and Pribilof island groups. St. Paul Island has sandy surficial material in excess of 40 feet thick (Feulner 1980).

Figure 51 A. Location of the Bering Sea Unit.

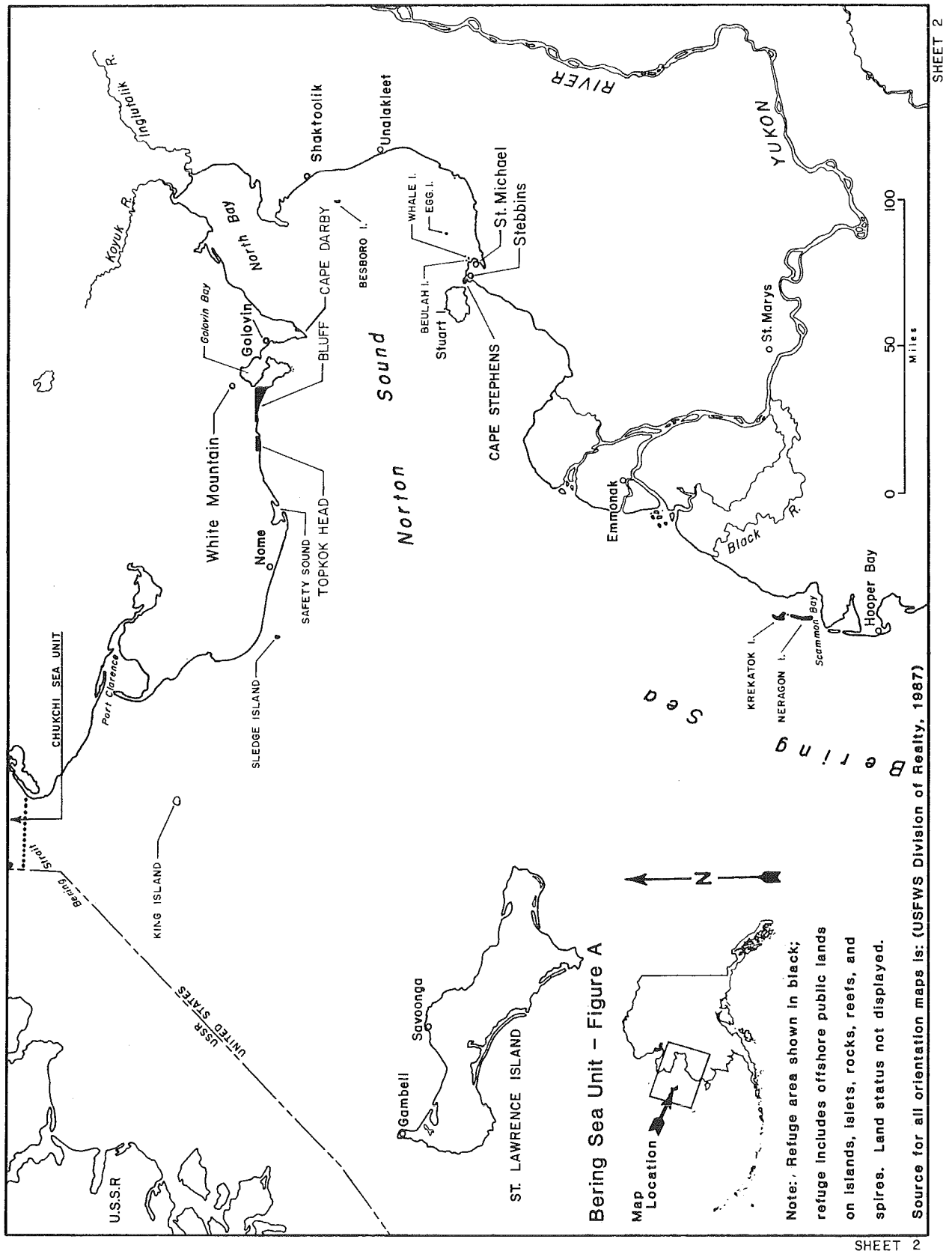
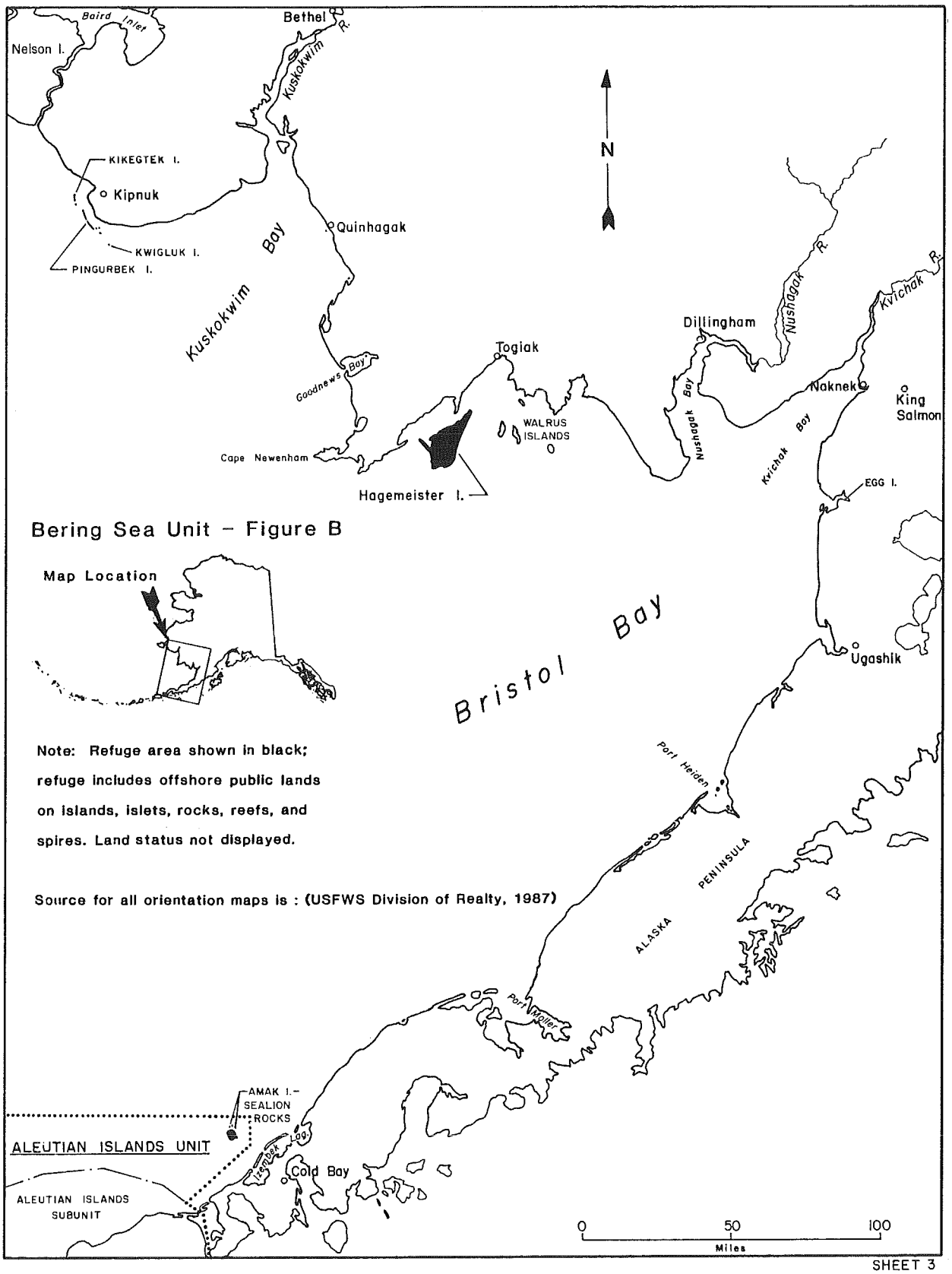
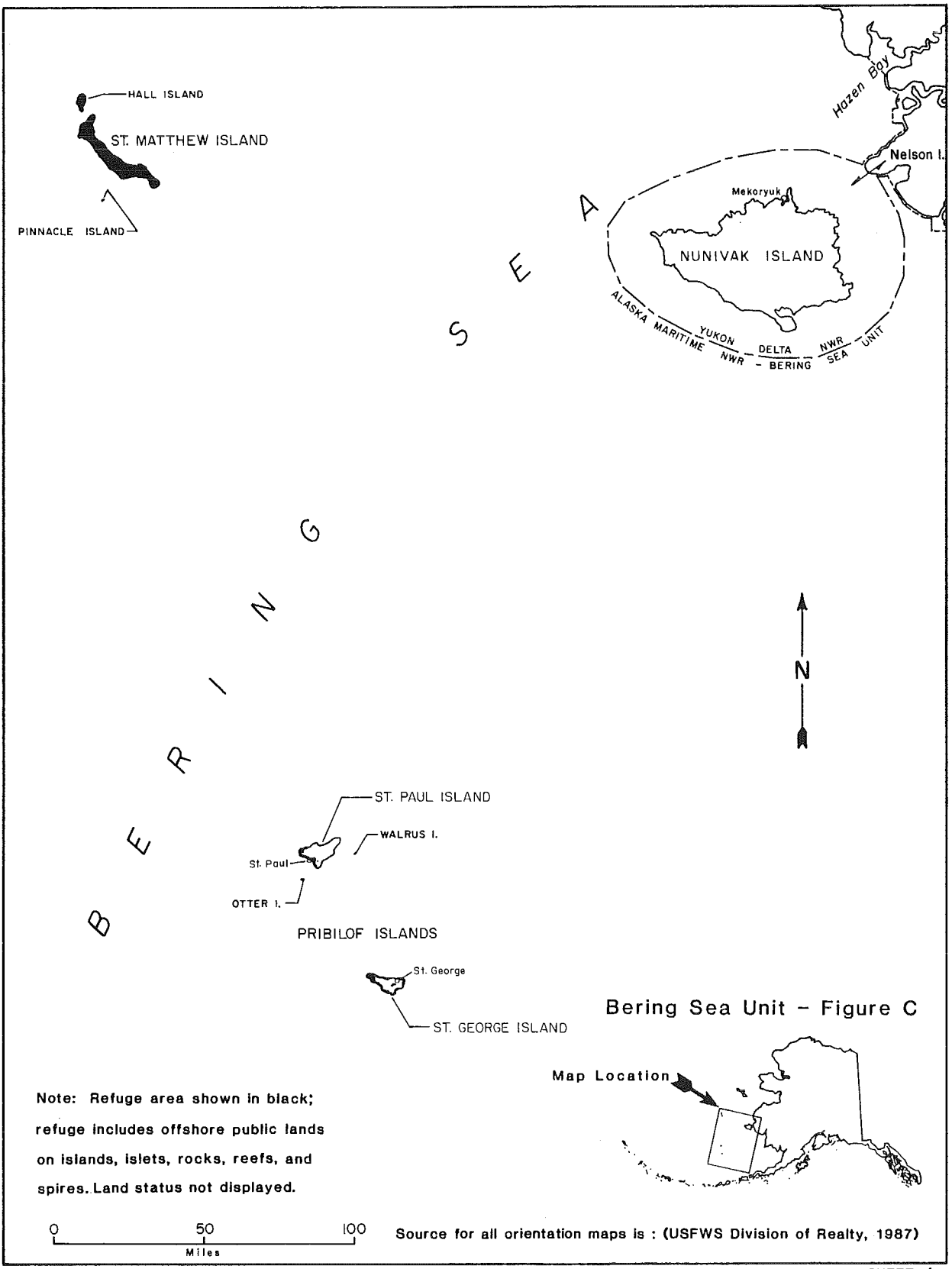


Figure 51 B. Location of the Bering Sea Unit.



SHEET 3

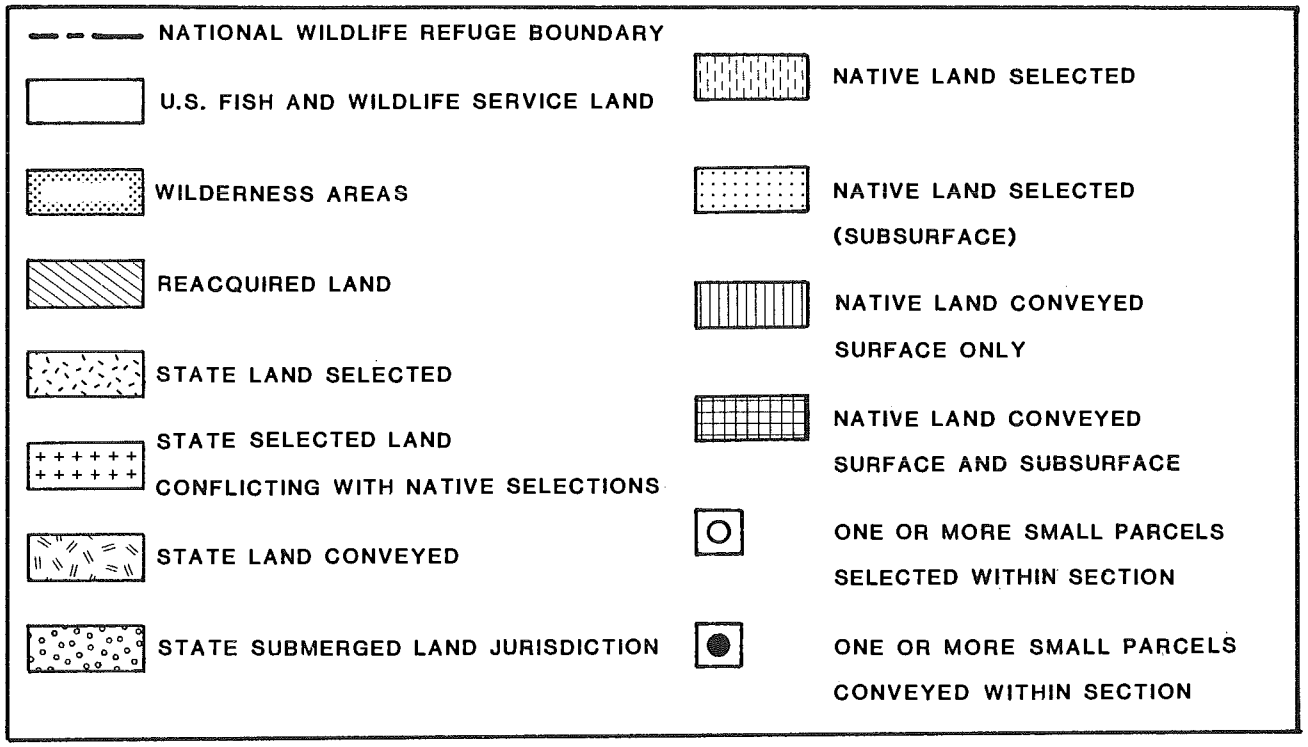
Figure 51 C. Location of the Bering Sea Unit.



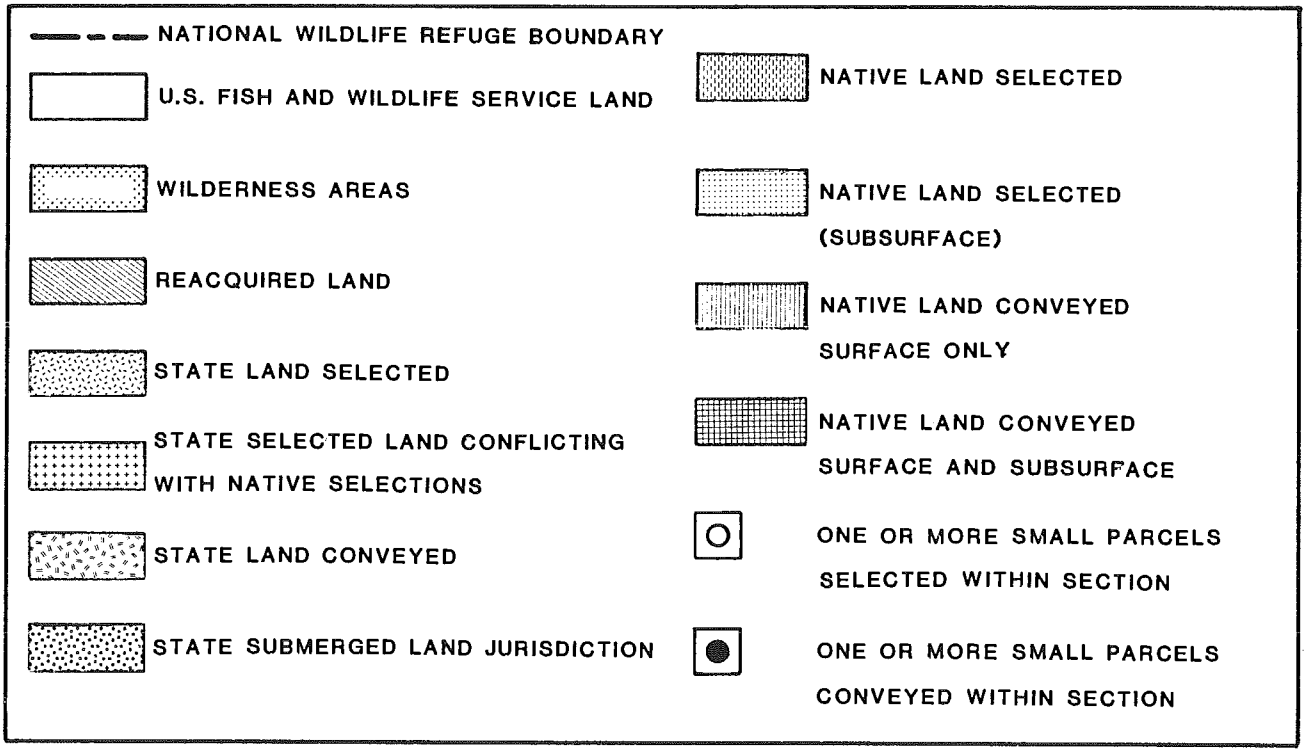
SHEET 4

Figure 52. Legends for land status in the Bering Sea Unit.

Legend for Figures B - H.



Legend for Figure* 50A



*This figure is reduced 50 percent and land status patterns appear much smaller.

Figure 53 A. Land status in the Bering Sea Unit as of November 1987.

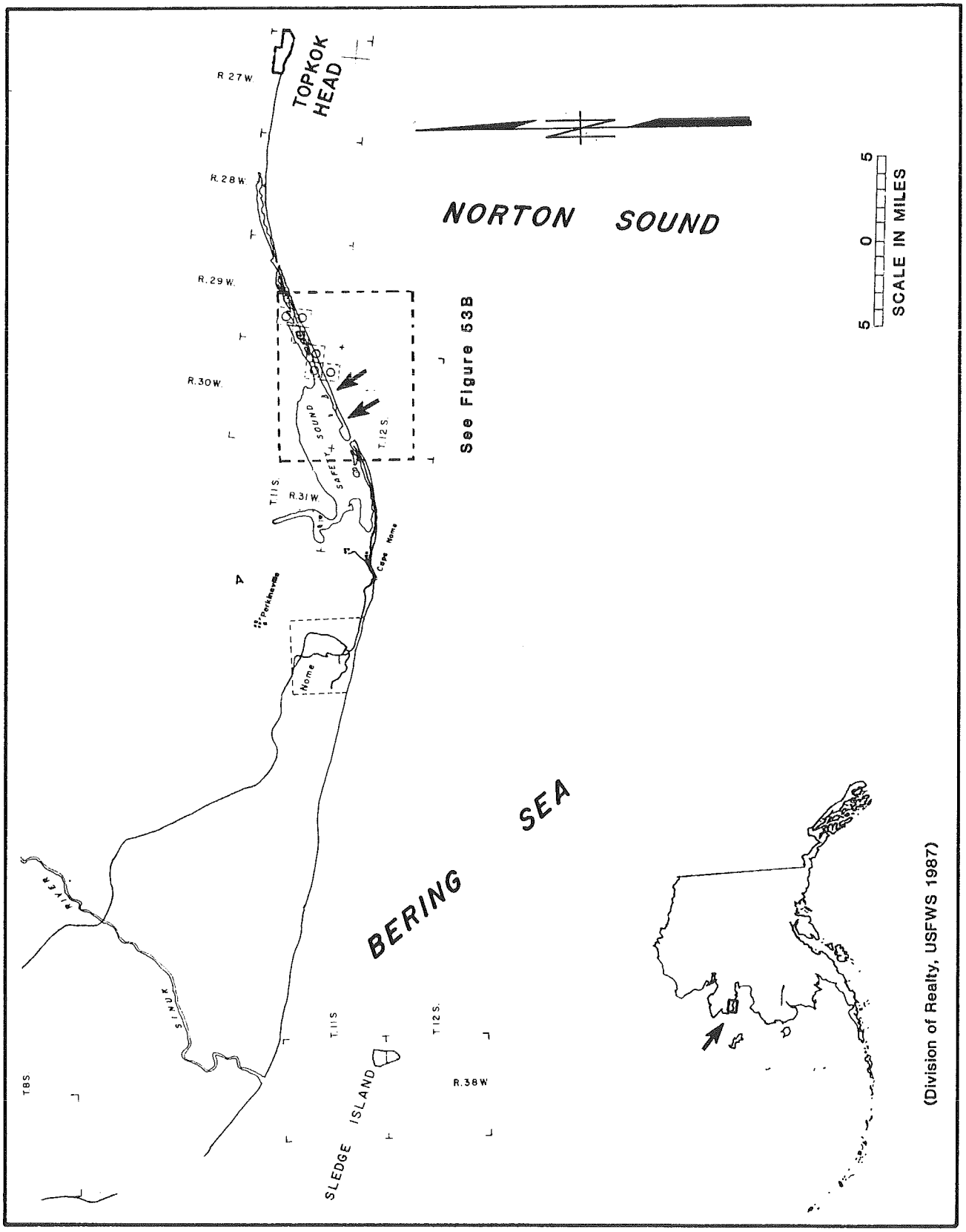


Figure 53AA. Land status in the Bering Sea Unit as of November 1987.

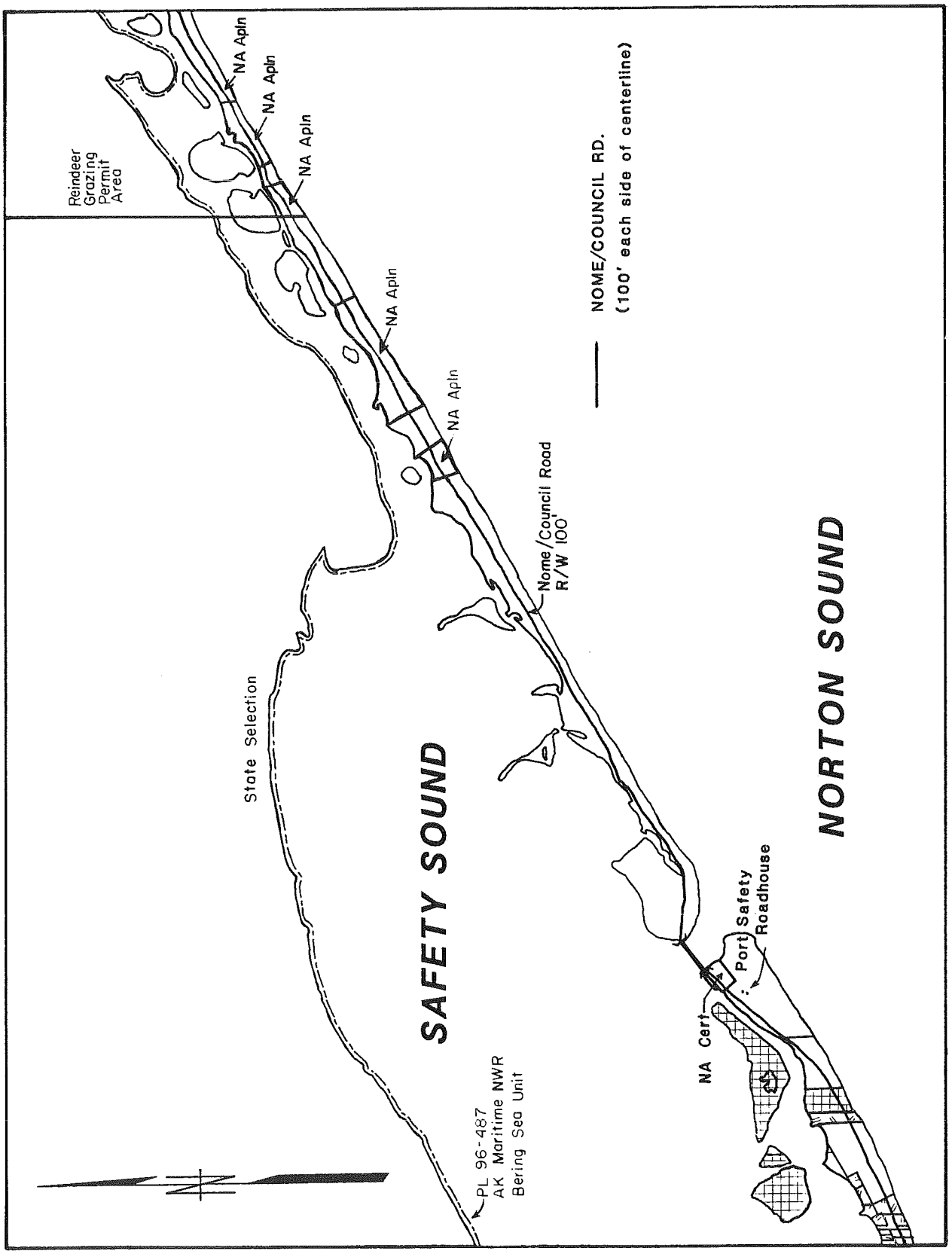


Figure 53 B. Land status in the Bering Sea Unit as of November 1987.

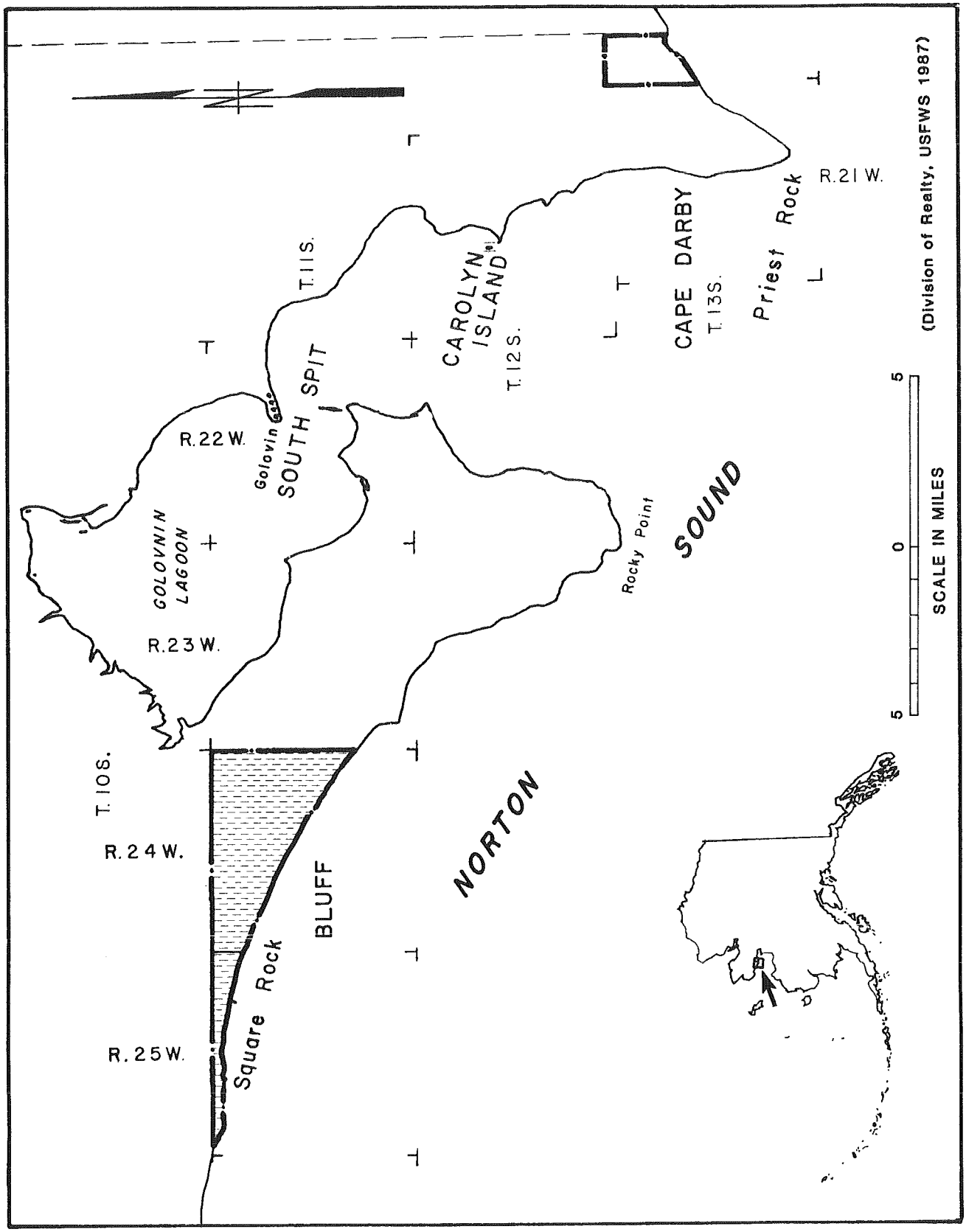


Figure 53 C. Land status in the Bering Sea Unit as of November 1987.

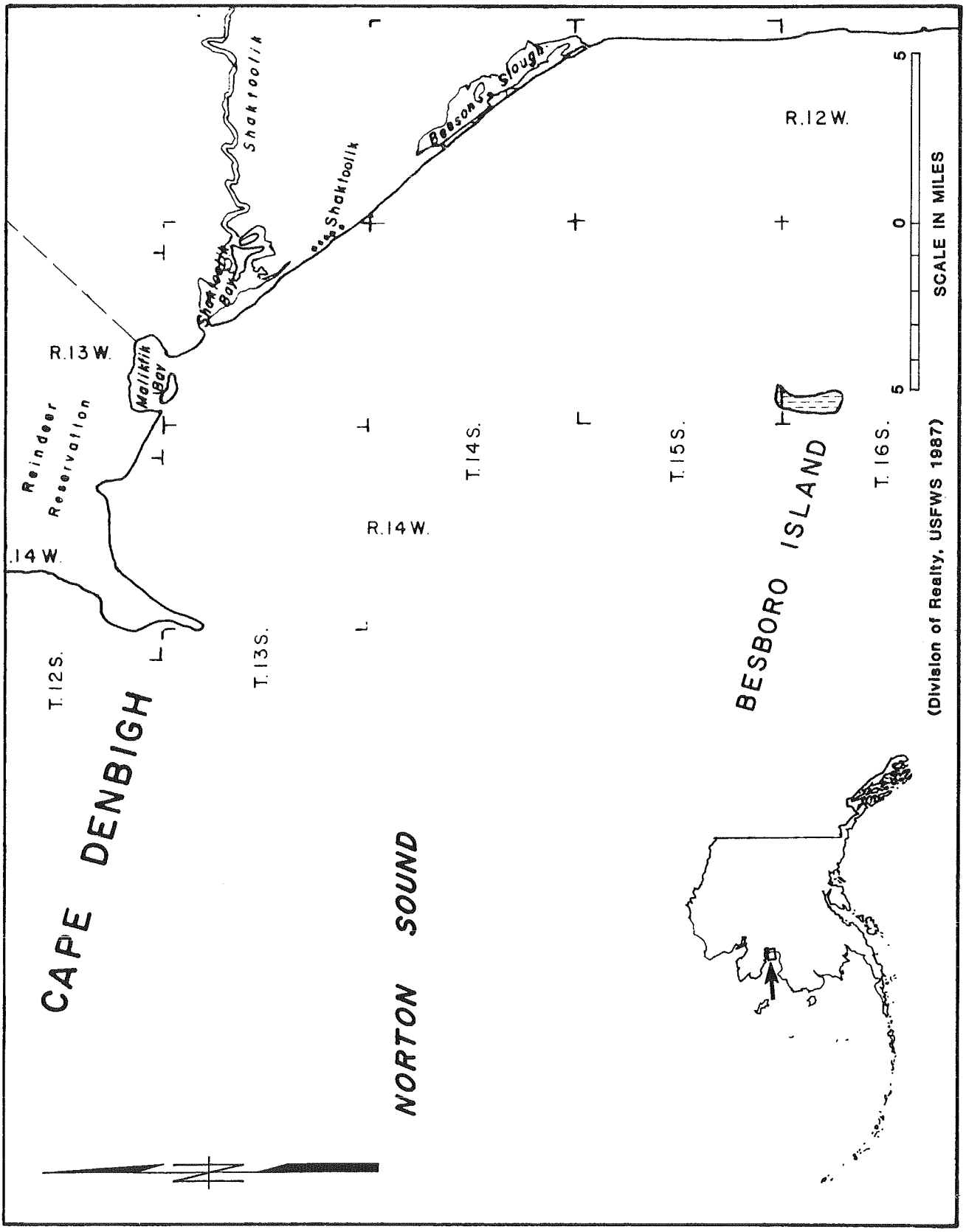


Figure 53 D. Land status in the Bering Sea Unit as of November 1987.

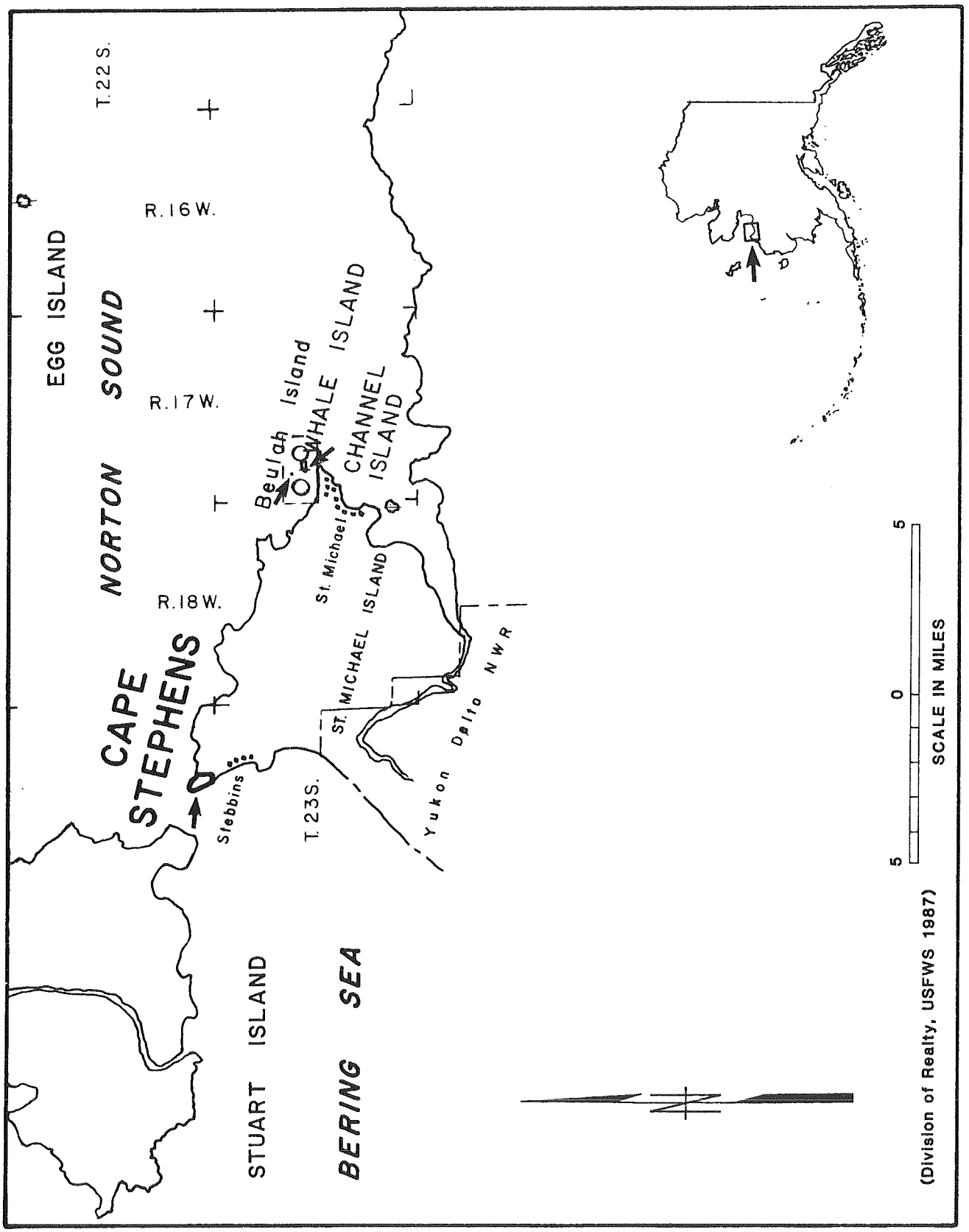


Figure 53 E. Land status in the Bering Sea Unit as of November 1987.

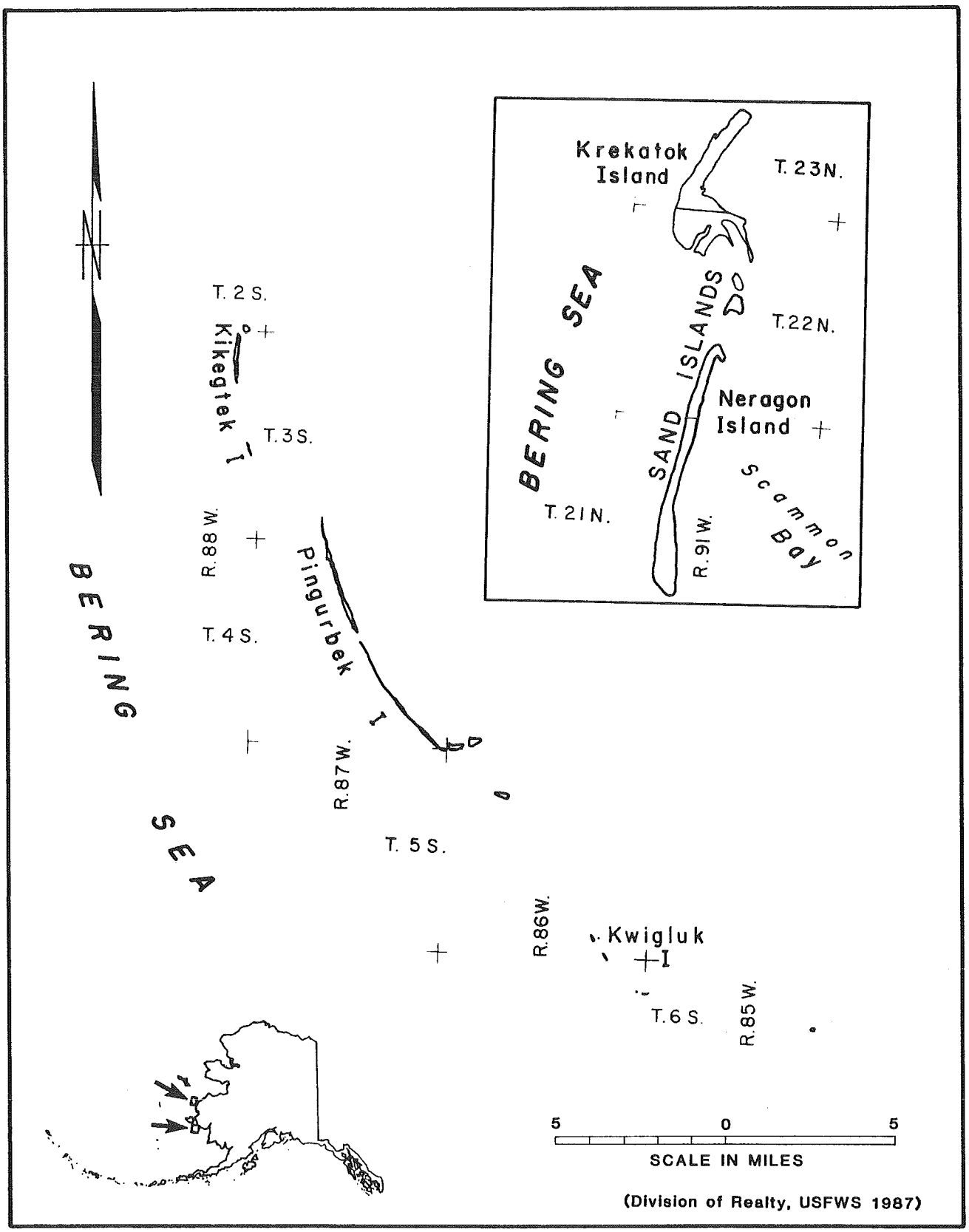


Figure 53 F. Land status in the Bering Sea Unit as of November 1987.

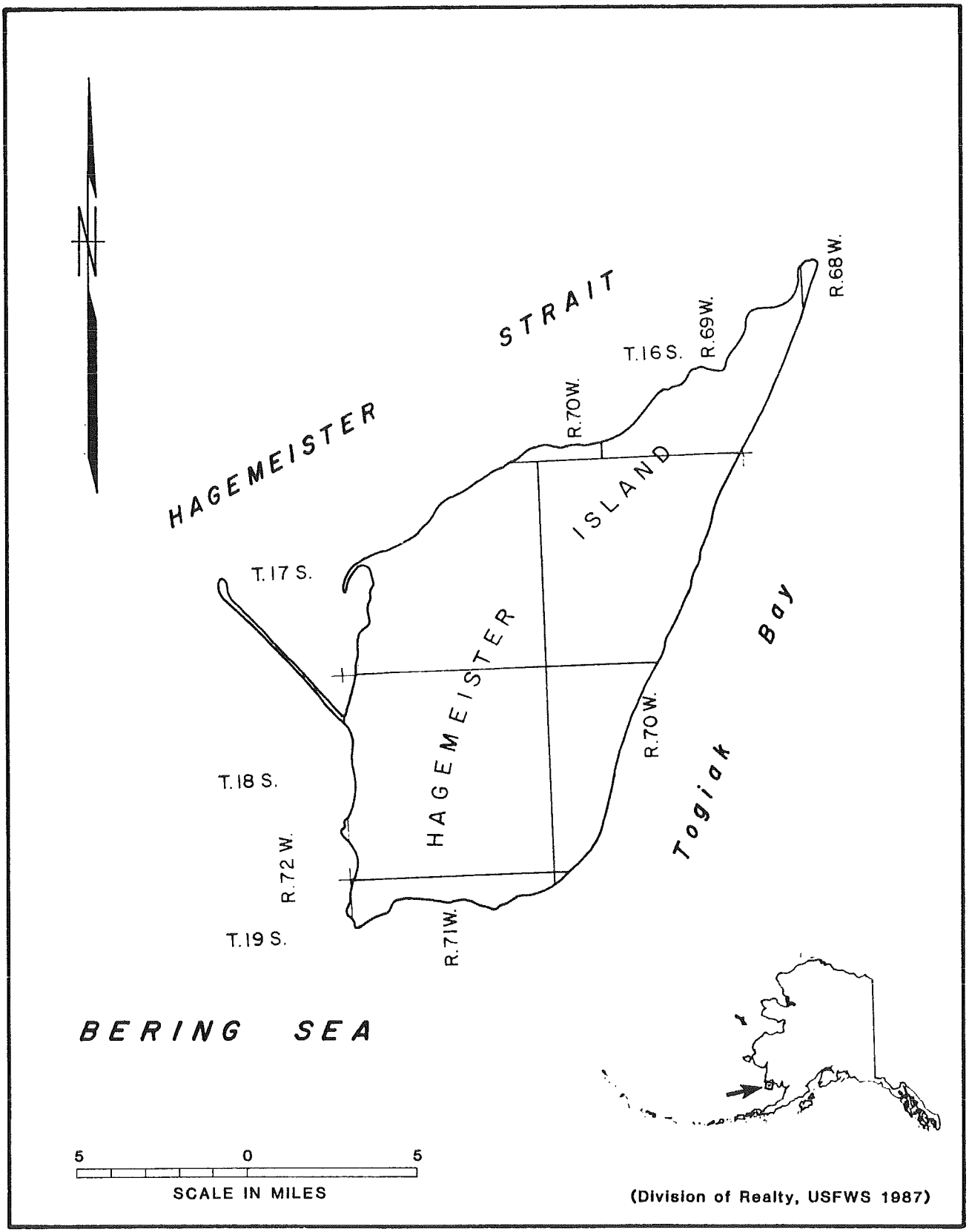


Figure 53 G. Land status in the Bering Sea Unit as of November 1987.

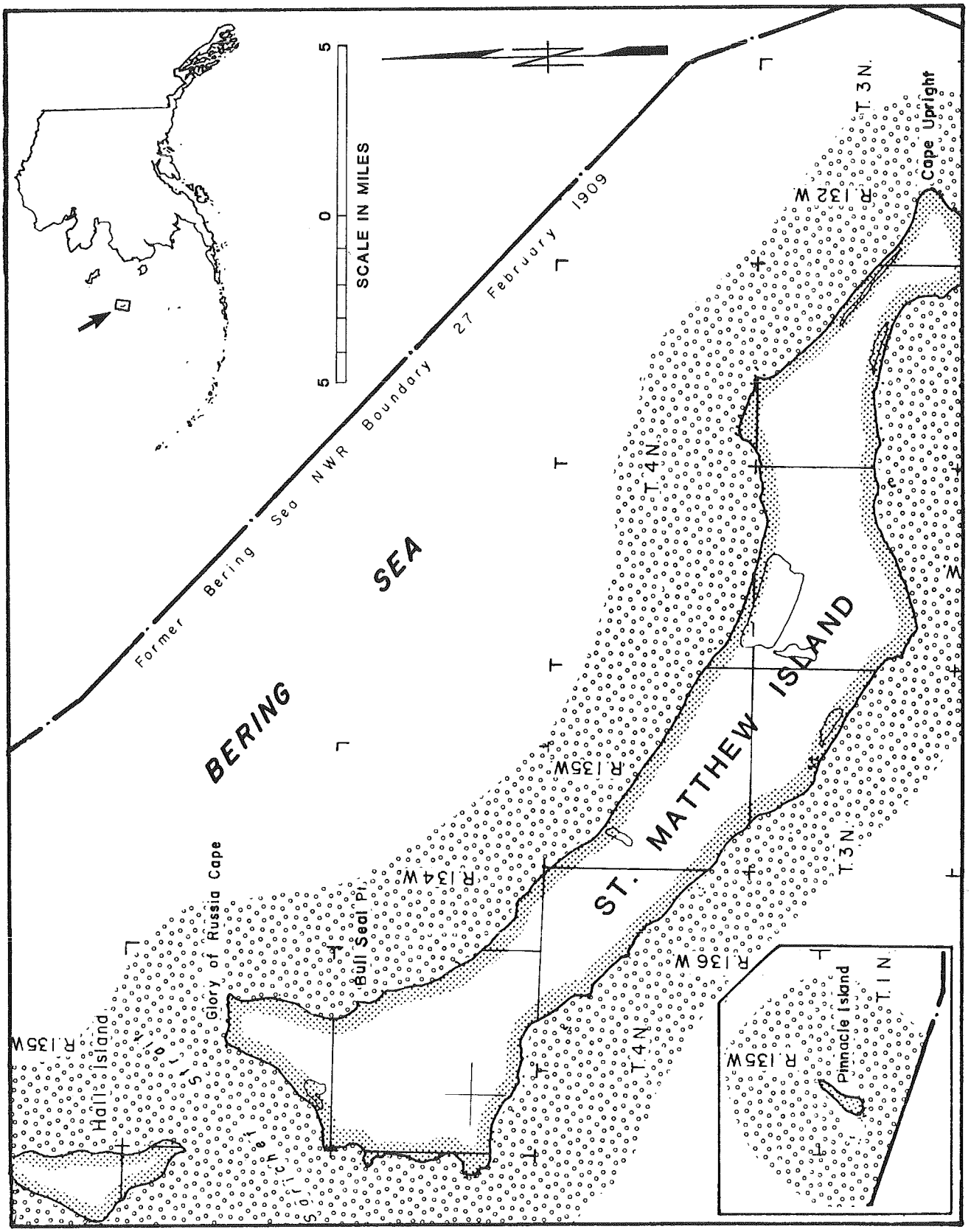
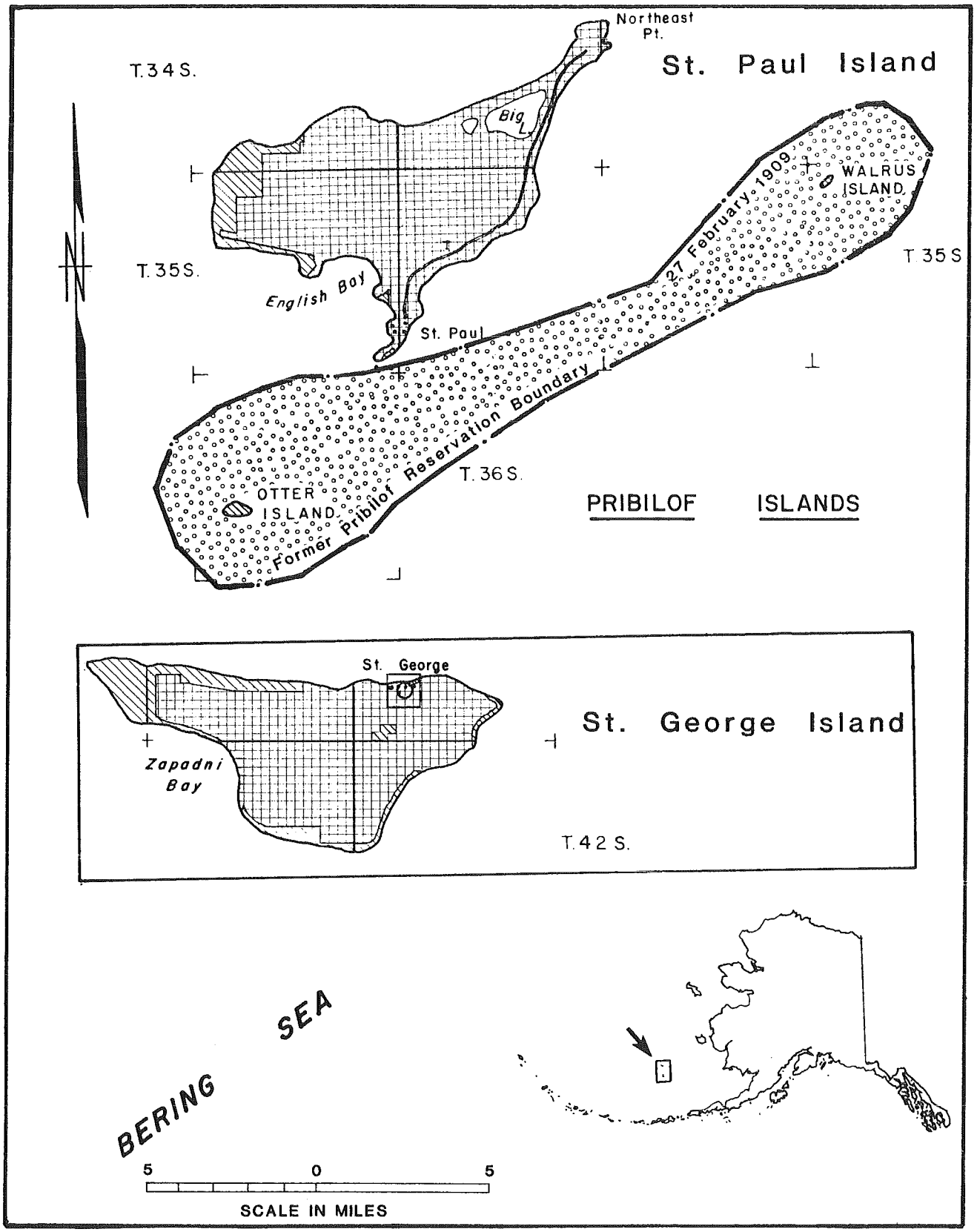


Figure 53 H. Land status in the Bering Sea Unit as of November 1987.

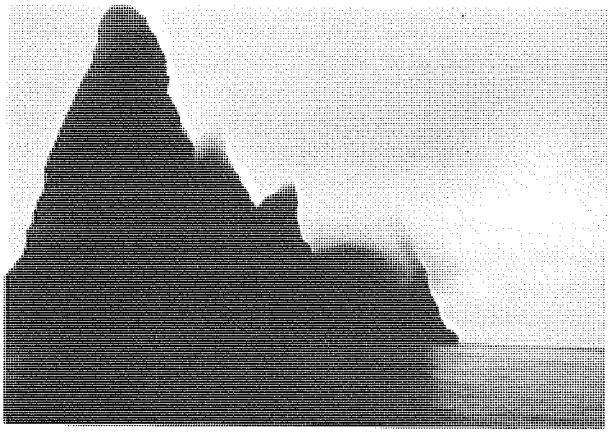


Soils - Poorly drained, frozen, loamy soil with a thick organic mat occupies coastal headlands in Norton Sound. Areas with depressions contain peat deposits. Erosion potential is high. On Bering Sea islands, gravelly loam overlain by shallow silt loam comprises much of the soil structure. Areas situated on steep hills or cliffs are comprised of bare rock or rubble (Michaelson 1974).

Mineral occurrences - Most islands in the Norton Sound area have low mineral potential and mineral lode deposits have not been identified. However, Sledge Island and the Bluff area are situated in metallogenic provinces which may contain tin, tungsten, gold, antimony, mercury, fluorite, lead, silver, or bismuth (Alaska Planning Group 1973). Placer deposits in the Bluff and Topkok Head areas have produced an unknown amount of gold. Alaska Gold, Inc. operates dredge, Bima, offshore between Nome and Sledge Island. Offshore gold dredging may also occur near Bluff where the Alaska Department of Natural Resources has issued a 20 year lease of 1,287 acres to Auric Offshore Mining. Mineral lode deposits have not been identified in the Sand, St. Matthew, and Pribilof Island groups (Berg and Cobb 1967). At this time, no mining claims are known to occur in this unit.

Oil and gas - The Bering Sea Unit includes the Norton Basin, Navarin Basin, North Aleutian Basin, St. George Basin, and St. Matthew - Hall Outer Continental Shelf planning areas (See Figure 46).

The Norton Basin and areas west of the basin, which encompass over 25 million acres, have potential for petroleum because of possible traps for hydrocarbons in the underlying rock structure (Fisher et al. 1982). The recoverable oil and gas volumes are estimated at 0.64 billion barrels of oil, and 2.94 billion cubic feet of gas. The Minerals Management Service held Outer Continental Shelf Sale 57 in Norton Sound on March 15, 1983. Fifty-nine tracts totalling nearly 336,000 acres were leased. Fifty-one leases are still active and eight have been relinquished. Six wells were drilled and all were plugged or abandoned. Sale 100 was cancelled on April 11, 1986 due to lack of industry interest. Sale 120 is scheduled for June, 1989 (U.S. Department of the Interior, Minerals Management Service 1987).



Precipitous islands like Pinnacle Rock near St. Matthew Island are ideal nesting habitat for cliff nesting seabirds.

The Navarin Basin, which encompasses over 37 million acres, has been identified by the Minerals Management Service as favorable for petroleum prospects. The recoverable oil and gas volumes are estimated at 1.2 billion barrels of oil, and 7.68 trillion cubic feet of gas. Sale 83, held on April 17, 1984, distributed 163 leases totaling about 376,000 hectares. One hundred and forty leases remain active; 23 leases were relinquished or expired. Eight wells were drilled; all were plugged or abandoned. Sale 107, which encompasses over 28 million acres, is scheduled for March, 1988; Sale 130 is scheduled for March, 1991 (U.S. Department of the Interior, Minerals Management Service 1987).

Over 32 million acres are included in the North Aleutian Basin Outer Continental Shelf Planning Area. The Minerals Management Service has identified areas in the southeastern Bering Sea as favorable for petroleum prospects. The recoverable oil and gas volumes are estimated at 0.36 billion barrels of oil, and 2.62 trillion cubic feet of gas. Two lease sales were scheduled, but not held (Sale 75, October, 1983 and Sale 51, 1977). Sale 92, scheduled for January 1986, was halted by a preliminary injunction issued by the district court on January 13, 1986 (U.S. Department of the Interior, Minerals Management Service 1987).

The St. George Basin, which encompasses over 70 million acres, has been identified as favorable for petroleum prospects. Estimates for undiscovered recoverable resources for oil and gas are 1.69 billion barrels of oil, and 15.76 trillion cubic feet of gas. Lease sale 70, held April 12, 1983, resulted in 76 tracts (218,906 acres) leased. The leases are still active. Twenty leases have been relinquished. Ten wells have been drilled; all were plugged or abandoned. Two lease sales have been cancelled (Sale 45, 1977; Sale 89, May, 1986). Sale 101 is scheduled for September, 1989 (U.S. Department of the Interior, Minerals Management Service 1987).

The St. Matthew - Hall Outer Continental Shelf planning area has not had environmental studies done and is not on a current five-year leasing schedule. Undiscovered recoverable resources for oil and gas are expected to be negligible (U.S. Department of the Interior, Minerals Management Service 1987).

See Table 5 for a listing of Outer Continental Shelf planning areas and their estimated reserves and Table 6 for a summary of active leases near the refuge.

The geologic potential for hydrocarbons is rated as low or none for nearly all of the parcels within the Bering Sea Unit. Puffin Island and Chamisso Island are rated moderate for geological potential but low for economic potential due to the small size of the parcels, lack of appropriate infastructure, and lack of industry interest (Teseneer, Seidlitz, and Borkoski 1988).

Geothermal - Although geothermal resources have been identified on the Seward Peninsula none are known to occur on refuge lands.

Water Resources

Mainland areas in Norton Sound have some small streams and occasional ponds. St. Paul and St. George islands have a number of lakes but no streams. Water supply for the villages is from ground-water (Anderson 1976). There are several fresh and brackish water lakes on St. Matthew Island which have been formed by gravel bars built by wave action. Numerous small streams drain the valleys and empty into the lakes. Streams on St. Matthew Island are occasionally used by commercial fishing boats as a water source. Although a potential for dewatering problems exists, the refuge is not currently impacted.

BIOLOGICAL ENVIRONMENT

Vegetation

The vegetation of the islands of the Bering Sea Unit are classified as maritime tundra (Amundsen 1977). Vegetation descriptions of the major islands in this unit are listed below:

Pribilof Islands - The vegetation consists chiefly of rank grass and bog moss, interspersed with a multitude of flowers. There are no trees or bushes on the islands. The highest woody plant, a dwarf willow, hardly reaches 75 mm. (three inches) above the moss-bed in which it grows. Many of the side hills and flats are buried waist deep in a dense growth of rank rye grass and cow parsnip. Lupine averages nearly one meter (three feet) and is abundant in most parts of the islands, often growing with monkshood. Sphagnum moss is scarce on St. Paul, but common on the low bogs of St. George. Heather abounds on both islands, forming extensive beds but usually mixed with moss (Merriam 1892).

St. Matthew Island - The vegetation of St. Matthew Island is an arctic tundra type that is drier than that of the Pribilof Islands. All plants are low growing and only the annual growth of a few forbs and grasses exceeds one foot in height. Willows, the only shrubs present, are dwarf forms. The major plant communities are divided by groups and are described briefly below (Klein 1959):

Dry flats - Extensive flats, located northwest of Cape Upright and southwest of Big Lake, support a dry tundra vegetation consisting mainly of lichens, willows, and sedges.

Dry, low ridge tops and benches - Vegetation on these level, elevated areas is similar to that found on the low, dry flats. Willow decreases with altitude and is usually replaced by rose. The lichen and sedge communities are similar to the dry flats, but not as dense.

Moist, well-drained meadows - On these sites sedges predominate, ground cover is complete, and a wide variety of arctic-alpine forbs exist. Willows form dense mats, particularly when associated with snowflushes. Lichens are very scattered on such sites.

Wet, poorly-drained meadows - Bog meadows are common in some sections of the flats, in broad valleys, and low mountain passes where level ground is poorly drained. Sedges predominate in such sites and are grazed heavily by reindeer in the summer. The areas between the sedges are occupied by mosses, a few lichens, and higher plant forms.

Rock rubble fields and high ridge tops - Vegetation on high rubble fields and ridge tops is mainly restricted to crustose lichens. Soil formation is very limited, but soil pockets support lush growths of lichens where there is wind protection.

Stabilized beach ridges - Nearly pure stands of lyme grass are located immediately behind bands of gravel beaches. Crowberry grows almost exclusively between Big Lake on St. Paul Island and the sea. Flood plains, adjacent to several of the large lakes, support lush growth of grasses, some forbs, and willows.

Egg Island - Egg Island in St. Michael Bay has several plant communities, including beach fringe, grassy slope, crowberry tundra, willow shrub, and upland tundra (Byrd 1984).

Fishery Resources

The primary fish species occurring in the Bering Sea Unit are halibut, all species of Pacific salmon, walleye pollock, Pacific cod, saffron cod, capelin, sandlance, herring and yellowfin sole. Salmon (primarily sockeye) occur in Bristol Bay. Red king crab occur in commercial quantities in Norton Sound. Primary commercial finfish species include walleye pollock, pacific cod, yellowfin sole and herring. No significant fishery for capelin or sandlance occurs, but Nuka Point Fisheries has, in the past, requested permission to process 2,000 metric tons of capelin in Bristol Bay. A small subsistence fishery for capelin occurs in Norton Sound.

There is some indication that murre populations on St. Paul Island have been steadily declining since the mid-1970's.

Two islands in the Bering Sea unit support salmon populations. Hagemeister Island east of Cape Newenham has two chum salmon streams also utilized by anadromous Dolly Varden/Arctic char. A lake on St. Matthew Island has a unique population of land-locked chinook salmon (Ray Baxter pers. comm.). These fish are plankton feeders and mature at four years of age at a length of 225-265 millimeters. Dolly Varden/Arctic char use streams on St. Matthew Island as well.

Birds

Seabirds are the dominant nesting birds in the Bering Sea Unit in terms of numbers and biomass. Due to limited habitat diversity on the islands and coastal headlands of the unit, diversity and populations of other species of breeding birds are relatively low (e.g. only about 25 species at the Pribilofs and St. Matthew). In contrast, many species of migrant or vagrant birds stop on the islands in the Bering Sea (e.g. over 135 species at the Pribilofs and St. Matthew). Most of the birds leave the refuge in winter.

Only a portion of the Bering Sea Unit has been thoroughly surveyed for land birds, including St. Matthew Island and the Pribilofs. Seabirds have been surveyed one or more times throughout the unit.

Seabirds - Over 3.5 million seabirds of 14 species breed on the Bering Sea Unit (Appendix D). The largest concentrations are at three locations: the Pribilofs, Bluff, St. Matthew (hereafter including Hall and Pinnacle islands unless otherwise specified). Over half the total breeding seabirds are murres. The concentration at St. George Island in the Pribilofs, approximately 1 million seabirds, is the largest in Alaska (Sowls et al. 1978). The Pribilofs also host 90 percent of the world's breeding red-legged kittiwakes (Hickey and Craighead 1977). St. Matthew and the Pribilofs are three of only six major breeding concentrations of northern fulmars in Alaska (Sowls et al. 1978). These two locations also have substantial populations of black-legged kittiwakes and auklets. Nocturnal seabirds (e.g., storm-petrels, ancient murrelets) probably do not nest in the Bering Sea Unit and burrow-nesters, and surface-nesters (gulls and terns) are scarce. The presence of foxes on many of the sites accounts for the absence or scarcity of many of these species, and it has been suggested that lack of sufficiently long periods of darkness in summer limit nocturnal species at these latitudes.

Northern fulmar - Sowls and Slothower (1987) record observations of approximately two million breeding fulmars in Alaska. Nearly 30 percent of the state population occurs on the Bering Sea Unit.

Cormorants - Red-faced cormorants reach the northern edge of their breeding range in the Bering Sea at about the latitude of the Pribilofs. Pelagic cormorants are rare in the Pribilofs, but are the only cormorants that occur regularly further north in the Bering Sea (Sowls et al. 1978). Indications are that the number of red-faced cormorants may have declined from 1976 to 1984 in the Pribilofs (Troy and Baker 1985), and pelagic cormorant numbers at colonies in Norton Sound were lower in 1984 than in 1976 (Byrd 1984). Annual reproductive success in the unit is known to vary from almost total failure (Rodstrom 1984, Murphy 1984) to the average production of over two fledglings per nest (Byrd et al. 1985).

Gulls - Due to the presence of foxes on most of the potential nesting areas for these ground-nesting birds, gulls breed in numbers only where sizable fox-free offshore islets occur. In the Bering Sea Unit such a situation prevails only on St. Matthew, the lone site where over 1,000 gulls nest; most of these gulls are glaucous gulls. Most parts of the unit provide important habitat for non-breeding gulls; for example few gulls breed on the Pribilofs, but many non-breeding birds roost there.

Kittiwakes - Black-legged kittiwakes are widespread in Alaska, and the Bering Sea Unit contains only about 10 percent of the state total (Sowls et al. 1978). In contrast, red-legged kittiwakes are restricted to only six known breeding locations, four of which are on the refuge. Three of these, with approximately 90 percent of the total world's breeding population, are in the Pribilofs (Hunt et al. 1981). Recent studies in the Bering Sea Unit (Hunt et al. 1981b, Johnson and Baker 1985) demonstrate that annual reproductive success may vary drastically from nearly total failure to production of over one fledgling per nest for black-legged kittiwakes. In some years the food limitations are so severe that many adult birds die (Nysewander and Trapp 1983). Troy and Baker (1985) estimated that populations of both species of kittiwakes had declined in the Pribilofs from the mid-1970's to the early 1980's. The decline was most severe for red-legged kittiwakes (about 50 percent). Possible causes of changes in productivity are

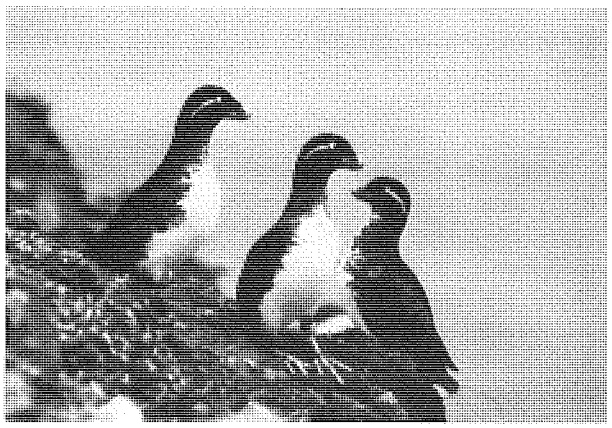
discussed in Chapter II, Overview, under "Kittiwakes".

Murres - Over 30 percent of Alaska's murres occur on the Bering Sea Unit. As indicated earlier, by far the largest colony of murres is found on St. George Island. Other large colonies are on Hall and St. Matthew islands, with over 200,000 birds each, and Bluff, Pinnacle, and St. Paul islands with more than 25,000 murres (Sowls et al. 1978). Most are thick-billed murres in the Pribilofs and St. Matthew, whereas a large proportion at Bluff are common murres.

Since the mid-1970's, murre populations have declined steadily at Bluff (Murphy et al. 1986), and there is some indication that similar declines have occurred in the Pribilofs, especially on St. Paul Island (Troy and Baker 1985).

Pigeon guillemot - Pigeon guillemot populations are particularly interesting at two locations in the Bering Sea Unit. Hall and St. Matthew islands host two of only nine colonies in Alaska with more than 1,000 birds, whereas the Pribilofs are the only island group in the Bering Sea where the species apparently does not breed. Little is known about annual variations in populations or reproductive success for this species, and no monitoring program is currently in effect on the unit.

Auklets - Three species of auklets breed on the unit: parakeet, least, and crested auklets. Parakeet auklets are the most widespread breeders in Alaska and also in the Bering Sea Unit, but they do not assemble in densities nearly as high as the other two species. According to Sowls et al. (1978), St. George Island has the largest concentration of parakeet auklets in Alaska, and the Pribilofs (including St. George) host over 20 percent of the recorded total for the state. Least and crested auklets occur, often together, in high concentrations on Bering Sea islands, but the largest nesting colonies are on islands outside the refuge (e.g. St. Lawrence and Little Diomede islands). Nevertheless, St. George and St. Matthew each have breeding populations of least auklets exceeding 150,000 birds and St. Matthew has over 100,000 crested auklets as well. The foxes that are naturally present on most islands in the unit rely heavily on seabirds for food in summer, particularly least auklets, near whose colonies are found relatively high densities of fox dens. The auklet species of the Bering Sea Unit are apparently able to coexist with foxes because they nest in talus, which protects the deeper nest crevices from fox attacks. Presumably, the foxes feed on birds that choose too shallow a crevice.



Parakeet auklets are one of several species of seabirds which only nest in the North Pacific.

Puffins - Tufted and horned puffins are relatively uncommon in the Bering Sea Unit. The only colony of tufted puffins with more than 5,000 birds is at St. George Island. Horned puffins are more abundant than tufted puffins on the unit, largely due to the colony at St. George which contains over 60 percent of the unit total (Sowls et al. 1978).

Waterfowl - A few northern pintails, common eiders, and oldsquaws nest on the unit, and green-winged teal have also been recorded, but nesting is very sparse because there is little dense cover to conceal the birds from foxes which occur naturally in most places. Most waterfowl in the Bering Sea Unit are migrants or vagrants.

Shorebirds - Like waterfowl, the shorebird fauna is poor in breeders (five to six species) and rich in migrants and vagrants (45 species if breeders are excluded). The only common breeding shorebird is the rock sandpiper. The form that breeds on Bering Sea islands is recognized as a distinct race (*Calidris ptilocnemis pribilofensis*). The Pribilofs are

uniquely important to migrant ruddy turnstones. Apparently most of the birds that breed in north and west Alaska, and probably those from eastern Siberia as well, stage at St. Paul and St. George in fall on their way to wintering grounds in the central Pacific (Thompson 1973). There are at least 20 species of migrant shorebirds which have a primary affinity for Asia. This phenomenon attracts many birdwatchers annually to the Pribilof Islands in search of rare species for their North American bird lists.

Passerines - As is the case for waterfowl and shorebirds, there are few breeding species of passerines (six species) on the central Bering Sea Islands (Pribilofs and St. Matthew), but numerous migrants (54 species), many of them Asiatic, have been recorded. The most common breeder is the Lapland longspur. Rosy finches and snow buntings are also common. St. Matthew hosts most of the world's breeding population of McKay's bunting, a species for which no quantitative population data are available. Besides the species breeding on St. Matthew and the Pribilofs, a few additional passerines breed on islands in Norton Sound and at mainland locations. This is due to the presence of dense shrubs such as willow and alder, a habitat not found in the rest of the unit. These birds include several species of thrushes, warblers, sparrows, and redpolls (Byrd 1984) typical of the Seward Peninsula.

Raptors - Eleven species of birds of prey (eagles, hawks, owls) have been recorded on the unit. None are known to nest south of Norton Sound, with the possible exception of the snowy owl at St. Matthew. In Norton Sound, a few gyrfalcons and peregrine falcons probably nest on refuge islands (e.g. Besbora, Sledge) and on mainland areas (e.g. Bluff).

Mammals

Few species of native terrestrial mammals are found on the Bering Sea Unit, because most of the refuge sites are islands or coastal headlands. Terrestrial mammals now found on the islands either remained after water covered the land bridge (e.g. indigenous rodents) or crossed the ice in winter (e.g. foxes). Non-native mammals have also been introduced by man on some of the refuge areas: reindeer at several sites, house cats in the Pribilofs, and arctic foxes in the Pribilofs, although foxes are also thought to have reached the islands naturally over sea ice.

Marine mammals are common in the Bering Sea Unit; in fact, the Bering Sea is perhaps the most important marine mammal habitat in the world in terms of numbers of species and individuals. A number of species of whales, some of them endangered, occur near the refuge. Other nearshore, but not onshore, visitors to the vicinity include several species of seals which come south with the ice pack in winter. Sea otters are common in the waters north of Unimak Island on the north-side of the Alaska Peninsula. Although the largest numbers occur around Bechevin Bay and Izembek Lagoon, the population has expanded to Port Moller, with seals occasionally seen near Ugashik and Egegik bays. Hundreds of otters have been seen in the water around Amak Island. Sea otters also haul out on refuge areas. Marine mammals that regularly haul out on refuge areas include Pacific walrus, harbor and spotted seals, northern fur seals, and Steller sea lions.

Foxes - Arctic foxes occur naturally on the Pribilof Islands and St. Matthew, but no data are available on populations. A single red fox was noticed on Egg Island in southern Norton Sound (Byrd 1984), and this species may occur on other islands near the mainland in Norton Sound. Both species are present on mainland portions of the unit. In the Pribilofs and at St. Matthew observations indicate foxes rely heavily on seabirds for food in summer. Relatively high densities of fox dens are found near least auklet colonies (on St. George and St. Matthew islands).

Voles and shrews - Several species of microtenes are found on Bering Sea islands, and apparently due to long isolation, unique forms exist on different islands. In the Pribilofs there are two unique animals: the Pribilof shrew and the St. George lemming. The shrew is found only on St. Paul, and it has been listed as a candidate species under the Endangered Species Act (M. Amaral pers. comm. 1987). Both St. Matthew and Hall islands have a unique vole, each bearing the name of its host island. Of all the voles and lemmings, only the St. Matthew

vole has been studied (Rausch and Rausch 1968). The refuge staff is studying habitats used by the Pribilof shrew (Byrd and Mendenhall 1986).

Reindeer - Reindeer have been established on most of the larger islands in the unit (Hagemeister, St. George, St. Paul, St. Matthew) having been introduced for various reasons (e.g. food for Coast Guard crews during World War II, commercial enterprise, etc.). Herds on the Seward Peninsula probably visit mainland areas of the Bering Sea Unit in Norton Sound regularly. Klein (1968) documented the buildup and crash of the reindeer herd on St. Matthew Island. Reindeer no longer occur on St. Matthew Island. There is concern that similar patterns of habitat damage due to high populations with subsequent population crashes might occur on other islands in the unit if reindeer are not kept in check by periodic harvests. Although little management has been practiced in the Pribilofs, enough harvest takes place to keep the herd in check at St. Paul (about 450 animals in fall 1985). The herd at St. George has fewer than 50 animals.

On Hagemeister Island an individual raises reindeer for commercial purposes, but overgrazing has caused harm to vegetation. The U.S. Fish and Wildlife Service and the Soil Conservation Service are working to determine acceptable herd size.

Walrus - Most walrus remain on or near sea ice, but there are a few summer haul out areas south of the ice used by bulls only. One of these is on St. Matthew Island. At least two haul out sites are known on St. Matthew Island and one on Hall Island. At times dozens of walrus use these sites, but their presence is erratic and numbers fluctuate significantly. Summer peak counts at Hall Island, the most frequently used site, have exceeded 150 animals. There is apparently a buildup in fall, and the site at Hall Island may be used by several thousand animals.

Hagemeister Island is used intermittently during early summer and late fall by up to 200 walrus for short periods. Harassment by humans keeps use to a minimum. In fact, the majority of terrestrial haulouts in the Bering Sea have been abandoned as harassment levels have increased over time.

Northern sea lion - The only known breeding location for this species in the Bering Sea Unit is at Walrus Island in the Pribilofs. A July 1984 count conducted from a vessel offshore was 335 animals; this estimate represents a conservative minimum. Haul out sites for non-breeding sea lions are known elsewhere in the Pribilofs and at St. Matthew.

Other marine mammals - Northern fur seals, harbor seals, and spotted seals haul out on sites in the Bering Sea Unit. The Pribilof Islands host the largest concentrations of fur seals in the world. The breeding rookeries are under the jurisdiction of the National Marine Fisheries Service and are not a part of the refuge, but numerous non-breeding animals occupy refuge beaches as well. Harbor seals also occur in the Pribilofs, and they are common on islands off the Yukon Delta (e.g. Sand Islands) and in Norton Sound (e.g. Besboro Island). Spotted seals use the waters near St. Matthew and periodically haul out on offshore rocks and beaches.

HUMAN ENVIRONMENT

Cultural Resources

The Bering Sea Unit was occupied primarily by Yupik-speaking Eskimos at the time of first European contact. St. Lawrence Island, however, was occupied by Eskimos speaking a Siberian dialect. Like their cousins to the north, the Eskimos of the Bering Sea depended heavily on sea mammals for food and raw materials. Whaling, however, was less significant and in some cases absent. Parts of this area also have exceptionally rich fishery resources which lessened the importance of sea mammals in general. The people occupied permanent winter villages with semisubterranean houses. Lacking the strong whaling emphasis, the social organization also lacked the strong authority figures of whaling captains.

Captain James Cook was the first European to explore extensively in the Bering Sea, in the late 1770's, although it is possible that some Russian traders entered the area slightly earlier. Extensive Russian fur trade in the area began by at least the second decade of the nineteenth century (VanStone 1984). The fur trade, combined with missionary activity,

further served to establish fixed villages. Reindeer herding, introduced in some areas in the 1890's, had no influence on lands currently managed as part of the refuge, but definitely impacted the lives of people living in the area.

Most of the archaeological work that has been done in the Bering Sea has not occurred on refuge lands. However, substantial sites on small islands off of St. Lawrence Island, on Cape Denbigh, and elsewhere, have been cornerstones in the interpretation of Alaskan prehistory. Recent work by Service volunteers on Hagemeister Island (Bailey n.d.) is only a first step in identifying and interpreting the cultural resources on the lands of this Unit.

Subsistence Uses

The communities in and around the Bering Sea Unit are rural and are heavily dependent on subsistence activities. These activities include fishing, hunting, trapping, egging (collecting bird eggs), and gathering wood, berries, and other plant materials.

With the rapid expansion of regional level governments and Native corporations in the past decade, local residents have been increasingly drawn a cash economy. However, local residents remain strongly tied to a traditional Native subsistence lifestyle. Subsistence continues to provide food, social relationships, and a link to a traditional lifestyle.

The greater participation in a cash economy has caused some changes in subsistence lifestyles. Increased use of mechanized equipment has caused a shift in the goals of subsistence activities. For example, there is not as pressing a need for meat for dog food. The winter hunt has shifted toward land resources (such as caribou) as snow machines do not perform as well on ice. More game can be harvested in a shorter period of time, and at greater distances from the community (Alaska Consultants et al. 1985). Three-wheelers are used extensively for subsistence as well. They are particularly important for marine mammal hunting in the spring and are used extensively in the summer to check fishing nets as well. Larger islands are used for berrypicking and hunting. Refuge bird colonies are often used for subsistence egging.

Most refuge lands in Norton Sound have been selected and will be conveyed to Native ownership; these lands are all important subsistence use areas.

Recreational Uses

Refuge lands in the Bering Sea Unit are well known for their spectacular scenery and abundant bird (especially seabird) populations. Although the tourism and wildlife observation opportunities have been developed to only modest levels, non-resident travel is growing by local standards. The Pribilof Islands are the best known area in the refuge, although well-informed tourists are aware of scenic opportunities along the cliffs near Topkok, Bluff, and Cape Darby.

Recreational use of Hagemeister Island is primarily beachcombing, camping, and picniking by residents of Dillingham. Small aircraft are used to fly to the island over a six month period from May through October. Activities are centered on the beaches. Approximately two groups of two people each use the island each week. While most of this use is for day trips, approximately 20 percent camp overnight.

Recreational hunting and fishing and passive sightseeing are the dominant recreational activities in this unit. These uses may be overshadowed by organized tourism and wildlife observation in the Pribilofs. Tourism on the Pribilof Islands is discussed under the St. Paul and St. George sections of this chapter.

Economic Uses

Commercial recreation tours are active on St. Paul and St. George islands. Occasionally cruise ships visit St. Matthew Island (less than one per year).

Hagemeister Island is being grazed by up to 1000 reindeer. The range is overgrazed and plans are underway to reduce the number of animals to a level which will protect the vegetation.

Military Uses

There are no military facilities on or adjacent to refuge lands in the Bering Sea Unit.

Communities

Most of the communities in this area are small and isolated. The residents are primarily Native Alaskans of the Inupiat Eskimo, Yupik Eskimo, or Aleut peoples. Much social change has occurred with the infusion of state revenues into the communities. Also, the Alaska Native Claims Settlement Act created land-holding village and regional corporations.

Table 15. Communities near the Bering Sea Unit.

Community	1986 Population
Nome	3,876
Golovin	135
St. Michael	291
Stebbins	384
Scammon Bay	303
Togiak	623
St. Paul	595
St. George	195
Aleknagik	232
Clarks Point	80

There are ten communities in the vicinity of Bering Sea Unit lands. These communities and their populations are listed in Table 15. Residents of White Mountain, Shaktoolik, and Unalakleet also use lands that were once included in the refuge but have now been conveyed to village or regional Native corporations. Although each community is individual in its character, they share many attributes. Three communities, Nome, St. Paul, and St. George are discussed as examples of communities in the area.

Nome

Nome is located on the southern edge of the Seward Peninsula, approximately 535 miles northwest of Anchorage. It was settled in 1898 after the discovery of gold on the beaches in the area. Since that time Nome has served as a regional trade and service center.

Population trends and composition - Following the discovery of gold, the population increased rapidly to 3,000 people in 1899 and 12,488 in 1900. The decline in gold production resulted in a decrease in the population. In 1920 the population was 852. Since that time Nome's population has slowly increased. In 1986, the population had risen to 3,876. Fifty-nine percent of the population is Native (Institue for Social and Economic Research 1984). The projected increase in population during the next ten years is presented in Table 15A.

Sociocultural systems - Although a small community by urban standards, Nome has historically served as a population center for the Bering - Norton region and as a cultural crossroads for Native and non-Native, Yup'ik and Inupiat. As such, it came under the way of the larger Euro-American sociocultural system much earlier than the smaller communities in the region. Nome functions as a regional service center. In this capacity, there is considerable interaction between local governments, Native corporation officials, and other service organizations and residents of villages throughout the region (Ellanna 1980). It serves as a center for retail trade, government administration, and provision of services for the entire region.

Subsistence activities are widely practiced throughout the community, especially by the Native and older non-Native segments of the population. Such activities represent a way of maintaining social relations with extended kin groups, supplementing their diet, especially during times of economic hardship, and maintaining their traditional ethnic identity (Ellanna 1980).

Table 15A. Nome area population and employment.

	1990	1995	2000
Population	3,810	3,905	4,005
Employment	1,448	1,484	1,552

* the 1980 population according to U.S. Census figures was 2,301.

(Policy Analysts, Ltd. 1980)

Traditional subsistence activities are likely to become more important culturally as Native residents feel increasing pressure from non-Native cultures.

Community infrastructure - Nome has a fairly well developed community infrastructure because of its population size, its status as a first class city, and its location as a regional center for Native profit and nonprofit corporations. The city is governed by a seven member council with one member serving as mayor. In 1982, the city annexed 10,700 acres of surrounding land and waters and has a total area of 21 square miles. The city provides the following services: water, electricity, sewage, solid waste disposal, streets, police and fire protection, and education. A medium-draft port operated by the city was completed for the 1987 shipping season. City revenues rose by 169 percent between 1981 and 1982 while expenditures rose by 236 percent, due largely to an infusion of state funds. Local property and sales taxes accounted for only 10 percent of city revenues (John Muir Institute 1982).

The State of Alaska holds and maintains a road right-of-way from Nome to Council. A portion of this right-of-way crosses refuge lands on the Safety Sound Barrier Island.

Economy - Due to its role as a regional center, the provision of services plays a large role in Nome's economy. This includes health and social services, legal services, and governmental agencies. The three largest employers in Nome from 1980 through 1986 were the Norton Sound Health Corporation, the Nome City School District, and the State Department of Transportation and Public Facilities.

Retail trade, oil exploration, and mining are prominent factors affecting the economy. The retail trade sector provides goods throughout the region. The Nome airport served as an air support base for the oil rigs conducting exploratory work in offshore areas from 1984 to 1986. Since 1980, mining activity has increased in the Nome area. The Alaska Gold Company has a year-round operation that employs 80 to 150 people for 8 months of the year and 40 workers through the rest of the year. Inspiration Mines, Inc. was expected to employ 90 workers from May through October in 1986.

Sitnasuak Native Corporation, which is based in Nome, is the single largest organization in the private sector. It has interests in retail sales, property leasing and management, support services, and construction. Corporation holdings include a hardware store; recreational vehicle sales, parts, and service; a fuel company; a service station; a car rental service; and a Ford dealership.

Tourism is an important component of the Nome economy. Each day during the months of June, July, and August, 40 to 80 tourists, principally from Anchorage, fly to Nome for an overnight visit. It is estimated that 10,000 tourists visited Nome in 1980 and that the number has been increasing approximately 8 to 10 percent each year. In addition, an estimated 1,000 people visit Nome in the month of March for the annual Iditarod Sled Dog Race that terminates there. These visitors rarely travel outside of Nome.

Commercial fishing is a relatively minor component of the economy. Few commercial fishermen fish the Nome subdistrict of the Norton Sound. Fish that are caught in the area are flown to processors elsewhere in the state instead of being processed in Nome.

The total number of jobs in the community for the period 1980-1986 grew from 1,169 to 1,452, a 24 percent increase. The government and service sectors employed the greatest number of people followed by trade, mining, and transportation.

According to a survey conducted by the Norton Sound Health Corporation in 1984, 12 percent of Nome's residents had an income between $12,000 and $24,999, and 55 percent had incomes of $25,000 or greater (22 percent did not respond). The same survey indicated that three percent of the community's economic support came from food stamps and other entitlement programs and nine percent from subsistence activities. The cost of living in Nome is estimated to be 33 percent greater than that of Anchorage and 47 percent greater than Seattle.

Subsistence - A significant portion of the Nome population maintains a subsistence food diet supplemented by food available on the retail market. Even the non-Native population

uses the locally available food sources. These foods include salmon, moose, and sea mammals.

Recreational use - Access to the offshore areas of the refuge from Nome is by boat and amphibious airplane only. Nome's airport is capable of accommodating jet aircraft enabling easy access to the region.

The most famous recreational activity associated with Nome is the Iditarod Sled Dog Race, for which Nome is the trail terminus. This activity draws very large crowds to Nome which exceed the capacity of all commercial room and catering services. The Iditarod Trail crosses refuge lands at Bluff and as it traverses the barrier island at Safety Sound on the Nome-Council Road.

Pribilof Island Communities - St. Paul and St. George

Population trends and composition - The populations of St. Paul and St. George have grown slightly during the past five years (see Table 16). The Alaska Department of Communities and Regional Affairs listed the 1985 population of St. Paul as 595 and St. George as 195.

The continued population growth of these communities is tied to the prospects of harbor development in either community and the development of a bottomfish industry to replace the commercial fur seal harvest. Such development has served as the primary impetus for immigration of Natives from other parts of the Aleutians and non-Natives. In the last two decades, pressure on St. George residents to consolidate fur seal operations on St. Paul Island resulted in the migration of many residents from St. George to St. Paul. The populations of both communities are mostly Aleut. The end of the commercial fur seal harvest has eliminated the motivation of St. George residents to migrate to St. Paul. The populations of both communities are expected to stabilize during the next ten years and perhaps show signs of a slight decline due to increasing outmigration in search of economic opportunities.

Sociocultural systems - Since the forced relocation of Aleuts from the Aleutian Islands by the Russians in the late eighteenth century, the sociocultural systems of the Pribilof Islands have revolved around the commercial harvest of fur seals. Until 1985, the seal hunt was administered as a commercial operation by the U.S. Government: 1985 was the first year of a strictly subsistence harvest. With the end of the commercial seal harvest, the way of life among local residents is undergoing a profound change. Both communities are attempting a transition from an economy dominated by the federal government, to a diversified economy supported by fisheries, marine and oil exploration activities, and tourism (Braund et al. 1985). As economic activities become more diversified, the way of life of local residents also will diversify.

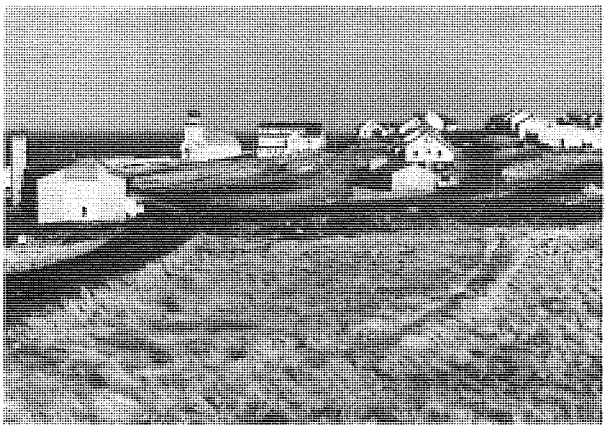
Community infrastructure - St. Paul was incorporated as a second class city in 1971, while St. George was incorporated as a second-class city in September 1983. Among their responsibilities are fuel delivery, power and electrical maintenance, lightering and longshoring, water and sewer services, road and airport maintenance, and garage and machine shop maintenance (Braund et. al 1985). The IRA Councils were both chartered in 1951 and each is governed by a seven person board. Among their key responsibilities are Indian Claims Commission settlement disbursements and investments, Bureau of Indian Affairs housing administration, and shared oversight

Table 16. Population characteristics of Pribilof Island communities.

	Population			Annual Growth Rate	Percent
	1970	1980	1985	1970-1980	Native
St. George	156	158	179	0.1	95
St. Paul	455	551	595	2.1	81.7

(Braund et al. 1985)

Economy - The economy of the two Pribilof Island communities has historically centered around fur sealing operations managed by the National Marine Fisheries Service. The local residents harvested fur seals and processed the pelts to be shipped elsewhere for final tanning



The economic future of St. George is tied to harbor development and the bottomfish industry replacing the commercial fur seal harvest.

and processing. The fur seal harvesters and processors were paid hourly wages by the federal government which also provided housing and other public services. This long-term relationship came to an end in 1983 when the National Marine Fisheries Service terminated its activities on the islands. The end of federal support for the fur seal harvest caused a sudden change in the economy of both communities. Fur seal workers were not trained for other economic activities, which meant that retraining and reorientation were immediately necessary. In addition, the responsibility for public services was transferred to community organizations (Braund et al. 1985).

Data on income and employment in the two Pribilof Island communities for 1980 to 1984 are provided in Table 17. During this period average annual employment increased 34 percent while payrolls increased 53 percent.

Income opportunities are relatively unstable and are expected to be increasingly so for the next ten years. Most employers have reduced wages from inflated federal wage levels in order to keep relatively high numbers of local residents employed. In addition, employers rotate residents among jobs in a manner that distributes income throughout the community (Braund et al. 1985). These policies are expected to remain in force for the next ten years (Petterson pers. comm. 1985).Approximately 63 residents of St. George and 296 residents of St. Paul are employed, an employment rate of 57 and 71 percent, respectively. Although below the statewide rate of 73 percent, these rates are significantly higher than the 36 percent rate for the southwest region of Alaska (Alaska Department of Labor 1985). City governments, school districts, local Native corporations, construction and oil exploration related activities represent the largest employers in both communities. Tourism is expected to remain at a fairly steady level in St. Paul.

Commercial fishing activities by the residents of St. Paul and St. George began in 1982. The focus of the fishery to date has been on halibut because of the experience of local people in jigging for halibut for subsistence use and the low capital investment required for fishing in comparison to groundfish trawling (Braund et. al 1985). There are approximately 30 fishermen in St. George, including crew members. Their fishing fleet is composed of 13 or 14 skiffs. The fishing fleet in St. Paul provides employment for 29 residents. Although smaller in total number of vessels, (seven vessels), the St. Paul fleet is more modern and better-equipped. Both fleets fish in the International Pacific Halibut Commission (IPHC) regulatory area 4C. The current harvest quota for this area is 600,000 pounds for all fishermen. Fishermen from the two communities

Table 17. Pribilof Islands regional economy.

	Employment	Monthly Wages	Payroll	# Firms
1980	284	$1,547	$5,273,510	17
1981	304	$1,506	$5,494,316	16
1982	291	$1,043	$5,909,881	15
1983	311	$1,821	$6,755,283	15
1984	380	$1,765	$8,042,168	17

(Braund et al. 1985)

are thus forced to compete with each other as well as larger and better equipped vessels from elsewhere (Braund et al 1985). The value of fish landed in St. Paul and St. George in 1984 was $100,000 and $99,000, respectively (Braund et al. 1985). Fish processing in St. Paul is restricted to the operation of a production line for halibut in a plant operated by the local IRA Council.

Subsistence - On both St. Paul and St. George, the entire Aleut population makes use of a variety of subsistence resources. A chart depicting the seasonal round of subsistence activities and resources for the residents of the Pribilof Islands is provided in Table 18. The most important subsistence item and dietary staple of local Aleuts since their arrival to the islands in the late 1700s has been the meat of the fur seal. But halibut is an important subsistence resource for local residents as well as birds, bird eggs, and sea lions. Reindeer are present on both islands but only the St. Paul herd is harvested.

Recreation - The Pribilof Islands are reknown for their excellant bird and marine mammal viewing opportunities. At this time, approximately 1,000 visitors per year visit St. Paul Island (7,000 visitor use days) and 60 tourists per year visit St. George Island (420 visitor use days). Local residents enjoy picnicing on refuge lands near Antones Lake. Some recreational fishing may occur on the islands, but hunting is generally considered a subsistence activity.

WILDERNESS REVIEW

This evaluation will determine what lands, if any, in the Bering Sea Unit meet the criteria necessary for wilderness designation. Those criteria are explained in the wilderness review section of the Overview.

Safety Sound Barrier Island, Topkok Head, Cape Darby, Whale Island, St. Paul Island, St. George Island, and Cape Stephens will not be evaluated for wilderness designation, because they do not meet the minimum size criterion of 5,000 acres or a size manageable as wilderness. These areas either include private land or are adjacent to private land. Bluff will not be evaluated for wilderness designation, because it does not meet the naturalness criterion. A web of 3-wheeler trails and inhabited cabins mar the naturalness of this area. Beulah Island does not meet the solitude or primitive recreation criterion, because it is only one mile from St. Michael, is very small, and is frequently used for subsistence activities. Sledge Island, Besboro Island, and Egg Island have been selected. Although they meet the wilderness criteria, they cannot be proposed for wilderness at this time, because their eventual ownership is uncertain. See Table 7 for a complete listing of selected lands in this unit which are suitable for wilderness but are not being proposed. The St. Matthew Island group is already designated wilderness.

Sand Islands - The Sand Islands including Krekatok and Neragon islands are a group of low sandy barrier islands at the mouth of Scammon Bay. There is little vegetation as parts of the islands are frequently submerged. These islands are important for migrating shorebirds and provide nesting habitat for arctic terns, mew gulls, and glaucous gulls. Harbor seals haul out on the islands.

1. Size - The size of the islands changes with storm tides but is thought to be about 3,870 acres.
2. Land ownership - The islands are in federal ownership and have not been selected.
3. Natural integrity - Marine mammal hunting and other subsistence activities which have occurred on the islands have not affected the ecosystems.
4. Apparent naturalness - The islands appear natural.
5. Outstanding opportunities for solitude - These islands are located in a remote part of western Alaska and receive very little use. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Camping, bird watching, and photography can occur here but would not be considered outstanding.
7. Special or unique features - There are no known special features.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Not applicable.

Table 18. Subsistence activities in the Pribilof Islands.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Fur seals						---						
Sea lions	---	---	---	---	- -				- - -	---	---	---
Hair seals	- - -	- - -	- - -	- - -					- - -	- - -	- - -	- - -
Halibut				-	---	---	-	-	-	-	-	-
Cod 1					-	---	-	-	-	-	-	-
Murres			-	---	-							
Murre eggs						-	---	-				
Kittiwakes				-	---	-	-	-	-	-	-	-
Lake ducks			-	---	-				-	---	-	-
Sea ducks	---	---	---	---	- -						-	---
Cormorants[1]	---	---	---	---	- -						-	--
Least auklets				-	---	-						
Least auklet eggs[2]						-	--	-				
Reindeer[2]	- - -								-	-----	-	- - -
Sea urchins	---							-	---	-		
Wild celery						----	-	-				
Berries								-	---	-	-	

--- primary procurement period
- - secondary procurement period
[1] Primarily in St. George
[2] Primarily in St. Paul

(Veltre and Veltre 1981)

Conclusion - Although the islands meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation, they are not adjacent to existing wilderness and do not meet the Service's criterion of outstanding resource values.

Kikegtek, Pingurbek, and Kwigluk islands - This group of narrow sandy islands are located in shallow seas just west of Kuskokwim Bay. Common eiders, glaucous gulls, and arctic terns nest there.

1. Size - The size of these islands varies with storm tides but has been estimated at 1,150 acres.
2. Land ownership - They are in federal ownership and have not been selected.
3. Natural integrity - Nothing has affected the integrity of the islands' ecosystems.
4. Apparent naturalness - The islands appear natural. There are no known human improvements.
5. Outstanding opportunities for solitude - Few people ever visit these islands which are in a very remote part of western Alaska. The exception to this is during the Cape Avinof commercial herring fishery opening. For 10 to 20 days from mid-May to mid-June herring is by harvested by gill net. This activity could diminish opportunities for solitude on a temporary basis. In general, solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Camping and bird watching are available here but would not be considered to be outstanding. The islands offer little variety in terrain, species, or possible activities.
7. Special or unique features - There are no known special features.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - Although the islands meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation, they are not adjacent to an existing wilderness and do not meet the Service's criterion of outstanding resource values.

Hagemeister Island - This large mountainous island, with peaks to 1,600 feet, is located in Bristol Bay just south of Cape Newenham. Unique features include hot springs and a sand spit projecting seven miles into the sea. Terrestrial animals include arctic foxes, red foxes, and a herd of about 700 reindeer grazed under permit. Seven seabird colonies totaling about 31,000 birds are located on cliffs around the island. The principle species is the black-legged kittiwake. Other species are common murres, cormorants, glaucous-winged gulls, pigeon guillemots, parakeet auklets, horned puffins, and tufted puffins. Walrus and harbor seals haul out on the island.

1. Size - The island is about 60,000 acres.
2. Land ownership - The island is in federal ownership and has not been selected.
3. Natural integrity - A range survey by the Soil Conservation Service in 1987 found that grazing by introduced reindeer had caused severe lichen depletion.
4. Apparent naturalness - Two sets of small cabins are located on the island. Most visitors would not find them obtrusive. The cabins cannot be seen for more than a hundred yards and do not affect the naturalness of the remainder of the island.
5. Outstanding opportunities for solitude - This island is large and has excellent topographic screening. Visitors would only be aware of other people if they were on the same beach. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Camping, hiking, bird watching, nature study, and photography would all be enjoyable on this island. Recreational opportunities are outstanding due to the diversity of activities and environments.
7. Special or unique features - The sand spit and the hot springs are unique recreational features. Walrus are also a special value.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - Although the island meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation, it is not adjacent to an existing wilderness and does not meet the Service's criterion of outstanding resource values.

Walrus and Otter islands - These two small islands are located in the biologically rich Pribilof Islands less than 10 miles from St. Paul Island. Walrus is steep and flat-topped with elevations to 300 feet. A sea lion rookery

with 330 animals is located on the island. The murre colony on Walrus Island has declined precipitously from a solid mass of birds shown in photographs from the 1950's to 400 birds recently. Otter Island has seabird cliffs on the south and west side and grassy habitat and a small lake on top. Otter Island is one of only five sites in the state where red-legged kittiwakes nest. Fur seals and some sea lions haul out on Otter Island. In 1984, Service personnel observed 240 fur seals hauled out on the island. Fur seal pupping may occur on Otter Island. Black-legged kittiwakes, cormorants, and murres nest on both islands.

1. Size - The size of the islands is 182 acres.
2. Land ownership - The islands are in federal ownership and have not been selected.
3. Natural integrity - Marine mammal hunting and egging have occurred on the islands but are not known to have affected the ecosystems. The drastic decline in murres on Walrus Island is believed to be the result of the expansion of the sea lion rookery.
4. Apparent naturalness - The islands appear natural.
5. Outstanding opportunities for solitude - These islands are located in a remote part of western Alaska and receive very little use. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Bird watching, marine mammal study, and photography opportunities are outstanding. However, landing on the islands is difficult.
7. Special or unique features - The red-legged kittiwakes, fur seal haul out and sea lion rookery are special features. Sea lions are declining drastically throughout the Bering Sea.
8. Outstanding resource values - The sea lion rookery is an outstanding resource value.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - The islands meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation, and also meet the Service's criterion of outstanding resource values. They are not adjacent to existing wilderness.

ALEUTIAN ISLANDS UNIT

PHYSICAL ENVIRONMENT

Geography

The Aleutian Islands Unit comprises about 3.9 million acres in southwestern Alaska and extends over 1,100 miles from Unimak Island west to Attu Island (Figures 54 A-C). The chain of islands is 20-60 miles wide with a maximum elevation of 9,373 feet above sea level. Izembek National Wildlife Refuge borders the east end of the unit.

Bounded by the Pacific Ocean to the south and the Bering Sea to the north, the unit includes over 200 mostly treeless named islands, islets and rocks. The Aleutian Trench, 50-100 miles wide and over 25,000 feet deep, borders the Pacific side of the unit. The Bering Sea, shallow at the east end of the Aleutian Chain, is deep at the west end of the unit. These surrounding oceans affect the climate and weather, and provide habitat and migrational pathways for fish, birds, and mammals (Morgan et. al).

Some islands are wave-cut platforms, less than 600 feet above sea level, bordered by low sea cliffs. Other islands are intensely glaciated mountainous islands, 600-3,000 feet above sea level, indented with fjords and bordered by cliffs as high as 2,000 feet. Broad, level, intertidal platforms border some islands (Wahrhaftig 1965).

The Aleutian Islands Unit is divided into seven island groups. From west to east are the: Near Islands, Rat Islands, Delarof Islands, Andreanof Islands, Islands of the Four Mountains, Fox Islands, and Krenitzen Islands. Unimak Island is also presently part of the unit but is not considered part of the Aleutian Islands.

Most of the unit is accessible by boat but on most islands access can be difficult due to the rocky, rugged shoreline. Amphibious planes can provide access in some areas.

See Table 36 in the management alternatives chapter for a complete listing of lands located within the unit.

The Aleutian Islands, including the Islands of the Four Mountains, pictured here, are actually crests of an arc of submarine volcanos.

Land Status

The land status of the Aleutian Islands Unit changes constantly as selected lands are conveyed, exchanged, or relinquished. Table 19 summarizes land status within the unit as of 11/1/87. Figures 56 A-M show the arrangement of ownership.

Of the approximately 3.9 million acres within the congressional refuge unit boundary, about 62 percent has not been selected and will remain in

Table 19. Land status within the Aleutian Islands Unit as of 11/1/87.

Ownership	Acres	% of Unit
Nonselected	2,395,768	62%
Selected (village, regional, state)	902,000	23%
Conveyed	590,000	15%
Native Allotment	2,000	1%
Total	3,889,768	

(U.S. Fish and Wildlife Service 1987)

federal ownership. The remaining 38 percent has been selected or conveyed. Overselections are extensive throughout the refuge and much of the selected land will also remain in federal ownership. Approximately 68 percent or 2.3 million acres of the Aleutian Islands Unit is currently congressionally designated wilderness; this includes Unimak Island which has 910,000 acres existing wilderness. Unimak Island is proposed for transfer to Izembek National Wildlife Refuge as discussed in the common management directions section. United States military installations are located on Attu, Shemya, Amchitka, and Adak islands.

Climate

The Aleutian Islands have a maritime climate which is characterized by persistantly overcast skies, frequent, often violent, cyclonic storms, and high winds. Weather can be very local, with conditions of fog, low ceilings, precipitation, and clear weather all encountered in a short distance. Year-round temperatures are cold but not normally severe, with a mean annual temperature of 40°F (See Table 20). Strong winds, sometimes approaching 100 m.p.h., can induce very cold chill factors.

The summer months are affected by the Pacific high pressure system which is located south of the Aleutian Chain. During these months air has a cooling effect on ocean surfaces and results in the formation of widespread fog and low stratus clouds. Over 50 inches of precipitation occurs in most areas during this period but storm frequency is higher during the winter season.

During the winter months air reaching the Aleutian Chain normally flows from the Siberian high pressure system. After flowing across the colder areas to the north, the air reaches slightly warmer open water areas in the vicinity of the chain, causing frequent, severe storms. Winter storms are characterized by gusty winds, rain and snow, or rain mixed with snow. Precipitation over 70 inches is common. Winter lasts six to nine months and frost can be expected every month except possibly July and August.

Table 20. Aleutian annual mean temperatures.

Recording Station	Maximum Mean (F)	Minimum Mean (F)	Mean Temp. (F)
Cold Bay	42.6	37.9	38
Dutch Harbor	44.6	36.2	41
Adak	44.8	36.5	41
Amchitka	42.0	36.0	39
Shemya	41.1	35.7	39
Attu	42.5	35.6	39

(Sekora 1973)

Geology

The geology of most of the Aleutian Islands has been investigated only at a reconnaisance level because of remoteness, inaccessibility, extreme climatic conditions, limited resource potential, and low economic potential. The exception to this is Amchitka and adjacent islands where detailed geological work related to the Atomic Energy Commission's 1966-1975 activities were accomplished.

The Aleutian Island Unit is composed almost entirely of Tertiary and Quaternary volcanic and volcaniclastic rocks (U.S. Department of the Interior, Bureau of Land Management 1988).

Many geologic forces are eroding and uplifting the landscape of the Aleutian Islands Unit. Water, ice, and wind erode the landscape. Volcanic and seismic activities in the unit indicate that mountain-building (deformation and volcanism) results from the Pacific Ocean plate descending northwest under the platform along the Aleutian Trench. This trench parallels the Aleutian Chain off the south shore. The subduction or movement of one crustal plate beneath another results in earthquake activity, making this unit one of the most seismically active areas in the world (Coats 1950).

Figure 54 A. Location of the Aleutian Islands Unit.

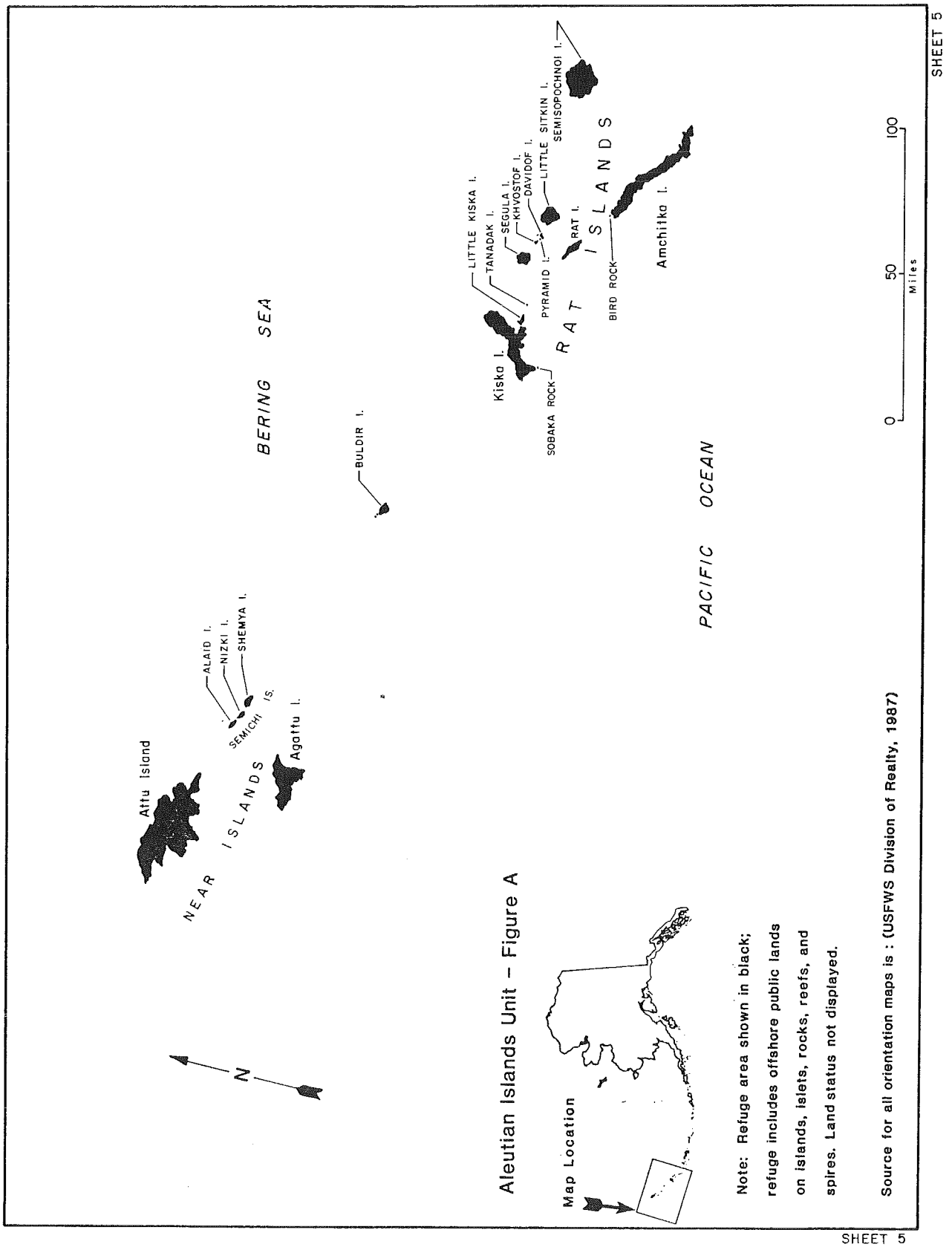


Figure 54 B. Location of the Aleutian Islands Unit.

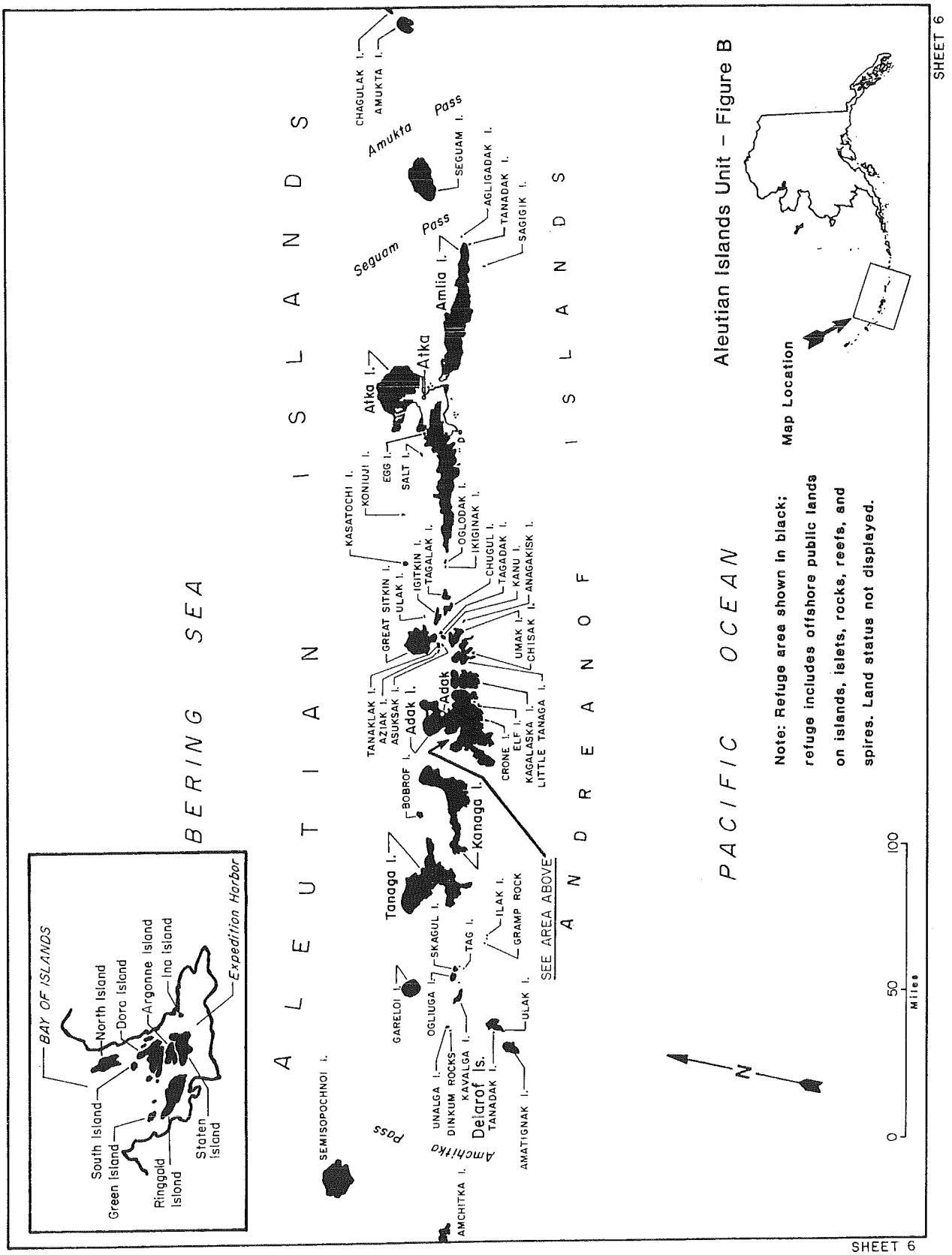


Figure 54 C. Location of the Aleutian Islands Unit.

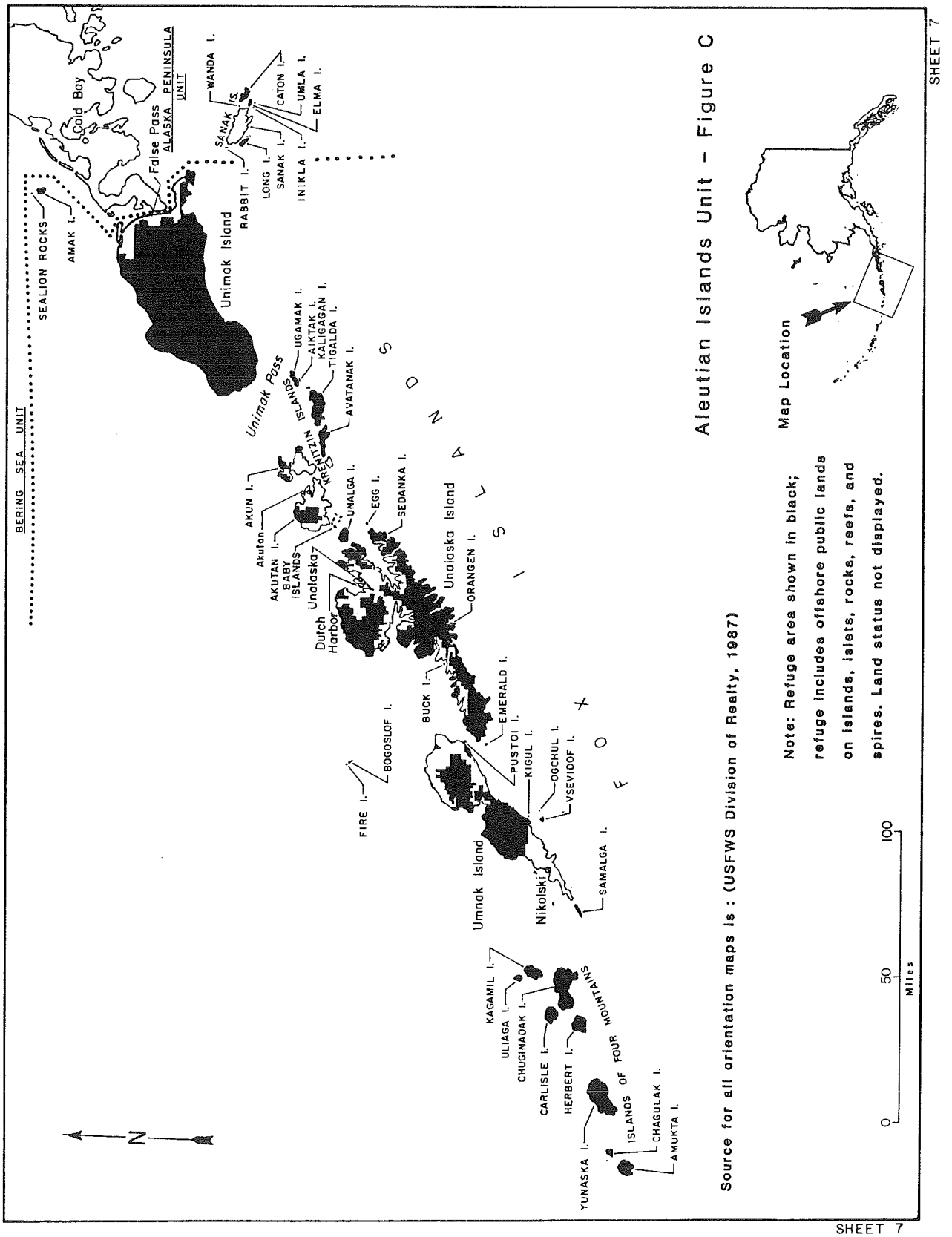
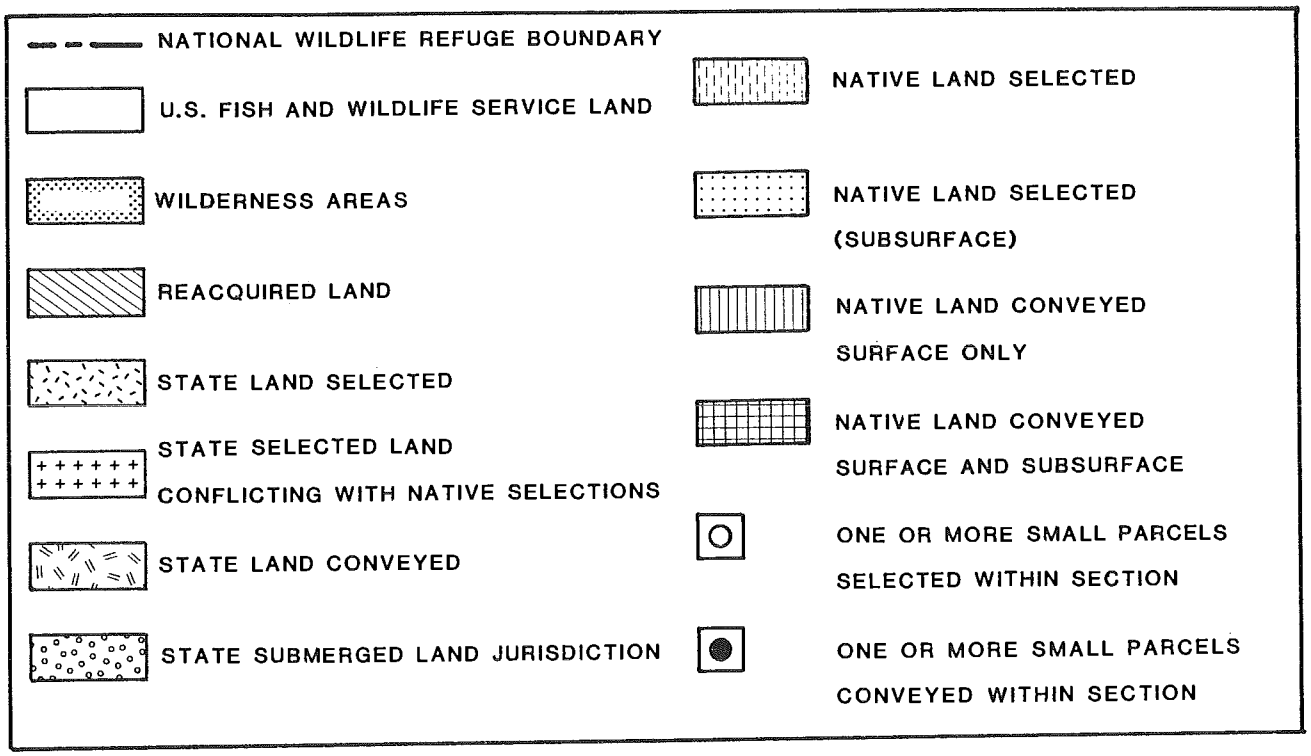
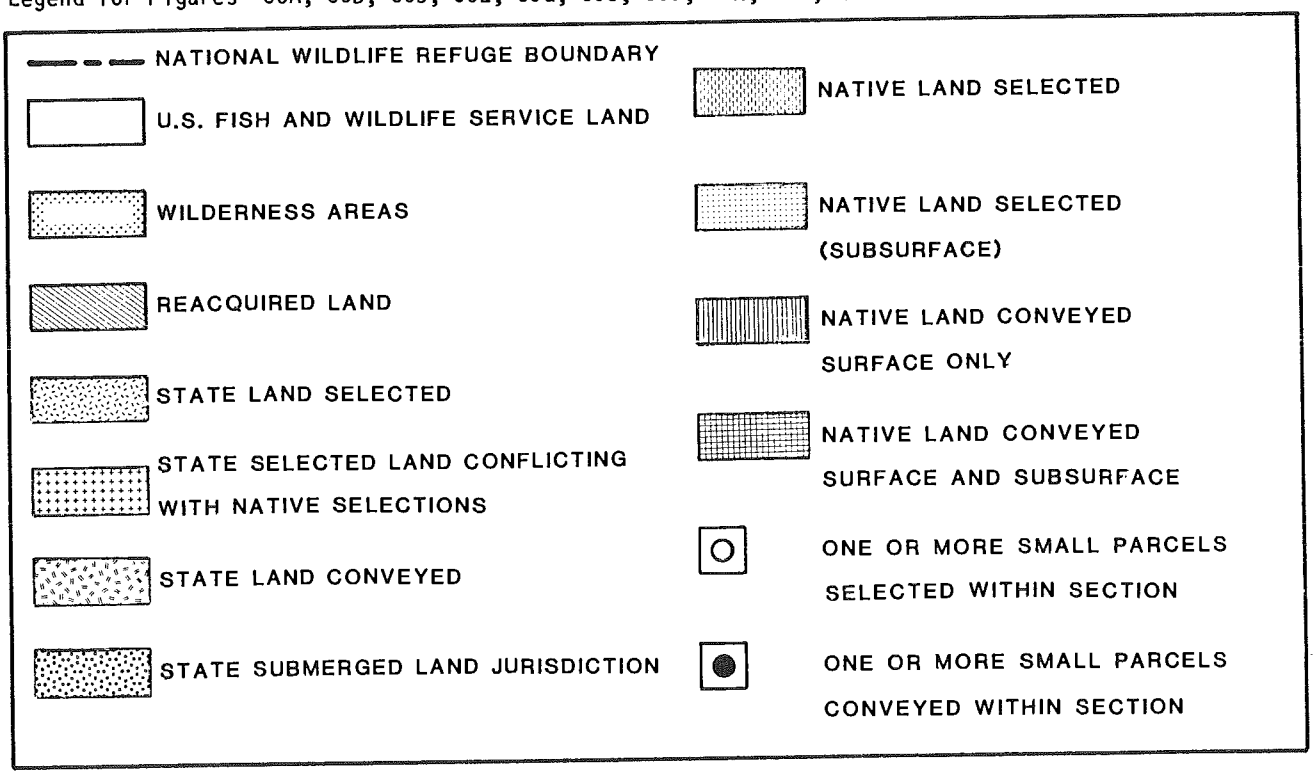


Figure 55. Legends for land status for the Aleutian Islands Unit.

Legend for Figures 56C, 56F, and 56H.



Legend for Figures* 56A, 56B, 56D, 56E, 56G, 56I, 56J, 56K, 56L, and 56M.



*Figures are reduced 50% and land status patterns appear much smaller.

Figure 56 A. Land status in the Aleutian Islands Unit as of November 1987.

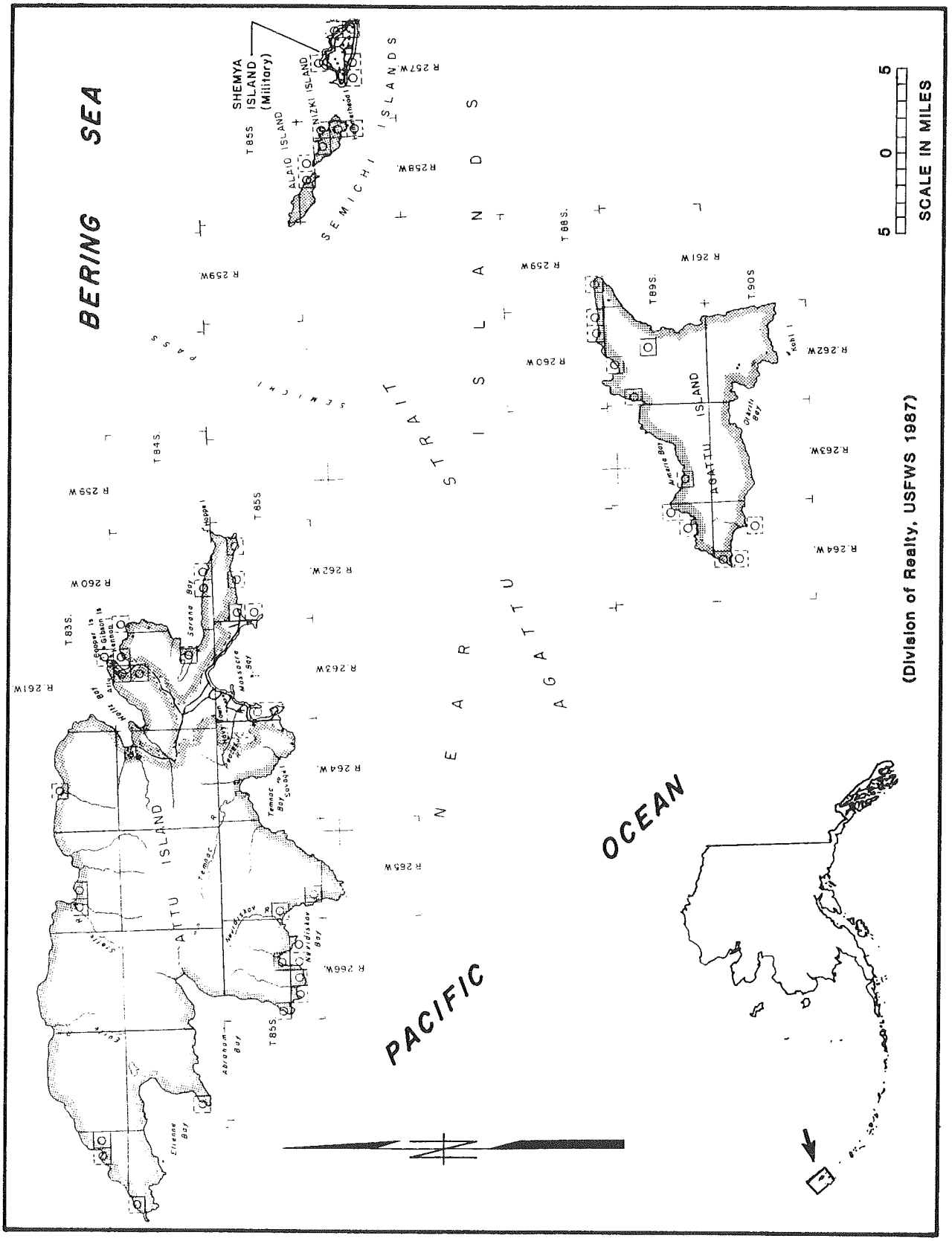


Figure 56 B. Land status in the Aleutian Islands Unit as of November 1987.

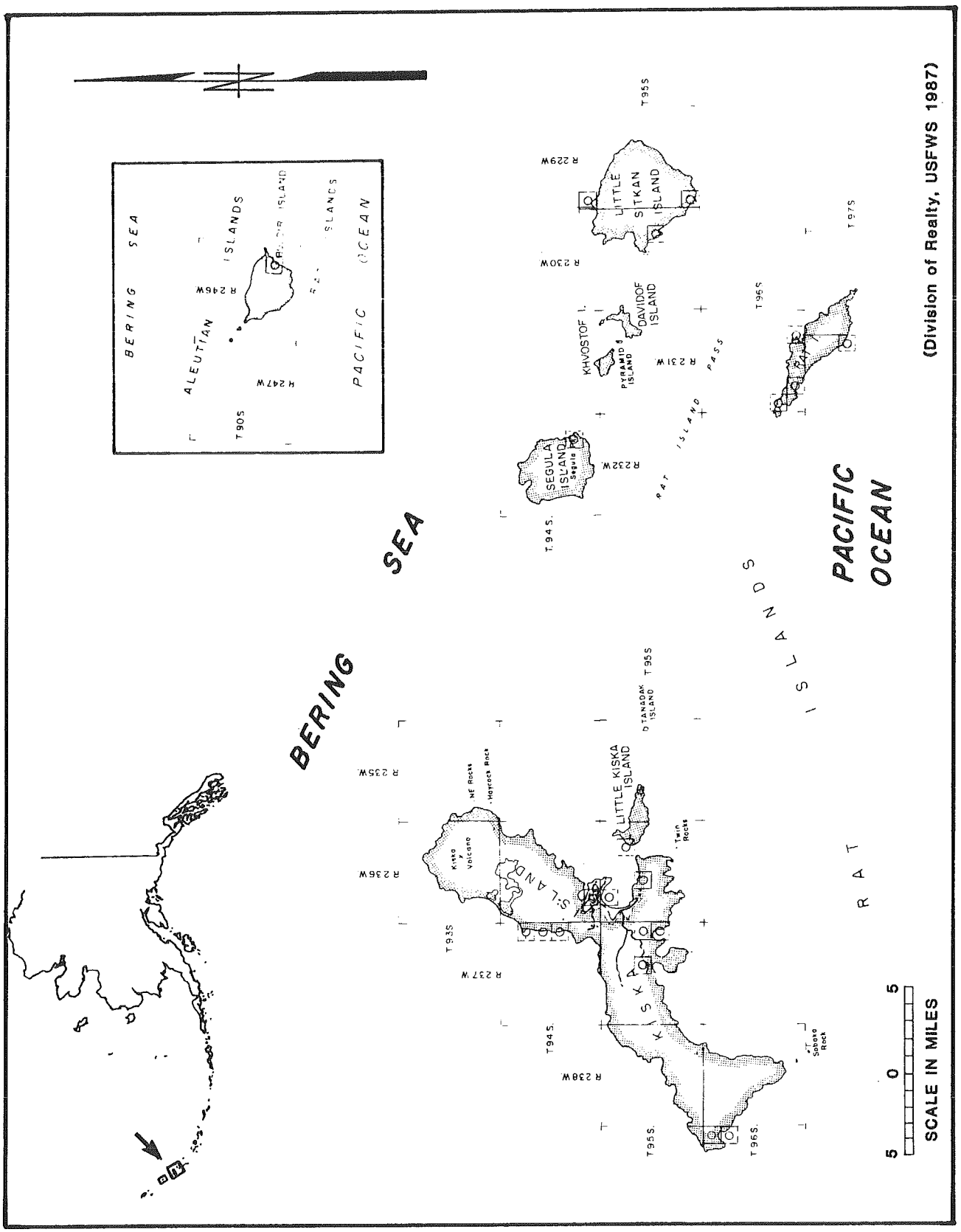


Figure 56 C. Land status in the Aleutian Islands Unit as of November 1987.

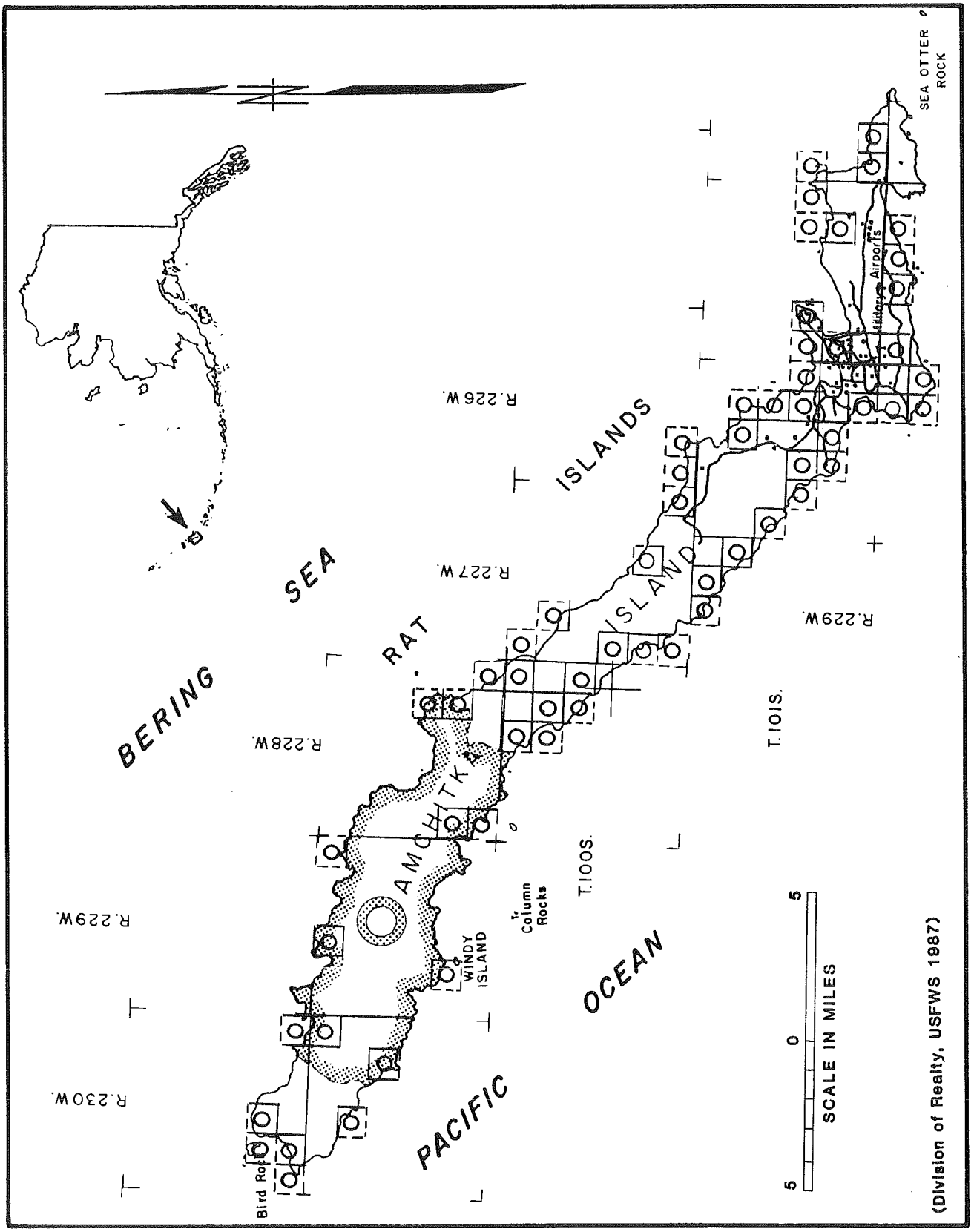


Figure 56 D. Land status in the Aleutian Islands Unit as of November 1987.

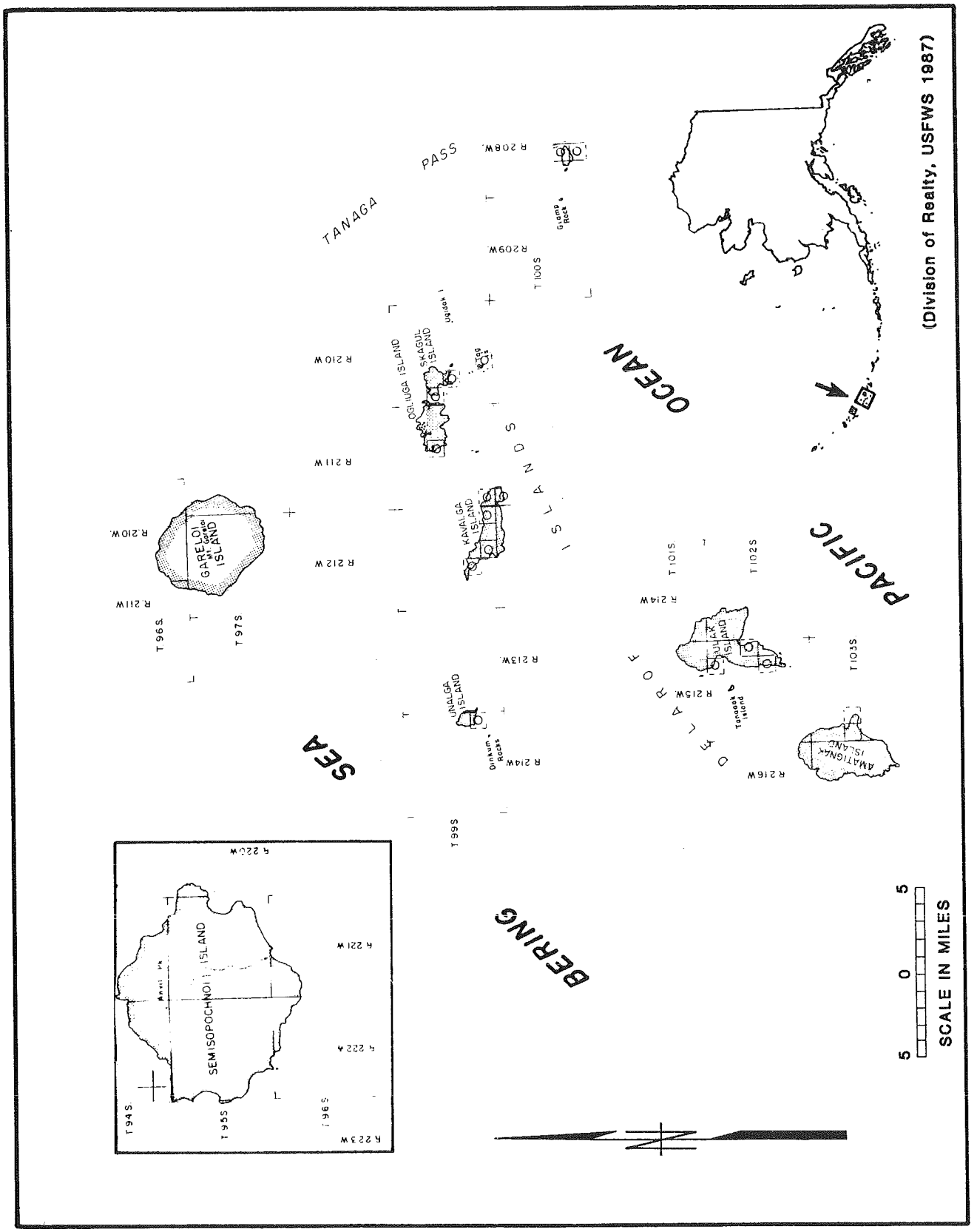


Figure 56 E. Land status in the Aleutian Islands Unit as of November 1987.

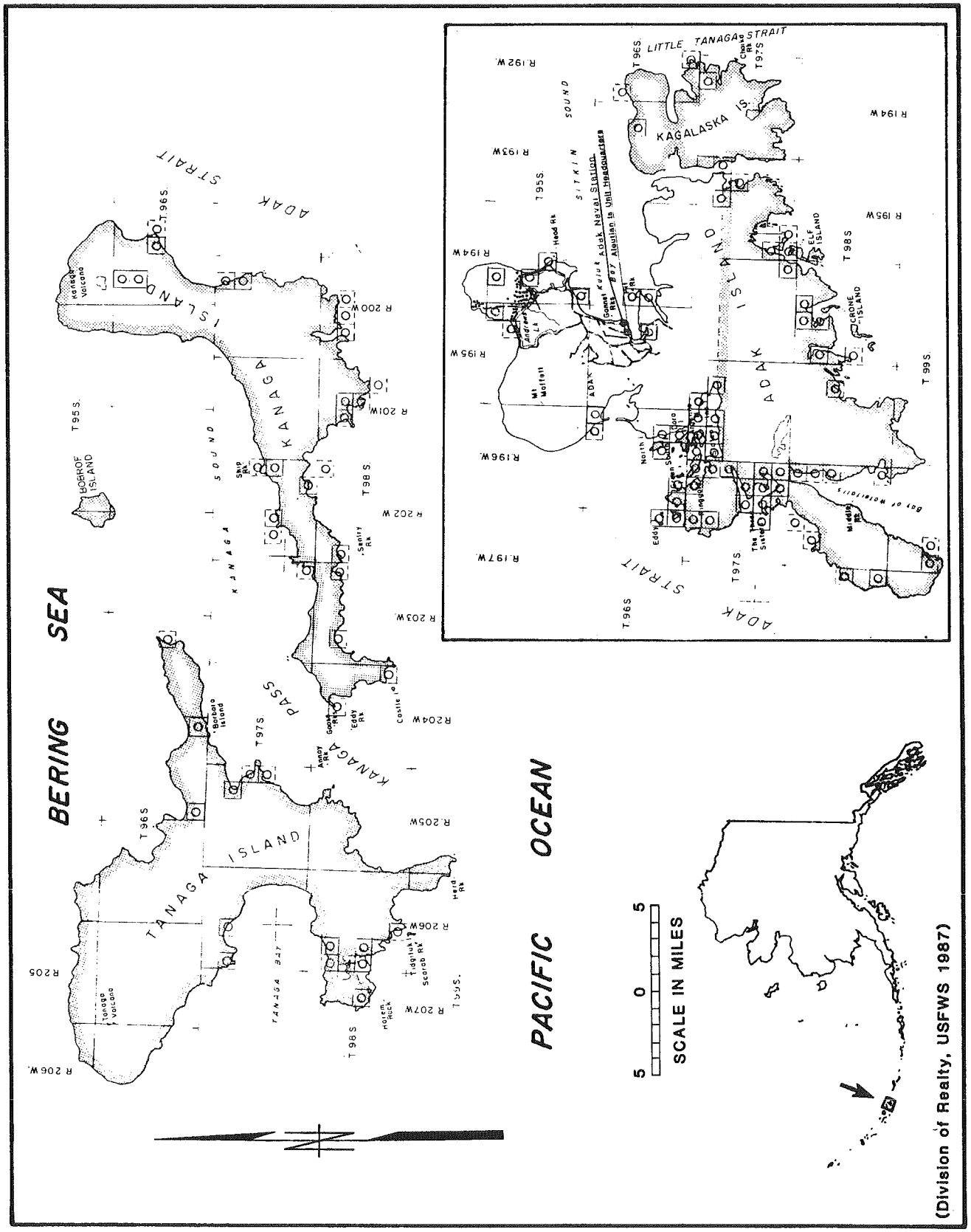


Figure 56 F. Land status in the Aleutian Islands Unit as of November 1987.

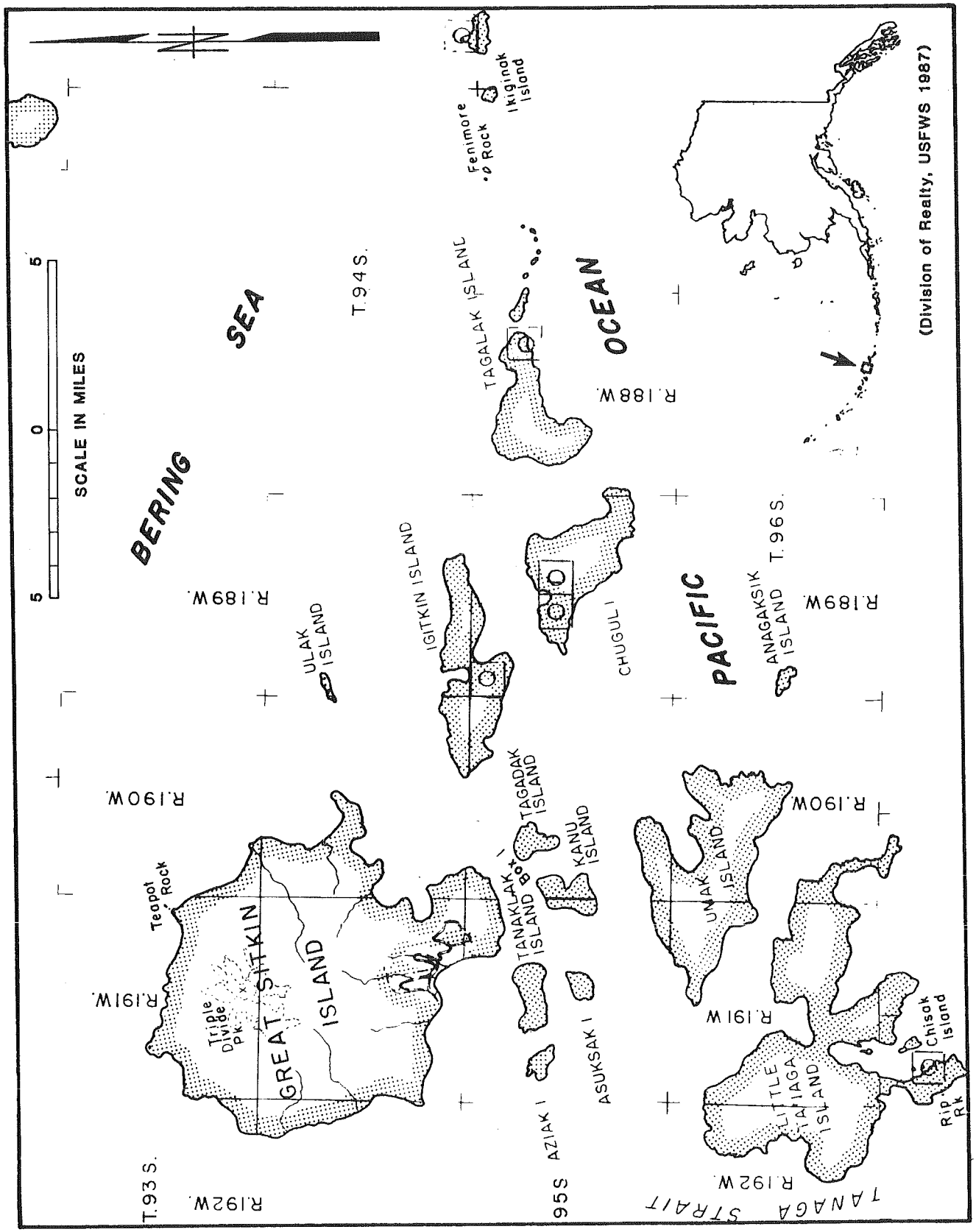


Figure 56 G. Land status in the Aleutian Islands Unit as of November 1987.

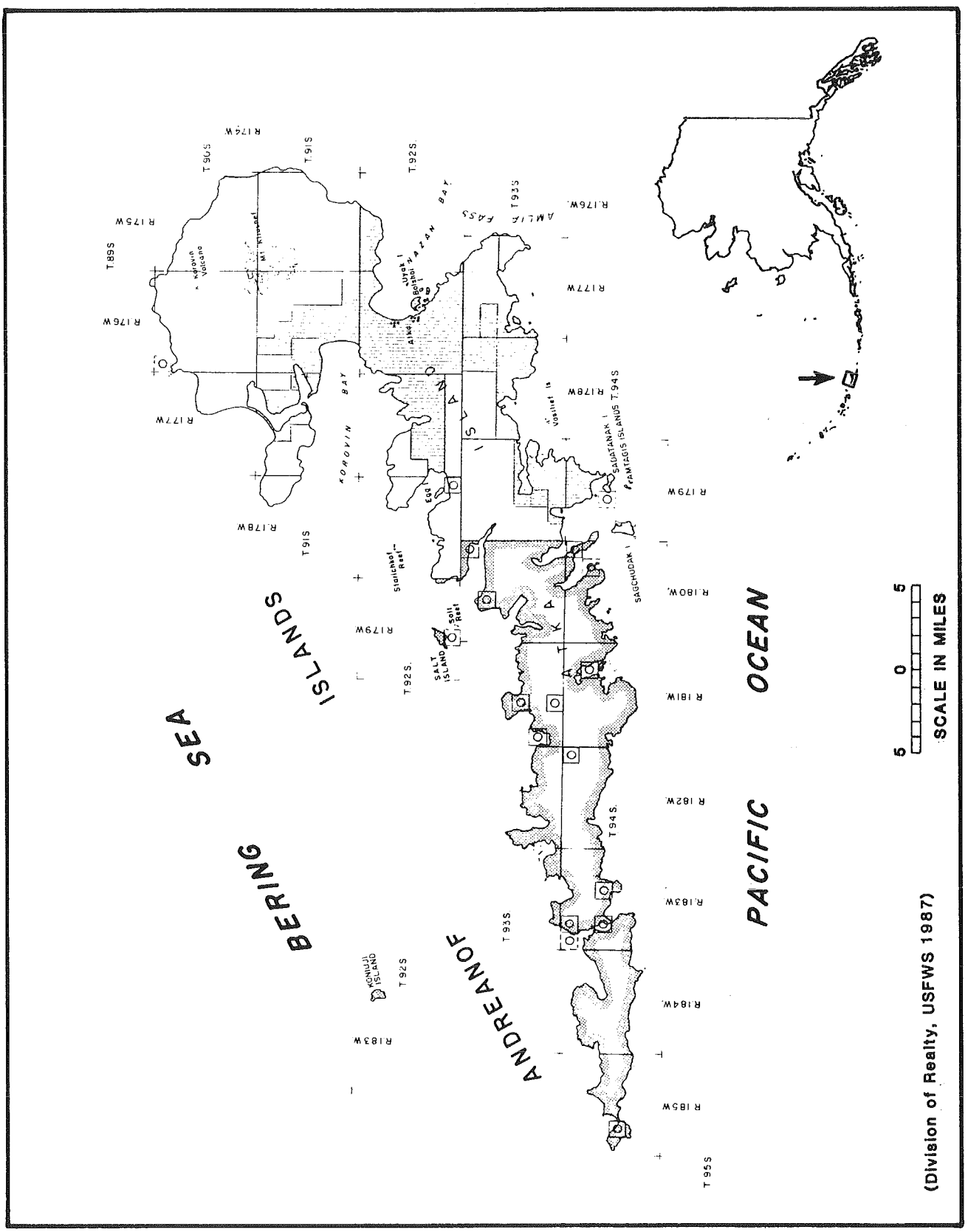


Figure 56 H. Land status in the Aleutian Islands Unit as of November 1987.

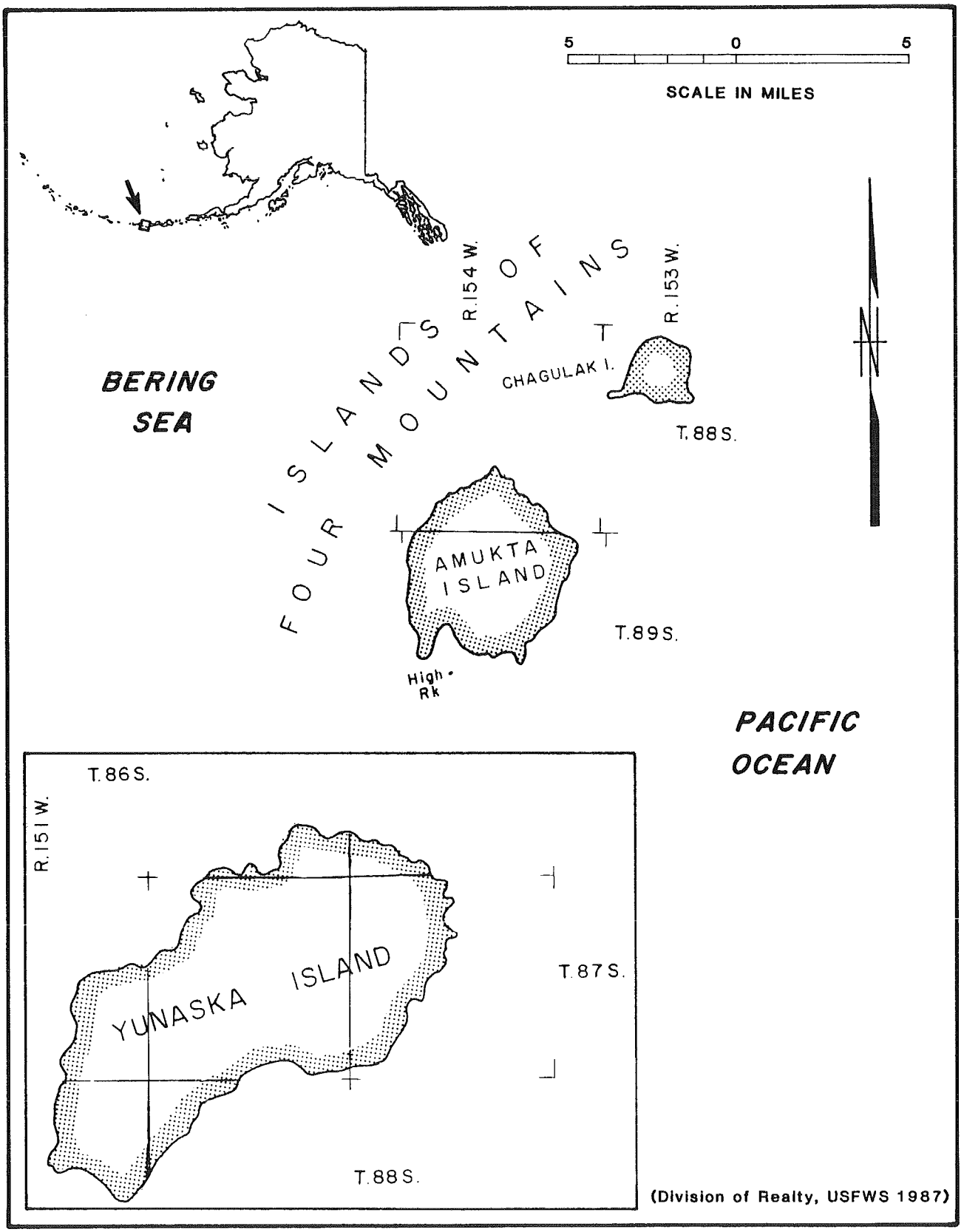


Figure 56 I. Land status in the Aleutian Islands Unit as of November 1987.

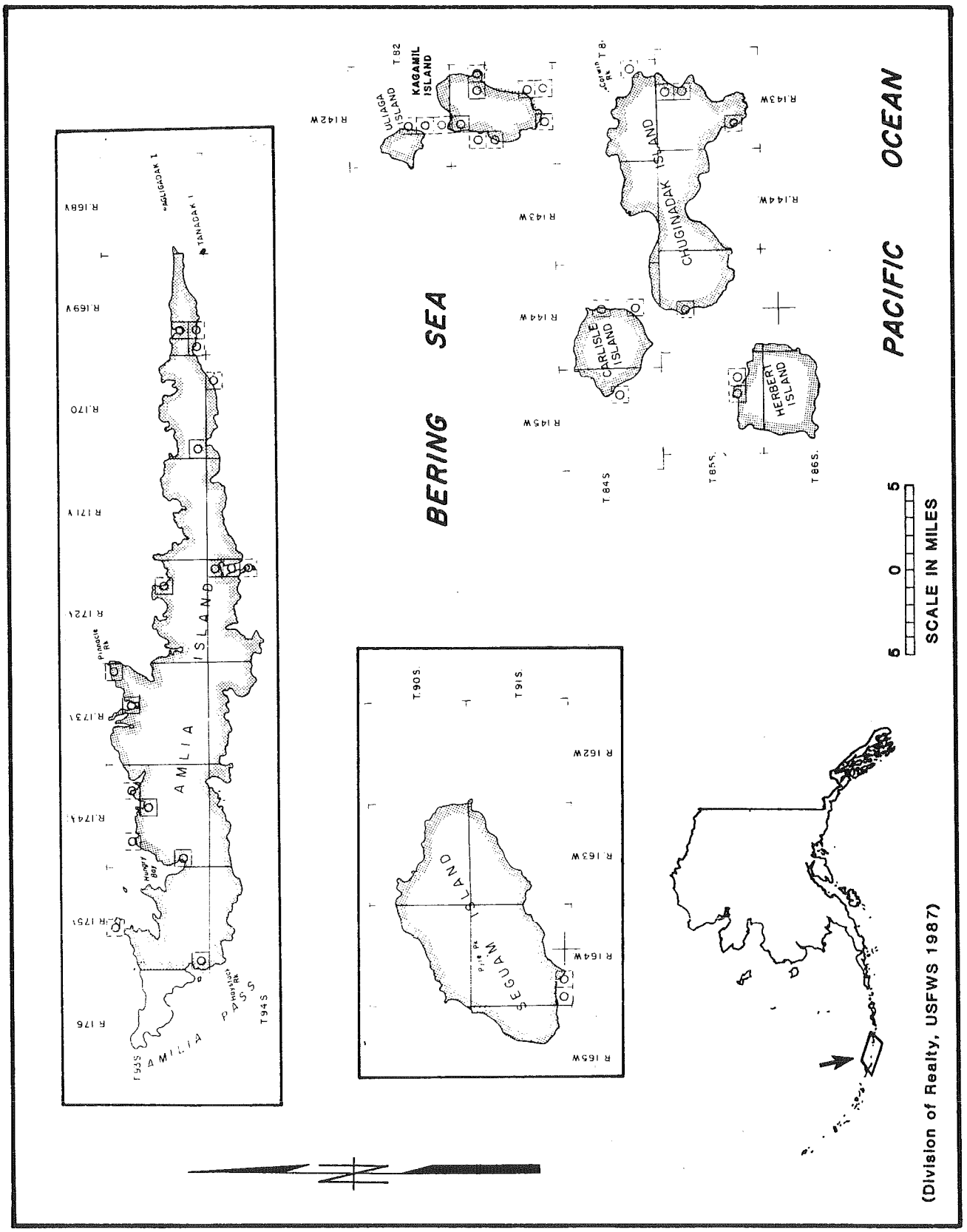


Figure 56 J. Land status in the Aleutian Islands Unit as of November 1987.

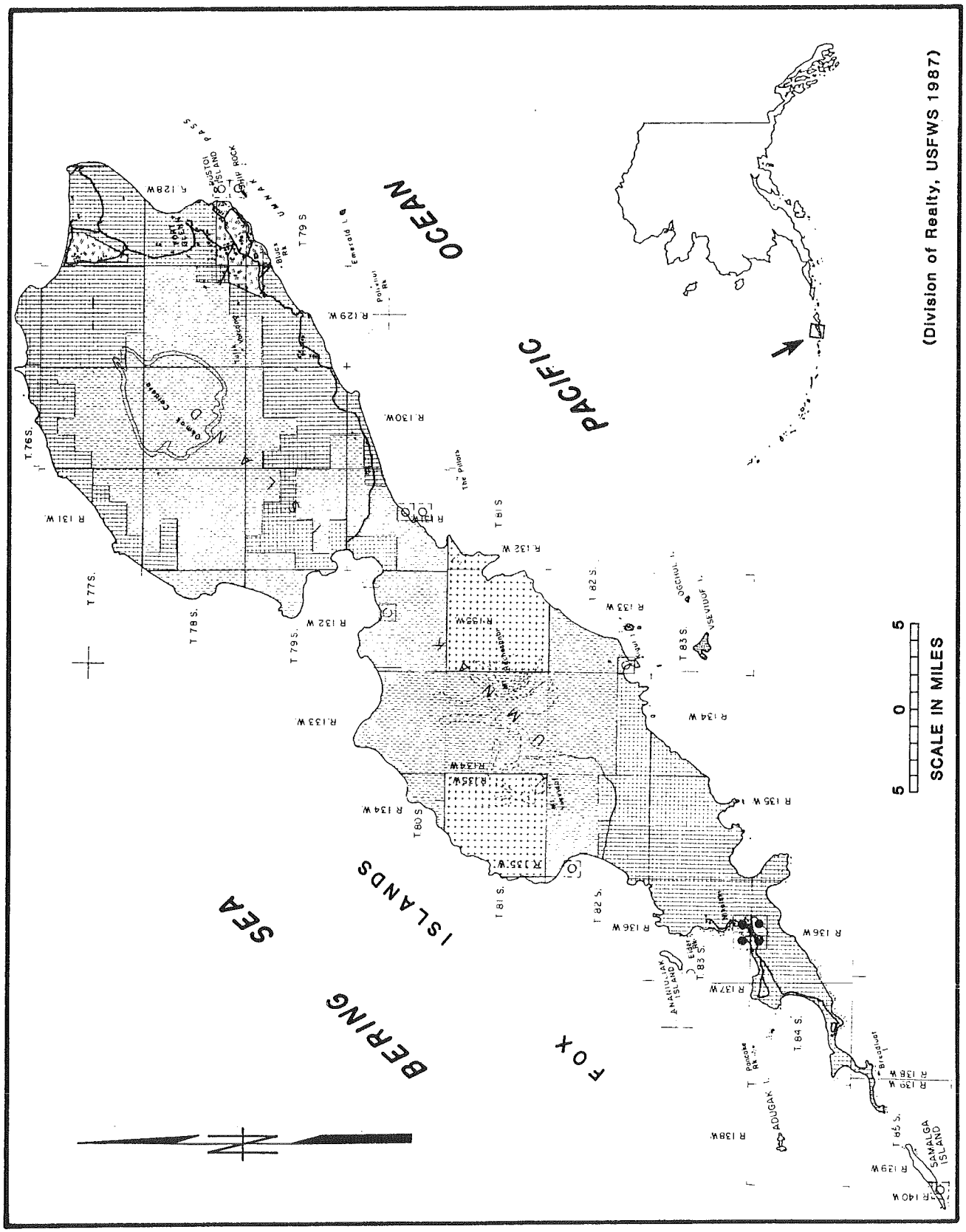


Figure 56 K. Land status in the Aleutian Islands Unit as of November 1987.

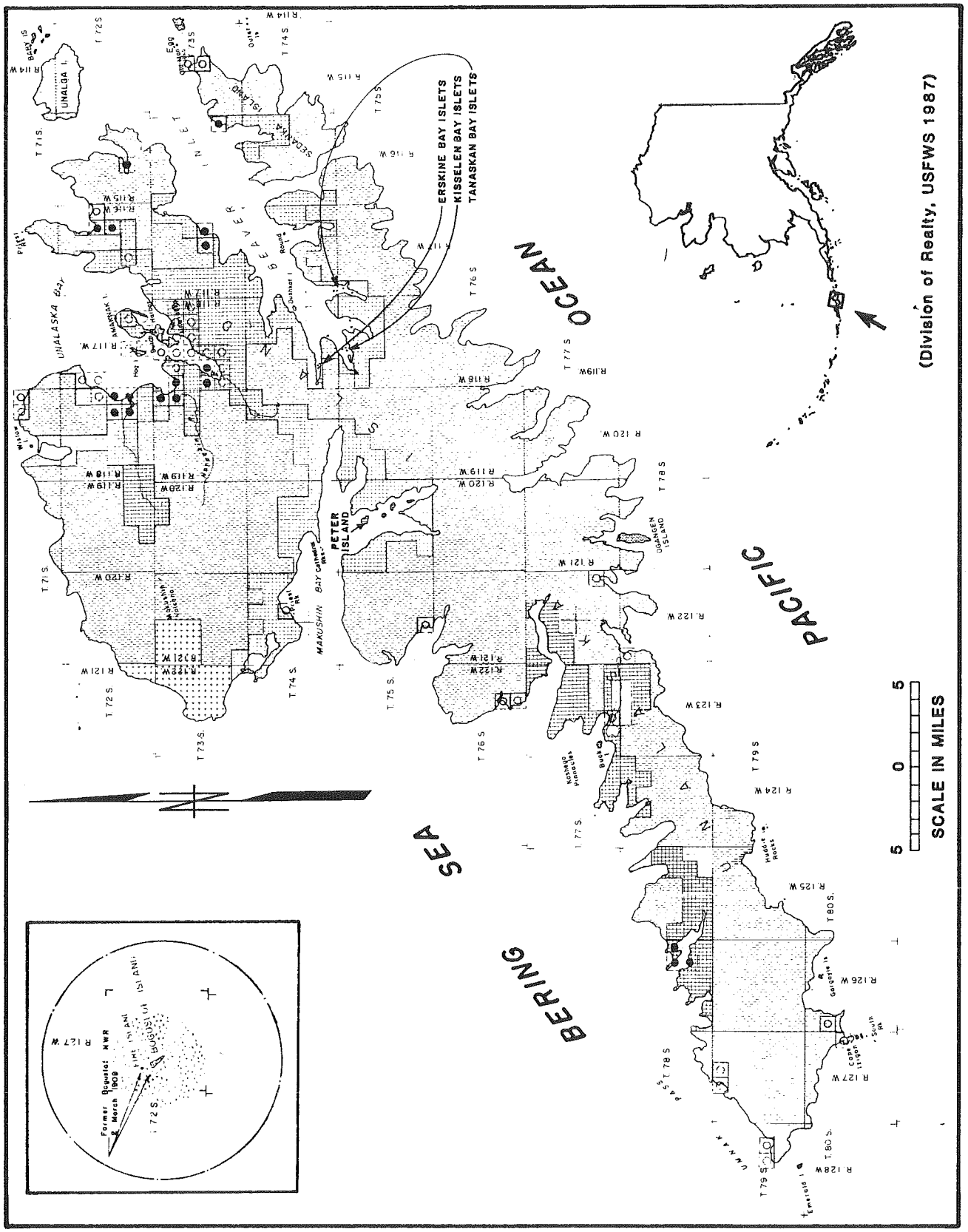


Figure 56 L. Land status in the Aleutian Islands Unit as of November 1987.

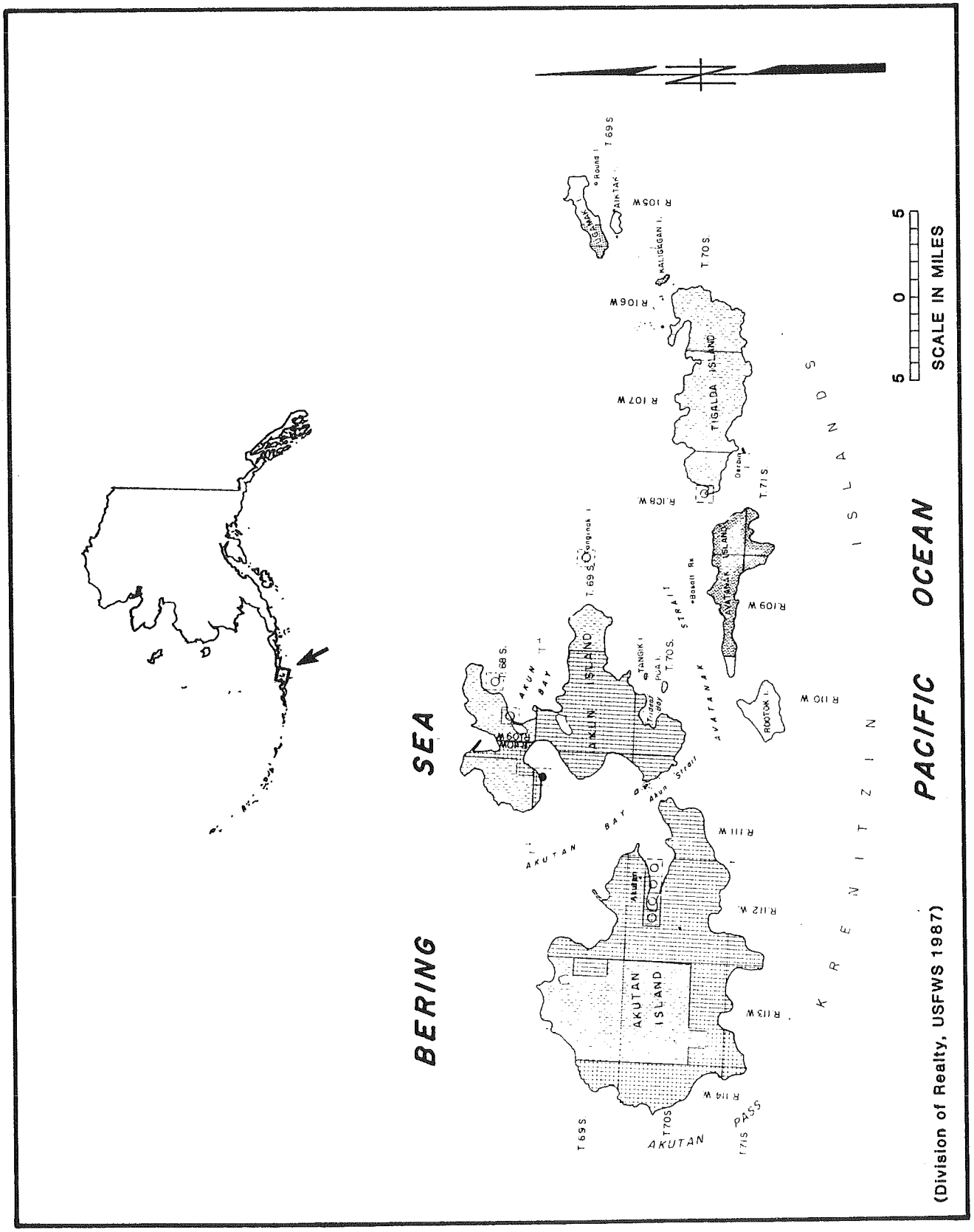
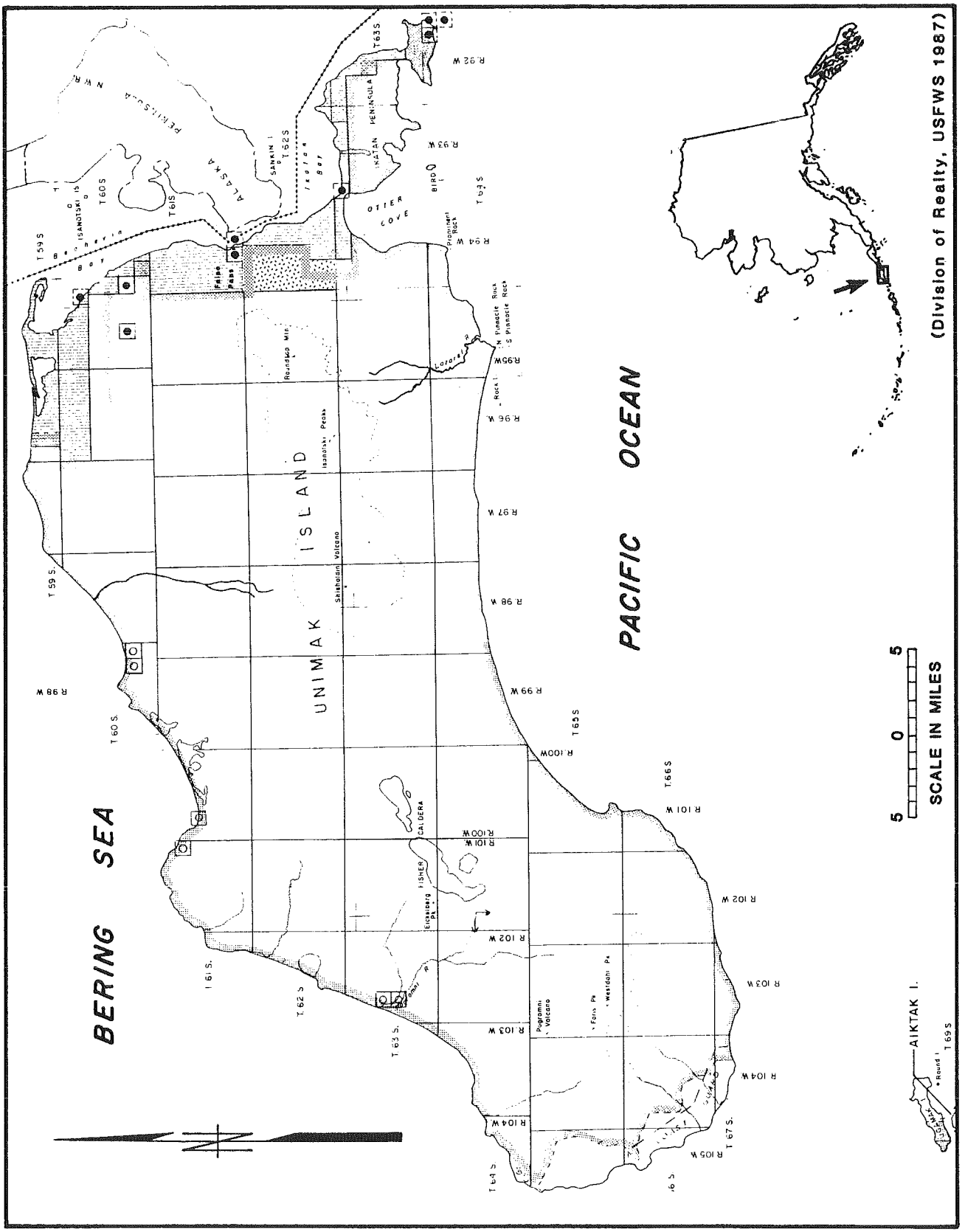


Figure 56 M. Land status in the Aleutian Islands Unit as of November 1987.



The Aleutian Islands are actually crests of an arc of submarine volcanoes. An arcuate line of 57 volcanoes, 27 of these active, rise 2,000 to over 9,000 feet above sea level along the north side of the islands. The most striking feature of Alaskan volcanoes is the presence of many calderas which are craters of volcanoes that have collapsed. Okmok Caldera, with its steaming fissures, measures 6.5 miles across its crater on the northeast side of Umnak Island and is one of at least 17 calderas in the Aleutian Chain.

Volcanic domes, a steep-sided viscous protrusion of lava forming a dome shaped vent, are also present. They occupy the summit crater or form on the flank of the volcano, and put a temporary or permanent halt to the activity of the cone. Domes are present on Buldir Island, Bobrof Island, Unimak Island, and other islands (Coats 1950).

Older volcanoes of the Aleutians include both shield volcanoes, characterized by thin flows, little fragmented material, and gentle slopes, and strato volcanoes which are steep sloped. The major active volcanoes in the Aleutians are strato volcanoes (Coats 1950).

The older rocks of the Aleutians date back to the Paleozoic and are both faulted and folded. The folding is open and dips are moderate. Major faults are reverse faults and parallel the island chain. The nature of the faults and the large number of earthquakes in the Aleutian Islands are because of subduction of the Pacific plate and the associated stresses and strains. Between 1904 and 1959, 20 earthquakes were recorded at a magnitude of 7.0 or higher and one was recorded at 8.0 (Morgan et. al 1980). Shallow earthquakes tend to be south of the Aleutian Chain; those of intermediate depth are in the islands or to the north; and deep earthquakes occur along an active zone north of the Aleutian Trench (Coats 1950). Earthquakes usually occur under 300 km in depth (Benioff 1954).

Bedrock - The region is underlain by Cenozoic basalt and andesite lava flows. The Aleutians are geologically the youngest region in Alaska (Cobb 1974). Most rocks contain high percentages of calcic plagioclase crystals and green augite. Some rocks such as highly glassy lava or light colored pumice (dacites or rhyolites) are comparatively rich in silica but are less plentiful.

Surficial deposits - Various kinds of surficial deposits cover the Aleutian Islands Unit: volcanic ash, pumice, cinders, glacial till, outwash, and alluvium covers the bedrock. These deposits were laid down by glacier ice, running water, lake water, mass wasting, and wind.

Glaciation is directly responsible for till and morraine and indirectly responsible for drainage reversal, damned lakes, meltwater outwash, and loess. Glaciers have carved deep fjords, U-shaped valleys, horns, aretes, cirques, cols, and basins. Today, many high volcanoes bear icecaps or small glaciers, and a few cirque glaciers occur on mountainous islands. It is unlikely that permafrost occurs in the Aleutian Islands, but glacial erosional processes are active because of the cold, wet climate.

At least eight islands in the Aleutians have ice masses present: Unimak, Unalaska, Umnak, Atka, Great Sitkin, Tanaga, Garleoi, and Kiska. Glaciers are concentrated on Umimak Island on the Shishaldin Volcano-Isanotski Peaks-Roundtop Mountain complex and on Pogromni Volcano. On Atka Island, Korovin Volcano and Mount Kliuchef have summit glaciers covering less than 20 square miles (Morgan et. al 1980).

Soils - Volcanic ash deposits extend outward over the Aleutian Islands, mantling all land surfaces except steep, rocky mountain masses on some islands. On islands where ash lies close to old volcanic cones, soils are gravelly. Erosion potential is moderate on soils of the mountain slopes and low on the coastal plain.

Ash soils with loamy texture are more common throughout the unit and occupy all slopes except rocky areas. Potential for erosion in these soils is moderate. Well drained, dark, loamy soils occupy fine ash deposits on slopes of scattered islands throughout the chain. In these areas peat soils fill depressions and erosion is moderate (Michaelson 1974).

Mineral occurences - Mineral occurences have been reported in the Fox Islands, Rat Islands and Near Atka Island. Minerals reported include gold, sulfur, copper, titanium, zinc, silver, lead, cadmium, quartz crystal and zeolites (U.S. Department of the Interior, Bureau of Mines 1988). No commercially valuable deposits have been discovered; however, mineral exploration has been impeded by the remoteness and inaccessibility of the unit.

One lode claim (AVI 9850610) located at Section 34, T.64 S, R.104 W., has been filed in this unit. It is situated on the western end of Unimak Island near the Coast Guard facility.

Oil and gas - The Aleutian Islands Unit is located in the Aleutian Arc Outer Continental Shelf planning area and just south of Bowers Basin (See Figure 46). These areas have not had environmental and socio-economic studies done and are not on a current five-year leasing schedule.

The U.S. Department of the Interior, Bureau of Land Management (Teseneer, Seidlitz, and Borkoski 1988) has rated the geologic potential for hydrocarbons as none for all parcels in the Aleutian Islands Unit. Development potential for this unit is also rated as none.

See Table 5 for a listing of Outer Continental Shelf planning areas and their estimated reserves and Table 6 for a summary of active leases near the refuge.

Geothermal resources - Thermal springs and hydrothermal convection systems (circulating water heated by magma) are associated with volcanoes. Hot-water systems are located throughout the Aleutian Chain. See Table 21 for a listing of thermal springs in the Aleutian Islands (Waring 1965). A large group of hot springs, mud pots, and geysers occur at about 2,000 feet on Great Sitkin Island. The largest geyser is about 25 feet long and 20 feet wide. Saline thermal springs emanate along the Bering Sea coast at the base of Mount Adagdak, northwest of Adak Naval Base. The U.S. Navy is continuing examination of the geothermal potential of the Adak area.

Several thermal areas have been identified on Atka Island on Mount Kliuchef and Korivan Volcano. Reeder (1985) has described six active fumarole and/or hot-spring fields in the area. These resources are near a good harbor and potential users and appear to have good potential for development.

Numerous fumeroles, hot springs, and several small geysers are located in Geyser Bight Valley on Umnak Island, and constitute probably the best known, most widespread, and hottest thermal springs system with chloride rich waters in Alaska. However, due to its remote location it is doubtful that geothermal development will occur in the near future. Numerous thermal springs, geysers, and fumeroles also occur near Partov Cove and Hot Springs Cove on Umnak Island. An extensive thermal field occurs on Unalaska Island at the head of Glacier Valley in the southeast flank of Makushin Volcano and in Summer Bay. Hot springs are also found on Akutan and Akun islands.

Water Resources

A wide diversity of water types is found in the Aleutian Islands, from a great interspersion of lakes and streams, such as on Amchitka Island, to islands having no fresh water, like the small rocky islands of Chagulak and Amak. Many small lakes occur in irregular ice-covered basins on the glaciated islands. Lakes also fill a few volcanic craters and calderas. Many of the islands such as Amchitka, Kanaga, and Agattu islands, have freshwater "potholes" and some areas superficially resemble the prairie pothole country. Streams in this unit are short and swift and many plunge into the sea over waterfalls. Little is known of surface waters in the unit because of low demand for stream use.

BIOLOGICAL ENVIRONMENT

Vegetation

The vegetation of the Aleutian Islands Unit is similar to alpine types and is classified as maritime tundra (Amundsen 1977). The high uplands and mountain slopes support a variety of lichens, mosses, and low-growing alpine plants. The lowlands are covered with tall herbaceous meadows. With the exception of a few trees which were planted in the Aleutians during the early 1800's and World War II, the islands are treeless. Portions of the eastern part of the

Table 21. Thermal springs in the Aleutian Islands.

Location	Water Temp.(F)	Assoc. Rocks	Remarks
Attu	Warm	Lava	Water rises in pools
Kiska	Hot	Lava	Near solfataric volcano
Semisopochnoi	Hot	Lava	---
Hot Springs Bay, Tanaga	Hot	Lava	---
Volcano base and summit, Kanaga	219	Lava	Hot springs and fumaroles.
Near White Volcano, Adak	Hot	Lava	---
Great Sitkin	190-208	Lava	12 main springs; mud pots and fumaroles at 2,000 feet
Conical Volcano, Atka	Hot	Lava	Mud pools, some boiling
Kliuchef Volcano, Atka	Hot	Lava	---
5 miles from Korivan Bay, Atka	167	Lava	---
Seguam	Hot	Lava	Springs and hot mud pools
Base of volcano, Chuginadak	Hot	Lava	---
Kagamil	Hot	Lava	Springs and fumaroles
NE of Vsevidof Volcano, Umnak	43-68	Lava	16 springs, geyser, fumaroles
Central Umnak	214	Lava	Small geyser
Hot Springs Cove, Umnak*	95-215	Lava	28 springs, small geysers
Bogoslof	Hot	Lava	Steam vents
Makushin Volcano, Unalaska	94	Lava	Springs and solfataras
Akutan*	181	Lava	Springs and steam vents
Islet NW of Akutan*	Hot	Lava	---
Islet SE of Akutan*	Hot	Lava	Springs at beach level
Pogromni Volcano, Unimak	Hot	Lava	Springs, hot marshes

*Not within the Aleutian Islands Unit.

(Waring 1965)

Aleutian Islands have traces of subalpine plant communities with medium to tall shrubs (Hultén 1960).

Islands near Amber and Kamishak bays - Alpine and moist tundra characterize these islands and much of the adjacent coast. Insular vegetation is dominated by beach wild rye and other grasses, sedges, and umbellifers. Inland portions of larger islands with few surface and burrow-nesting seabirds, such as those in Wide Bay, are generally dominated by crowberry, whereas those with large numbers of burrowing birds, such as Central Island, are covered by grasses and umbellifers (Bailey and Faust 1984).

Ugaiushak Island - Heaths predominate with crowberry as the most important species in the western part of Ugaiushak Island . A mixed meadow type is also present and small areas of

The following is a generalized, vegetative description of islands in the Aleutian Islands Unit. Due to the unit's magnitude, not all islands will be individually addressed, but references will be made to Buldir and Amchitka islands where detailed studies have been conducted. These and other studies will be used as a base for descriptions of the following broad habitat types: 1) unvegetated substrates (rocky shores and reefs, beaches and tidal flats, rock fields, cliffs, scree and barren fellfield); 2) fresh and brackish water (lacustrine, fluviatile); 3) meadows (wet meadow, mesic meadow); and 4) scrub (dwarf scrub, medium scrub).

Rocky shores and reefs - Clear cold water, rocky bottoms, surging waves, and strong currents are ideal for seaweeds, which are common. They cover the rocks from high tide

level down to 240 feet. Algae grows around the low tide level and kelp is found well below low tide to great depths (Walker 1945).

Eelgrass grows in the soft sediments of shallow waters in bays on the Alaska Peninsula and the Aleutian Islands as far west as Atka and Adak Islands. The eelgrass beds in Izembek Lagoon on the Alaska Peninsula are the largest known single stand of this species (McRoy 1968).

Beaches and tidal flats - The grass hummock community grows on sandy beaches, old terraces, and on tops of sea cliffs 25 to 100 ft above sea level (Shacklette et al. 1969). A dispersed community of succulent herbs occurs between the grass hummock zone and the mean high tide mark (Amundsen 1972; Amundsen and Clebsch 1971).

Block fields - The talus community, dominated by grasses, is found on vegetated boulder slides and occurs locally from sea level to over 500 m in elevation on Buldir Island. Like other upland communities, no overstory occurs (Byrd 1984).

Cliffs - Amchitka Island is almost completely bordered with steep sea cliffs that range from a few to 100 ft above the sea level. Four plant communities grow on these cliffs: a grass community occurs on beach boulders, rock pinnacles, and cliff faces to the very cliff summits; the rose, mustard, and saxifrage community grows in rock crevices from 10 feet above sea level to the tops of the cliffs; the lichen community occurs near the summits of high cliffs and offshore sea stacks; and a lyme grass community occurs on sloping faces of the less steep cliffs, at the brink of vertical cliffs, and on large flat-topped sea stacks (Shacklette et al. 1969).

Scree, barren fellfield - The moss/willow community occurs as scattered patches at lower edges of the upland overlooking the alluvial valley on Buldir Islands. There is no overstory. A thinly-vegetated middle story contains willow and sedge. A thick mat of crowberry, mosses, and 10 other species of dwarf plants, interspersed with bare areas, form the ground cover. Mosses are the most dominant species, and willow and lichens are common in the fellfield community which occurs on windswept ridges and plateaus at high elevations. Total plant cover is less than 20 percent (Byrd 1984).

Lacustrine

Pond and lake - Lakes are comparatively rare and are very sparsely vegetated (Hultén 1960). Two kinds of lakes occur on the low plateaus of Amchitka Island. Those with an origin related to geologic structure are relatively deep with a bedrock or cobble bottom, while others develop on undulated surfaces of old, elevated marine platforms are shallow and have a muck or soil bottom. With few exceptions, only the latter lake type contains emergent or immersed bottom-rooted vascular plants (Shacklette et al. 1969).

Fresh water marsh - Marshes have a preponderance of sedges and forbs and typically occur at the borders of lakes but also develop on very wet slopes and beside streams in the heath (Shacklette et al. 1969).

Peatland - Heath vegetation dominates the peatlands in the Aleutians and is underlain in most places by a layer of peat up to a foot and a half thick. The wetter parts of the heath are classified as peatlands. Boglike areas are common throughout the Aleutians and on Amchitka Island and occur on gentle to moderate slopes. A Sphagnum bog community occurs and is best developed in seepage channels or broader areas of gentle slope (Bank 1951). Lichen, meadow, and peat bank are three communities in addition to the Sphagnum bog, located in the peatland.

Fluviatile

Stream - Most streams are narrow, swift, and short and are deeply entrenched in vegetation or peat mantle and have a bedrock, gravel, or colluvium channel bottom. They appear to have become entrenched by the growth and deposition of vegetation at their margins and include an understory of forbs, bryophytes, and lichens (Shacklette et al. 1969).

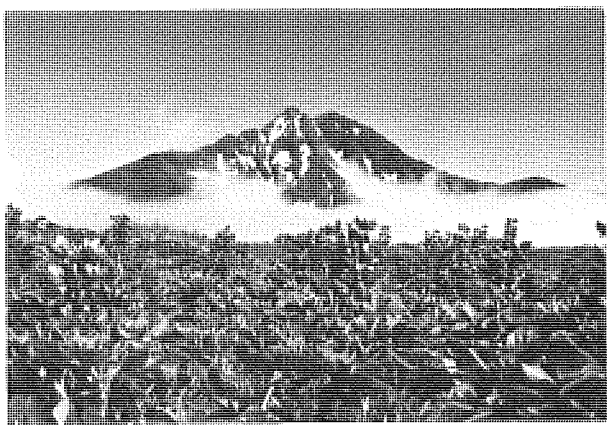
Wet meadow

Snow-bed - In narrow alpine meadows in the mountains on Amchitka, wind velocity is greatly reduced, and in some places snow accumulation may persist until mid-June. Here snow-bed plant

communities such as saxifrage develop in the wettest parts of the valleys where snow melt water saturates the ground (Shacklette et al. 1969).

Mesic meadow - Tall forb, subalpine, and alpine meadows are plant communities found in the mesic meadow (requiring moderate moisture). Tall forb meadows are found on the westernmost Aleutian Islands, especially on Attu, but do not go further east. Subalpine meadows are restricted to small areas in the bottom of the broad valleys in the eastern part of the Aleutians. Alpine meadows, located in the upper elevations, are very narrow and are being invaded from below by subalpine meadows and above by strongly developed heaths.

Dwarf scrub - The moss-willow tundra community is the most extensive on Buldir Island covering over 80 percent of the upland complex. The community has scattered tall plants, but only the middle and ground stories are very well developed. Several species of willow are dominant. The middle story has at least 38 different species. Mosses cover over 40 percent of the ground in this community. Crowberry and various unidentified lichens are also frequently found. The moss-willow tundra has one of the most diverse ground stories, with 30 species (Byrd 1984).



Lupines carpet a meadow below Ragged Top Mountain on Semisopochnoi Island.

Medium scrub - Willow thickets covering only small areas are composed of shrubs three to five feet in height and occur in the eastern Aleutian Islands (Hultén 1960).

Fishery Resources

Principal marine fishes in this unit are halibut, Pacific ocean perch, Pacific cod, sablefish, yellowfin sole, salmon (primarily pink and chum), walleye pollock, sandlance and Pacific herring. Tanner and king crab occur in commercial quantities.

A total of approximately 360 anadromous salmon streams occur on refuge lands within the

Island	Total No.	Pink (1982) 1/	Sock-eyed	Coho	Chum
Unimak	16	4/not surveyed	7	2	8
Akutan	1	1/10,500	0	0	0
Unalaska	106	104/1,706,500	16	4	1
Umnak	21	19/295,400	3	7	0
Amlia	40	35/132,000	6	0	4
Atka	65	65/576,900	9	17	4
Great Sitkin	5	5/7,700	0	0	0
Amak	1	1/200	0	0	0
Little Tanga	2	2/1,500	0	1	1
Kagalaska	5	4/3,200	2	0	0
Adak	36	32/362,400	7	1	0
Kanaga	9	9/18,500	0	0	0
Tanaga	13	12/67,400	0	3	0
Amchitka	22	22/1,200	0	1	0
Semiso-pochnoi	1	1/400	0	0	0
Kiska	13	12/44,400	1	2	1
Agattu	5	5/2,800	0	1	0
Attu	15	14/142,700	3	3	1
TOTAL	360	347/3,373,600	54	42	20

(U.S. Fish and Wildlife Service 1987)

1/ Not all salmon observed were counted and some runs were still in progress when counts were made.

Aleutian Islands Unit (Holmes 1982). Of these, 346 support pink salmon, 54 support sockeye salmon, 42 support coho salmon, and 20 support chum salmon (Table 22). These counts were from Table 22. Salmon streams in the Aleutian Islands Unit.

Alaska Department of Fish and Game field studies conducted in 1982; the counts, which emphasized pink salmon, may have been conducted too late to identify some late coho salmon runs. It should be noted that these counts were done in an even numbered year, and odd numbered year runs would be much lower.

These streams and many others support anadromous, and in the case of lakes, resident populations of Dolly Varden/Arctic char. Kokanee salmon, a land-locked or resident form of sockeye salmon, also occur on Adak Island. The Alaska Department of Fish and Game is currently attempting to establish land-locked coho on the Shemya Air Force Base. Rainbow trout were stocked on Adak and Shemya Islands for years, but these programs were discontinued in the mid-1970's. An early report (Scheffer 1959) referred to at least four streams on Umnak Island that supported steelhead runs, but this information has never been verified. Pacific herring are reported to spawn on coastal beaches on Akutan, Unalaska, Umnak and Adak islands; late summer post-spawning migrations of herring leaving Bristol Bay and other spawning areas to the north occur in a westward direction along the Aleutian chain. Little is known about the distribution of capelin and sandlance along the Aleutians.

Human use of the fisheries resources on or originating on the refuge is slight. Three exceptions are the commercial salmon fisheries that occur off Unalaska and to the east, a late summer commercial fishery for herring in the vicinity of the Fox Islands (annual harvest about 3,500 tons), and local subsistence fisheries. Commercial salmon harvest in the Aleutian Island District from 1951 to 1985 is shown in Table 23 (catches off Unimak Island are not included since, statistically, they are part of another district). These harvests should not be used as indices of abundance since a large portion of the catch results from interceptions of salmon bound for Bristol Bay or elsewhere - in order to reduce interceptions, the salmon fishery season on the Aleutians does not begin until July 10. Furthermore, effort is not consistent due to weather and economics.

The very low 1985 pink salmon harvest, however, did reflect a severe reduction in the resources. The 1983 parent year escapement was poor and state managers were alert to a possible resource problem; as a result, the season was closed by emergency order only one week after it opened. Indications were that, with the exception to Attu Island, 1985 pink salmon runs were depressed all along the chain.

A more detailed description of the fishery resources of each of the islands follows:

Attu Island - Only the eastern half of the island has been surveyed. The major pink runs are on Henderson River (48,000 fish) and Peaceful River (33,000 fish) and the largest sockeye run is on Lake Nicholas (about 600 fish).

Agattu Island - Only five known salmon streams occur on the island, the two largest of which support between 1,000 and 2,000 pink salmon.

Kiska Island - One major run of pink salmon occurs on the island (Gertrude Cove, 31,900 pinks); only four other streams support salmon runs of over 1,000 pinks and none of these exceed 4,000 fish.

Semisopochnoi Island - While anadromous Dolly Varden runs occur in several streams, only one stream supports salmon (Fenner Creek, 620 pinks).

Amchitka Island - For its size, this island is the least productive on the chain; the drainages, especially in the southern half, are very small. None of the streams support runs of over 1,000 fish. The largest run is in Middle Cove (620 pinks).

Tanaga Island - This island is also very unproductive. The major run is on the northeastern portion of Tanaga Bay (40,000 pinks). One other stream (on Cable Bay) supports about 17,500 pinks, but only three others support more than 1,000 fish.

Table 23. Aleutian Islands area commercial salmon harvest, 1951-1985.

Year	Pink	Sockeye	Coho	Chum
1951	500	11,700	400	94,500
1952	31,800	42,800	0	25,700
1953	69,200	4,300	500	800
1954	566,500	6,300	800	200
1955	31,100	12,600	100	400
1956	33,900	400	0	0
1957	500	27,300	100	13,900
1958	613,200	300	0	3,700
1959	12,000	6,100	0	100
1960	444,900	7,600	0	300
1961	94,000	2,700	0	200
1962	2,001,700	5,400	100	1,200
1963	93,900	4,500	0	300
1964	194,100	200	0	2,300
1965	NO FISHERY			
1966	63,500	1,000	0	700
1967	7,900	200	0	0
1968	902,800	2,000	200	800
1969	242,200	500	0	1,500
1970	672,500	200	100	3,300
1971	45,500	300	0	,100
1972	2,800	100	0	0
1973	7,000	100	0	0
1974	NO FISHERY			
1975	NO FISHERY			
1976	NO FISHERY			
1977	NO FISHERY			
1978	38,100	1,800	0	0
1979	539,400	12,200	0	200
1980	2,611,900	9,200	0	4,900
1981	302,800	5,400	200	6,600
1982	1,447,800	2,700	0	6,100
1983	2,000,000	4,400	0	11,4001/
1984	2,390,700	6,720	0	33,9002/
19851/	100	2,800	0	14,2003/

(U.S. Fish and Wildlife Service 1987)

1/ Preliminary
2/ Largely interceptions.

Kanaga Island - This island is one of the least productive for its size; most of the streams terminate in waterfalls at the beach line. The only significant salmon run (12,700 pinks) occurs in Kanaga Bay; only two other streams support runs of over 1,000 fish.

Adak Island - Most of the major streams are on the north side of the island. The largest pink run is in a stream on Finger Bay (100,000 fish) even though only about 0.6 miles of spawning area exists. Two other streams support runs of over 25,000 pinks. The largest sockeye run (800 fish) is in the Hidden Bay system. Lake Andrew supports populations of kokanee (land-locked sockeye salmon).

In order to supplement recreational fisheries for resident and anadromous Dolly Varden/Arctic char in the vicinity of the Adak Naval Station, rainbow trout and steelhead were stocked by the U.S. Navy during the late 1950's from a small hatchery on Lake Leone. The Alaska Department of Fish and Game stocked rainbow and steelhead between 1968 and 1974. In 1973, the Fish and Wildlife Service assumed management responsibility for fishery management on the Naval Station, and stocked rainbows until 1976. During this period, the Service considered construction of fish passage facilities at Lake Andrew but determined that the project was infeasible because of anticipated damage from storms. More recently, Arctic grayling introductions were considered, but rejected because of refuge policy regarding introduction of non-indigenous species.

Kagalaska Island - The largest of the five pink salmon streams (2,300) and the largest of the two sockeye salmon streams (700) is on Quail Bay.

Little Tanaga Island - Two small streams with runs of 900 and 650 pinks are located on the island. The first, on Scripps Bay, also supports a small run of coho salmon.

Umak Island - The only salmon stream on the island is a small stream on Umak Bight with about 200 pinks.

Great Sitkin Island - There are five pink salmon streams on this island, the largest of which is Fox Creek (5,000 pinks). The only other stream with more than 500 salmon is as stream on Yoke Bay (1,900 fish).

Atka Island - There are several moderate to good runs on the south and northcentral sides of the island. Streams on Korovinski Lagoon and Deep Bay support the largest number of pink salmon (86,000 - 100,000) and sockeye salmon (2,500) respectively west of Unalaska Island. A stream about 10 miles west of Cape Utalug supports the largest number of chum salmon (1,350) on the chain. Additionally, one other stream supports pink salmon runs greater than 50,000 fish and five support between 25,000 and 50,000 fish. Salmon are an important subsistence resource to the residents of Atka and recent construction of freezing facilities to support a growing commercial halibut fishery could result in commercial utilization of salmon.

Amlia Island - These streams have steep gradients and small drainages. The better salmon streams are on the northwest side, the best being in Hungry Bay (18,000 pinks). Four other streams support runs of over 10,000 pinks.

Umnak Island - Almost all of the streams used by anadromous fishes occur on the southern half of the island. Streams in the northern half seem to be capable of supporting salmon but it is thought that drainage from Okmok Volcano restricts usage. The largest producer is on Okee Bay (44,000 pinks) and the second largest is on Geyser Bight (40,000 pinks). Lakes in the vicinity of Nikolski village support sockeye, pink, and coho salmon runs which are an important subsistence resource to village residents.

Unalaska Island - This island supports the largest production of salmon on the chain. The best pink salmon streams are on the southwestern panhandle. The largest run, estimated at 243,000 pinks in 1982, occurs in the Nateekin River. Two other streams support runs of over 100,000 pinks, and eight streams support runs of between 50,000 and 100,000 pinks. The largest run of sockeye salmon occurs in the Kashega Lake system; 8,000 in East Lake and 16,000 in West Lake. There are no major runs of chum salmon on the island.

Akutan Island - A stream flowing into Akutan Harbor supports pink salmon, but other streams have little potential for salmon.

Unimak Island - This island is noteworthy because of its production of sockeye salmon. Several excellent streams are located on Urilia Bay and the Pogromni River. Unimak Island was not included in the 1982 survey because it is located in a different commercial fishery district than the rest of the chain.

Birds

The Aleutian Islands Unit provides unique nesting habitat for several million seabirds, the endangered Aleutian Canada goose, and other waterfowl. It is also an important migration and staging area for a wide variety of waterfowl, shorebirds and passerines and provides wintering habitat for the emperor goose and other waterfowl. The refuge is one of the few places in North America where Asiatic bird species can be observed on a regular basis in the spring and fall. Fully 35 percent of all bird species observed in the Aleutians breed only in Asia; most of these are seen at the western end of the chain. Nineteen percent of Aleutian species breed only in North America, and 55 percent breed on both continents. An additional 4 percent (mostly marsh and waterbirds rather than seabirds) visit from Hawaii, and the south Pacific (Australia, New Zealand, and the sub-Antarctic). Appendix D gives a listing of the 245 bird species which can be found on the Aleutian Islands Unit.

Seabirds - The Aleutian Islands Unit has the largest total nesting population of seabirds (approximately 10 million) in North America. It is one of the few refuge areas in the United States which is managed primarily for seabirds. Table 24 summarizes the most numerous species. It is important to note that population estimates should be considered minimum figures because of some of the inherent difficulty of accurately censusing seabirds over the 1,760 km (1,200 mi) and nearly 200 islands of the unit.

One of the principal problems affecting seabirds in the Aleutian Islands Unit is the widespread introduction of foxes. The number of seabirds found in the Aleutians (10 million) is probably a fraction of what it was prior to fox

Table 24. Aleutian Islands Unit summary of seabird populations.

Bird Species Group (number of species)	Island Groups: Near	Rat	Delarof	Andreanof	Islands 4 Mtns.	Fox	Total Birds
Fulmar (1)	--	1,361	5,920	160	503,000	7,010	517,451
Storm-Petrels (2)	--	1,360,050	100	252,500	1,000,000	582,553	3,195,203
Cormorants (3)	63,856	6,338	1,060	7,431	1,356	14,908	94,949
Gulls & Terns (3)	14,302	20,078	1,751	7,057	3,146	52,916	99,250
Kittiwakes (2)	20,407	42,532	2,729	2,866	6,085	3,609	78,428
Murres (2)	34,706	48,084	779	7,700	60,400	114,357	226,026
Guillemot (1)	630	1,664	920	6,498	752	12,455	22,919
Murrelets (3)	42	7,240	21	12,069	5,000	32,495	126,867
Auklets (6)	15	3,147,687	631,385	46,071	103,290	19,121	3,947,569
Puffins (2)	38,873	77,176	23,075	81,956	55,890	1,204,292	1,481,262
Total Birds/ Island Group	172,831	4,712,210	666,740	424,308	1,738,919	2,043,716	9,759,724 Total #

References: Near Islands - Early and Beal 1980. Rat Islands - Day et al. 1978, Day et al. 1979, Dragoo and Deines 1983, Early and Beal 1980. Delarof Islands - Day et al. 1978. Andreanof Islands - Bailey and Trapp 1983, Day et al. 1978, Dragoo and Deines 1983, Early et al. 1981. Islands of Four Mountains - Bailey and Trapp 1983. Fox Islands - Nysewander et al. 1982.

introduction. Of the over 100 named islands, islets and rocks in the Aleutian Islands Unit (3.9 million acres), only 44 units or six percent of the total acreage are fox free.

Another problem affecting Aleutian Islands Unit seabirds is the lack of regular monitoring of their numbers and breeding success. Most nesting colonies have been located and censused at least once in ten years. However, the difficulty and expense of field work in the vast Aleutian Chain has until now precluded any regular visits to selected colonies. The Aleutian Islands Unit is the only unit in the Alaska Maritime Refuge without some monitoring of population trends. These data are especially needed as commercial activities increase in the north Pacific Ocean and Bering Sea.

Northern fulmar - The over 500,000 northern fulmars nesting on Chagulak Island constitute the largest known single fulmar colony in North America. This number is an estimate, the actual number is probably considerably higher. Much smaller colonies are found on Buldir, Gareloi, and Seguam islands.

Storm-petrels - Fork-tailed and Leach's storm-petrels are found throughout the Aleutians. Their abundance here and elsewhere is not well known because they are nocturnal burrow nesters. There are over twenty colonies in the Aleutians with the two largest being on Buldir and Chagulak islands where the numbers for each species is estimated at near 1/2 million birds (Bailey and Trapp 1983; Early et al. 1980). Other large colonies are found on Egg, Vsevidof, Koniuji, Aiktak and Kaligan islands. Although abundant, storm-petrels are preyed on heavily by foxes (Murie 1959) and were probably more common before foxes were introduced.

Cormorants - Three species of cormorants nest in the Aleutian Islands Unit. Major nesting areas are located on Attu, Agattu, Alaid, Nizki, Gareloi, Tanaga, Great Sitkin, and Amak islands. Pelagic and red-faced cormorants

are both abundant, with the red-faced being the most numerous. Double-crested cormorants are infrequently observed in the eastern Aleutians and absent in the west.

Gulls - The glaucous-winged gull is the most abundant gull and the only species nesting in the Aleutian Islands Unit. With a few exceptions, it nests on nearly all of the Aleutian Islands. Although common, it does not nest in any large concentrations. There are at least 69 colonies in the Aleutians totaling at least 98,000 birds. The largest colony is found on Buldir Island and contains approximately 12,026 birds (Early et al. 1980).

Terns - Aleutian and arctic terns also nest on the ground in small colonies in the Aleutians. The largest combined colony is composed of 500 birds located on Amchitka (Sowls et al. 1978). There are four known colonies totaling 950 birds in the Aleutians (Table 24).

Kittiwakes - Both species of kittiwakes occur in the Aleutians. The black-legged kittiwake nests throughout the chain. The much less abundant red-legged kittiwake, whose entire population is restricted to the north Pacific, nests in the Aleutian Islands Unit only on Buldir and Bogoslof islands. Major black-legged kittiwake colonies are on Attu, Agattu, Buldir, Koniuji, Chagulak, and Amak islands. The largest colony of about 29,000 birds is located on Buldir island (Early et al. 1980). Both of these species build nests on cliffs, and are usually found in association with murres.

Murres - The two species of murres constitute about three percent of the total birds found in the Aleutian Islands Unit, the thick-billed being more numerous than the common murre. Murre colonies are located from Cape Wrangell at Attu on the western end of the chain to Amak Island on the east. Major colonies are found on Attu, Agattu, Buldir, Chagulak, Kagamil, Koniuji, Bogoslof and Amak islands. The largest colony is on Bogoslof and Fire island with almost 70,000 murres in total (Byrd et al. 1980). Murie (1959) also recorded that murres were "numerous" at colonies on Amukta and Kasatochi islands in the 1930's; these colonies still exist, but are small (300 on Kasatochi and 600 or less on Amukta; Refuge files, Adak).

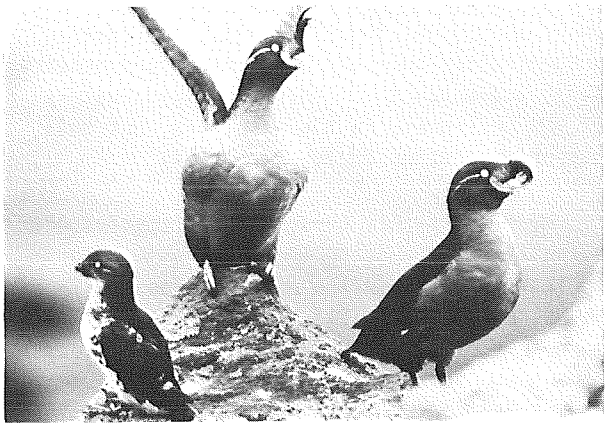
Pigeon guillemots - Pigeon guillemots are found throughout the Aleutians. They are predominantly solitary or small colony nesters. It is estimated that there are approximately 22,919 guillemots in the Aleutians, but this number is considered low (Table 24).

Murrelets - All three Alaskan species of murrelets are found in the Aleutians. The ancient murrelet is the most numerous, with 56,391 birds (Table 24). Marbled and Kittlitz's murrelets are also present but are much less numerous. Ancient murrelets nest in burrows, and marbled and Kittlitz's murrelets in solitary nests high on mountainsides, so estimated numbers are probably low.

Auklets - The least auklet is the most abundant seabird in the Aleutian Island Unit, numbering 2.75 million birds (about 69 percent of the auklets and 28 percent of all seabirds), followed by crested auklets (25 percent of the auklets) (Table 24). The western and central Aleutians support the majority of these birds, major colonies occur on Buldir, Kiska, Segula, Semisopochnoi, Gareloi, Oglodak, Kasatochi, Koniuji, Yunaska, Chagulak, and Ulak islands. The two largest colonies are on Kiska and Buldir, with 1,300,000 least auklets (Day et al. 1979) and 500,000 crested auklets (Byrd and Day 1986). These birds resemble large clouds of smoke when seen from a distance in feeding flights enroute to and from their coastal rookeries.

Cassin's auklet is the next most abundant species of the alcid family found in the Aleutians, numbering 119,940 birds. The majority of these birds, up to 100,000, are found at one colony on Chagulak (Bailey and Trapp 1983). The largest known parakeet auklet population in the Aleutians is on Gareloi, with 43,200 birds (Day et al. 1978), and for the whiskered auklet is 3,000 on Buldir Island (Byrd and Day). Thousands of whiskered auklets, however, can be seen in the tide rips of the eastern and central Aleutians.

Several auklets of the Aleutian Islands Unit deserve special attention from managers. The whiskered auklet breeds only in the Aleutian Islands (Harrison 1983). Its numbers and biology are still unknown; its population is probably underestimated, but is believed to have



Two large colonies of crested and least auklets are on Buldir and Kiska islands.

the smallest numbers of any North American seabird. The whiskered auklet feeds in passes between islands. This bird may be highly vulnerable to oil spills, since tankers are expected to traverse some passes very frequently in the future. Because Cassin's auklets nest in burrows, they have been severely reduced by foxes (Murie 1959). Rhinoceros auklets are rare in the Aleutian Islands Unit, but are more common to the east.

Puffins - Tufted and horned puffins are also members of the alcid family and constitute about 15 percent of the total seabirds nesting in the Aleutian Islands Unit (Table 24). They can be observed on nearly every island and are common throughout the chain. Major nesting areas are located on Attu, Agattu, Buldir, Khvostof, Davidof, Ulak (in the Delarofs), Gareloi, Yunaska, Chagulak, Adak, Bobrof, Tanaga, Ulak (in the Andreanofs), Uliaga, Avatanak, and Rootok islands.

Waterfowl - The lowland lakes, streams and adjacent marine waters of the Aleutians support thousands of nesting and feeding waterfowl, but they do not contain waterfowl habitats of the quality found in bays, lagoons and estuaries on the Alaska Peninsula or elsewhere in the state. The unit does, however, still have a sizeable waterfowl population in spring and fall (estimated to be 250,000 and 125,000 respectively) and is the major breeding area for the endangered Aleutian Canada goose and wintering ground for the emperor goose (refuge files, Adak; Zeillemaker, pers. comm.). The Aleutian Canada goose is discussed further in the endangered species section of this report.

Many waterfowl winter in the Aleutians. A non-migratory population of 500-600 tundra swans breed on Unimak Island and the tip of the Alaska Peninsula. This population winters primarily on Unimak Island. Emperor geese breed on the Kuskokwim/Yukon River Delta and Soviet Siberia. The majority of these geese (60,000 - 140,000 birds) winter in the Aleutian Island Unit. These birds are distributed all along the chain from December to April. The (Asiatic) whooper swan is a regular visitor from Siberian breeding grounds to the western and central Aleutians. The harlequin duck is found throughout the year in the Aleutians, but is most common in winter and spring. Its numbers are estimated to be about 25,000 birds (refuge files, Adak; Zeillemaker pers. comm.) during this period, but is not known to breed in the Unit. Approximately 30,000 oldsquaw winter in the Aleutian Islands Unit along with 30,000 black and 20,000 white-winged scoters (refuge files, Adak; Zeillemaker pers. comm.). Other wintering waterfowl in the Aleutians include approximately 25,000 common goldeneye, 10,000 bufflehead, and about 7,500 king eiders (Refuge files, Adak; Zeillemaker pers. comm.).

The Eurasian green-winged teal is the most common nesting waterfowl, followed by the red-breasted merganser, common eider, northern pintail, and mallard. The common eider is the most abundant nesting sea duck. The importance of each species varies throughout the chain. For example, the common eider is most abundant in the central and western Aleutians, whereas in the central Aleutians the green-winged teal is most abundant. The mallard is evenly distributed throughout the chain. Steller's eiders, mallards, northern pintails, and red-breasted mergansers are year round residents. All waterfowl of the Aleutian Islands Unit were probably reduced in numbers by introduced foxes (Murie 1959). Their numbers have increased ten-fold on Alaid and Nizki Islands since foxes were removed (Zeillemaker and Trapp 1986).

Marsh and waterbirds - At least four and possibly five species of loons occur in the

Aleutians. Red-throated and common loons nest on several islands and some also overwinter. Pacific and yellow-billed loons migrate through the chain. The arctic loon, a Eurasian species, probably visits as well, but it is quite similar to the Pacific loon (and was considered the same species until recently), so positive records are not yet available. Horned and red-necked grebes winter around most islands. The Chinese egret and black-crowned night-heron have each been seen a few times. Some sandhill cranes migrate over the Aleutians in spring and fall with a few stopping briefly enroute to and from Russia. Of the marsh and waterbirds that pass through or breed in the Aleutians, 28 percent breed only in North America, 26 percent only in Asia, 44 percent breed on both continents, and 32 percent are visitors from Hawaii or the south Pacific.

Shorebirds - Fifty-two species of shorebirds have been recorded in the Aleutians (refuge files, Adak; Zeillemaker pers. comm.). Most are spring and fall migrants, but the semipalmated plover, black oystercatcher, and least sandpiper nest in the eastern Aleutians; two Asiatic species, the common sandpiper and wood sandpiper, occasionally nest in the western Aleutians. The common snipe nests at both ends of the chain (North American race in east and Asiatic race in the west). The rock sandpiper and red-necked phalarope nest throughout the chain. Of the migrants, which occur in the thousands, 52 percent are of Asiatic origin, 17 percent come from North America, and 31 percent breed on both continents. Migrant shorebird flocks may appear as "smoke" on the horizon in the eastern Aleutians.

Raptors - Of raptors known to occur in the Aleutians, 39 percent are Asiatic breeders, 55 percent breed on both Asia and North America, and only 6 percent are strictly North American.

Bald eagles and peregrine falcons are permanent residents of the Aleutian Islands Unit. An estimated 500 pairs of eagles fledge approximately 564 young each year (Early 1983). The nesting range of the bald eagle extends from the Alaska mainland westward as far as Buldir. About 50 pairs nest on Adak and over 300 eagles have been counted there in the winter. Large numbers are also known to occur on Umnak and Unimak islands. The (Asiatic) white-tailed eagle has nested on Attu Island. No eagles are known to occur at Shemya, Nizki, Alaid, or Agattu islands, which are between Buldir and Attu.

Limited peregrine falcon reproductive data have been collected in the Aleutians because of the bird's secretive nature. Eyries have been found on 17 islands in the Aleutians. Population estimates are difficult to determine, but are in excess of 200 birds (Sekora 1973).

The snowy owl breeds on Attu, Amchitka, and Buldir islands. The short-eared owl breeds on several islands. Other raptors which have been recorded in the chain are the osprey, northern harrier, rough-legged hawk, golden eagle, Eurasian kestrel, merlin, gyrfalcon, and Oriental scops-owl. The Steller's sea eagle, northern goshawk, and northern hobby occur only accidentally in the Aleutians.

Other birds - Unique to the Aleutians are the many Asiatic bird species which can be found regularly nowhere else in North America. The majority of these observations occur in the western half of the chain. Although sightings of some species have occurred year round, most are observed during the spring and fall migrations. A list of Asiatic species observed to date is contained in Appendix D. In the last four years, nine new North American records have been tallied, including the black-winged stilt, northern hobby, Oriental pratincole, mugimaki flycatcher, gray-breasted flycatcher, Siberian blue robin, pintailed snipe, black-tailed gull and lanceolated warbler.

Rock ptarmigan are distributed throughout the chain west of Unimak and are common on the larger islands. Variations between island groups have resulted in the classification of several subspecies (Gabrielson and Lincoln 1959; Johnsgard 1983):

Everman's Rock Ptarmigan,
Lagopus mutus evermanni: Resident on Attu Island. About 4,600 are thought to inhabit the island.
Townsend's Rock Ptarmigan,
Lagopus mutus townsendi: Resident on Kiska, Little Kiska, and possibly Buldir Island.
Amchitka Rock Ptarmigan,
Lagopus mutus gabrielsoni: Resident on Semisopochnoi, Amchitka, Little Sitkin,

Segula, and Rat islands. About 3,500 occur on Amchitka.

Sanford's Rock Ptarmigan, Lagopus mutus sanfordi: Resident on Tanaga and Kanaga islands. About 2,800 are on Kanaga.

Chamberlain's Rock Ptarmigan, Lagopus mutus chamberlaini: Resident on Adak, Kagalaska, Great Sitkin, and other islands between Adak and Great Sitkin islands.

Turner's Rock Ptarmigan, Lagopus mutus atkhensis: Resident only on Atka Island.

Yunaska Rock Ptarmigan, Lagopus mutus yunaskensis: Resident on Yunaska, Amukta, and possibly other sites in the Islands of Four Mountains.

Nelson's Rock Ptarmigan, Lagopus mutus nelsoni: Resident on Chuginadak, Herbert, Kagamil, Umnak, Unalaska, Akutan, and Unimak islands.

The willow ptarmigan occurs on Unimak Island.

The three most common songbirds in the Aleutian Islands Unit are the rosy finch and snow bunting, which are year round residents, and the Lapland longspur, which is a summer nesting resident. Other common passerine species are the song sparrow, winter wren, and common raven.

Mammals

Land mammals - Appendix E lists the 12 species of land mammals found in the Aleutian Islands Unit. Five of these species (wolf, brown bear, weasel, least weasel, and wolverine) are found only on Unimak Island. Population estimates for brown bear and caribou are 65 to 85, and 2,000 to 3,000 respectively. Of the remaining seven species of land mammals, five were introduced. They are the caribou/reindeer, the Norway rat, the arctic ground squirrel, the Greenland collared lemming and the arctic fox.

Reindeer were initially introduced to Atka as a food source and for antlers to be sold as an aphrodisiac. The commercial venture has since failed and there are now over 2,000 feral reindeer left on the island. Caribou from the Nelchina herd on mainland Alaska were introduced to Adak in 1958 to serve as a potential emergency food source and for recreational hunting. The herd is managed for a post-season population of 250 animals. Over 130 animals are harvested annually.

The Norway rat was accidentally introduced by the early Russians and more significantly when ships docked during World War II. It is now found on 16-19 islands scattered throughout the chain. In some instances, introduced rodents act as predators of ground nesting birds; in a few cases, voles and ground squirrels are causing erosion problems by overgrazing the vegetation. Rats appear to have become extremely numerous on Rat Island since foxes were eliminated there; no rat removal measures have yet been undertaken.

Arctic and red fox were originally found only on a few of the eastern Aleutians. They were introduced to over 80 of the Aleutian Islands between 1836 and 1930. The damage from this introduction to native bird species found on the islands is significant, as already discussed. Because of the extirpation of many species of birds from these islands, a plan for fox management was developed. This plan basically promotes the eradication of the introduced fox from select islands to allow native bird species to return and/or recover.

Marine mammals

Sea otter - The Aleutian Islands were established as a refuge in 1913 initially to protect the sea otter. Since that time, the sea otter has made a dramatic recovery. Their population in the Aleutians are now estimated to be between 55,100-73,700 sea otters (Calkins and Schneider 1985). The sea otter populations in the Rat and Andreanof Islands of the central Aleutians showed signs of being at carrying capacity in the 1940s (Kenyon 1969). In 1969, an aerial count of sea otter was completed for the central and eastern Aleutians, Islands of Four Mountains, and Fox Islands. Colonies were established in the Fox and Krenitzin Islands during the 1960s and these have the greatest potential for further population increase. Sea otters are common in the waters north of Unimak Island on the north side of the Alaska Peninsula. Hundreds of otters have been seen in the water around Amak Island. No intensive efforts to survey sea otter populations in the Aleutian Islands have been made since 1965, with

no concerted effort to gather data on sea otter abundance for over 20 years (and close to 30 years in some areas).

Seals - Harbor seals are found throughout the Aleutians, typically in areas where water depths are less than 180 feet. They can be observed hauled out on offshore reefs, rocks, ledges, and beaches along the main islands of the chain. The number of harbor seals in the Aleutian Islands Unit is estimated to be about 85,000 animals (Lowry and Frost 1981).

The northern fur seal is another marine mammal that was hunted almost to extinction near the turn of the century. Fur seals feed mostly on fish and squid. At present, there is only one rookery in the Aleutians. It is located on Bogoslof Island where the population is approximately 112 animals in 1985. Unimak Pass in the eastern Aleutians is extensively used by the Pribilof Islands stock, especially during southward migration in the fall and the northward migration in the spring. Juvenile fur seals use the area year round, and adult males wintering in the southeastern Bering Sea and northern Gulf of Alaska also forage in that area. Akutan and Umnak passes are also extensively used by the northern fur seal.

Sea Lion - The northern or Steller sea lion ranges in the nearshore and offshore waters throughout the Aleutian Chain. Their distribution is associated with specific land areas (rookeries, haul outs and stopover areas) where they concentrate in conspicuous numbers for breeding, pupping, and resting (Calkins and Pitcher 1982). Northern sea lions are found at approximately 50 different locations in the Aleutian Islands Unit and their number was estimated at 97,720 animals (Lowry et al. 1982). The world population of northern sea lion has decreased over a ten year period more than 50 percent from the 230,000 once present (Braham et al. 1980). This decrease is forcing the National Marine Fisheries Service to consider giving this species a "depleted" status (Tom Loughlin pers. comm.). On certain rookeries in the eastern Aleutian Islands, the sea lion population is estimated to be only 20 percent or less of its original numbers (Nysewander et al. 1982, Braham et al. 1980). In the western Aleutians, populations have declined to 40 percent of their 1978 numbers. On three western Aleutian rookeries, Gramp Rock, Tanadak, and Kiska, populations declined from 8,935 in 1978 to 2,883 in 1988 (Vern Byrd, pers. comm. 1988). Appendix C indicates specific sea lion habitat locations in the Aleutians.

Walrus - Regular walrus occurrence in the Aleutians is limited to Amak Island in the eastern Aleutians. There is one recent (1985) sighting of walrus on Unalaska Island. There have also been two recent (1977 and 1978) sightings of northern elephant seals on Ugamak Island in the eastern Aleutians.

Whales and porpoises - Very little is known about the whales and porpoises that occur in the waters off the Aleutian Islands Unit. Gray whales migrate through the eastern passes as far west as Unalaska. Blue and sei whales are found in the salt waters from Akutan to Buldir Island and from Akutan to the Delarof Island Group respectively. Sperm whales, killer whales, northern harbor porpoises, Dall porpoises, Baird's beaked whales, goosebeaked whale, Pacific beaked whales, minke whales, fin whales, humpbacked whales, and right whales are also found in waters off the Aleutian Chain. Little is known, however, of their distribution or abundance. Killer whales, Dall porpoises, and minke whales are the three species most commonly observed in the Aleutians.

Endangered species

The Aleutian Canada goose, short-tailed albatross, Chinese egret, and the Aleutian shield fern are the four endangered species that have been observed in the Aleutians. The short-tailed albatross is a rare, but regular visitor in May and August. One Chinese egret was observed once on Agattu Island in 1974.

The Aleutian Canada goose historically nested throughout the Aleutians. Since the introduction of arctic foxes to most of the Aleutian Islands, these birds now occur on only two islands (Chagulak and Buldir) in the Aleutian Islands Unit. Neither island had foxes introduced. A reintroduced population is currently developing at Agattu Island following fox removal.

To aid in the recovery of this endangered species, fox are being eradicated on selected

islands and geese are being transplanted from Buldir to fox free islands where the birds historically nested. The Aleutian Canada goose population is currently estimated to be about 4,500 birds, a gain from its estimated 1975 population of about 700 geese.

The Aleutian shield fern, Polystichum aleuticum, which was historically found only on Adak and Atka islands, was listed as endangered in 1988. A total of twenty clumps at two separate sites were found in 1987 and 1988 on Adak. Field work was being done in 1988 as the first step in preparing a recovery plan for this species.

HUMAN ENVIRONMENT

Cultural Resources

The Aleutian Islands, as well as parts of the adjacent mainland, were occupied at the time of contact by the Aleuts, a group related to the Eskimos. The subsistence base of the Aleuts was virtually entirely maritime, with extensive exploitation of almost all local whale species, sea mammals, fish, invertebrates, seabirds (including eggs), and, to a limited extent, plants. Terrestrial mammals were virtually absent from the islands. Due to the weather, even the smaller camps of the Aleuts tended to have large semisubterranean houses, each housing several families (Lantis 1984:166). Each village would generally have a recognized leader, but beyond the village or small island there was no particular organization. Leadership was frequently hereditary, and leaders were often whaling captains as well as the heads of the strongest family in the village.

The Russian fur trade, along with the Russian Orthodox Church, dominated Aleutian life from the 1850's until the American purchase of Alaska. The early years, before the founding of the Russian-American Company, saw considerable loss of population from epidemic and other causes (Lantis 1984:163). The Russians also caused a relocation and consolidation of the population for better control. Aleut hunters were used elsewhere by the Russians (some reportedly traveled as far as Fort Ross in California), and whole villages were moved, even to previously uninhabited territory (the Pribilof Islands).

The later history of the Aleutians was marked by a continuation of fur trapping, the introduction of fox farming, and the development of commercial fishing. The twentieth century history of the area was dominated by World War II, including the only battle of that war fought on United States soil. Military uses of islands in the Aleutians continues to the present.

Some areas of the Aleutians are known very well archaeologically; these tend to be on those islands where there are now permanent villages (Atka, Unalaska), or where government projects have generated substantial archaeological effort, such as Amchitka (McCartney 1977). Other islands no doubt have similar numbers of sites waiting to be discovered. One particularly significant site is the Anangula Site on a small island off the coast of Umnak. Materials at Anangula date to about 6,000 B.C.

Several sites in the Aleutians are now designated as National Historic Landmarks due to their significance in World War II. Two of these, Attu and Kiska, are administered as part of the refuge. Dutch Harbor is in private ownership, and Adak is a Naval base. Many other World War II sites are dotted throughout the chain.

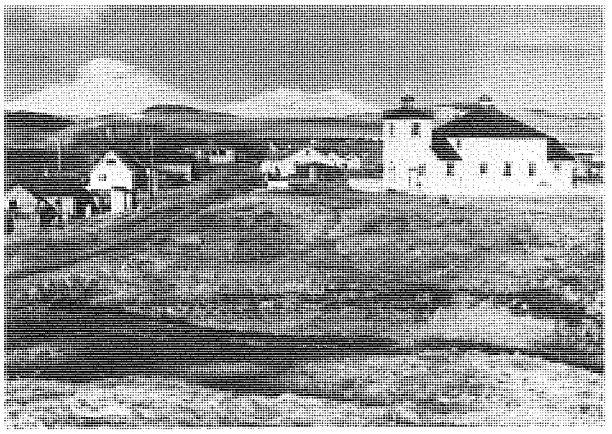
Subsistence Uses

All communities in the Aleutian Islands are considered rural communities for subsistence purposes. The military communities do not have a true subsistence orientation since most residents have been in the Aleutians less than a two year tour of duty and many are not Alaskan residents. Nikolski, Atka, Akutan, False Pass, and, to a lesser extent, Unalaska are very dependent on subsistence. This is discussed in greater detail in the sections on the individual communities.

Recreational Uses

Most recreational use occurs by military personnel and their families adjacent to the bases, by local residents near the villages in the eastern part of the chain, or by commercial fishing crews who occasionally come ashore to beachcomb or sport fish. There is very little use of the Aleutian chain by nonlocal people due

to the difficulties of access, both in terms of logistics and expense. At least one adventure cruise ship a year, carrying about 150 people, visits the Aleutians. In recent years stops have been made at Atka, Unalaska, Akutan, Akun, Kiska, and Bogoslof. Japanese or American World War II veterans and their families occasionally visit the sites of World War II engagements at Kiska and Attu. Bird watching groups of about 65 people also visit Attu every spring. Aleutian Experiences tour company operates out of Unalaska and flies visitors to Unimak, other parts of Unalaska, and Akutan. Some sightseeing is done from the state ferry which runs to Unalaska from Seward once a month from May to October. Approximately 600 passengers took this ferry to or from Unalaska in the year ending October 1987 (Alaska D.O.T. 1987). Other adventure travelers have been known to visit the Aleutians by sailboat, yacht, or sea kayak. No visitor use data is available except for the military bases and the commercial groups who must apply for permits. Recreation is discussed in greater detail under the communities.



Residents of Nikolski, an Aleut village on Umnak Island, depend heavily on subsistence. Near the village only the mountains remain in the refuge.

Economic Uses

Two grazing permits on the refuge were in existence at the time the areas became part of the refuge. Currently, approximately 600 sheep and 300 cattle graze on Umnak and 425 sheep, 425 cattle, and 300 horses graze on Unalaska. The only commercial guiding and tours done on the refuge are those described above.

Military Uses

Four Aleutian Islands (Attu, Shemya, Amchitka, and Adak) contain military bases, and portions of the islands or neighboring islands are used for military training. The Coast Guard maintains a base on the eastern one-third of Attu Island between Massacre and Holtz Bays and at Adak. The Navy is located on both Adak and Amchitka Islands. About one-third of Amchitka and Adak islands are used by the Navy. The Navy has several commands located on Adak Island centered around Kuluk Bay. The Air Force uses all of Shemya Island. The Coast Guard still holds a withdrawal for an abandoned base on 9,584 acres of Unimak Island. An Intent to Relinquish the withdrawal has been filed but clean-up of buildings and debris has not yet been accomplished.

New facilities and training activities are currently planned for the Aleutian bases. Additional radar facilities on Amchitka Island are already under construction (U.S. Army Corps of Engineers 1987).

Proposed training exercises include activities such as helicopter overflights; vehicular travel using rubber-tired equipment and tracked vehicles; aircraft operations using C130, C141, and C5A aircraft; nearshore use and docking of various maritime vessels; beach landings with small rubber boats; cross-country foot patrols; and weapons use, including small arms and mortars. Specific areas are designated for military exercises (State of Alaska Office of Management and Budget 1987b).

The Department of Defense is continuing its Environmental Restoration Defense Account, Debris Cleanup and Restoration project, which was initiated in 1983. The purpose of this project is to clean up and, where appropriate, rehabilitate World War II military sites. Chemical sampling and analysis for contaminants also is conducted, where appropriate. Sites on Alaid, Agattu, Buldir, Amchitka, Tanaga, Atka, Great Sitkin, and Unimak islands in the Aleutian Islands Unit are targeted for cleanup.

Communities

This is a far-flung region geographically and a disparate region in terms of community organization. The Aleutian region includes communities structured around several fundamentally different organizational principles. There are four military communities or bases, Adak, Amchitka, Attu, and Shemya, and five civilian communities, Akutan, Atka, False Pass, Nikolski, and Unalaska, in the Aleutians Island Unit. Only three of the communities, Adak, Atka, and Unalaska have been studied in depth although some information on the other communities is contained in the following discussions.

Regional generalizations cannot be made about the three specified study communities as they are extremes with respect to their organization and cultural adaptations. Unalaska/Dutch Harbor is unique to the region as a whole. It is a relatively large, ethnically plural commercial center dominated by non-Aleuts, though until as late as the early 1970's it was described as an Aleut village. Its structure and vitality is determined by external commercial and governmental forces which are beyond local control. Atka is a small, ethnically homogeneous community that is often referred to as "the last bastion of Aleut culture." Adak is organized along still another set of social parameters; it is a military enclave. This is not a region at all in contemporary human terms, though it was in precontact and historical times. It is a region only geographically; it is not a region defined by organizational similarities among the communities or cultural and political bonds between the communities.

There are some ties between the civilian communities of the Aleutian region, though these ties are not as strong as community relations in other areas of the state. The first of these is the economic and social ties generated by the Aleut Corporation. The Aleut Corporation is the regional for-profit Native corporation and the Aleutian/Pribilof Islands Association is the regional nonprofit corporation both established under the Alaska Native Claims Settlement Act. Both of these corporations operate in each of the civilian communities, and individuals in each of the communities participate in corporate activities. Between each of the regional communities which have an Aleut population component (Akutan, Atka, False Pass, Nikolski, and Unalaska) there are ties of kinship, though the number and strength of these ties have declined. There are economic ties between the communities involved in the commercial fishing industry (Unalaska and Akutan). The Aleutians East Borough was formed by seven communities in October of 1987. The new borough includes Akutan, Cold Bay, False Pass, King Cove, Nelson Lagoon, Port Moller, and Sand Point. The Aleutians West Coastal Resources Service Area, including everything from Unalaska west, was also recently formed.

Adak

Adak has the largest population, 5,000, on the Aleutian Chain and is the sixth largest community in the state. It is unlike either Unalaska or Atka in its organization in that it is a government enclave. The other government enclaves in the region, Shemya, Amchitka, and Attu, are smaller. Shemya Air Force Base has about 1,100 residents, Amchitka Navy Base, which is currently under construction, will eventually have a population of about 225, and Attu Coast Guard base has a population of approximately 25 individuals. Adak approaches a normal population as there are a number of families in the community, and this diverse population utilizes local resources. Adak appears in few regional studies; it, as well as Shemya and Attu, are "invisible" communities, as they do not conform to the organizational parameters of civilian communities, nor do they share cultural and/or historical ties to the other communities in the region.

Population trends and composition - Adak is an active Naval base. The population of Adak (along with the populations of Shemya, Amchitka, and Attu) fluctuates in response to changes in national defense policy, not in response to changing local conditions as is the case in the other Aleutian communities. There is no residential Aleut Native population group on Adak, Shemya, Amchitka, or Attu. Another fundamental difference between the population of the military communities and other Aleutian communities is the transient nature of virtually the entire population. Military residents of Adak are on an assigned tour of duty, which last approximately one and one-half to two years.

Barring major changes in national defense or Navy policy, neither of which is considered likely, the population of Adak is expected to remain stable throughout the planning period. The same holds true for the other military installations.

Sociocultural systems - Adak residents have a frontier or sporting attitude towards refuge resources rather than the subsistence orientation of other Aleutian communities.

Community infrastructure - As it is a military base, there is no local government in Adak. It does operate its own school system, however, and there are several local active social groups with formal organizational structures, including the Adak Community Education Council and the Adak Civic League.

Economy - The economy of Adak is strictly based on the military budget. The community is absolutely dependent upon the military. Were the military to withdraw, there would be no community of Adak. Changes for the planning period will be determined by changes in the federal budget, not by fluctuations at the local level. Large changes in levels of federal funding are not anticipated.

Subsistence - Adak is considered a rural community, and some subsistence set net fishing occurs. However, nearly half the inhabitants are not Alaskan residents having resided in Alaska less than one year. Also there are no traditions of subsistence on Adak as no adults residing there were born on Adak and few have been on the island more than five years.

Recreation - There is no "public" use of Adak Island, because access to Adak is restricted. There is no tourism on Adak. However, Adak military and civilian personnel and their families do utilize the refuge for recreation.

The local population is interested in wildlife observation, hunting, fishing, boating, photography, and hiking (Table 25). Visitor use data is possible to collect on Adak, because it has a refuge headquarters and the military monitors activities on the island. The refuge headquarters has a visitor center and public programs which increase interest in refuge lands and resources. A program on the refuge and wildlife-oriented recreational activities was given 51 times during 1986 to a total of 1,311 island residents. In 1984, 400 people attended the "blue card" lectures which are a prerequisite for obtaining the "blue card" necessary for hiking, hunting, or fishing on the island. Educational programs are also run in conjunction with the Navy Youth Center. Due to the high turnover on Adak, information and education programs must be continually repeated.

Table 25. Wildlife related recreational uses on Adak, 1983 through 1986.

	Visits			
	1983	1984	1985	1986
Hunting				
Caribou	0	556	1,110	871
Ptarmigan	560	721	764	919
Waterfowl	130	194	221	265
Fishing	5,553	7,243	3,500	5,317
Wildlife Observation				
Hiking	4,033	3,362	3,258	4,444
Land Vehicle	6,175	5,970	4,881	4,938
Photography	2,057	2,070	1,614	1,657
Total	18,508	20,116	15,348	18,411

(U.S. Fish and Wildlife Service Files)

Waterfowl and ptarmigan hunting are popular on Adak. Waterfowl hunting is also allowed at Attu. Ptarmigan hunting seasons are usually long, opening in early August and closing in April. Caribou hunting is considered extremely popular. In 1986, over 388 caribou hunting permits were issued. Barren ground caribou were introduced to Adak in 1958 and 1959 when 23 calves were transplanted from the Alaska mainland. Since caribou have no natural predators on the island, the annual hunt is essential to limit overpopulation and the destruction of habitat. Approximately two-thirds of the caribou taken during 1986 were taken in conjunction with boat service provided by the Navy to personnel who wish to utilize the public use cabins on the south side of Adak.

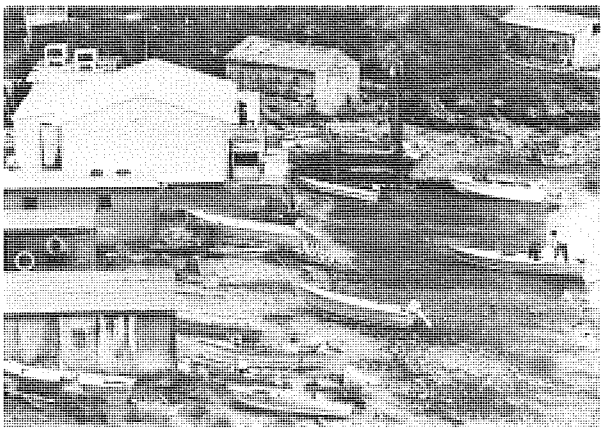
Fishing is the most popular consumptive use on Adak. Popular saltwater species include halibut and crab, while salmon, along with Dolly Varden are popular in the freshwater streams and ponds. Adak has both anadromous and nonmigratory populations of Dolly Varden. The most popular time to fish for Dollies is from June through September, for pink salmon in July and August, and silver salmon during August and September. In 1984 Finger Bay and NAVFAC creek received the heaviest use during the strong pink salmon run. Finger Bay received so much fishing pressure that it has been designated "fly fishing only" by Naval directive. Interest in halibut fishing can be gauged by the use of the recreational fishing vessel "Kuluk Clipper" operated by the Recreational Services Division of the Navy. The vessel can carry up to six fishers, and is continuously booked up at least one month in advance.

Twenty-one trappers took advantage of the opportunity to obtain free and unlimited permits to trap arctic fox on Adak. Most of the trapping occurs near recreational cabins. Five backcountry cabins maintained by the Service are available for use on a first come, first serve reservation basis.

Atka

Population trends and composition - The population of Atka was 93 in the 1980 census and 88 in the 1970 census. The numerical stability of the population indicates that natural growth is being offset by outmigration. In 1983, 89 of Atka's 91 residents were Aleut. This ethnic homogeneity has led to the characterization of Atka as "the last bastion of Aleut culture." Other attributes that lead to this characterization include the degree to which the Aleut language is still used within the village.

The largest determinant of population size and composition in Atka is, and will remain for the foreseeable future, the economy and the lack of commercial development in and around Atka. Without employment opportunities, Atka is unlikely to attract new residents and retain all of its young residents. New commercial avenues are being explored, including the recent construction of a cold storage facility and seafood processing plant and the acquisition of a larger fishing vessel.



Atka, the farthest west civilian community in the Aleutians, is one of the most isolated villages in the state both in terms of distance from other settlements and frequency and intensity of interactions with outsiders.

Sociocultural systems - Atka is a small, ethnically homogeneous Aleut community. It is similar in these respects to Nikolski and Akutan. Atka is one of the most isolated villages in Alaska both in terms of distance from other settlements and frequency and intensity of interaction with outsiders. Atka differs strongly from Akutan in this respect, as Akutan is heavily involved with the commercial fishing industry. Atka, like Nikolski, has seen little development of a commercial economy. In 1983 there were only eight full-time and 23 part-time jobs, and this, coupled with cultural factors, has resulted in a relatively high degree of subsistence activity.

Subsistence resource utilization is still an integral part of a distinctive cultural system on Atka. Atkans rely heavily on the procurement of local resources, including an introduced species, the reindeer. Two sets of values are inextricably associated with pursuit of subsistence resources on Atka. These are cooperation in the procurement of the resources, and sharing of the resources obtained with all those who desire them.

Isolation influences virtually all aspects of community life, including the subsistence orientation and community institutional structures. The remoteness of Atka has a

decided effect on the degree of interaction with other communities of the region, as well as with communities outside of the region. There are few ways to get to Atka. The most expensive option is by charter flight from Unalaska or the Alaska Peninsula. Scheduled flights from Anchorage via the Navy installation at Adak cost $980 roundtrip. Prior to 1982, there was no airstrip in Atka. Air service was handled by an amphibious Goose out of Adak, which began service in the late 1970's. Previously tug service from Adak provided the only transportation to the village. The late 1970's also brought telephone service to Atka, with the installation of a satellite dish and a single phone controlled by the village council. In 1983, a telephone utility installed house to house service and more long distance lines.

Community infrastructure - The local government of Atka is in the form of a council established in 1939 under the Indian Reorganization Act. This council is involved with a wide range of activities, including the running of the Atka Native Store, public services, and provision of local fire service. Atka has recently petitioned for incorporation as a second class city. The local for-profit corporation, formed under the Alaska Native Claims Settlement Act is the Axtam Corporation. The Axtam Corporation controls much of the land on the eastern half of Atka Island, along with lands the village selected in the eastern Aleutians and on the Alaska Peninsula. A subsidiary of the Axtam Corporation, the Andreanof Electric Corporation, provides electrical power to the community.

Economy - As noted above, Atka has a small commercial economy in absolute terms and when compared to some of the other communities in the region such as Unalaska or Akutan. The community has a small scale bottomfish processing plant in operation with plans to expand operations in 1988. A small boat harbor in Nazan Bay to support the commercial fishing fleet is also planned. Local employment, primarily part-time, is shown in Table 26.

Subsistence - Although the village of Atka is surrounded by Native land, Atkans have easy access to refuge lands on the remainder of the island and utilize resources from them extensively.

Table 26. Employment in Atka, March 1988.

Employer	Positions	
	Part-Time	Full-Time
Atka Fishermen's Association	2	1
Axtam Corporation	2	1
Andreanof Electric Corporation	3	0
Atka School	2	3
Atka Village Council	8	1
Atka Native Store	0	2
Aleutian/Pribilof Island Assoc.	2	2
Island Store	1	0
Alaska Dept. of Transportation	1	0
U.S. Postal Service	0	1
Total	21	11

(Atka Village Council pers. comm. 1988)

According to Veltre and Veltre (1983), several factors are changing the pattern of subsistence in Atka. The cost of gasoline has increased the importance of success on hunting and fishing trips. The availability of three-wheeled vehicles, new lightweight aluminum and fiber glass boats which are easier to transport to launch sites, and an improved road system has opened up larger areas of the island including Korovin Bay and Korovin Lake. Changes in employment patterns influence subsistence resource use as well. The share of the Atkan diet which comes from locally procured resources increases from the usual 50 percent to 75 percent when employment is low. Since the introduction of continuous provision of electricity approximately eight years ago, the store has been able to stock frozen foods, including meat. However, few people can afford, nor do they desire, this as an exclusive alternative to subsistence hunting. The availability of electricity has also meant that individuals, by using newly purchased refrigerators and freezers, have been able to "stock up" on subsistence resources when the hunting and fishing have been good.

Atkans view sea otters, the high cost of fuel, and the increase in commercial fishing by nonlocals as threats to subsistence activities. The abundance of sea otters is seen as the cause

of the depletion of invertebrate resources (Veltre 1983). Concerns revolving around commercial fishing include potential damage to local resources from oil spills, increased noise, and garbage thrown overboard, including nets which have been known to entangle and kill reindeer on the beaches.

Sea lion hunting may take place almost anywhere along the coast of Atka and Amlia islands, though effort is concentrated on the rookeries and haul outs. Hunting is usually done from three or four skiffs at a time, with two hunters per boat. Such hunts are usually successful, and the resulting meat is informally divided among the whole village. In the past, an estimated 15-25 sea lions were brought to the village each year, an approximate retrieval rate of 60 percent of sea lions killed. Recently, the sea lion harvest has declined for unknown reasons.

Harbor seals are also hunted on Atka. Though they do not maintain rookeries as the sea lions do, there are favorite hauling out places which are favored by hunters. Although many parts of sea lions and harbor seals were used for other than dietary purposes in the past, they are mainly used for consumption today. It is estimated that approximately 30 harbor seals per year are taken. It is estimated that only about ten percent of harbor seals shot are not retrieved. No other marine mammals are utilized for subsistence in Atka, though within memory both a walrus and a porpoise have been killed and eaten.

Reindeer, introduced in 1914, have grown from 40 original animals to a herd estimated at around 2,000. These reindeer are considered feral so permits are not needed to hunt them. Hunting is a year round activity, although fall is the most active season and calving season the least active because the animals are thin from the winter. Most reindeer hunting is done from boats by scanning the hills for the reindeer. Most of the reindeer stay toward the western end of the island, away from human activity, so a hunting trip involves substantial planning and cooperation. Local hunters estimate that approximately 100 animals per year are taken, and the meat informally distributed around the village.

Foxes are trapped on both Atka and Amlia Islands. Only blue fox are found on Atka, while both blue and silver are found on Amlia Island. Trapping is done only along coastal areas, during the months of December and January. During the 1982-83 trapping season approximately 80 fox were taken. Prices for pelts were low, so trapping was not as lucrative as it once was.

Salmon, cod, and halibut are the most important fish species. Subsistence use of salmon is important to the residents of Unalaska, Atka, Akutan, and Nikolski. In the past, salmon were taken in the streams with weirs and traps but now the fishery occurs in the bays with gill nets, and beach and round haul seining. Sockeyes are considered the most desirable species on Atka and are taken primarily from four locations; Deep Bay, Sarana Bay, a bay just west of Explorer Bay and the outlet from Korovin Lake. Significant numbers of Dolly Varden/Arctic char are also taken, primarily with gill nets and with rod and reel.

Cod and halibut are caught with hand lines, skates (single baited lines with multiple hooks, up to 25 of them one meter apart), or deep sea poles. Pogies are taken throughout the year by hand lines and poles. Pogies are taken most often during the winter and early spring months when other food sources are scarce. Several other species of fish are caught infrequently: these include Atka mackerel, yellow sculpin, bullhead, Japanese perch, and herring.

Birds and eggs are also utilized by Atkans. Common eiders are probably the most frequently hunted bird. In a good year it is estimated that 150 geese, primarily emperor geese, are taken. A wide variety of other birds are hunted less frequently by Atkans (Veltre and Veltre 1983). All families utilize locally collected eggs, with sea gull eggs being the most common. Eider eggs are also popular, and some oystercatcher, puffin, and ancient murrelet eggs are taken as well.

A variety of marine invertebrates are utilized by Atkans. These include sea urchins and clams, (whose diminishing numbers have been the cause of much concern), chitons, limpets, blue mussels, octopus, and crabs. Less frequently eaten are sea cucumbers, sea anemones, and sea snails.

Local plant resources, though constituting a small portion of the diet, continue to be used today. These include wild celery, petruski, and berries. Plants utilized for purposes other than consumption include driftwood for heating and cooking at camps, and cottonwood for smoking salmon. Grass is used for basket making, and yarrow is utilized to stop bleeding.

Recreation - Transportation to Atka Island is extremely expensive so there is little, if any, nonlocal use of the island. There are no guides operating in Atka. The waters around Atka Island are utilized by outside commercial fishermen, and some of them may bird watch, photograph, sport fish, or beachcomb.

Unalaska-Dutch Harbor

The official name of this incorporated first class city is Unalaska. The city includes land on both Amaknak and Unalaska islands, and one of the harbors on Amaknak Island is known as Dutch Harbor.

Population trends and composition - Unalaska is experiencing a period of population growth, following a decline resulting from the collapse of the crab fishery in the early 1980's. According to the Alaska Department of Labor, the population for 1981, 1983, and 1984 was 1,944, 1,677, and 1,630 persons respectively. Current population is believed to be higher, perhaps in the 1,700 or 1,800 range. In addition, approximately 2,500 nonresidents work seasonally in Unalaska (Miller 1987).

Ethnically, Unalaska is a diverse community. Traditionally an Aleut village, Unalaska has nonetheless experienced considerable contact with outsiders due to its fine harbor. During World War II, a large military installation was built in and around the community. Following the war, it became a fishing and shipping port of international importance. Currently, Aleuts, around 200 individuals, are a minority of the population. Euro-North Americans comprise the bulk of the population, but there are significant numbers of Southeast Asians, Filipinos, and Mexicans who came primarily to work in the seafood industry.

With the decline of the crab fishery, the composition of the population of Unalaska has been altered. The Aleut population has remained stable, the number of Euro-North Americans has declined somewhat, and the population of other ethnic groups has declined significantly with the closure of many of the seafood processors. The population changes for the next ten years appear to be dependent on three things: the recovery, if any, in the crab fishery, the development of a bottomfishery which is already underway, and involvement with oil and gas development.

The social, political, and economic organization of Unalaska focuses on the commercial fishing industry.

Dramatic recovery of the crab fishery is not considered likely. Several attempts with mixed results have been made by firms in both Unalaska and Akutan to enter the bottomfishery. Unalaska has already been the site of activity associated with oil and gas exploration, and marine service facilities have been constructed to support the exploration phase. Growth based on oil and gas will depend on the quantities of these resources that are found.

Sociocultural systems - Unalaska is an ethnically heterogeneous, primarily non-Native community. Social, political, and economic organization focuses on the commercial fishing industry. When compared with other communities in the region, it is characterized by an extraordinary level of involvement in the commercial economy. While unemployment is a large concern in most of the other communities, Unalaska employers lament the small pool of

potential workers. There is much entrepreneurial activity as well, even with the decline in the crab fishery. Community structure is influenced to an exceptional degree by external commercial and governmental forces. Unalaska is isolated, in terms of distance, from other major commercial centers, but it is plugged into many communication, shipping, and commerce networks. It is the best deepwater port in this part of the Bering Sea, and it lies close to the Great Circle shipping route. Unalaska enjoys ease of access to shipping lanes from the south, so supplies for western and northern Alaska pass through its waters.

Unalaska is often characterized as a regional service center, but this is not entirely true. Activities throughout the region are supplied from Unalaska, such as commercial fishing, but Unalaska does not act as a focal community for villages such as Nikolski or Atka. Villagers are much more likely to go to Anchorage than Unalaska to obtain things that they cannot get in their home community. Akutan has the greatest frequency of interaction with Unalaska, because of the interaction between the fisheries based out of these communities. Also, Akutan does not have an airstrip so air service to Akutan is routed through Unalaska. The Western Aleutians Coastal Resource Service Area was recently formed which should increase Unalaska's role in regional affairs.

There are several different general ways of life in Unalaska, with length of residence in the community being strongly correlated with lifestyle. Aleuts, and the handful of non-Aleuts who are also permanent residents of the community, share a particular set of orientations. Another group, the long-term transients, are primarily professionals and skilled workers who have come to Unalaska typically for three to five years and have some financial or career goal to accomplish during that time. This group is composed primarily of Euro-North Americans. The third group, the short-term transients, are the most ethnically diverse. These individuals typically live at one of the seafood processing facilities in an enclave-style living arrangement, and have little interaction with the community at large, or even the physical environment outside of the workplace. In addition to these residential groups, large numbers of commercial fishers pass through the community during the fishing seasons.

The subsistence orientation of Unalaskans varies widely between ethnic groups and residence categories. For the Aleuts, the use of subsistence resources is an important marker of ethnic identity and a way of maintaining continuity with the past. Subsistence resource utilization is also important for many of the people who have become long-term transient residents of Unalaska, in that what drew them to the community was their perception of Unalaska as a frontier community. For these individuals, utilization of local resources is an important part of their lifestyle. Short-term transient residents (residing in the community for a year or less) seldom get involved with the procurement of local resources except in a sporting sense, such as salmon fishing.

Community infrastructure - Unalaska is a first-class city, and as such is responsible for providing a wide range of municipal services, including power, water, road maintenance, a local school system, and public safety. During the crab fishery boom, city government and its support system grew rapidly. Now the community is going through a period of decision-making as to the direction of movement in an uncertain economy (Impact Assessment 1982a).

Economy - In 1980, Unalaska was the number one fishing port in the United States in terms of the dollar value of all harvests. Since that time, the king crab stock and the local economy declined dramatically. As a result, the commercial fishing industry has become more diversified. Pollock, cod, herring, salmon, and various species of crab are now harvested and processed in Unalaska. A surimi plant opened in early 1986, and a second one is planned. This diversification has made the industry less cyclical and has allowed many processors to operate year round.

In 1986, there were six seafood processors in Unalaska employing 400 to 500 workers during the peak season. More of these workers were Unalaska residents than in the past. The year round processing operations will be more likely to attract a less transient work force.

Other important segments of the economy include a relatively large support sector for the fishing industry, recently expanded air service to the community, and the Native corporations. In addition, between 1982 and 1985 the oil industry used Unalaska as a support base for exploration activity in the Bering Sea. Exploration has since ceased due to low oil prices.

The regional Aleut Corporation and Ounalashka Corporation have a strong presence in the economy. The Aleut Corporation owns a sand and gravel company and a ship repair and support company in Unalaska. The Ounalashka Corporation, which has recently shifted its focus to real estate, owns a service station and the American President Lines, a container cargo service.

There is no mineral activity in the area outside of a geothermal energy pilot project near Mount Makushin. A sheep and cattle ranch operates in the Chernofski area on the western end of Unalaska Island. A minimal amount of fox trapping is being done on Unalaska Island after years of inactivity. The handful of trappers do not feel trapping has the potential for providing any more than a supplemental income. One tour company operates in Unalaska.

Unalaska is "preadapted" to the changes that are forecast for the 15 year planning period. The institutions and infrastructure of Unalaska are compatible with the types of changes anticipated with the development of either a bottomfishery or oil and gas development. Facilities and services that will directly benefit from oil exploration and extraction related activity are already in Unalaska. Support services for the oil industry would be similar to those already utilized by the fishing industry. Oil industry activity, which is likely to increase, if only moderately and in the short-term, will not be as potentially disruptive as in other rural Alaskan communities.

Subsistence - Unalaskans do not utilize the Alaska Maritime Refuge to any significant degree. Virtually all of the resources that Unalaskans desire can be found within the Unalaska Bay area, and travel outside the Bay is much more difficult and dangerous than travel within it. However, increased population around the Bay along with increased pollution is beginning to force people to venture further.

Salmon is the most important resource utilized for subsistence in Unalaska. Residents fish primarily for pink salmon with the most important areas being Winslow, Wide, Broad, Nateekin, Captains, and Swimmers Bays (Veltre and Veltre 1982). Nets are used in the open bays. All Unalaska families utilize salmon, and there is an extensive network of sharing salmon. Halibut and cod are the most common fish caught on the open sea. Virtually all of the owners of the 20 or so skiffs in Unalaska use them for halibut fishing. Halibut are taken with single baited hooks or poles, or with halibut skates which may have as many as 50 hooks. Cod are taken at the same time as halibut, but they are not as popular nor as plentiful. A few other incidental fish are caught, including poogie, sea bass, pollock, and flounder, but the only other fish taken in significant numbers is Dolly Varden. Dollies are present all year, but they are most often fished for in the summer months. Dolly fishing is popular with all segments of Unalaska's population, as the gear used, fish poles, is relatively inexpensive, and the fishing spots are within easy walking distance of town.

Aleuts and other Alaska Natives are the only Unalaskans allowed to hunt marine mammals under the provisions of the Marine Mammals Protection Act of 1972. There are about 12 active Aleut sea lion hunters in Unalaska who take an estimated 20 animals per year. Harbor seals are hunted by the same individuals who hunt sea lions. Harbor seals are not as well liked as sea lions, and many of the 20 or so harbor seals that are taken annually are killed on hunts when no sea lions were found (Impact Assessment, Inc. 1985). Marine invertebrates are an important subsistence resource in Unalaska. The most popular are sea urchins, clams, chitons, mussels, crabs, and shrimp.

Bird hunting is popular in the fall and winter months, and both Aleuts and non-Aleuts participate in this activity. Ducks and geese are the most commonly hunted including emperor geese, mallards, teals, canvasbacks, scaups, goldeneyes, buffleheads, harlequins, eiders, scoters, and mergansers. Ptarmigan are hunted as well. Approximately 50 duck stamps per year

are sold locally. A few eggs are taken by Aleut residents, with sea gull eggs being the most popular. These are gathered primarily on offshore islands, and shared widely through the community.

Various plants and berries, including salmonberries, blueberries, mossberries, strawberries, and lingonberries, are utilized by Unalaskans as well. Virtually all Unalaskans participate in berry picking, with Captain's Bay and Summer Bay being the most popular locations. Wild celery ("pootchky") is utilized primarily by Aleuts, and petruski is widely used as a seasoning.

Recreation - During the frantic commercial fishing seasons, most recreational activities tend to occur in the community itself, either in homes or in commercial establishments. Otherwise, sport hunting, fishing, and sightseeing are the dominant forms of recreation on or near refuge lands. A cross-country ski shop operated in Dutch Harbor in the winter of 1986. However, it is unlikely that many skiers get beyond the private lands surrounding the community to the refuge lands. Unalaska does not have an established tourism industry due to its geographical isolation, although one local company, Aleutian Experiences, is now operating. Most nonresidents enter the community for nonrecreational purposes and are unlikely to engage in recreational activities on refuge lands.

WILDERNESS REVIEW

This evaluation will determine what lands, if any, in the Aleutian Island Unit meet the criteria necessary for wilderness designation. Those criteria are explained in the wilderness review section of the Overview.

Umnak, Unalaska, Sedanka, Akutan, Akun, and Tigalda islands have been selected. Although they all meet the wilderness criteria, they can not be proposed for wilderness at this time, because their eventual ownership is uncertain. Should the selections be relinquished, a wilderness proposal for those areas could be developed. See Table 7 for a complete listing of selected lands in this unit which are suitable for wilderness but are not being proposed.

Samalga and Unalga islands in the Fox Island group will not be evaluated for wilderness designation, because they do not meet the minimum size criterion of 5,000 acres or a size manageable as wilderness. There is private land on both islands. Attu, Shemya, and the northern 61,000 acres of Adak islands will not be evaluated for wilderness, because they are under military withdrawal and contain military facilities or are used for military activities. The remainder of Adak Island is already designated wilderness. The nonwilderness portion of Kiska Island will not be evaluated for wilderness, because it contains substantial amounts of World War II debris including a quonset hut, bomb craters, wooden buildings, gun emplacements, live shells, tunnels, and roads.

Much of the Aleutian Island Unit, 57 percent, is already designated wilderness. This designation was made by the Alaska Lands Act based on the recommendations in the 1973 Draft Wilderness Study Report (U.S. Department of the Interior 1973). Some areas in the chain were found unsuitable for wilderness designation in 1973, because they contained military debris which has since been or is scheduled for clean up. Other areas were not considered for wilderness based on Native land claims, or because they were not a part of the refuge at that time. These types of areas are being considered in the following evaluation.

Additions to the Unimak Island Wilderness Area will also be considered in this evaluation. Since Unimak is proposed for transfer to Izembek Refuge, it is not technically a part of the Aleutian Islands Unit.

Amchitka Island - Amchitka, the largest of the Rat Island group, is located in the western Aleutians. The mountainous third of Amchitka is already designated wilderness. The nonwilderness area contains a relatively flat lowlands interspersed with many small lakes and streams. Pink salmon run up the streams, but the lakes lack fish. The coastline is irregular and ringed with numerous rocks, reefs, and extensive kelp beds.

Foxes have been eliminated from the island, so the endangered Aleutian Canada geese are being reintroduced. In addition, 141 other bird species have been recorded on the island.

Principal seabird species are red-faced cormorant, common eider, glaucous-winged gull, tufted puffin, arctic tern, and Aleutian tern. The nonwilderness portion of the island supports the densest rock sandpiper and rock ptarmigan populations in the Aleutians. The ptarmigan support the most diverse and dense population of avian predators in the Aleutians including bald eagles, merlin, gyrfalcon, peregrine falcon, snowy owl, and short-eared owl.

A large colony of sea lions is located on offshore rocks adjacent to the nonwilderness area. Twenty-two archaeological sites have been located in the area under consideration for wilderness designation.

1. Size - The island is 75,212 acres of which 22,152 are already designated wilderness. Of the nonwilderness portion, 36,524 are covered by a memorandum of understanding with the U.S. Navy. The remaining 16,536 acres which are being evaluated for wilderness are contained in three parcels. The smallest parcel, which is less than 1,000 acres, is located in the middle of the existing wilderness area. The other parcels are located in the center of the island, adjacent to the existing wilderness area, and north and south of a road which runs the length of the island (Figure 56C). The road right of way consists of the road bed and 100 feet on either side of the road bed.
2. Land ownership - The entire island is owned by the federal government. There are 14 Native selected small tracts, 214 acres total, within the area under consideration for wilderness designation. These tracts cannot be proposed for wilderness at this time even though they meet the criteria, because their eventual ownership is uncertain. Should the selections be relinguished and Amchitka proposed for wilderness, these tracts should be added to the proposal.
3. Natural integrity - The military activities which have occurred on this island have not affected the natural systems of the parcels under consideration. Fox introduction in the early 1900's decimated the Aleutian Canada geese and undoubtedly reduced populations of other ground and burrow nesting seabirds. With the elimination of the foxes and the reintroduction of Aleutian Canada geese, bird populations are gradually returning to natural levels.
4. Apparent naturalness - The parcels under consideration appear natural except for the road which is technically outside the proposed wilderness areas. Any military debris remaining since World War II has since been cleaned up on this part of the island.
5. Outstanding opportunities for solitude - This island, located in one of the most remote corners of Alaska, is not open to public use due to military restrictions. Anyone wishing to visit the island must get authorization from the U.S. Navy. About 150 - 200 people will be living on the eastern end of the island once the Navy base is in operation. The parcels under consideration are located about 10 miles by road from the housing area. The road bisecting the parcels will be traveled several times a day as the shifts are changed at the military installations on the west end of the island. This would interfere with opportunities for solitude immediately adjacent to the road. However, with the existing wilderness area, these three parcels would create a very large area (38,688 acres) which overall would offer outstanding opportunities for solitude.
6. Outstanding opportunities for primitive recreation - Recreational opportunities will only be available to military personnel stationed on the island as described above. Fishing, camping, beach combing, photography, bird watching, and hiking are available on these parcels. If the parcels are considered separately, recreational opportunities are less than outstanding. When considered as part of the overall wilderness area, opportunities are outstanding due to the diversity of terrain and possible experiences.
7. Special or unique features - Special features include the unusually dense populations of rock sandpiper, rock ptarmigan, and avian predators. The endangered Aleutian Canada geese and the numerous archaeological sites are also special features.
8. Outstanding resource values - Taken as a group, these parcels have outstanding resource values. They provide habitat for

an endangered species (Aleutian Canada goose). Avian predators, rock ptarmigan, and rock sandpipers occur in unusual densities. In addition, the parcels are rich in archaeological sites.

9. Existing wilderness boundary adjustment - These parcels would expand the boundaries of the existing 22,152 acre wilderness area. These parcels would contribute to the habitat diversity of the wilderness area as they contain primarily lowland, wetter habitat, and the existing wilderness is almost all mountainous habitat. These areas were not proposed as part of the original wilderness area evaluated in 1973 and established in 1980 with passage of the Alaska Lands Act, because the military was interested in utilizing these parcels at that time, and World War II debris was not yet removed.

Conclusion - A portion of Amchitka, 16,322 acres, meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It also has special features which is an optional criterion. In addition, it meets both the Service's criteria in that it has outstanding resource values and is an adjustment to an existing wilderness boundary. The 36,524 acres which are covered by a memorandum of understanding with the U.S. Navy and the 14 small tract Native selections, 214 acres, cannot be proposed for wilderness at this time.

Ogliuga Island - This island is part of the Delarof Island group in the western Aleutians. Ogliuga is a low, flat plateau bounded by cliffs and rocky beaches. Surrounded by relatively shallow seas, it provides excellent sea otter habitat. Principal seabird species are horned puffins, pigeon guillemot, common eider, glaucous-winged gull, tufted puffin, and cormorant.

1. Size - The island is 2,389 acres of which 2,000 acres are already designated wilderness. The remainder, 389 acres, is under consideration for wilderness. This small parcel meets the size criterion because the entire island would be in wilderness status.
2. Land ownership - The area under consideration is in federal ownership and has not been selected.
3. Natural integrity - Foxes were introduced to this island in the first part of the century which resulted in the elimination of Aleutian Canada geese and undoubtedly affected the populations of other ground and burrow nesting birds. Foxes have been eliminated from the island, and geese may be reintroduced.
4. Apparent naturalness - World War II debris including a rusting Marston mat runway, collapsed bunkers, and antennas are located in a portion of the area under consideration. This debris is not substantially noticeable and is an insignificant part of the overall view. Debris cleanup will probably occur in the next five years under the Defense Environmental Restoration Act.
5. Outstanding opportunities for solitude - This island is located in one of the most remote and inaccessible parts of Alaska. The nearest human habitation is Adak 85 miles to the east. Solitude opportunities are outstanding.
6. Outstanding opportunities for primitive recreation - Camping, hiking, beach combing, and nature study are possible but would not be considered outstanding due to the lack of diversity in terrain and the small size of the area under consideration. Access is limited due to the remote location and difficult weather of the Aleutians.
7. Special or unique features - There are no known special features on this portion of the island.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - This 389 acre parcel would expand the existing 2,000 acre wilderness area and put the entire island under the same management scheme, wilderness management. This area was not considered for wilderness in the 1973 review, because the military debris was much more noticeable then, and the Defense Environmental Restoration Act cleanup program had not yet been instituted.

Conclusion - This area meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. In addition, it meets the Service's criterion in that it is an adjustment to an existing wilderness boundary which will improve manageability. It does not have outstanding resource values.

Tanaga Island - This is the westernmost island in the Andreanof Island group. Tanaga Volcano, 5,925 feet, is the highest of the two volcanoes on the island and the highest volcano in the Andreanof Islands. Precipitous cliffs and steep slopes line the north shoreline. The small parcel under consideration for wilderness is on the south shore on relatively flat ground interspersed with numerous small lakes and streams. Twenty-seven bird species have been recorded on the island including common eider, bald eagle, peregrine falcon, rock ptarmigan, red phalarope, pomarine jaeger, glaucous-winged gull, black-legged kittiwake, song sparrow, and Lapland longspur. Two archaeological sites are located in the parcel.

1. Size - The island is 128,000 acres of which 127,226 acres are already designated wilderness and the remainder, 774 acres, is under consideration for wilderness. This parcel meets the size requirement because it would be part of a much larger wilderness area.
2. Land ownership - The area is in federal ownership. There is one small tract Native selection, nine acres, within the parcel. This tract cannot be proposed for wilderness at this time even though it meets the criteria, because its eventual ownership is uncertain. Should the selection be relinguished and the larger parcel proposed for wilderness, this tract should be added to the proposal.
3. Natural integrity - Foxes were introduced to this island in the first part of the century which resulted in the elimination of Aleutian Canada geese and undoubtedly affected the populations of other ground and burrow nesting birds. Foxes are scheduled to be eliminated from the island in the next 10 years, if the use of Compound 1080 is approved.
4. Apparent naturalness - This parcel was left out of the 1980 wilderness designation of Tanaga because of World War II debris. Remains of the U.S. Army airbase include a deteriorated Marston runway, several pieces of heavy equipment, collapsed buildings and 55 gallon drums. About 100 acres of this area appears unnatural now but is scheduled for Defense Environmental Restoration Act clean-up by 1991. After clean-up the area will appear natural due to the revegetation and weathering which has occurred in the past 40 years.
5. Outstanding opportunities for solitude - This island is located in one of the most remote and inaccessible parts of Alaska. Very little human use has occurred here since World War II. The nearest human habitation is Adak 60 miles to the east. Solitude opportunities are outstanding.
6. Outstanding opportunities for primitive recreation - Camping, hiking, bird watching, photography, and nature study are possible on this parcel. Views of the high volcanic country to the north are spectacular. By itself, the parcel does not offer outstanding opportunities for recreation because of its small size and lack of topographic diversity. However, when the large wilderness area of which it would become a part is considered, opportunities for recreation are outstanding.
7. Special or unique features - The archaeological sites are unique features.
8. Outstanding resource values - This parcel by itself does not have outstanding resource values. Tanaga Island as a whole does have outstanding values because of its spectacular terrain.
9. Existing wilderness boundary adjustment - This 765 acre parcel would expand the existing 127,226 acre wilderness area and put the entire island, except for the nine acre selected tract, under the same management scheme, wilderness management. This area was not considered for wilderness in the 1973 review, because the military debris was much more noticeable then, and the Defense Environmental Restoration Act cleanup program had not yet been instituted.

Conclusion - This area, 765 acres, meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It also has special features which is an optional criterion. In

Congress gave most of Great Sitkin Island wilderness status in 1980. The remaining 700 acres will qualify for wilderness designation following clean-up of World War II debris.

addition, it meets the Service's criterion in that it is an adjustment to an existing wilderness boundary which would improve manageability. Tanaga Island as a whole has outstanding resource values. A Native selected tract, nine acres, cannot be proposed for wilderness until the selection issue is resolved.

Great Sitkin Island - This picturesque island is located east of Adak in the Andreanof Island group. Great Sitkin Volcano, 5,740 feet, occupies most of the northern half of the island. Its asymmetrical cone displays a one-half mile wide crater in which a steaming basaltic lava dome was built in the 1940's. The most recent eruption was in the late 1970's. A large group of active hot springs, mud pots, and fumaroles occur at the 2,000 foot level. Five small glaciers are found on the upper slopes and deep, glacier carved U-shaped valleys radiate from the island's center. Several large streams, which have runs of pink salmon, drain the mountains. Bird species on the island include bald eagle, rock ptarmigan, winter wren, song sparrow, and glaucous-winged gull. A sea lion colony estimated at 450 to 650 animals is located on the north shore. The parcel under consideration for wilderness consists of a broad valley opening onto a large beach along Sand Bay.

1. Size - The island is 39,219 acres of which 38,519 acres are already designated wilderness. The remainder, 700 acres, is under consideration for wilderness. This small parcel meets the size criterion because, it would become part of a much larger wilderness area.
2. Land ownership - The entire island is in federal ownership, and none of it has been selected.
3. Natural integrity - Foxes were introduced to this island in the first part of the century which resulted in the elimination of Aleutian Canada geese and undoubtedly affected the populations of other ground and burrow nesting birds. Foxes are scheduled to be eliminated from the island within the next 10 years, if Compound 1080 is approved for use.
4. Apparent naturalness - This portion of the island was recommended as nonsuitable in the 1973 Wilderness Review (United States Department of Interior 1973) because of World War II debris. Remains of the Navy base include remnants of wooden buildings, pilings, large fuel tanks, and several sections of road which are almost completely healed over. These remains are substantially unnoticeable except in the immediate vicinity. They are a small part of the overall scene and have no affect on the naturalness of the rest of the parcel. This area is scheduled for cleanup within the next 10 years under the Defense Environmental Restoration Act.
5. Outstanding opportunities for solitude - This island is located in one of the most remote and inaccessible regions of Alaska. A few people visit the island from Adak 25 miles to the west. However, the island is big and rugged and could absorb many visitors without diminishing the opportunities for solitude. The particular parcel under consideration is too small to offer outstanding solitude. However, solitude is outstanding for the island as a whole.
6. Outstanding opportunities for primitive recreation - The 700 acres is too small to offer outstanding opportunities although camping, beachcombing, bird watching, hiking, fishing, and photographic opportunities are available. The beach is easy to land on, and the parcel does offer some of the easiest camping on the island. The island as a whole offers outstanding

opportunities for hiking, climbing, photography, fishing, and geologic study.

7. Special or unique features - The parcel does not have any special features, but the island as a whole does. Unique geologic features include glaciers and evidence of glaciation, an active volcano, examples of dome building, craters, and shield volcanoes, and active thermal areas including hot springs, mud pots, and fumaroles. The sea lion colony on the north shore is also a significant feature.
8. Outstanding resource values - By itself, the parcel does not have outstanding resource values. Great Sitkin Island as a whole does because of its outstanding scenery, excellent examples of volcanic activity and glaciation, and sea lion colony.
9. Existing wilderness boundary adjustment - This 700 acre parcel would expand the existing 38,519 acre wilderness area and put the entire island under the same management scheme. This would simplify management and ensure that wilderness values on the whole island would be protected. It would also add to the wilderness area a camping and landing area easily accessible from Adak. This parcel was not considered for wilderness in the 1973 review, because the military debris was much more noticeable then.

Conclusion - This area meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation when considered in conjunction with the existing wilderness area of which it would become a part. In addition, it meets the Service's criterion in that it is an adjustment to an existing wilderness boundary which would improve manageability. Great Sitkin Island as a whole has outstanding resource values.

Atka Island - This island, which is more than 50 miles long, is the largest in the Andreanof group. Its coastline is deeply indented with bays and coves which provide excellent anchorages. Headlands with sheer cliffs of 300 to 400 feet separate the bays. Korovin Volcano at 4,852 feet is the most prominent point on the island. In addition to Korovin, four other sites are volcanically active. The interior of the island is alpine and glaciated. There are still glaciers on the north end. Fifty-two bird species have been identified on the island including pelagic and red-faced cormorant, emperor goose in winter, green-winged teal, bald eagle, peregrine falcon, black oystercatcher, black-legged kittiwake, ancient murrelet, Cassin's auklet, tufted puffin, horned puffin, and song sparrow. Two sea lion colonies are on the north end of the island. Numerous streams have large runs of sockeye salmon. The historic site of Korovinski village is located on federal land on Korovin Bay. Atka village, population 91, is on the east end of the island on Native conveyed land.

1. Size - The entire island is 250,797 acres of which 59,365 are Native conveyed lands (private) and 81,988 acres are existing wilderness. The Native lands, which are located in the center of the island, split the federal nonwilderness acreage, 109,444 acres, into five separate parcels (Figure 56G). Two of those parcels, the parcel at the south end of Korovin Bay and the parcel at the southeast tip of the island, are less than 5,000 acres and do not meet the size criterion. The remaining three parcels which do meet the size criterion contain 104,184 acres.
2. Land ownership - The three parcels under consideration are in federal ownership. A total of 7,000 acres have been Native selected out of the northern and southern parcels. These selected tracts cannot be proposed for wilderness at this time even though they qualify, because their eventual ownership is uncertain. Should the selections be relinquished and adjacent lands be proposed for wilderness, these tracts should be added to the proposal.
3. Natural integrity - Foxes were introduced to this island in the first part of the century which resulted in the elimination of Aleutian Canada geese and undoubtedly affected the populations of other ground and burrow nesting birds. Reindeer have also been introduced to the island. The herd of about 2,000 animals has severely overgrazed the vegetation on the western end of the island.
4. Apparent naturalness - Off road vehicle trails enter the parcels under consideration in two places on the south side of Mt. Kliuchef and between the village of Atka and

Egg Island. Approximately 30 miles of trail lies within these parcels. The trails are used by Atka residents for subsistence activities. Although the trails are not visible for any substantial distance, they do affect naturalness in the immediate vicinity.

5. Outstanding opportunities for solitude - This island is so difficult and expensive to reach that use is rare other than by the 91 residents. These parcels are big and rugged and can easily accommodate that level of use. Solitude is outstanding in all the parcels.
6. Outstanding opportunities for primitive recreation - Fishing, hunting, bird watching, climbing, nature study, and sea kayaking would all be outstanding activities on this island. The scenery is exceptional both along the coast and in the mountains.
7. Special or unique features - Special features include glaciers, the five active volcanic sites particularly Korovin Volcano, the sea lion colonies, and the historic site of Korovinski.
8. Outstanding resource values - The northern parcel which includes Korovin Volcano and Mt. Kliuchef has outstanding resource values because of its scenery, excellent examples of volcanic activity and glaciation, and sea lion colonies.
9. Existing wilderness boundary adjustment - Only the western half of the island was considered in the 1973 Wilderness Study Report, because all of the townships on the remainder of the island were subject to Native selection. Almost all of the land which can be conveyed to Atka Village has already been conveyed. The status of only 7,000 acres of the remaining federal land is still in question.

   Only the southern parcel is contiguous to the existing wilderness area. However, all of the parcels could be considered an expansion of the Atka Island Wilderness. The addition of the southern parcel would create a more manageable boundary and completely protect Banner Bay. This would improve the current wilderness boundary which isolates a small area of designated wilderness on the north side of Kobakof Bay. The Korovin Volcano parcel would add sea lion colonies and the most scenic and geologically significant features of the island to the existing wilderness. The parcel on the north shore of Korovin Bay would add the historic site of Korovinski.

Conclusion - Three parcels on Atka totaling 97,144 acres meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. They also have special features which is an optional criterion. In addition, all of the parcels meet the Service's criterion in that they are an adjustment to an existing wilderness boundary which will improve manageability or resource protection. The Korovin Volcano parcel meets the outstanding resource values criterion. Two parcels, 5,260 acres, do not meet the size criterion. Native selected lands, 7,000 acres, cannot be considered for wilderness at this time.

Egg Island - This small, rugged island is located in a bay on the west side of Atka Island. Pigeon guillemot and bald eagle are found on Egg.

1. Size - The island is 102 acres.
2. Land ownership - The island is in federal ownership and has not been selected.
3. Natural integrity - Nothing has affected the natural systems of the island.
4. Apparent naturalness - The island shows no sign of human activity.
5. Outstanding opportunities for solitude - The island is located in an extremely remote area. Atka villagers would be the only visitors to the island, and those visits would be infrequent. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Bird watching, sea kayaking, and photography are possible on this island. It is possible to land on the island, but it does not have good camping spots. The island is very scenic but is too small to offer outstanding opportunities for solitude.
7. Special or unique features - There are no known special features.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - This island could be considered an addition to the existing Atka Island Wilderness. It is located in a deep bay of Atka Island and

is surrounded by lands under consideration for wilderness. It would add a highly scenic feature to the existing wilderness area. It was not considered in the 1973 Wilderness Review because it is located in a township subject to Native selection. That question was resolved as discussed under Atka Island.

Conclusion - Egg Island meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. In addition, it meets the Service's criterion in that it is an adjustment to an existing wilderness boundary. It does not have outstanding resource values.

Peter Island - Peter Island and several off-shore rocks and islets are located in Anderson Bay, a fjord-like extension of Makushin Bay, on the west side of Unalaska Island. This mountainous, lushly vegetated island provides nesting habitat for about 2,900 tufted puffins, numerous glaucous-winged gulls, cormorants, and black oystercatchers.

1. Size - The island is 128 acres.
2. Land ownership - The island was reacquired in 1987 through a land exchange.
3. Natural integrity - Nothing has been known to affect the natural systems of the island.
4. Apparent naturalness - There are no known human improvements on the island.
5. Outstanding opportunities for solitude - Peter Island is on the opposite side of Unalaska from Dutch Harbor and the community of Unalaska. Fishing boats would visit Anderson Bay, but it is unlikely that the island would be visited more than a few times a year. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Sea kayaking, camping, bird watching, photography, and hiking are possible on this island. Views of the surrounding bays, coves, and rugged mountains of Unalaska are spectacular. Overall, recreation opportunities are outstanding.
7. Special or unique features - There are no known special features.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Numerous other small islands surrounding Unalaska were included in the Aleutian Island Wilderness in 1980. This island was not considered at that time because it had been Native selected and was subsequently conveyed. Now that it has been reacquired it can be considered for addition to the existing wilderness.

Conclusion - Peter Island meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. In addition, it meets the Service's criterion in that it is an adjustment to an existing wilderness boundary. It does not have outstanding resource values.

Wislow and the Beaver Inlet islands - Round, and Dushkot islands and Erskine Bay, Kisselen Bay, and Tanaskan Bay islets - Wislow Island, located just off the north shore of Unalaska, provides nesting habitat for 10,000 tufted puffins, 3,000 ancient murrelets, and 40 whiskered auklets, one of the higher concentrations in the eastern Aleutians. The Beaver Inlet islands are small low, grassy-topped islands, islets and rocks located near the head of Beaver Inlet on the east side of Unalaska Island. Round Island has the largest tufted puffin colony in Beaver Inlet, 11,500 birds. Dushkot Island provides nesting habitat for 5,500 puffins, black-legged kittiwakes and glaucous-winged gulls. Tanaskan Bay, Erskine Bay, and Kisselen Bay islets also have puffin and gull colonies.

1. Size - The islands total 75 acres.
2. Land ownership - The islands were reacquired in 1987 through a land exchange.
3. Natural integrity - Nothing has been known to affect the natural systems of the islands.
4. Apparent naturalness - There are no known human improvements on the islands.
5. Outstanding opportunities for solitude - The Beaver Inlet islands are located approximately 30 miles by sea from Dutch Harbor and the village of Unalaska. A cannery ship ties up some summers near Sedanka Island on the south shore of Beaver Inlet. Fishing boats come into Beaver Inlet, and some people land on these islands in summer. However, it is unlikely that visitors would encounter anyone else on the islands and virtually no use occurs most of the year. Wislow is located 15 miles

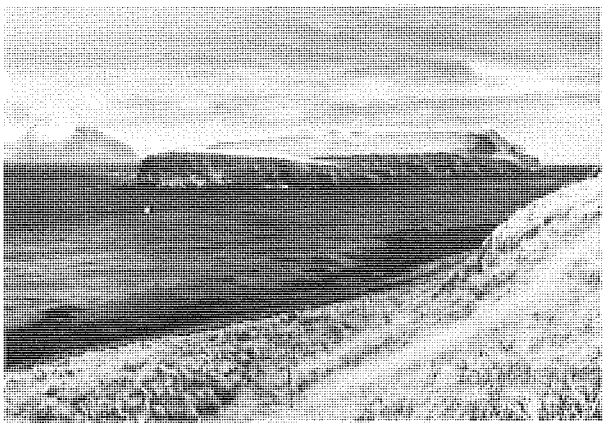
northwest of Dutch Harbor. Wislow may have occasional visitors but opportunities for solitude remain outstanding.

6. Outstanding opportunities for primitive recreation - Sea kayaking, bird watching, and photography would be enjoyable around these islands. However, camping would not be possible on most of them and landing would be difficult. Views of the rugged coastline and the mountains beyond would be spectacular. Overall, recreational opportunities are outstanding.
7. Special or unique features - The dense populations of seabirds are a special feature.
8. Outstanding resource values - The seabird colonies are an outstanding resource.
9. Existing wilderness boundary adjustment - Numerous other small islands surrounding Unalaska were included in the Aleutian Island Wilderness in 1980. These islands were not considered at that time because they had been Native selected and were subsequently conveyed. Now that they have been reacquired they can be considered for addition to the existing wilderness.

Conclusion - The Beaver Inlet islands meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. They also meet the optional special features criterion. In addition, they meet the Service's criteria in that they would be an addition to an existing wilderness and have outstanding resource values.

Baby Islands - This group of five islands and off-shore rocks is located just west of Akutan Pass between Akutan and Unalga islands. These steep-sided flat-topped islands provide some of the most valuable seabird habitat in the eastern Aleutians. Nesting species include tufted puffins, 146,000; all five nocturnal nesters (Leach's and fork-tailed storm-petrels, ancient murrelets, Cassin's auklets, and whiskered auklets) and pigeon guillemots. Ancient murrelets, Cassin's auklets, pigeon guillemots, and whiskered auklets are found in unusually large numbers.

1. Size - The islands total 250 acres.
2. Land ownership - The islands were reacquired in 1987 through a land exchange.



The Baby Islands, reacquired through a 1987 land exchange, provide some of the most valuable seabird habitat in the eastern Aleutians.

3. Natural integrity - Nothing has been known to affect the natural systems of the islands.
4. Apparent naturalness - There are no known human improvements on the islands.
5. Outstanding opportunities for solitude - The islands are located about 25 miles from Dutch Harbor and Unalaska. They are occasionally visited, but solitude opportunities remain outstanding.
6. Outstanding opportunities for primitive recreation - Bird watching, sea kayaking, and photography would be outstanding opportunities on these islands. Landing and camping on the island are relatively easy.
7. Special or unique features - The dense bird populations are a unique feature. The islands support some of the largest numbers of ancient murrelets, Cassin's auklets, pigeon guillemots, and whiskered auklets in the eastern Aleutians.
8. Outstanding resource values - The bird colonies of the Baby Islands are an outstanding resource value. Several species occur in unusually large numbers as described above.
9. Existing wilderness boundary adjustment - Numerous other small islands surrounding Unalaska were included in the Aleutian Island Wilderness in 1980 (Figure 56M). These islands were not considered at that time because they had been Native selected and were subsequently conveyed. Now that

they have been reacquired they can be considered for addition to the existing wilderness.

Conclusion - The Baby Islands meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. They also meet the optional special features criterion. In addition, they meet the Service's criteria in that they would be an addition to an existing wilderness and have outstanding resource values.

Aiktak Island - This small island is located in the Krenitzin Island group on the south side of Unimak Pass. The north shore of the island is relatively low with 30 to 50 foot rocky cliffs and grass slopes. On the south shore, 300 to 600 foot rock walls and grass covered cliffs provide seabird habitat. Seabirds are exceptionally abundant. A 1980 census found there were about 150,000 birds on the island. Principal species were fork-tailed storm-petrels, 15,000; Leach's storm-petrel, 8,500; red-faced cormorant 1,588; glaucous-winged gull, 2,750; common murre, 12,600; thick-billed murre, 2,400; ancient murrelet, 1,000; and tufted puffin, 102,428. Because this island is located on the south side of Unimak Pass, it is an important area for seabirds, waterfowl, and marine mammals who migrate through the pass or feed on the rich sea resources in the pass.

Three bald eagle nests are also located on the island. The endangered Aleutian Canada goose has been observed on the island in recent years but is not known to nest here. Introduced foxes have died off so this island is suitable for reestablishment of geese. An archaeological site consisting of eight house pits is located on the island.

1. Size - The island is 307 acres.
2. Land ownership - The island is all in federal ownership and has not been selected.
3. Natural integrity - Foxes were introduced to this island in the first part of the century which resulted in the elimination of Aleutian Canada geese and undoubtedly affected the populations of other ground and burrow nesting birds. Foxes have been eliminated from the island, and geese may be reintroduced.
4. Apparent naturalness - There are no known signs of human activity on the island.
5. Outstanding opportunities for solitude - This island offers outstanding opportunities for solitude, because it is located in such a remote area. It is possible that no one visits the island in some years.
6. Outstanding opportunities for primitive recreation - Bird watching and photography would be outstanding activities on this island. Camping and other forms of nature study would also be possible. On a clear day, views of the surrounding islands would be exceptional.
7. Special or unique features - The abundance of seabirds on such a small island is a unique feature. The archaeological site is unique as well.
8. Outstanding resource values - This island has outstanding resource values because of its seabird colonies and its location in the midst of key wildlife habitat at the south side of Unimak Pass.
9. Existing wilderness boundary adjustment - This island was not considered in the 1973 Wilderness Review, because it was subject to Native selection. It was not selected, so this issue is resolved. Although Aiktak does not share a common boundary with existing wilderness, it should be considered as part of the larger Aleutian Wilderness. Islands to the east and west were recommended for wilderness in 1973 and subsequently designated.

Conclusion - Aiktak Island meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It also meets the optional special features criterion and the Service's criterion of outstanding resource values. It could be considered a boundary adjustment of the existing Aleutian Islands Wilderness.

Ugamak Island and Round Island - These are the easternmost islands in the Krenitzin Island group. The eastern portion of Ugamak, which is under consideration for wilderness, contains the highest point, a sharp peak 1,042 feet in elevation. Steep cliffs 50 to 1,000 feet high line the north shore. Round Island, a rocky island of less than 20 acres, is located off the southeast shore of Ugamak. Ugamak and Round are

considered by the National Marine Fisheries Service as extremely important northern (Steller) sea lion rookeries. Recent data indicate over 1,500 animals use the sites. Sea lion populations have declined drastically throughout the Aleutians in recent years. Sea otters and harbor seals also use the islands. Because these islands are located on the south side of Unimak Pass, they are important areas for seabirds, waterfowl, and marine mammals that migrate through the pass or feed on the rich sea resources in the pass.

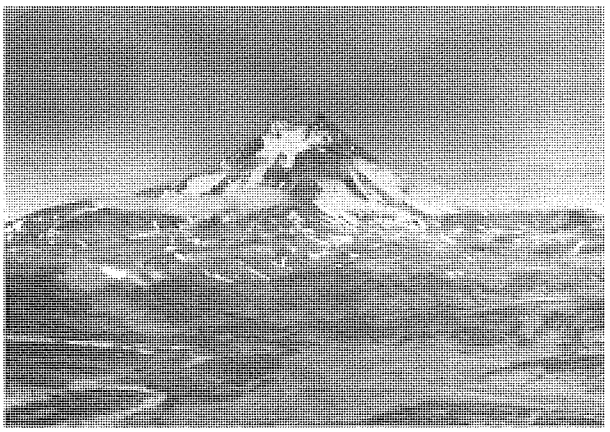
Arctic foxes were introduced to Ugamak Island which has undoubtedly kept seabird populations low. At least 23 species of birds have been recorded including pigeon guillemot, 142; horned puffin, 268; tufted puffin, 200; and lesser numbers of harlequin duck, common eider, bald eagle, black oystercatcher, and whiskered auklet.

1. Size - Ugamak Island is 3,200 acres of which 1,300 acres are already designated wilderness. The remaining 1,900 acres is under consideration for wilderness. Round Island is less than 20 acres.
2. Land ownership - Both islands are in federal ownership and have not been selected.
3. Natural integrity - Foxes were introduced to Ugamak in the first part of the century which resulted in the elimination of Aleutian Canada geese and undoubtedly affected the populations of other ground and burrow nesting birds.
4. Apparent naturalness - There are no known signs of human activity on either of these island.
5. Outstanding opportunities for solitude - These islands offers outstanding opportunities for solitude, because they are located in such a remote area. It is possible that no one visits these islands in some years.
6. Outstanding opportunities for primitive recreation - Sea lion observation and photography would be outstanding activities on these islands. Camping and other forms of nature study would also be possible on Ugamak. On a clear day, views of the surrounding islands, particularly mountainous Unimak, would be exceptional.
7. Special or unique features - The sea lion rookery is a unique feature because sea lions are declining at an alarming rate throughout the Aleutian chain.
8. Outstanding resource values - These islands have outstanding resource values because they provide critical sea lion habitat and are located in the midst of key wildlife habitat at the south side of Unimak Pass.
9. Existing wilderness boundary adjustment - The east half of Ugamak was not considered in the 1973 Wilderness Review when the west half was recommended and subsequently designated wilderness. The east half and Round Island were in a different township, one which was subject to Native selection. However, the islands were not selected. This created a very awkward management situation where only half of a relatively small island is designated wilderness. This is obviously a mistake resulting from the process used to evaluate wilderness in 1973. The nonwilderness half, together with Round Island, provide some of the best sea lion habitat and should be added to the existing wilderness area.

Conclusion - Ugamak and Round islands meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. They also meet the optional special features criterion and the Service's criterion of outstanding resource values. This is a boundary adjustment to the existing wilderness on Ugamak Island which will solve a management problem and protect a key resource, sea lion habitat.

Unimak Island - The Alaska Lands Act designated 93 percent, 910,000 acres, of Unimak Island as wilderness in 1980. An additional 12,900 acres of Service land on the island was not recommended for wilderness in 1980, because it was subject to Native selection. Only 4,900 acres were selected and the remainder is under consideration here. The Coast Guard had withdrawn 9,584 acres on the west shore of the island. That station has since been closed, clean-up efforts initiated, and an intent to relinquish the withdrawal filed. When the withdrawal is relinquished, that area should be proposed for addition to the Unimak Island wilderness.

Unimak has outstanding examples of volcanic activity including the nearly perfect cone of



Isonotski Peak is part of the Umimak Wilderness created in 1980. The plan proposes a boundary adjustment to this existing wilderness.

Shishaldin Volcano, at 9,372 feet the highest cone in the Aleutians. Shishaldin is a National Historic Landmark because it served as a navigational aid for seaman since at least the days of the Russian explorers and undoubtedly was used by the Aleuts as well. Three volcanoes including Shishaldin are active. Perpetual snowfields and glaciers surround the five highest peaks. Other features include Fisher caldera, which contains a large lake, extensive lava flows of varying ages, and bare ash fields.

Extensive wetlands provide nesting, feeding, and resting, habitat for waterfowl and shorebirds in summer. Principle species include whistling swan, Canada and emperor geese, black brant, sea duck, mallard, pintail, gadwall, green-winged and common teal, widgeon, bufflehead, common goldeneye, and greater scaup. Upland habitat is utilized by brown bear, caribou, wolves, wolverine, bald eagles, and short-eared owls. Most of the coast is steep and the bluffs, headlands, and off-shore sea stacks provide seabird and marine mammal habitat.

1. Size - Unimak Island is 978,574 acres of which 910,000 acres are already designated wilderness.
2. Ownership - Of the nonwilderness acres, 45,855 acres are in private ownership, 235 acres are in state ownership, 9,584 are Coast Guard lands, and 12,900 acres are in Service ownership. Of the 12,900 acres, 4,900 have been selected and cannot be proposed for wilderness at this time.
3. Natural integrity - Nothing has affected the natural systems of the island.
4. Apparent naturalness - No signs of human activity on the parcels being considered.
5. Outstanding opportunities for solitude - Unimak is very large and remote. Although False Pass is on the east end of Unimak, it is surrounded by private land; the villagers rarely use the federal lands. Solitude opportunities are outstanding.
6. Outstanding opportunities for primitive recreation - Camping, backpacking, hunting, photography, fishing, climbing, and wildlife observation are all outstanding activities on this island.
7. Special or unique features - Include active volcanoes, Shishaldin Cone, Fisher caldera, glaciers, brown bear.
8. Outstanding resource values - Unimak has outstanding wilderness qualities, wildlife habitats, and geologic features. Resource values are outstanding.
9. Existing wilderness boundary adjustment - The boundaries of the existing Unimak Island Wilderness were drawn along section lines leaving out qualifying sections, because they might be subject to Native selection. Although some of the selections still have not been resolved, 8,000 acres were not selected and are available for wilderness designation. This land is located in a line of sections separating designated wilderness from private land on the northeast end of the island (Figure 56M). This creates an awkward management situation. One other section and a partial section are located along the east boundary of the wilderness. The adjacent private land is not developed. The nonwilderness land shares the wilderness qualities of the designated area and should be included in the existing wilderness.

Conclusion - Unimak Island meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It also meets the optional special features criterion and the Service's criterion of outstanding resource values. This is a boundary adjustment to the existing wilderness on Unimak Island which will solve a management problem and protect wilderness qualities.

ALASKA PENINSULA UNIT

PHYSICAL ENVIRONMENT

Geography

The Alaska Peninsula Unit includes over 800 islands and comprises approximately 850,000 acres in southwestern Alaska. It incorporates two former National Wildlife Refuges, the Semidi Islands, designated a refuge in 1932, and Simeonof Island, a refuge since 1958. The Service is responsible for 365,880 acres of waters, tidelands, and submerged lands associated with these former refuges. Seal Cape, a small headland south of the village of Chignik, is the only portion of the unit located on the Alaska Peninsula; all other areas are offshore islands.

This unit, which extends over 400 miles, includes all federally owned islands, sea stacks, columns, islets and rocks off the south side of the Alaska Peninsula between the tip of the Alaska Peninsula and Katmai National Park (Figure 57). The islands range from one acre to over 100,000 acres. In general, islands in this unit have steep mountainous terrain, some with elevations exceeding 2,000 feet, and irregular shores that are often rock-bound and surrounded by rocky reefs and outcrops. The unit is situated on the Shumagin-Kodiak Shelf which borders the Aleutian Trench (Burk 1965).

The Alaska Peninsula Unit includes the following island groups from west to east: Sanak Islands, Sandman Reefs, Pavlof Islands, Shumagin Islands, Chiachi Islands, islands associated with the Alaska Peninsula, Semidi Islands, and the Wide Bay Islands.

Most of the unit is accessible by boat but due to the rocky, rugged shoreline on most islands access can be difficult. Amphibious planes can provide access in some areas.

See Table 36 in the management alternatives chapter for a complete listing of lands, tidelands, offshore waters, and submerged lands located within the unit.

Land Status

The land status of the Alaska Peninsula Unit changes constantly as selected lands are conveyed, exchanged, or relinquished. Table 27 summarizes land status within the unit as of 11/1/87. Figures 59 A-E show the arrangement of ownership.

Of the approximately 850,000 acres within the congressional refuge unit boundary, about 50 percent has not been selected and will remain in federal ownership. Most of the nonselected acres, 365,880, are the water column and tidelands surrounding Simeonof Island and the submerged lands surrounding the Semidi Islands. The remaining 50 percent, all islands, has been selected or conveyed. Overselections are extensive throughout the refuge and much of the selected land will also remain in federal ownership. Approximately 55 percent, 390,870 acres, of the Alaska Peninsula Unit is congressionally designated wilderness. The wilderness areas are the Sanak Islands, Simeonof Islands and surrounding waters and tidelands, and the Semidi Islands and surrounding submerged lands. Of the designated wilderness, only 24,990 acres are islands, the remainder is waters, submerged lands, or tidelands.

The Service is also responsible for management of approximately 366,000 acres of water, tidelands, and submerged lands. Around the Semidi Islands, the refuge includes submerged land between parallels 55° 57' and 56° 15' north latitude and meridians 156° 30' and 157° 00' longitude. Around Simeonof Island, Service ownership extends one mile beyond mean low water and includes the tidelands and the water column but not the submerged land. Both of these marine areas are designated wilderness. The State of Alaska asserts that these marine areas are in state ownership; this issue will most likely be resolved in the courts.

Climate

The Alaska Peninsula Unit has a moderate polar maritime climate characterized by high winds,

Figure 57. Location of the Alaska Peninsula Unit.

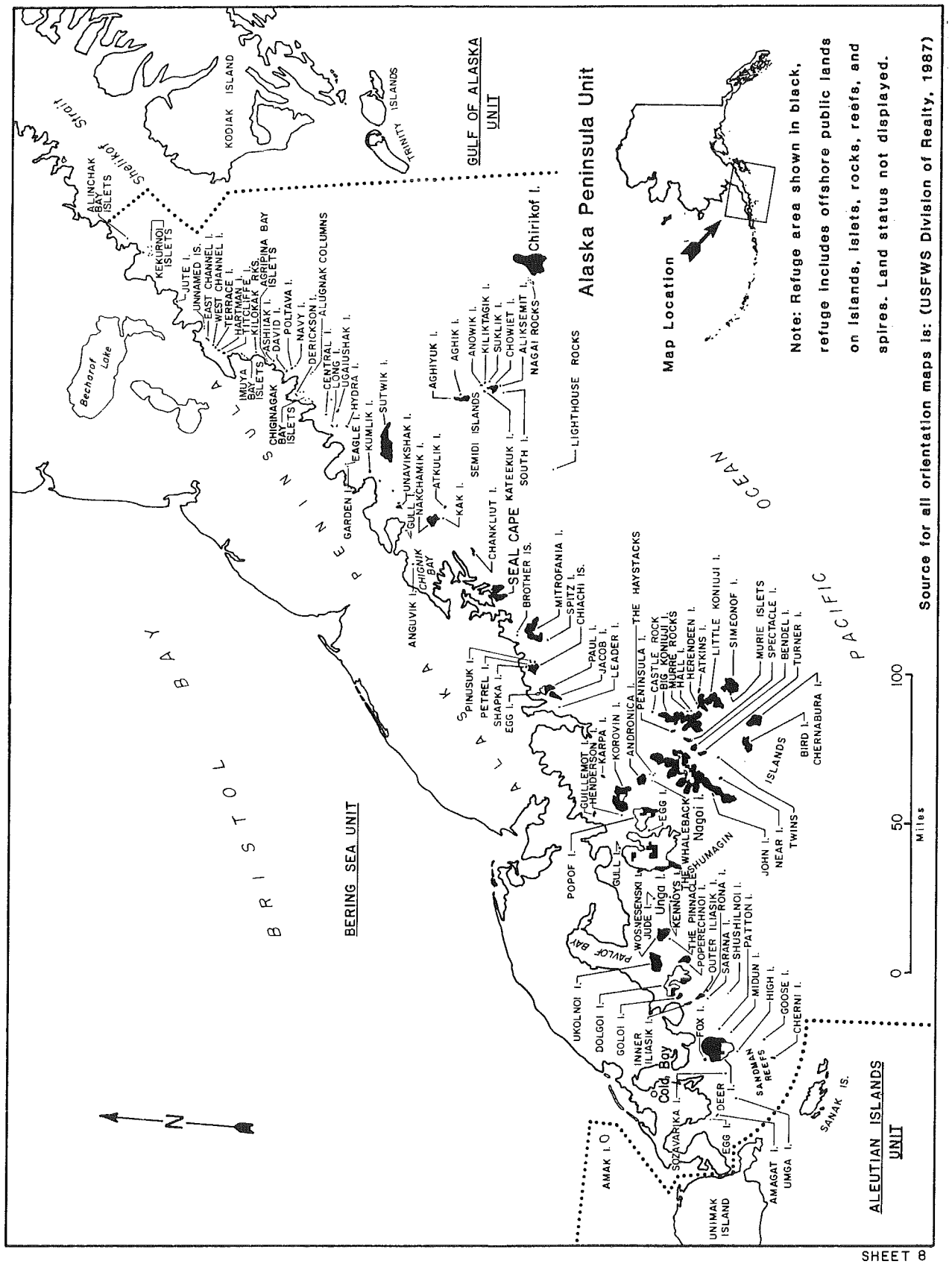
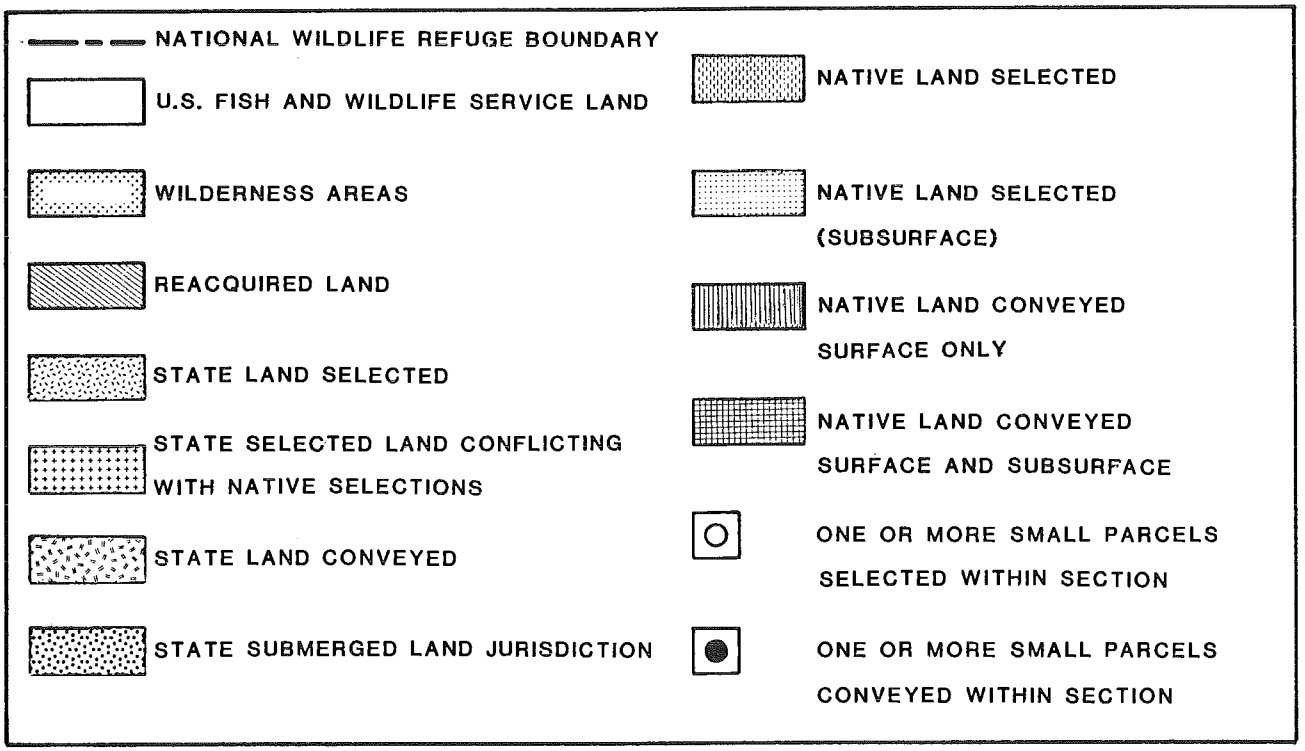


Figure 58. Legend* for land status for the Alaska Peninsula Unit.



* Figures in this unit are reduced 50 percent and follow a reduced scale legend.

Figure 59 A. Land status in the Alaska Peninsula Unit as of November 1987.

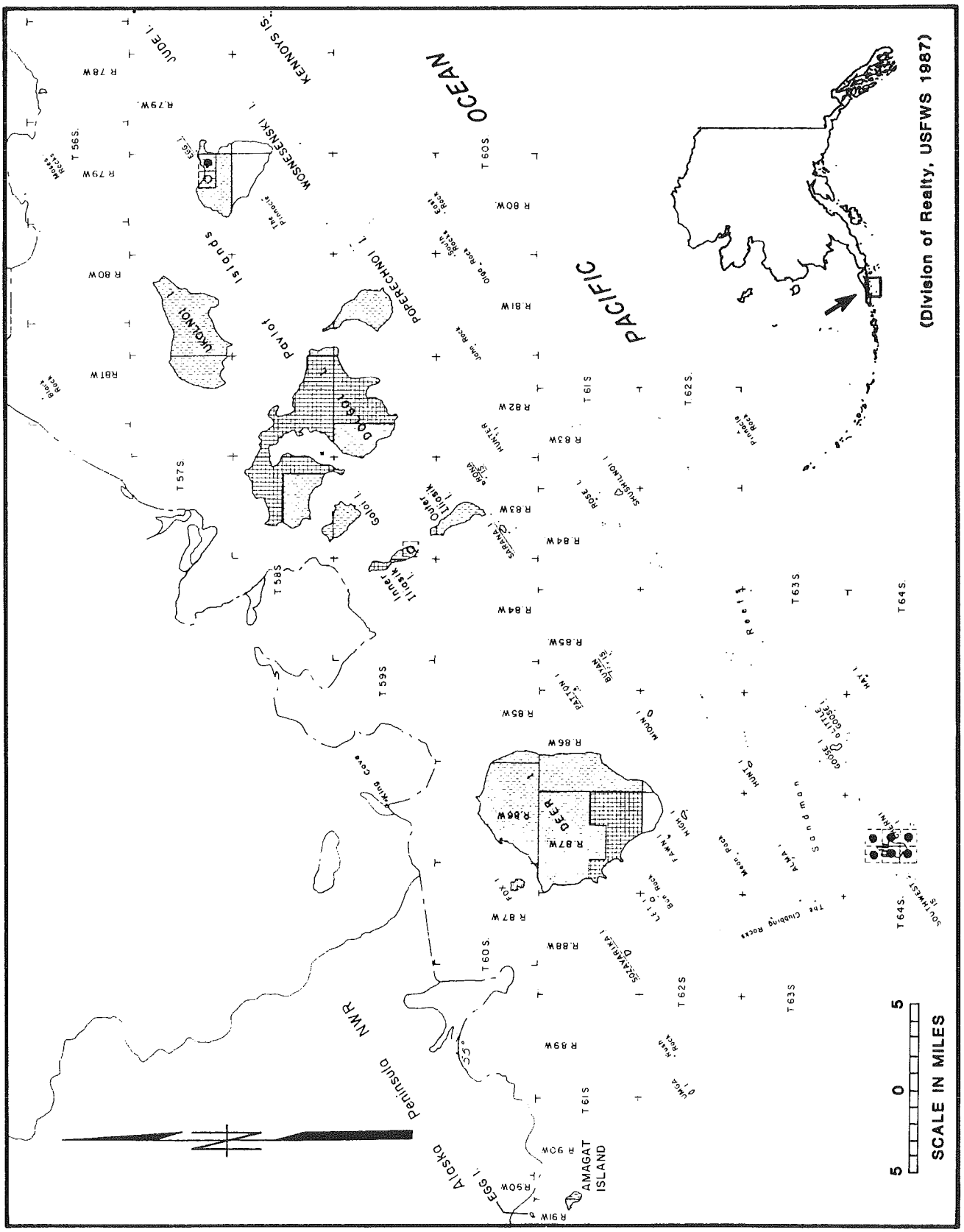


Figure 59 B. Land status in the Alaska Peninsula Unit as of November 1987.

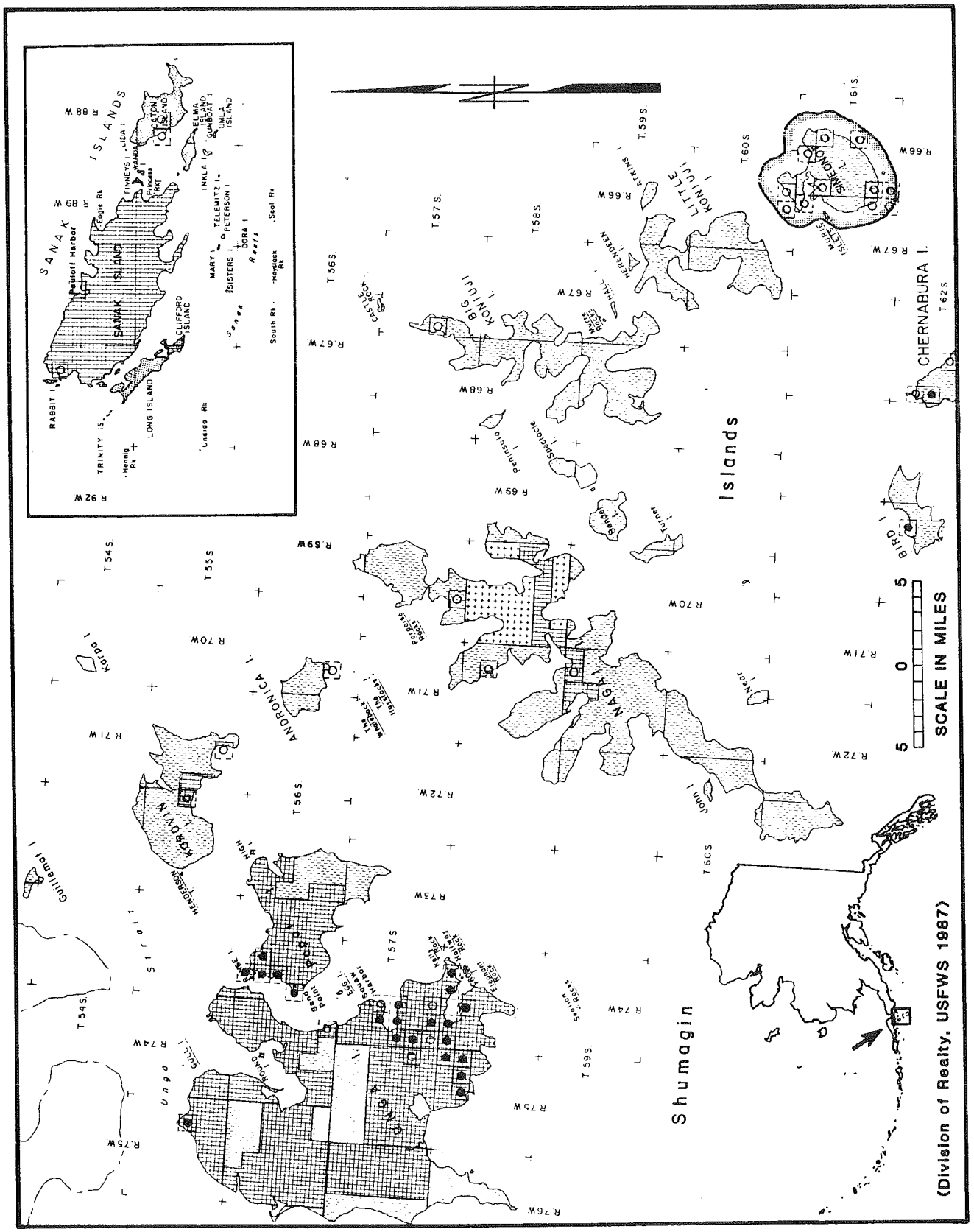


Figure 59 C. Land status in the Alaska Peninsula Unit as of November 1987.

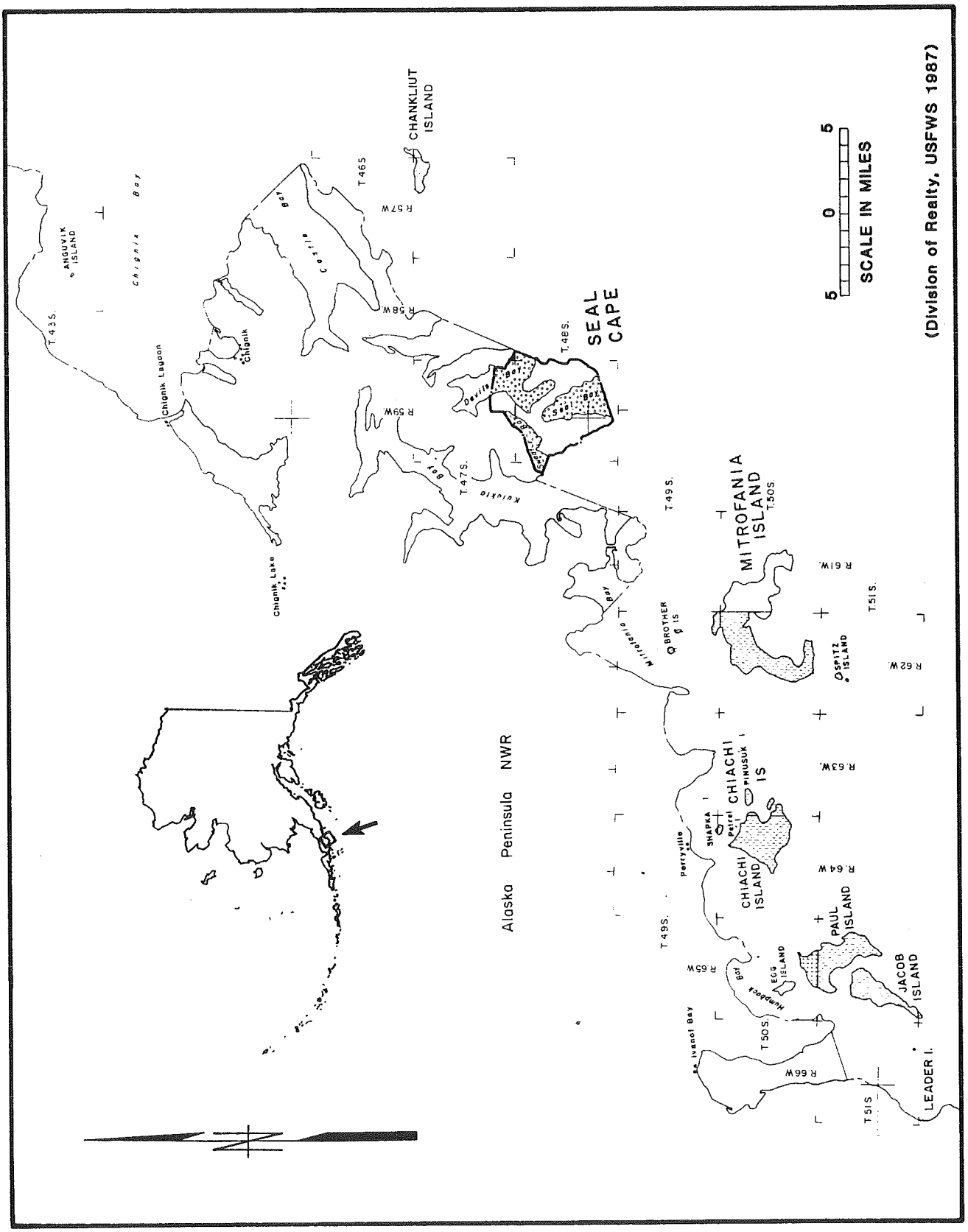


Figure 59 D. Land status in the Alaska Peninsula Unit as of November 1987.

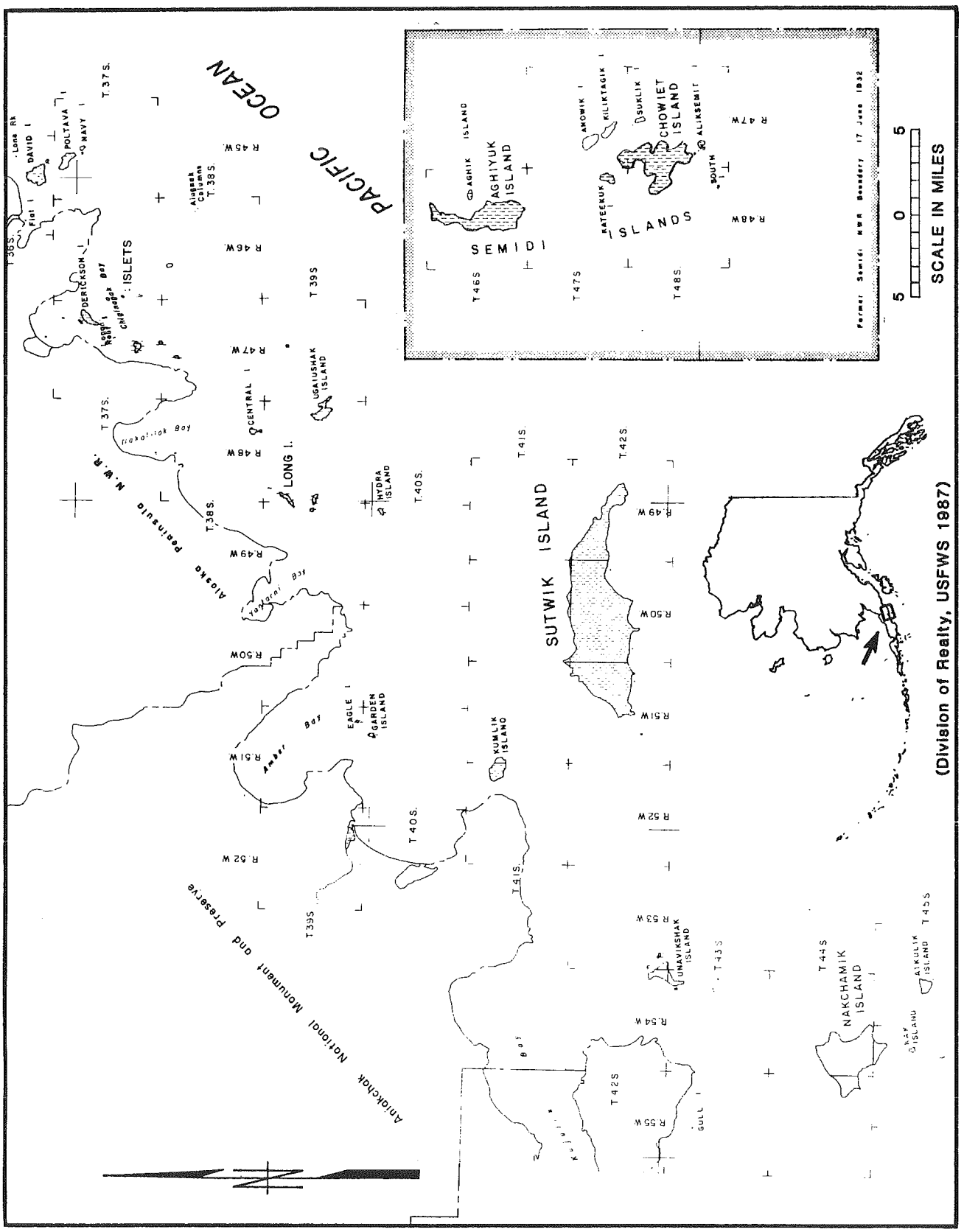


Figure 59 E. Land status in the Alaska Peninsula Unit as of November 1987.

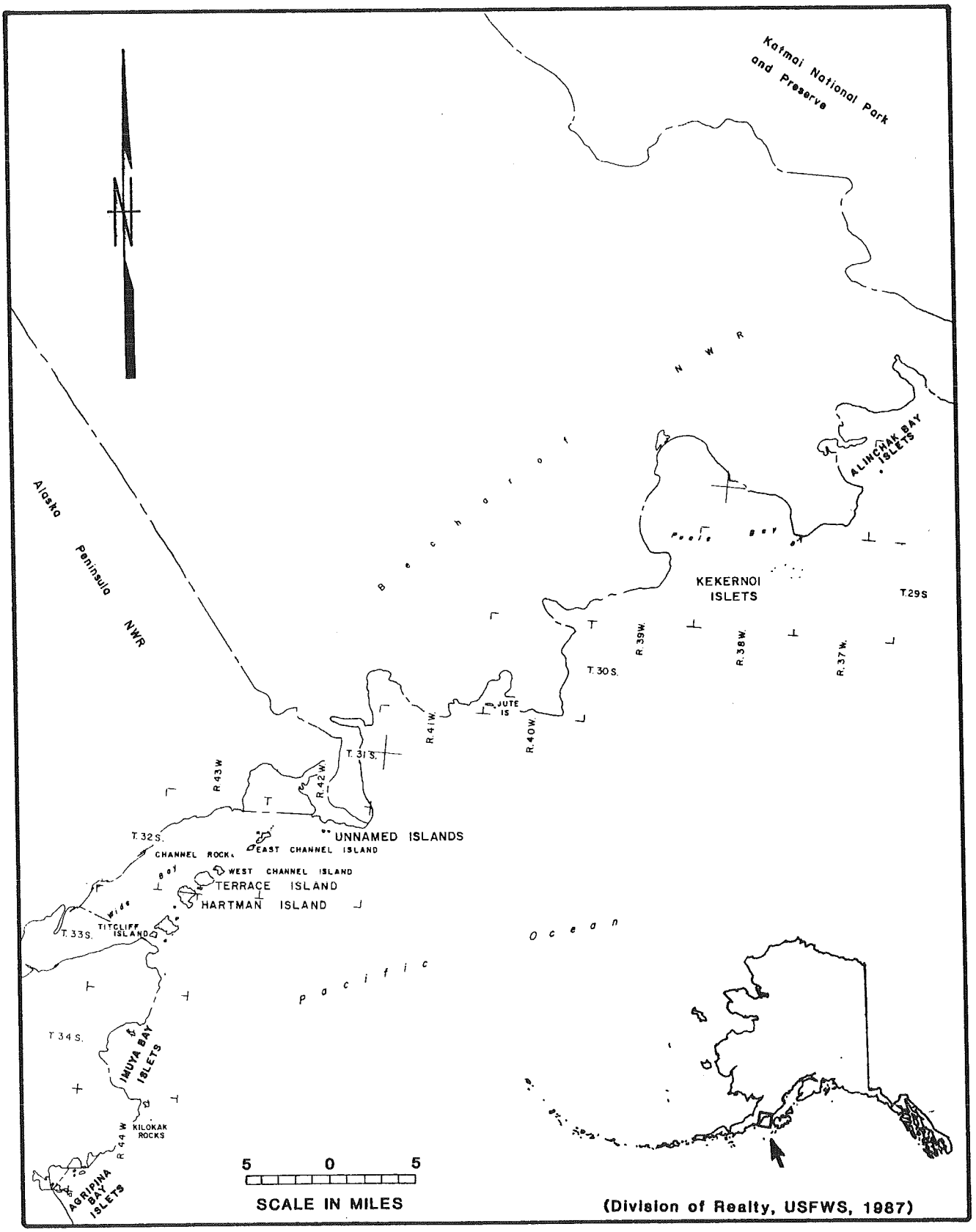


Table 27. Land and water status within the Alaska Peninsula Unit as of 11/1/87.

Ownership	Acres	% of unit
Nonselected	420,371	50%
Selected (village, regional, state)	295,000	35%
Conveyed	131,000	15%
Native Allotments	nominal	1%
Total	846,371	

(U.S. Fish and Wildlife Service Files 1987)

mild temperatures, cloud cover, and frequent precipitation. Fog and drizzle are frequent in summer. Severe storms can occur year-round often with intense winds known as willawaws.

The Pacific Ocean is a primary factor affecting local weather in island groups in this unit. Sea winds with a high moisture content are responsible for a high mean annual precipitation.

Temperatures in the region often lack much difference between day and night temperatures. This lack is caused by the surrounding ocean acting as a heat sink, absorbing heat during the day and releasing it at night. The differences between day and night temperatures in Cold Bay are often only nine degrees. Cold Bay also provides the only long term weather records available for the south side of the Alaska Peninsula. Winter temperatures range usually from -13°F to 28°F, and summer temperatures range from 51°F to 78°F. However these temperatures ranges are often much closer because of the heat sink. Mean annual temperature is 37.9°F and mean annual precipitation is 35.01 inches. Intermittent records are available from Sand Point in the Shumagin Islands and Chignik to the northeast. Sand Point's mean annual temperature is 39.1°F and it averages 60.3 inches of precipitation. Chignik, one of the wettest areas in the state, averages 127 inches of precipitation and has an annual mean temperature of 38.5°F.

Geology

The Alaska Peninsula Unit is composed of deformed strata of continental origin that has been detached from the Alaska Peninsula by faulting and volcanism (Morris 1987). The unit, situated on the Shumagin-Kodiak Shelf, is part of the "slate and graywacke belt" of southern Alaska. This belt of sedimentary rock is highly deformed and displays local and complex folding and faulting. It parallels the edge of the continental shelf and dips toward the Alaska Peninsula. The boundary between rock of the Alaska Peninsula and rock of the "slate-graywacke belt" probably represents a major fault (Burk 1965). Portions of the unit are covered by Tertiary and Quaternary and/or volcanic rocks which prevent identification of the underlying terranes.

There are no volcanoes or calderas present in island groups within the unit but volcanoes are present on the adjacent Alaska Peninsula. Hazards posed by these volcanoes include distribution of ash over island groups and earthquakes associated with volcanic activities (Morris 1987).

Intense earthquakes in this unit have been rare in recent years although it has been identified as a high potential zone for future earthquakes. The last major earthquake occurred in the Shumagin Islands in 1938 and registered 8.7. It centered in an area known as the "Shumagin Gap." Calculations show at least half of this gap was not ruptured by the 1938 earthquake and has not experienced a major earthquake for at least 77 years. It is highly likely this area will experience a major earthquake (7.9+) by the year 2000 (Sykes et al. 1980). The "Unalaska Gap," west of the "Shumagin Gap," has also been identified as an area of high earthquake potential. If this area were to release its energy simultaneously with the "Shumagin Gap" geologists predict an earthquake of 9+ could result (Morris 1987).

Bedrock - The region is primarily underlain by a thick sequence of Tertiary graywacke sandstone, black argillite, marls, shales, clays, and some conglomerates. This is underlain by Mid-Tertiary quartz diorite. The sedimentary layers are all intruded by granite.

The Shumagin Islands and islands nearby are underlain chiefly by sedimentary and volcanic rocks that are intruded by felsic and intermediate plutons. Igneous rocks, a biotite granodiorite, makes up much of Simeonof Island and the Semidi Islands. Nagai Island is composed of biotite adamellite (Cobb 1974).

Surficial deposits - Although there are no glaciers in this unit today, deposits are present in some areas. On Simeonof Island, bedrock is overlain by unconsolidated deposits of variable thicknesses. In a few places on Simeonof Island, deposits of beach and wind-blown sand exceed 30 feet in thickness.

Much of the unit is overlain by unconsolidated materials such as: alluvium, colluvium, vegetation-covered, inactive dune sand, and active dune sand.

Soils - Soils in this unit are similar to the Aleutian Islands Unit. Areas with steep terrain, characterized by low-growing shrubs, are comprised of gravelly loam or silty volcanic ash. Hilly areas are also layered with silty volcanic ash but valley bottoms and moraine hills contain deep fibrous or partially decomposed peat. Low undulating areas are dominated by deep fibrous peat with lenses of volcanic ash. Wind erosion is active on soils in this unit and exposed low coastlines have active shoreline erosion (Michaelson 1974).

Mineral occurrences - Mineral prospects for gold, silver, copper, coal, zinc, and lead are located throughout the Shumagin Islands, primarily on Popof and Unga islands. Several of these are past producers although none occur on refuge lands (U.S. Department of the Interior, Bureau of Mines 1988). No commercially valuable deposits have been recently discovered. Mineral exploration has been impeded by the remoteness, ruggedness, and inaccessibility of the unit.

Unga Island, which has 80 percent private ownership, was mined commercially from 1891 to 1904. Here the Apollo Mine produced over $2 million of gold and silver. Significant coal resources are also known on Unga Island, with 987 million tons being produced between 1882 and 1902. Mining on Unga Island occurred on private or selected land. Placer gold, approximately 600 ounces, was mined from the beaches of Popof Island in the early 1900's (Cobb 1974).

Aiktalik Island is within a geologic terraine with potential for metalliferous deposits containing gold, copper, and silver. Due to the inaccessibility of the unit, and its lack of proximity to market, it is doubtful that mineral resources will be developed.

No mining activity is known to have occured on refuge lands in this unit and no mining claims are known to occur on refuge lands at this time.

Oil and gas - The Alaska Peninsula unit encompasses over 83 million acres and is located in the Shumagin Outer Continental Shelf Planning Area (See Figure 46).

The Minerals Management Service scheduled two sales for the Shumagin Planning Area. Sale 86, originally scheduled for February 26, 1986, was cancelled due to lack of industry interest. Sale 129 is scheduled for February, 1991. See Table 5 for a listing of Outer Continental Shelf planning areas and their estimated reserves and Table 6 for a summary of active leases near the refuge.

The Bureau of Land Management has rated the geologic potential for hydrocarbons in the Alaska Penninsula Unit as none or low for most parcels. A few islands in the Shumagin and Chiachi islands are rated as moderate potential. Four parcels in the Chiachi Islands and most of the parcels in the islands and capes associated with the Alaska Peninsula, the Semidi Islands, and the Wide Bay Islands are rated as having high geologic potential for hydrocarbons. Development potential for all of these lands is rated as none or low (Teseneer, Seidlitz and Borkoski 1988).

Geothermal resources - Although many thermal sites have been located on the Alaska Peninsula only one area has been documented in the unit. Egg Island, a 15 acre island at the eastern edge of the mouth of Morzhovoi Bay, has several hot springs and hot-water seeps on the southeast shore. A hot spring has also been reported on and off the shore of Sutwik Island and Egg Island. These hot springs probably result from circulation of surface waters along deep-seated fractures in bedrock (Waring 1965).

Water Resources

Estuaries, semi-enclosed bodies of coastal water, are found in several areas of the unit including: Wide Bay, Mitrofania Bay, Chignik Lagoon, and Zachary Bay on Unga Island. These productive areas are especially important to anadromous fish.

Swamps, freshwater marshes, and bogs are found on Sutwik Island and the Shumagin Island group. Wetlands border the Shumagin Islands and consist mainly of wet sedge meadows found in poorly drained peat lowlands, and wet riparian corridors. Wet sedge meadows also occur on Sanak and Caton Islands (Morris 1987).

Streams, lakes, and ponds are found throughout the unit. Simeonof and Sutwik Islands have numerous lakes. Ponds in the Shumagin Islands rarely exceed 16 acres.

BIOLOGICAL ENVIRONMENT

Vegetation

Several vegetation classes have been identified in the Alaska Peninsula Unit (Kuchler 1967, Joint Federal-State Land Use Planning Commission for Alaska 1973). The classes identified are: 1) alpine tundra, 2) moist tundra, 3) wet tundra and 4) high brush, including alder thickets, Dryas meadows, Aleutian meadows, and Aleutian heath and barren. Vegetative descriptions of major island groups in this unit are listed below.

Pavlof Islands - On the Pavlof Islands the shore is dominated by grasses while sedges dominate the interior lowland. Shrubs line many streams and ring the lower mountain slopes. Crowberry dominates the upland tundra zone (Bailey 1983).

Shumagin Islands - Most of the larger Shumagin Islands, particularly Nagai, Unga, and Popof are covered at lower elevations with tall, dense stands of alder. Pacific red elder, willows, and salmonberry also commonly occur with alders. Dwarf birch occurs in poorly drained areas. Alder brush is scarce or absent on the outermost islands of Bird, Chernabura, Simeonof, and Little Koniuji. The higher elevations above 1,000 feet are dominated by crowberry. Blueberry, lingonberry, and bearberry are common shrubs in mountainous parts of most of the islands (Bailey 1978). Grasses and sedges predominate in meadow areas, on some slopes, and on small, rocky islands devoid of shrubs. Sixteen species of sedges and 31 grasses have been collected in the Shumagin Islands (Hultén 1968).

Sandman Reefs - There is much less variety in vegetation in the Sandman Reefs than in the Shumagin Islands (Bailey 1978). Deer Island is dominated by tundra type of vegetation similar to that on the nearby Alaska Peninsula. Vegetated islands of the Sandman Reefs are covered with lush grass, sedges, ferns, and herbs.

The only shrub commonly encountered in the Sandman Reefs is salmonberry on Amagat Island. Eelgrass is found in lagoons at Cherni, Goose, and Outer Iliasik islands. Cherni Island's flora is more varied and comparatively low and matted, as this island is the only one in the Sandman Reefs with cattle (Bailey and Faust 1980).

Sanak Islands - In the Sanak Islands lyme grass, umbellifers, and other grasses cover most of the area, while many islets on the south side of Sanak are mainly bare rock. Vegetation is similar to that described for the Sandman Reefs (Bailey and Faust 1980).

Simeonof Island - In a range inventory of Simeonof Island (Shumagin Islands), five community types were mapped and identified (Talbot et al. 1984). The most abundant type is mesic crowberry heath (44 percent). It occurs on hummocky lower slopes, lowlands, and exposed mid-slopes. The second most widespread type (31 percent) is mesic grassland, occurring on low hummocks in the lowlands. Wet meadow (15 percent) occurs in peatlands and is usually associated with ponds and drainages. Dry grassland is found on sandy coastal beaches (4 percent). Mesic scrub (2 percent) occurs on protected mid-slopes. A barren type accounts for the remainder (4 percent).

Mitrofania and nearby Sutwik islands - Alpine and moist tundra characterize most of the islands and adjacent coastal mainland. Heavy alder brush covers much of the Alaska Peninsula

and the larger islands, primarily Sutwik, Mitrofania, and Nakchamik. Insular vegetation along coastlines is dominated by beach rye, while other grasses, sedges, and umbellifers predominate inland at lower elevations and on small islands. Higher elevations are dominated by crowberry. Umbellifers are rare, and beach rye is much shorter here than on other islands due to heavy grazing by voles (Bailey and Faust 1981).

grassland occur on better drained sites. The east island area supports a more lush grassland and mixed meadow community than the west island area. A small strand community of lyme grass and crowberry heath also occurs. The main talus slopes support well-drained grasslands. The isthmus area is composed of beaches and strand communities (Powers 1977).

Semidi Islands - The vegetation of the Semidi Islands is maritime tundra. Hatch (1985) distinguishes two major vegetative classes, hierarchically subdivided into 22 community types and recorded as 202 vascular plant species for the Semidis.

Fishery Resources

Walleye pollock, Pacific cod, sablefish, sandlance, and Pacific herring are important marine fishes of this unit. Dungeness, red, brown, and tanner crab, scallops, and shrimp are all abundant in the unit. Important commercial fish species include salmon (primarily pink), Pacific cod, walleye pollock, sablefish, and crab. No significant fishery for capelin or sandlance occurs.

Nine islands in the Alaska Peninsula Unit have a total of 29 salmon streams, 26 supporting pink salmon, five supporting chum salmon, three supporting sockeye salmon, two supporting coho salmon, and two supporting steelhead (Table 28).

Chirikof Island has six pink salmon streams, four on the northeastern portion and two on the southwestern portion. Deer Island, off the southeastern tip of the Peninsula, also has six pink salmon streams, with all but one on the western side. Refuge lands on Unga Island include two steelhead streams, one on Baralof Bay and one on Acheredin Bay; pink salmon spawn in these and three other streams; and chum salmon spawn in a stream near Bay Point. Three streams on Simeonof Island support salmon; one stream has pink, coho, and chum salmon, another has pinks, and a third has chums. Korovin Island has pink and coho salmon in a small lake system on Korovin Bay and pink and sockeye salmon in Grosvold Bay. Nagai Island has pink and chum salmon in Falmouth Harbor and inshore of Porpoise Rocks and sockeye salmon in a system just to the south. In the Pavlof Island group, Wosnesenski Island has sockeye salmon, Ukolnoi Island has pink salmon, and Dolgoi Island has pink salmon.

Birds

Approximately 120 species of birds, excluding casual visitors and accidentals, are found on islands in the Alaska Peninsula Unit of the refuge. Of these, at least 70 species breed in the region (Appendix D). Besides resident species large numbers of shearwaters and other pelagic birds use waters surrounding islands in the unit. For the life histories of these birds see the introductory chapter.

Seabirds - More than 5,000,000 seabirds nest on the over 800 islands in the Alaska Peninsula Unit. Present populations of burrow-nesting and surface-nesting seabirds probably are mere remnants of former numbers as a result of introduction of fox for fur farming, which began in the 1800's.

More than 2,400,000 seabirds (Hatch and Hatch 1983), almost half of the seabirds breeding in the Alaska Peninsula Unit, are found in the Semidi Islands. Most of the Semidi Islands have seabird colonies of over 100,000 birds, and Aghiyuk, the largest and most rugged of the group, has over 500,000. Roughly 70 percent of the murres breeding in the Alaska Peninsula Unit occur in the Semidis, and populations here are exceeded only in the Pribilofs (Sowls et al. 1978). About 370,000 horned puffins nest on the Semidis. The colony on Suklik, probably is the largest nesting colony of horned puffins in the world (Hatch and Hatch 1983). Populations of fossorial birds and surface-nesters in the Semidis probably were even greater before fox and presumably ground squirrels were released on larger islands in the 1880's (Bower and Aller 1917). For more information see the discussion in the mammals section below.

Table 28. Salmon/Steelhead Streams, Alaska Peninsula Unit.

Island	Total	Pink	Sock-eye	Coho	Chum	Steel-head
Chirikov	6	6	0	0	0	0
Deer	6	6	0	0	0	0
Unga	5	5	0	0	1	2
Korovin	2	2	1	1	0	0
Nagai	3	2	1	0	2	0
Wosnesenski	1	0	1	0	0	0
Ukolnoi	2	2	0	0	0	0
Dolgoi	1	1	0	0	0	0
Simeonof	3	2	0	1	2	0
TOTALS	29	26	3	2	5	2

(U.S. Fish and Wildlife Service Files 1987)

After the Semidi Islands the next largest numbers of breeding seabirds in the Alaska Peninsula Unit are found in the Sandman Reefs. The numerous small, low islands in this area have the most nocturnal nesting seabirds found anywhere in Alaska, except the far more extensive Aleutians (Bailey and Faust 1980). The Sandman Reefs also support the largest numbers of fork-tailed storm-petrels, ancient murrelets, and Cassin's auklets found anywhere in the Alaska Peninsula Unit. The tiny colony of rhinoceros auklets in the Sandman Reefs is the westernmost in North America. The enormous populations of nocturnal fossorial seabirds in the Sandmans probably is attributable to the lack of fox introductions on most of the islands. Although fox were released on a few of the larger islands, they failed to survive any length of time except for on Cherni, the largest one. Today, fox are no longer on Cherni.

The third most important area for nesting seabirds in the Alaska Peninsula Unit is the Shumagin Islands. The Shumagins, having 30 named islands, probably had the highest numbers of breeding seabirds prior to the introduction of fox. Fox were indigenous to Unga, Popof, and Nagai, the larger islands nearer to the Alaska Peninsula. However, fox, primarily arctic fox, were introduced to at least nine of the islands (Bailey 1976). Concomitant introductions of ground squirrels and voles ultimately have done more damage to some islands than fox, both where rodents and fox coexist and where fox have since been removed.

Karpa Island, inhabited by over 200,000 murres, has the largest population of diurnal nesting seabirds in the Shumagins (Bailey 1976). Because of ground squirrels, the only nocturnal nesting seabird is the ancient murrelet, which, for unknown reasons, seems to be somewhat less vulnerable to squirrels than other burrow-nesting seabirds. Storm-petrels and Cassin's auklets also probably formerly nested on Karpa Island.

The greatest density of seabirds in the Shumagins is found on spectacular Castle Rock. Sixteen of the 22 species nesting in the Shumagins occur on this small towering island where fox were never released (Bailey 1976). Outside of the Semidis, Shumagin, and Sandman Reefs groups, only scattered islands have considerable seabird populations. The key seabird islands north of Mitrofania Island are Spitz, Brother, Atkulik, Ugaiushak, Central, Long, Hydra, and the islets in Chiginagak Bay (Sowls et al. 1978, Bailey and Faust 1981 and 1984). Ugaiushak is by far the most important seabird island in this area, with more than 50,000 nesting seabirds representing 15 species.

The low numbers of seabirds nesting off the upper half of the Alaska Peninsula Unit, and the predominance of cliff-nesting species there appears due to the frequent presence of brown bears on islands from Sutwik eastward (see section on bears, below). Because of bears, some islands are nearly devoid of birds despite suitable nesting habitat and the absence of both introduced fox and rodents.

Northern fulmar - An estimated 440,000 fulmars nest in the Alaska Peninsula Unit. Most of these occur on nine of the Semidi Islands. The huge population in the Semidis accounts for roughly a quarter of the state's population (Sowls et al. 1978). Only the colony at Chagulak Island in the Aleutians appears to have more birds than the Semidis.

Storm-petrels - Leach's storm-petrels, the smallest Alaskan seabirds, nest on at least 40

islands in the Alaska Peninsula Unit. Although nocturnal at colonies and thus infrequently censused, this species probably is the most abundant of all breeding seabirds in the unit. The majority of Leach's storm-petrels, probably over a million birds, breed in the Sandman Reefs. More than 100,000 are believed to nest in the Semidi Islands. A small new colony also exists at Bird Island in the Shumagins.

Fork-tailed storm-petrels nest on at least 39 islands in the Alaska Peninsula Unit mainly in the Sandman Reefs and Semidis. Larger numbers, however, breed in the Aleutians and the Alexander Archipelago.

Storm-petrels are among the most vulnerable species to introduced predators. The populations of both species are undoubtedly only a fraction of what they were prior to widespread introductions of fox and rodents.

Cormorants - Three of Alaska's four species of cormorants breed on islands in the Alaska Peninsula Unit. Red-faced cormorants nest on a minimum of 52 islands and number over 20,000. The largest populations exist on Bird and Unga islands in the Shumagins, Cherni and Amagat islands in the Sandman Reefs, and on Chowiet Island in the Semidi Islands.

Pelagic cormorant colonies occur on at least 59 islands and total approximately 13,000 breeding birds. The highest numbers are found in the Shumagins and Sandmans.

Only about 1,100 double-crested cormorants nest on 15 islands in the Alaska Peninsula Unit. The colony on Cherni Island in the Sandman Reefs is one of the biggest in the state. On many islands, such as in the Semidis where the other two species are abundant, double-crested cormorants are absent. All three species occur together on a few islands. Red-faced and pelagic cormorants almost always co-exist on the same cliffs.

Jaegers - Only the parasitic jaeger nests in the Alaska Peninsula Unit of the refuge. They breed in small, loose colonies or as solitary pairs on eight islands and total less than 200 birds. Most are located in the Semidi Islands.

Gulls - about 60,000 glaucous-winged gulls nest on over 100 islands. This species is the most widely distributed colonial seabird in the unit. The largest colonies are situated in the Sandman Reefs, Shumagins, and probably in the Sanak Islands. The largest colony, an estimated 4,000 breeding pairs, occupies Amagat Island (Sandmans). Three islands in the Shumagins have over 2,000 pairs (Sowls et al. 1978). Most colonies are small, usually consisting of less than 500 pairs.

Only three mew gull colonies are known in the Alaska Peninsula Unit; Bendle Island in the Shumagins with 300 pairs has nearly all the nesting birds in the unit (Bailey 1978).

Black-legged kittiwakes - Over 300,000 kittiwakes nest in the Alaska Peninsula Unit. The largest colonies in the region are on Unga and Bird islands (Shumagins), Aghiyuk and Chowiet (Semidis), and Spitz Island (Sowls et al. 1978). Kittiwake populations and other cliff-nesters have not been affected seriously by introduced fox or other animals.

Terns - Arctic terns number about 500 and nest on only three islands in the unit, Range Island and the Murie Islets (Shumagins) and Egg Island (Chiachis). They formerly also nested on Simeonof Island but evidently disappeared due to vegetation destruction and disturbance by cattle. Now that cattle have been removed, this colony may become reestablished. Tern colonies are very susceptible to disturbance and small colonies are readily abandoned for new areas.

Murres - An estimated 1,730,000 murres nest on thirty islands in the Alaska Peninsula Unit (USFWS 1987). There are over a million murres in the Semidi Islands and the colonies on Aghiyuk (440,000) dwarf all others in the region (Hatch and Hatch 1983). About 270,000 murres occupy Karpa Island in the Shumagins. Other significant murre colonies in the region are on Atkulik and Spitz islands. Common murres comprise 80-90 percent of the breeding murre population and are the most abundant diurnal nesting seabird in the unit. Thick-billed murres outnumber common murres only in a few small colonies, such as the Haystacks in the Shumagins. Few murres nest in the Sandman or Sanak reefs because most of the islands are low and relatively flat.

Pigeon guillemots - Guillemots are the most widely distributed nesting seabird in the unit, occurring on nearly every island with boulder beaches. The Shumagin Islands, have the greatest population of guillemots, followed by the islands between Mitrofania and Sutwik, and the Semidis. A few small fox-free islands have exceptionally high densities of guillemots. For example, at least 2,000 guillemots inhabit Atkins, a 600 acre island in the Shumagins (Bailey 1978).

Murrelets - Marbled and Kittlitz's murrelets probably breed in small numbers on a few islands in the Alaska Peninsula Unit, but no nests of these solitary nesting species have been found. Kittlitz's murrelet nests have been found inland on the Peninsula itself (Bailey 1973). Murrelets are most often encountered in areas with large protected bays, particularly in the Seal Cape area south of the village of Chignik. Both these species are rarely seen in the Sandman or Sanak reefs or other open areas comprised mainly of small islands.

Ancient murrelets are abundant in the Sandman Reefs, Shumagin Islands, Semidi Islands, and on Spitz and Atkulik islands. They have been recorded on 35 islands from Ugaiushak Island westward to the end of the Alaska Peninsula (Sowls et al 1978). Like other burrow-nesting seabirds, only a fraction of former populations remain in many areas, such as the Sanak Islands, because of fox introductions (Murie 1959).

Auklets - All of Alaska's six species of auklets, except for whiskered auklets, breed in the Alaska Peninsula Unit. Probably over half the state's Cassin's auklets breed in the Sandman Reefs. Large concentrations also occur on two of the Shumagin Islands and on one of the Semidi Islands (Sowls et al. 1978). Transects or census plots have been established only in the Semidi Islands and on Castle Rock in the Shumagins. Other notable Cassin's auklet populations are on Umga, Nigrud, and Hunter islands in the Sandmans. Large numbers formerly bred in the Sanak Islands prior to fox introductions (Murie 1959). This nocturnal species currently breeds on 25 islands in the Alaska Peninsula Unit. It seems to be one of the most sensitive to introduced predators and may be the last to recolonize islands after disappearance of fox.

Parakeet auklets nest on over 40 islands in the unit and are most abundant on Chowiet and several other islands in the Semidis and on Castle, Hall, and Atkins islands in the Shumagins. None of these colonies are large compared to some of the huge ones in the Bering Sea (Sowls et al. 1978). Like guillemots, parakeet auklets nest in boulder fields and often are found in small, loose colonies or as isolated pairs. These diurnal auklets are comparatively scarce in the Sandman Reefs and on islands east of Mitrofania, except for the Semidis.

Crested auklets occupy only four islands in the unit, all in the Shumagins. The largest colony, located in Yukon Harbor on Big Koniuji Island, is the easternmost in North America. This colony supposedly supported huge populations in the early 1900's according to Townsend (1913), who related there were more here than in the Pribilofs, where today they number some 250,000 (Sowls et al. 1978). In 1916 red fox were released on Big Koniuji, and by 1976 this colony had dwindled to an estimated 30,000 birds (Moe and Day 1978). The colony appears to have decreased considerably since. This decline most likely can be attributed to the introduction of fox. In 1985 most foxes were removed, and the few remaining foxes apparently were eliminated in 1986. If auklets then show no recovery, explanation for the decline probably rests with changes in climate, oceanographic factors, or nesting habitat.

Least auklets are rare in the Alaska Peninsula Unit. A few nest on Chowiet in the Semidis, and occasional birds have been spotted during the breeding season at Castle Rock in the Shumagins.

Another rare breeder in the region is the rhinoceros auklet, probably numbering only around 1,000 birds on five islands. The largest colony of this nocturnal burrow nester is on Chowiet Island with small colonies on Ugaiushak, Hydra, Near (Shumagins), and Patton islands. Patton Island, in the Sandman Reefs, is the westernmost colony in North America. The only colony in the western Aleutians is on Buldir, which is in the Eastern Hemisphere. Rhinoceros auklets are more common in the Gulf of Alaska and southward (Sowls et al. 1978).

Puffins - Nearly 600,000 tufted puffins breed on over 100 islands in the Alaska Peninsula Unit. The largest colonies occur on Castle Rock (Shumagins), Amagat Island (Sandmans), and Suklik and Ateekuk islands (Semidis). Only the eastern Aleutians have more tufted puffins than the islands off the Alaska Peninsula. Like other burrow nesting seabirds, there are fewer tufted puffins than before fox introductions, and some colonies have disappeared entirely. Tufted puffins nest in rock crevices on some islands, particularly those with foxes.

Horned puffins prefer nesting in rock crevices, but do use burrows on several islands, notably in the Semidis and Sandman Reefs. Their center of abundance in the state is off the Peninsula, where they number almost 800,000 birds. Colonies have been recorded on at least 90 islands. Approximately a third of the horned puffins in the unit nest on Suklik Island in the Semidis, evidently the largest colony in the world (Hatch and Hatch 1983). Besides an estimated 370,000 birds in the Semidis, other notable horned puffin colonies include Castle Rock and Big Koniuji in the Shumagins, Amagat and High islands in the Sandmans, and Ugaiushak Island. The largest colony in the Shumagins, located on Big Koniuji Island, appears to have declined dramatically in recent years, much like that of the nearby crested auklet colony.

Waterfowl - Many of the islands and surrounding waters south of the Alaska Peninsula are used by migrating and wintering ducks and geese. Large numbers of emperor geese, brant, scoter, eider, harlequin duck, oldsquaw, scaup, bufflehead, goldeneye, and mallard winter in the region, particularly in the Sandman Reefs and Shumagin Islands. Tundra swans, Canada geese, and at least 10 species of ducks nest in the Alaska Peninsula Unit, but densities of nesting waterfowl are generally very low. There are, however, some conspicuous exceptions, such as in the Trinity Islands, south of Sanak, where mallards, mergansers, gadwalls, and other ducks nest in amazingly dense concentrations (Bailey and Faust 1980). Such unusually dense breeding populations probably represent relic populations of birds formerly using nearby islands. Foxes and cattle were introduced on the best waterfowl islands, those few with extensive low-lying marsh and estuarine habitat, namely Sanak, Simeonof, and Caton. Cattle denude habitat and render nesting waterfowl more vulnerable to fox predation. Now that cattle have been removed from the latter two islands, nesting waterfowl populations should improve, though still severely limited by fox on Simeonof. Fox eradication is planned on Simeonof Island (Shumagins), the best refuge-owned waterfowl habitat in the region.

Green-winged teal are the most widespread nesting species of duck in the Alaska Peninsula Unit. Other nesting ducks not already mentioned include white-winged scoter, greater scaup, northern shoveler, northern pintail, and common eider (Bailey 1978, Bailey and Faust 1930, Bailey and Faust 1981, Bailey and Faust 1984). Big flocks of molting surf and white-winged scoters and common and red-breasted mergansers are found in certain fjords along the Alaska Peninsula.

Swans nest on three islands with large lakes (Bailey and Faust 1981), and a remnant population of Aleutian Canada geese breeds on tiny Kaliktagik Island in the Semidis (Hatch and Hatch 1983).

Marsh and waterbirds - All four North American loons occur in the Alaska Peninsula Unit, most commonly in winter. Red-throated, and less frequently, common loons nest on lakes on some of the larger islands. Red-necked and horned grebes winter off refuge islands. The former species probably also nests on a few islands. Sandhill cranes stop on some islands during migration. Nonbreeders occasionally spend time on larger islands in summer.

Shorebirds - The islands in the Alaska Peninsula Unit are used during migration by numerous shorebirds. Thousands congregate along beaches of large islands. At least six species of shorebirds nest in the area. Semipalmated plovers, rock sandpipers, and red-necked phalaropes also are locally common breeders. No less than 16 species of shorebirds use various islands and capes during some time of the year. Chief migrants, especially in fall, include lesser golden plovers, western and least sandpipers, dunlins, phalaropes, and ruddy

turnstones. Nonbreeding whimbrels and wandering tattlers often use many islands in summer.

Raptors - About 150 bald eagle eyries have been denoted on islands in the Alaska Peninsula Unit. The largest number of nesting eagles is in the Shumagin Islands and on the islands in Wide Bay; the fewest reside in the Sandman Reefs.

Golden eagles nest on Bird Island and probably elsewhere in the Shumagins. Some eagles from the nearby Alaska Peninsula probably move onto the offshore islands during winter when sea ducks and other waterfowl congregate there. The average population of adult eagles south of the peninsula is around 1,500.

Compared to the Aleutian Islands Unit, peregrine falcons are scarce in the Alaska Peninsula Unit. Less then a dozen eyries have been located. Thorough cliff inspection may reveal more peregrines. Other raptors nesting in the unit include the rough-legged hawk and gyrfalcon (one record: Bailey and Faust 1984). Northern harrier, goshawk, sharp-shinned hawk, merlin, osprey, and short-eared owl have been observed, chiefly during migration.

Upland birds - Rock ptarmigan inhabit most of the larger, mountainous islands. Before fox introductions, they were probably much more numerous and inhabited smaller islands as well. On some islands like Nagai in the Shumagins where fox have been eradicated, ptarmigan are prolific. Willow ptarmigan inhabit a few of the large islands in or near the Shumagins, such as Mitrofania, Unga, Nagai and Big Koniuji, and it is likely they are present in the Pavlof Islands as well. Curiously, no ptarmigan have been found on islands east of Nakchamik in Chignik Bay. None are in the Semidis or on Sutwik Island, which have ideal habitat and are fox free.

Passerine birds - Excluding accidental visitors, at least 28 species of passerine birds use islands in the Alaska Peninsula Unit during migration or at least for seasonal residence. Although all islands are treeless except for a few introduced spruce, diversity of passerines is highly variable. Larger islands, such as in the Shumagin and Pavlof group, have extensive alder thickets on mountain slopes and dense willows in riparian zones. Such islands commonly have black-capped chickadee; yellow and Wilson's warblers; common and hoary redpolls; savannah, golden-crowned, and fox sparrows; and hermit thrush. On smaller islands lacking shrubs and in tundra areas on bigger islands, savannah sparrows, water pipits, and on some islands, Lapland longspurs predominate. The savannah sparrow probably is the most common species on islands in the Alaska Peninsula Unit (Bailey 1974).

The song sparrow is the most widespread passerine bird associated with beaches. Winter wrens and rosy finches are locally abundant on certain islands, mainly smaller ones free of foxes. Rosy finches also occur in alpine areas on some islands. Passerine abundance, especially along beaches, is noticeably higher on islands without fox. The distribution and abundance of snow buntings is exceedingly localized. On the islands in Wide Bay, for example, they are numerous at sea level, whereas on others in the region they are absent or present only near mountain tops (Bailey and Faust 1984). Common ravens abound throughout the region and prey on cliff and surface nesting seabirds. Black-billed magpies are locally abundant mainly in the Shumagins and Pavlof Islands, but they are conspicuously absent from some areas, such as the Semidi Islands. A few species like the pine grosbeak appear to be a newly established breeder on Big Koniuji, Popof, and probably some other shrub-covered islands. Bank swallow colonies exist on several islands.

Mammals

Marine mammals

Sea otter - Except for the Aleutians, more sea otters inhabit waters in the Alaska Peninsula Unit than any other region. Estimates of otter numbers range from 22,000 to 30,000 (Burns et al. 1985). Sea otters continued to expand in most areas since being protected in 1911. The largest sea otter numbers are found in the Sandman Reefs and Shumagin and Pavlof islands. Pods of several hundred animals are occasionally sighted at Sarana, Bird, and Poperechnoi islands and other locales in this area (Ed Bailey pers. obs.). Sea otters become less numerous east of the Shumagins, where water depths are generally greater. Surprisingly few

were present during a recent survey of the Sanak Islands, an area reported to have large concentrations (Ed Bailey pers. obs.).

Simeonof Island originally was established in 1958 as a refuge for sea otters, but currently relatively few inhabit the extensive shoals and kelp beds around this island (Ed Bailey pers. obs.). Unlike some other areas, no serious conflicts between otters and humans over shellfish have developed yet in the Alaska Peninsula Unit.

Since the refuge boundary is mean high tide on all islands except for the Semidi Islands, which include roughly 250,000 acres of surrounding seabed, and for Simeonof Island, which includes water within a mile of shore, otters are using state-owned waters, except when hauling out.

Northern sea lions - The majority of Alaska's sea lions used to inhabit the western Gulf of Alaska and the south side of the Alaska Peninsula (Burns et al. 1985). Now, Merrick et al. (1987) indicated that approximately 31,000 sea lions occurred along the south side of the Alaska Peninsula in 1986. Most of the 12 sea lion haul outs and all five rookeries south of the Peninsula are on refuge-owned land. Clubbing and Pinnacle rocks in the Sandman Reefs are now occupied by approximately 3,000 adults and pups (down from the previous number of 8,500). Only 2,100 use Atkins and Chernabura islands in the Shumagins (down from 13,000), and 4,400 now occur on Chowiet (Semidis)(down from roughly 10,000), the largest rookery off the Alaska Peninsula (Caulkins and Pitcher 1982). The Atkins Island colony used to be almost as large (previously had 9,500 animals). In the past, these five rookeries collectively produced about 14,000 pups, nearly half the state's total. Sea lion numbers on haul outs fluctuate greatly, and few or no pups are born on haul outs. Sea lions disperse from rookeries in late summer after breeding. Sea lions are markedly declining off the Alaska Peninsula, similar to the nearby Aleutian Islands, where populations have declined about 50 percent in nearly 30 years. Planned expanded commercial fishing in the Shumagins and elsewhere in the region poses a threat to sustained numbers of sea lions.

Walrus - Pacific walrus, largely restricted to the Bering Sea and north, occasionally haul out on islands south of the Peninsula in years when the population reaches high levels. Small groups of walrus south of the Peninsula also were reported by the Russians in some years before 1900 (Murie 1959). Walrus have been recently sighted on Spitz and Mitrofania islands (Ed Bailey pers. obs.).

Harbor seals - Less than 50,000 seals occur in the Alaska Peninsula Unit (Burns et al. 1985). Seals haul out in thousands of different locales. As with sea lions, conflicts with commercial fishing may occur. The largest number of seals in the region appear to be in the Sandman Reefs and Shumagin Islands. In past years Simeonof and surrounding islets have been one of the heaviest used areas by seals (Kenyon 1964). Seal numbers generally are lower along the upper Alaska Peninsula, except for Douglas Reef and the Shakun Islands, both of which are not in the refuge.

Northern fur seals - Fur seals seldom appear on islands in the Alaska Peninsula Unit.

Whales - Up to 17 species of whales and dolphins occupy the waters south of the Alaska Peninsula. None actually occur in the refuge except at Simeonof, where the Service manages waters within one mile of the island. Minke whales are among the most abundant species and they often venture very close to shore. Killer whales are also locally common, especially near sea lion colonies. In 1986, over 200 humpback and fin whales were found feeding off the Shumagin Islands shores.

Terrestrial mammals

River otters - River otters range throughout the region and are locally abundant on some islands, primarily in the outer Shumagins such as Big Koniuji. On most islands otters are now more prevalent than during the fox farming era prior to World War II, when they too were heavily trapped. River otters readily swim between islands and venture far from the Alaska Peninsula. They also traverse the interior portions of large islands, using streams and mountain passes. River otter densities on some islands may be higher than anywhere in the state because they are not trapped. Though they sporadically prey on seabird colonies in some parts of the state,

this has not been observed in the Alaska Peninsula Unit.

Shrews - The dusky shrew inhabits Popof, Big Koniuji, Bird, and other islands in the Shumagins (Manville and Young 1965; E.P. Bailey, pers. obs.). It may also be found on similar large islands, such as the Shumagins, Pavlofs, and Chiachis, when surveys are done there.

Voles - Tundra voles apparently are indigenous to some large islands off the peninsula, primarily in the Shumagin, Pavlof, and Chiachi groups. They also are exceedingly abundant in the Sanak Islands, where some very small islands are overrun with them. Voles were introduced by fox farmers to some islands, such as Chankliut in 1918, where they subsequently ravaged vegetation and caused severe erosion (Bailey and Faust 1981). Similar damage is evident on Andronica Island in the Shumagins. On most islands it is not clear whether voles were introduced as an added food source for foxes or whether they are native.

Ground squirrels - As with voles, the origin of ground squirrels is obscure on many islands. Ground squirrels are indigenous to Nagai Island and other large islands near the Alaska Peninsula in the Shumagins, as they were reported by Steller in 1741 (Golder 1925). However, other large islands off the peninsula, such as Sutwik, have none, while squirrels are present on nearby tiny Kak Island. No squirrels have been found on any islands east of the Semidis. Fox farmers brought barrels loaded with ground squirrels and released them on islands where there were none in the Aleutians (Peterson 1961) and undoubtedly did the same on islands in the Alaska Peninsula Unit. Like voles, squirrels have overpopulated certain islands, damaging seabird habitat. On Bird Island in the Shumagins squirrels have altered vegetation from grassland to dwarf shrub heath, and have denuded areas, causing sand blows. This seems likely to preclude recolonization by burrowing seabirds after the removal of fox. Meanwhile, on other nearby islands, squirrel populations remain comparatively low and are not adversely affecting vegetation.

Except for ancient murrelets, nocturnal seabirds generally do not coexist with ground squirrels on small islands. Perhaps nowhere is this more pronounced than in the Semidis, where huge concentrations of nocturnal birds occur on the few islands free of ground squirrels (Hatch and Hatch 1983).

Hares - Snowshoe hares from Kodiak were introduced to Popof Island in 1955, and a small population is still there (Manville and Young 1985).

Caribou - Caribou from the Alaska Peninsula occasionally swim to some nearby offshore islands, such as Kumlik.

Bison - Bison were introduced to Popof Island over 30 years ago and now number more than 85 animals.

Brown bears - Bears readily swim to islands many miles south of the Alaska Peninsula and have been reported in Shelikof Strait half way between the mainland and Kodiak Island. Bears generally supplanted foxes on islands off the upper part of the Alaska Peninsula as the chief limiting factor on the distribution, abundance, and species composition of ground and burrow nesting seabirds. Certain island groups, especially close to the mainland, are practically devoid of burrow nesting birds because of brown bears. Bears periodically raid seabird islands to consume gull eggs and chicks and to dig up burrows of puffins and other species (Bailey and Faust 1984).

There are few villages along the eastern half of the south side of the Alaska Peninsula, which probably accounts for the widespread use of islands by bears in this region. Ten villages are located in the western part of the peninsula, and since villagers have been known to shoot any bears observed, bears evidently were eliminated from the Shumagins and other islands off the lower peninsula. Indeed, there formerly were bears in the Shumagins (Murie 1957). The abundance of bears on islands off the eastern peninsula has probably greatly increased since 1912, when Katmai volcano buried several villages in ash and the area was never resettled. Many seabird colonies undoubtedly disappeared after bears reinvaded islands off the eastern half of the peninsula. Changes in local seabird species composition and numbers caused by human influence on island bear

populations may have been as significant as those caused by fox farms in other regions.

Foxes - As previously discussed, the distribution and abundance of many species of birds on islands south of the Alaska Peninsula are profoundly influenced by fox populations. Only relic numbers of some species probably remain. Red foxes are native to some of the Shumagins. They may also have been native to some other large islands in the Pavlof and Chiachi group. On Nagai, the second largest of the Shumagins, they apparently were eliminated with strychnine in the early 1900's by trappers. Introductions of foxes to islands in Alaska probably began as early as the 1750's, but records of releases to islands in the Alaska Peninsula Unit are obscure compared to introductions in the Aleutians and elsewhere. It appears that they were introduced on up to 60 islands along the Peninsula. With few exceptions, like Big Koniuji Island in the Shumagins where red foxes were released, arctic foxes were introduced. Both arctic and red foxes were placed on at least two islands in the unit, but only reds survived on one island and none on the other.

No foxes remain on any of the 16 islands east of the Shumagins where arctic foxes were released. For unknown reasons foxes disappeared from these islands and 21 others in the Shumagins and westward to the end of the Peninsula. Fox removal on Big Koniuji and Bird islands has recently been completed. Fox remain on 17 islands.

Recolonization and marked increases in seabirds and other birds are occurring on many islands that formerly had foxes. Rebounding seabird populations also are evident in the Shumagins. Bendel Island, for example, now has the only sizeable mew gull colony in the refuge, and waterfowl also breed there (Bailey 1978). Huge numbers of northern fulmars and other birds presently nest in the now fox-free Semidi Islands.

Cattle - Cattle were first placed on Simeonof Island in the 1890's along with fox. They were also later released on nearby Chernabura Island and on Caton, Wosnesenski, Dolgoi, Sanak, and Cherni. The latter two islands are now privately owned and most of Dolgoi and about half of Wosnesenski are Native-owned. Cattle from Sanak also occupy two adjoining refuge islands. By the 1960's overgrazing and erosion were documented on Simeonof and Chernabura. The number of cows on Simeonof sometimes was three times higher than the limit imposed by grazing permits. Damage to vegetation and soils escalated and vegetation was altered from grassland to prostrate heath. Worse, obvious desertification has occurred on the southwest end and in other places, with the loose sandy soil denuded of vegetation and eroding severely. Parts of Chernabura and Caton were also showing the effects of serious overuse.

Eventually terns and most other birds nesting on Simeonof abandoned the island. Finally, in 1985 cattle were removed from Simeonof, Chernabura, and Caton. Simeonof, especially, once reported to be abounding with breeding waterfowl and other birds, may witness a resurgence in wildlife following removal of cattle and fox.

Endangered species

Aleutian Canada geese were eliminated from all islands where they formerly bred by introduced fox. Relic populations survived on tiny Kaliktagik in the Semidis (Hatch and Hatch 1983). Recent genetic studies confirmed that the current 70 geese in the Semidis share the same origin as those in the Aleutians which have been designated as endangered. In 1984 at least 20 nests were found on Kaliktagik.

HUMAN ENVIRONMENT

Cultural Resources

The history, anthropology, and archaeology of the southern part of the Alaska Peninsula Unit is almost identical to that of the Aleutian Islands Unit, with the exception of the added availability of land mammals to the subsistence base; that of the northern portion is best considered as identical to that of the Kodiak Island portion of the Gulf of Alaska Unit.

One site of particular importance within this unit is located on Bird Island, in the Shumagin Islands, where the first recorded contact between Alaska Natives and Europeans occurred in 1741.

Subsistence Uses

All communities in the Alaska Peninsula Unit are considered rural communities for subsistence purposes. Subsistence plays an important part in the social and economic activities of Alaska Peninsula residents. In an average year, residents of local communities harvest an estimated 35,000 salmon, 175 caribou, 77 moose, and 10 bear for subsistence purposes. However, virtually no mammals and few fish are actually harvested on the offshore islands of the refuge itself. Most are harvested on the Alaska Peninsula (Petterson pers. comm. 1985).

According to an Aleutians East Coastal Resource Service Area survey conducted in 1983, 71 percent of the survey respondents indicated that subsistence activities were important and 28 percent indicated they were somewhat important. A survey conducted for the state of Alaska in 1982 divided the state into 19 districts. Within the Aleutian Islands district, survey data were gathered from Sand Point as well as Unalaska, Cold Bay, St. Paul Island, Atka, and Chignik. The results indicate that, for the region as a whole, 67 percent of the households engaged in subsistence activities. Furthermore, 62 percent of the subsistence participants obtained between 0-25 percent of their food supply in this manner; 30 percent said that subsistence activities contributed between 25-50 percent of their food supply; and eight percent indicated that 50-75 percent of their food supply was attributable to subsistence activities. Subsistence provides anywhere from 40 percent to 90 percent of the total amount of protein consumed by local residents (Combs 1982).

In 1982 and 1983, the Alaska Department of Fish and Game Subsistence Division conducted a household survey on subsistence harvests that included Perryville. The per capita subsistence harvest for one annual cycle was estimated to be 396 pounds. Of this, 70 percent was comprised of fish, and 21 percent was comprised of land mammals.

Recreational Uses

Recreational use of the region, but not the refuge, has significantly increased in the past five years, as measured by the increase in air-taxi pilots, outfitters, and activities of local guides. However, nearly all of the activity has been restricted to the Alaska Peninsula, because outsiders primarily hunt for caribou, moose, and bear and sport fish for salmon, lake trout, and Dolly Varden (Petterson pers. comm. 1985). There are no game species on the refuge islands. Occasionally adventure cruise ships like the Society Expeditions' visit islands particularly in the Shumagins. Rarely, sea kayakers or backpackers visit the islands. There has been some interest in guided bird watching expeditions, but none have occurred to date. Commercial fishing crews and local people occasionally visit the islands to sightsee, beachcomb, or bird watch. Some sightseeing occurs from state ferries which travel the length of the Alaska Peninsula, stopping at Chignik Bay and Sand Point. Tourism is not well developed anywhere in this unit.

Economic Uses

There are very few economic uses of refuge lands in the Alaska Peninsula Unit. There is one expedition cruise ship which occasionally stops at the Semidi Islands and Unga Island during summer months. Grazing is permited on Wosnesenski and Chirikof islands at the levels which were in existence at the time the islands became part of the refuge.

Military Uses

There are no military facilities on Alaska Maritime Refuge lands within the Alaska Peninsula Unit. Currently, no military training activities are planned in the unit and there are no sites that will be affected by the Department of Defense's Environmental Restoration Defense Account, Debris Cleanup and Restoration project.

Communities

There are eight communities within the Alaska Peninsula Unit, including Cold Bay, Chignik (also known as Chignik Bay), Chignik Lagoon, Chignik Lake, Perryville, Ivanof Bay, Sand Point, and King Cove. Activities associated with refuge management are not expected to measurably affect these communities. For this plan, three communities were studied in depth: Sand Point, King Cove, and Perryville. These three communities are fairly representative of

the range of communities within the Alaska Peninsula Unit.

King Cove, the westernmost community, is located on the south side of the Alaska Peninsula, 625 miles southwest of Anchorage and 18 miles southeast of Cold Bay. Sand Point is located within the refuge on Popof Island in the Shumagin Islands. Perryville is located on the Alaska Peninsula about 68 miles east of Sand Point.

All peninsula communities are eligible for land entitlements under the Alaska Native Claims Settlement Act except for Cold Bay. Local residents are shareholders in a local Native corporation which has title to local surface estates and to one of two regional corporations which owns the subsurface rights. King Cove and Sand Point are part of the for-profit Aleut Corporation and the nonprofit Aleutian-Pribilof Island Association, while Perryville is part of the for-profit Bristol Bay Native Corporation and nonprofit Bristol Bay Native Association. The Aleutians East Borough was formed by seven communities in October of 1987. The new borough includes Cold Bay, False Pass, King Cove, Nelson Lagoon, Port Moller, Sand Point, and Akutan.

Perryville, Sandpoint, and King Cove

Population trends and composition - Perryville, Sand Point, and King Cove display very similar demographic structures. Each community is predominantly Aleut, with a large proportion of residents under the age of 25 and greater numbers of males than females (Table 29). The populations in all three communities vary seasonally. At the peak of the fishing season, several hundred people are added to the populations of King Cove and Sand Point (Impact Assessment 1982). From 1980 to 1985, transient summer residents comprised between 26 and 31 percent of the total population in Sand Point. All but a few of Perryville's residents move to Chignik or Chignik Lagoon for the salmon season (Institute of Social and Economic Research 1983).

Throughout most of the 20th century, population growth rates for all three communities have been remarkably stable. In the 1950's, however, the growth rate for Sand Point began to increase significantly as a result of increased economic opportunities associated with the commercial fishing industry. A similar trend occurred in King Cove in the 1970's. In both instances, most of the population growth has been the result of natural increase and migration from other Alaska Peninsula communities (Combs 1982). Between 1970 and 1980, population increases ranged from a low of 1.8 percent per year in Perryville to a high of 2.4 percent per year in King Cove.

Projected changes in each community's population are presented in Table 30. These projections are based on prospects of limited economic growth, relatively stable rates of increase in available housing units, and projected increased fertility rates associated with a large proportion of young people in each community (Petterson pers. comm. 1986).

During the past five years, the communities of King Cove and Sand Point have been growing at a slower rate than anticipated by these projections, which are based on the rate of growth between 1970 and 1980. With relatively little growth (and perhaps even a significant decline in the case of King Cove), the age, sex, and ethnic distributions are expected to remain relatively constant for the next ten years. The proportion of Sand Point residents under the age of 30, however, is expected to increase significantly in relation to older age groups because of 1) the increase in population due to natural fertility and 2) migration of residents from other Alaska Peninsula communities seeking employment (Petterson pers. comm. 1986).

Sociocultural systems - Social and economic activities in these communities revolve around the commercial and subsistence uses of salmon. Local residents have long fished for salmon as a food source and as the primary cash producing activity. The latter activity has been reinforced by regional economic growth, which resulted in substantial increases in per capita and household income. Reinforcement of traditional fishing orientation has resulted in intensification of fishing effort rather than diversification of economic activities.

The occupational orientations of local residents are expected to remain the same for the next ten years. As regional and local Native

Table 29. Population characteristics of Alaska Peninsula Unit communities.

	Sand Point	King Cove	Perry-ville
1970 Population	360	283	94
1980 Population	794	684	111
Annual Growth Rate (1970-80)	2.2%	2.4%	1.8%
1984 Population	870	521	107
Percent Native	87	89	93
Percent Male	54	52	56

(Minerals Management Service 1987)

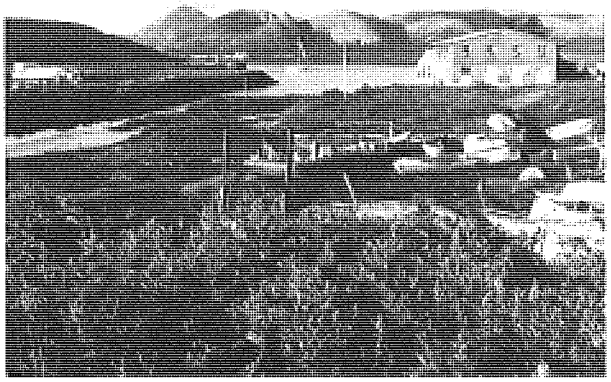
Table 30. Population projections for Alaska Peninsula Unit communities.

	1990	1995	2000
King Cove	812	886	965
Perryville	121	126	132
Sand Point	1,014	1,145	1,294

(Alaska Department of Community and Regional Affairs 1981)

corporations increase their efforts to diversify and generate income from corporation property, occupational patterns may begin to change.

Prior to the rise of the commercial salmon fishing industry, subsistence activities comprised the focus of the sociocultural systems of the Alaska Peninsula. While it has been supplanted to a great degree by the commercial salmon fishery and the increased contact with the larger Euro-American sociocultural system, subsistence remains an important basis for social relations, ethnic identity, community values, and world view. Most social relations among residents in each community involve subsistence production and/or distribution. Participation in subsistence activities has increasingly come to be a mark of ethnic



Sand Point is home port for the largest fleet of resident fishing vessels in the area.

identity and is used to distinguish local residents from outsiders. Increasing exposure to the outside world and a potential influx of outsiders in the event oil-related development occurs, will heighten the importance of subsistence as a marker of ethnic identity.

Historically, each community has been involved in extensive social interaction networks with other communities on the Alaska Peninsula. These networks are based in part on geographical proximity, on economic activities, and on kinship ties. Extensive links exist between the communities of King Cove and Belkovski, for instance (Institute of Social and Economic Research 1983). In 1976, these ties were further strengthened when the residents of Belkovski moved en masse to King Cove. A similar set of links has existed between the communities of Sand Point and Sanak. Residents of Perryville have ties to Chignik, where they migrate for the salmon fishing each summer (Petterson pers. comm. 1985; Impact Assessment, Inc. 1982).

As economic opportunities continue to develop in Sand Point and King Cove, intraregional ties will increase. This will be due to the migration of residents of less prosperous villages seeking employment and the efforts of local governments and Native corporations to consolidate economic resources and perpetuate economic development. Ties between King Cove and Sand Point are projected to strengthen with

increased interaction through school-related activities (Combs 1982; Petterson et al. 1982).

Community infrastructure - Community facilities vary from none to a full complement of facilities in the first class cities, King Cove and Sand Point. All three communities have centralized electrical and water systems. King Cove and Sand Point have sewage treatment facilities. Transportation and communication facilities in all three communities are fairly similar. Long distance telephone and television services are provided by ALASCOM through earth stations located in each community. Interior Telephone Company provides in-city service to residents of King Cove and Sand Point. Both King Cove and Sand Point have a small boat harbor and docking and wharfage facilities. Each community has an elementary/secondary school and a health clinic (Impact Assessment, Inc. 1982).

Airfields located in each community are all dirt/gravel strips ranging in length from 1,800 feet at Perryville to a 4,300-foot field near King Cove. Three-wheelers are commonly used on roads and beaches. No significant changes in local transportation facilities are expected to occur in the next ten years. Topographical constraints restrict significant improvements on the airfields at Perryville and Sand Point.

Perryville is the only community within the region chartered under the Indian Reorganization Act of 1934. It is governed by a six member IRA council which administers state and federal programs and owns and operates the village water and electrical systems. King Cove and Sand Point are both incorporated as first class cities. The local government in both communities provide community services including streets, sewage, solid waste disposal, health care, police and fire protection, education, housing development, electricity, water, and water transport. (Combs 1982; Institute of Social and Economic Research 1983).

Economy - King Cove's economy is dominated by the commercial fishing industry, which generates income through both the harvesting and processing of fish and through taxation of the fishing industry. While the fishing industry is dominated by the summer salmon harvest, it also includes the tanner crab harvest and, to some extent halibut and herring. Growth of this industry has been substantial over the last 10 years. In 1976, 38 King Cove residents held commercial fisheries entry permits for the salmon and crab fisheries. This number had risen to 74 by 1982 and coincided with a doubling of the catch, 7.4 million pounds in 1976 to 15 million pound in 1982. During the same period, the value of the catch increased 170 percent, from $2.7 million to $7.3 million. The estimated income of King Cove resident permit holders and crew members in 1984 was $2.75 million. This represented 49 percent of the total resident income.

King Cove has the largest fish processing facility in the state of Alaska. During the summer salmon season, the cannery hires more than 300 temporary workers; few of these workers are local residents. Only seven percent of the total resident income is attributed to cannery work.

The remainder of the permanent resident income is derived from positions with the city of King Cove, The King Cove Corporation, the King Cove School District, and the U.S. Postal Service. In 1984, employment was comprised of 46 full-time positions, 25 part-time positions, and 340 seasonal positions. In the same year, 58 salmon permit holders employed 174 crew members. In addition, an estimated 14 percent of all permanent resident income is generated by subsistence activities.

The fishing industry also provided a large portion of the city's revenue (30 percent in 1984) through a state business tax that returns a portion of the tax to King Cove. In addition, local sales and use taxes, which are also dependent on the commercial fishing industry, accounted for a total of 12 percent of the community's 1984 revenues. The state of Alaska provided the majority (44 percent) of the remainder of King Cove's 1984 revenue (Stephen R. Braund and Associates 1986).

Commercial fishing is also the center of economic activity in Sand Point. Since 1980, the economy of Sand Point has become somewhat more diversified. Sand Point is becoming a regional service center, as expanded roads, a modern runway, and improved ferry service have made the community more accessible to other

inhabitants of the region. Sand Point residents find it less necessary to acquire goods and services from other communities.

In 1980, employment in Sand Point was 538. Commercial fishing and processing accounted for 85 percent of this total. For the period 1980-1986, employment has been estimated to have remained relatively constant. Since 1980, 118 limited-entry fishing permits have been issued to 73 Sand Point residents. In 1986 there were approximately 127 resident fishing vessels, up from 91 in 1981.

Aside from the fishing industry, the city's school is the single largest employer with a total staff of 20 in 1986. Other sectors that provide employment include federal, state, and local government, commercial/retail services (including a full-service bank), construction, utilities, transportation, and the local Native corporation.

According to the 1980 U.S. census, the average household income for Sand Point residents was $47,951. This figure varies annually depending on the quantity and type of fish harvested and the value of that harvest. According to the 1985 state of Alaska survey, the Aleutian Islands district cost of living was 26 percent above that of Anchorage and 42 percent greater than that of Seattle.

The budget for the city of Sand Point has grown significantly over the period 1980 - 1985. Capital improvement projects have been a significant portion of city expenditures over the last six years, ranging from 20 percent to 40 percent of the total budget. Total city revenues have risen from $366,000 in Fiscal Year 1980 to $1,996,000 in Fiscal Year 1985. While a large portion of the revenue has been received through federal and state revenue sharing, this funding source peaked in 1983 and has gradually declined since then. In Fiscal Year 1985, revenue sharing accounted for only 10 percent of the total revenues. Local sources of funds include a two percent sales tax and boat harbor fees. Together these two categories made up 15 percent of the city's total revenues in Fiscal Year 1985 (Impact Assessment 1986).

As with the other two communities, Perryville's economy is centered around commercial fishing. In 1985, seven Perryville residents held commercial fishing permits. Twenty-three out of a total of 31 crew members associated with these permits were Perryville residents. The community's fishing industry depends almost solely on salmon harvests. Since there is not a good anchorage or boat harbor located at Perryville, residents must store their boats at Sand Point during the winter. This lack of access to vessels precludes involvement in the winter crab fisheries. In the nine year period 1975 through 1983, the average gross income for Perryville fishers (gear license holders) ranged from a low of $19,700 in 1975 to a high of $197,800 in 1978. In 1983, the average gross income was $131,800.

In addition to fishing, at least 14 other jobs were available to Perryville residents in 1985. These included postmistress, Peninsula Air local service agent, health aide and alternate, and various jobs at the school other than teachers. All but the postmistress job were part-time (Cultural Dynamics 1985).

Subsistence - Residents catch salmon by seining near their communities from spring until early winter. Candlefish are taken in May. King and dungeness crab, cockles, and razor and butter clams are caught year-round. Moose, caribou, bear, ptarmigan, ducks, sea ducks, and geese are hunted. Sand Point residents use boats to reach the refuge. Most of their estimated 75 caribou come from Canoe Bay and along the Pacific Coast of the peninsula from the eastern side of Pavlof Bay up to Balboa Bay. King Cove residents harvest about 100 caribou per year. Caribou are harvested from boats between the western shore of Pavlof Bay and Bechevin Bay along the Alaska Peninsula. Sand Point and King Cove residents harvest some waterfowl on the western side of Pavlof Bay around Chinamen and Jackson Lagoons. Seals and occasionally sea lions are taken year round by residents of Perryville and King Cove. In the fall, residents of these two communities, and to a lesser extent residents of Sand Point, pick blueberries, cranberries, blackberries, wineberries, and salmonberries. Wild celery and spinach are gathered in the spring (Alaska Dept. of Fish and Game 1982; Petterson pers. comm. 1985)

Recreation - Sand Point is located in the refuge on Popof Island. However, the village is surrounded by private lands, so villagers do not often utilize refuge lands on Popof. Perryville and King Cove residents rarely visit refuge islands for strictly recreational purposes. The tourist industry is not developed in any of these villages. Sand Point is one of the largest unit communities and is closest to the recreationally desirable Shumagin Islands. However, tourism has not been developed in Sand Point and a lack of float planes further hinders tourist access to the refuge islands.

WILDERNESS REVIEW

This evaluation will determine what lands, if any, in the Alaska Peninsula Unit meet the criteria necessary for wilderness designation. Those criteria are explained in the wilderness review section of the Overview.

Most of the islands in the Alaska Peninsula Unit have been Native selected (see Table 7). Although nearly all of these islands meet the wilderness criteria, they can not be proposed for wilderness at this time, because their eventual ownership is uncertain. Overselections are very common in this area so many islands will remain in federal ownership. When the selections are relinquished, a wilderness proposal for those areas meeting the criteria could be evaluated.

A few areas do not meet the wilderness criteria and will not be evaluated further. The parcels of Service land on Inner Iliasik, Dolgoi, and Paul islands do not meet the minimum size criterion of 5,000 acres or a size manageable as wilderness. Private land surrounds Service land on these three islands. Chirikof Island does not meet the naturalness criterion, because it has been heavily grazed by cattle and horses and has buildings, other ranching structures, roads, and off road vehicle trails. Chirikof has been state selected and will likely be conveyed.

The Sanak Islands, Simeonof Island and islets, and the Semidi Islands are already designated wilderness.

Egg Island - Egg is located near the tip of the Alaska Peninsula at the mouth of Morshovoi Bay. It is precipitous and rocky with gravel beaches. A bath temperature hot spring is located on the beach. About 3,000 diurnal birds and an unknown number of nocturnal birds nest primarily in crevices on the island. Principle species are ancient murrelets, Leach's storm-petrels, and glaucous-winged gulls.

1. Size - The island is 15 acres.
2. Land ownership - The island is in federal ownership and has not been selected.
3. Natural integrity - Nothing has affected the natural systems of the island. Judging by its name, egging has probably occurred on the island in the past but has not affected bird populations.
4. Apparent naturalness - There are no known human improvements on the island.
5. Outstanding opportunities for solitude - No human use is known to occur on this island although it is about 30 miles from Cold Bay. It is unlikely that a visitor would encounter anyone else. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Bird watching, photography, camping, and hot spring soaking are possible on this island. Opportunities are less than outstanding because of the small size of the island.
7. Special or unique features - The hot spring is a special feature.
8. Outstanding resource values - The concentration of seabirds, 3,000 diurnals plus an unknown but probably greater number of nocturnals on a 15 acre island, is an outstanding value.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - This island meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It also meets the Service's criterion of outstanding resource values. It is not adjacent to an existing wilderness.

Sandman Reefs - This extensive system of reefs, rocks, and low grassy islets extends from west of Deer Island to south of the Pavlof Islands. The area contains more than 100 islands and islets, only 23 of which are greater than 10 acres in size. Some of the larger islands are Umga, Goose, Little Goose, Midun,

and Sushilnoi islands and the Clubbing Rocks and Pinnacle Rock. Shallow, uncharted waters, which make boat access difficult for small boats and impossible for large boats, have protected this area from human influence. Sea otters survived here when they were eliminated elsewhere in the early 1900's. The area now supports one of the highest densities of sea otters along the Alaska Peninsula. Clubbing Rocks and Pinnacle Rocks are sea lion rookeries with over 8,000 animals.

Seabirds flourish here because of the lack of predators. Within the Alaska Peninsula Unit, only the Semidi Islands have more nesting seabirds. The number of nocturnal nesting seabirds in the Sandman Reefs is exceeded in Alaska only in the more extensive Aleutian Islands. Over a million Leach's storm-petrels breed on these low islands as well as half of all the Cassin's auklets in Alaska, the largest population of ancient murrelets in the Alaska Peninsula Unit, the westernmost colony of rhinocerous auklets, and fork-tailed storm-petrels. Diurnal species include horned puffin, tufted puffin, glaucous-winged gull, common murre, and thick-billed murre. The shallow waters of the reef system are also of great importance for wintering and migrating waterfowl. Emperor geese, brant, scoters, eiders, harlequin duck, oldsquaw, scaup, bufflehead, goldeneyes, and mallard winter in the area.

1. Size - The islets total approximately 270 acres.
2. Land ownership - All of the islands except the largest, Cherni Island, are in federal ownership. None have been selected.
3. Natural integrity - Nothing has affected the natural systems of the Sandmans.
4. Apparent naturalness - The only known human improvements are the remnants of a cabin on Goose Island and an eight foot navigational tower on Umga Island. The cabin remains are not readily apparent and do not affect the natural appearance of that island. The tower has a light and large orange board which detract from the natural appearance of a few acres of that island. Overall, the Sandmans appear natural.
5. Outstanding opportunities for solitude - Although these islands are only 25 to 50 miles from Cold Bay, they are rarely visited because of the dangerously shallow, uncharted waters surrounding them. The islands are scattered about an area approximately 40 miles long and 25 miles wide. It is very unlikely that a visitor would encounter anyone else in this large reef system. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Although access is difficult for the reasons discussed above, some of the islands have outstanding harbors and areas which would make good campsites. Bird watching, photography, and nature study would be outstanding activities in the Sandmans. Overall, primitive recreation opportunities are outstanding.
7. Special or unique features - Sea lion rookeries, a large sea otter population, numerous wintering waterfowl, and the number and diversity of breeding seabirds, particularly nocturnal species, are all significant features.
8. Outstanding resource values - The Sandman Reefs have outstanding resource values because of the special features discussed above. The National Natural Landmarks Program concluded in their 1982 study that the area was of national significance because of its seabird and marine mammal populations (Young and Batten 1982).
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - Sandman Reefs meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It also has special features which is an optional criterion and meets the Service's criterion of outstanding resource values. It is not adjacent to an existing wilderness area.

The Pinnacle - Two rock spires are located about one mile off the southwest side of Wosnesenski Island in the Pavlof Island group. The largest and tallest is about 500 feet in elevation. Seabirds nesting on the cliff faces include 1,000 horned puffins and cormorants.

1. Size - The rocks total approximately two acres.
2. Land ownership - They are in federal ownership and have not been selected.
3. Natural integrity - Nothing has affected the natural systems of the Pinnacle.

4. Apparent naturalness - The Pinnacle appears natural.
5. Outstanding opportunities for solitude - The area in which the Pinnacle is located is very remote and seldom visited. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - The Pinnacle is a very dramatic, scenic feature and offers bird watching opportunities. However, landings aren't feasible on the Pinnacle. Recreation opportunities are less than outstanding.
7. Special or unique features - There are no known special features.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - The Pinnacle meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It does not meet the Service's criterion of outstanding resource values, and it is not adjacent to an existing wilderness.

Omega, Kennoys, and Jude islands - These islets are located between Unga and Wosnesenski islands. All are steep, rocky islands with some grass on top. Sea lions and seals haul out on the islands or low rocky reefs nearby. Jude Island has about 1,000 ancient murrelets, short-eared owls, and probably Leach's storm-petrels. A glaucous-winged gull colony, 1,200 birds, is on Kennoys.

1. Size - Omega is about three acres, Kennoys, which is actually six islets, totals about 20 acres, and Jude about five acres.
2. Land ownership - The islands are in federal ownership and have not been selected.
3. Natural integrity - Voles have been introduced on Jude. Otherwise, nothing has affected the natural systems of the islands.
4. Apparent naturalness - There are no known signs of human activity on the islands.
5. Outstanding opportunities for solitude - These islands are remote and undoubtedly rarely visited. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - All are too small to have outstanding opportunities for recreation. The resources are not that rich or varied.
7. Special or unique features - There are no known special features.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - These islands meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. They do not meet the Service's criterion of outstanding resource values and are not adjacent to an existing wilderness area.

Karpa Island - This is the only island in the Shumagins which has not been Native selected. Numerous other islands in the group meet wilderness criteria as shown in Table 7. Scenic, rugged Karpa Island is located 20 miles northeast of Sand Point. Karpa is a massive rocky island with a peak elevation of 1,373 feet. A grass covered top provides habitat for burrow nesters. The largest murre colony in the Shumagins, a quarter million murres, nest on the steep headlands. Other species include the largest glaucous-winged gull colony in the Shumagins, 10,000 horned puffins, 10,000 tufted puffins, and ancient murrelets. Ground squirrels are also found on the island.

1. Size - Karpa is 610 acres.
2. Land ownership - The island is in federal ownership and has not been selected.
3. Natural integrity - It is uncertain whether ground squirrels were introduced or naturally occur on Karpa.
4. Apparent naturalness - The only known sign of human activity on Karpa is a temporary U.S.G.S. tiltmeter for monitoring seismic activity. It is temporary and an insignificant part of the overall scene.
5. Outstanding opportunities for solitude - This island is rarely visited as it is located in a very remote area. It is difficult to land on Karpa due to rough seas and rocky headlands. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Landing and camping are difficult on Karpa. However, it has one of the most impressive aggregations of seabirds in the region. Primitive recreation is outstanding because the bird watching

opportunities are so extraordinary.

7. Special or unique features - The murre colony of Karpa is unique to the Shumagins and one of the largest in the Alaska Peninsula region.
8. Outstanding resource values - Karpa has outstanding resource values due to the size of the murre colony and the dense population of other seabirds.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - Karpa Island meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It also has special features which is an optional criterion and meets the Service's criterion of outstanding resource values. Karpa is not adjacent to any existing wilderness areas.

Leader Island - Leader is a small rocky mound located off the mouth of Ivanof Bay between Jacob Island and the Kupreanof Peninsula. It is home to about 1,000 seabirds of which 200 are tufted puffins and 800 are glaucous-winged gulls. Bald eagles also nest on the island, and harbor seals haul out there.

1. Size - Leader is about 10 acres.
2. Land ownership - This island is in federal ownership and has not been selected.
3. Natural integrity - Nothing has affected the natural systems of this island.
4. Apparent naturalness - There are no known signs of human activity on the island.
5. Outstanding opportunities for solitude - This island is located in a remote part of Alaska and is seldom visited. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - The island is too small to offer outstanding opportunities for recreation. The island can be landed on and bird watching and photography are possible but not outstanding.
7. Special or unique features - There are no special features.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - Leader Island meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It does not meet the Service's criterion of outstanding resource values and is not adjacent to an existing wilderness area.

Seal Cape - Seal Cape is an extension of the Alaska Peninsula 30 miles south of Chignik Bay. The extremely rugged coastline of the cape is deeply indented by Seal Bay, Sweater Bay, and Devil's Bay. Cliffs line much of the coastline although there are sand beaches in Devil's Bay. The fjord-like bays cut the cape into two principle arms both of which top out over 2,000 feet. Principle nesting seabird species are 2,200 cormorants, 400 black-legged kittiwakes, and glaucous-winged gulls. Murrelets are often encountered in the protected bays around the cape.

1. Size - Seal Cape is 8,200 acres.
2. Land ownership - The area is in federal ownership and has not been selected.
3. Natural integrity - Nothing has affected the natural systems of the cape.
4. Apparent naturalness - There are no known signs of human activity on the cape.
5. Outstanding opportunities for solitude - This area is very rugged and remote. Parties camped in a bay would not be aware of other parties in other bays. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Sea kayaking, camping, climbing, photography, and bird watching would be possible on or around this cape. The scenery is spectacular on the cape itself and in the surrounding area. Fjords and deeply cut bays are set against a backdrop of jagged peaks and pinnacles. Primitive recreation opportunities are outstanding.
7. Special or unique features - The scenery of the cape and surrounding area is unique.
8. Outstanding resource values - The scenery of the cape is an outstanding resource particularly when considered in conjunction with the surrounding area (see discussion below).
9. Existing wilderness boundary adjustment - Seal Cape is adjacent to the Chignik

Wilderness Review Unit of the Alaska Peninsula Refuge. The Chignik Unit was found to have outstanding resource values and was proposed for wilderness in the final comprehensive conservation plan and wilderness review for the Alaska Peninsula Refuge (U.S. Fish and Wildlife Service 1985). Seal Cape has similar habitats and scenery as the adjacent Chignik Unit and would be a logical addition to the wilderness proposal.

Conclusion - Seal Cape meets the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. It also meets the Service's criterion of outstanding resource values and would be a logical extension of the proposed Chignik Wilderness Unit of the Alaska Peninsula Refuge.

Kak and Atkulik islands - These two small islands are located off the mouth of Chignik Bay just east of Nakchamik Island. Numerous other islands in the area such as Sutwik and Nakchamik also meet wilderness criteria but have been Native selected (see Table 7). Kak is made up of columnar basalt, and Atkulik is a steep-sided plateau with a small lake on top. Ancient murrelets, about 400 tufted puffins, 60 horned puffins and pigeon guillemots nest on Kak. Atkulik has a substantial seabird population including numerous fork-tailed storm-petrels and Leach's storm-petrels, 22,000 murres, 14,000 black-legged kittiwakes, 420 glaucous-winged gulls, all three species of cormorants, black oystercatchers, and ancient murrelets. Ducks nest around the lake. Harbor seals and sea otters are plentiful in the area.

1. Size - Kak is 50 acres, and Atkulik is 300 acres.
2. Land ownership - Both are in federal ownership and have not been selected.
3. Natural integrity - Ground squirrels which have been introduced to Kak Island have probably affected its populations of ground nesting birds. Nothing has affected the natural systems of Atkulik Island.
4. Apparent naturalness - There are no known signs of human activity on either island.
5. Outstanding opportunities for solitude - These islands are located in a very remote part of Alaska and are seldom visited. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Kak is too small and lacks abundant wildlife or diverse terrain features. It is also hard to land on. Kak does not have outstanding opportunities for recreation. Bird watching opportunities on Atkulik are outstanding due to a seabird population estimated at about 40,000. Camping and landing are extremely difficult on this island because of the steep terrain. The high plateau offers scenic views of the bays and peaks of the Alaska Peninsula. Overall recreational opportunities are outstanding on Atkulik.
7. Special or unique features - The dense population of nocturnal birds and the large murre colony are special features of Atkulik.
8. Outstanding resource values - The bird populations of Atkulik are an outstanding resource value. Kak does not have outstanding resource values.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - These islands meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. Aikulak has special features which is an optional wilderness criterion. Atkulik also meets the Service's criterion of outstanding resource values. Neither island is adjacent to an existing wilderness area.

Aiugnak Columns - The columns are located about 10 miles off the mouth of Chiginagak Bay along the Alaska Peninsula. These dramatic pillars of columnar basalt rise 100 feet out of the sea. The columns are a haul-out for 300 sea lions. Parakeet auklets, pigeon guillemots, and glaucous-winged gulls nest on the rocks.

1. Size - The total size of the columns is one acre.
2. Land ownership - The columns are in federal ownership and have not been selected.
3. Natural integrity - Nothing has affected the natural systems of the columns.
4. Apparent naturalness - There are no known signs of human activity.

5. Outstanding opportunities for solitude - The columns are located in a very remote area and are seldom visited. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - The columns would be difficult to land on and are not suitable for camping. Photography, bird watching, and sea lion observation would be enjoyable from boats. The columns are a very scenic feature. However, they are not large enough and diverse enough to offer outstanding recreational opportunities.
7. Special or unique features - Sea lions, parakeet auklets, and columnar basalt are unique features.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - The Aiugnak Columns meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. In addition, they have special features which are an optional criterion. However, the columns do not meet the Service's criterion of outstanding resource values and are not adjacent to an existing wilderness area.

Jute, Kekernoi, and Alinchak Bay islets - These islets are located about two miles off-shore of Becharof Wildlife Refuge. Jute Island is flat, grassy and home to about 600 seabirds. Oystercatchers, 400 tufted puffins, 60 pigeon guillemots, and 160 glaucous-winged gulls nest on the island. Brown bear occasionally get on the island.

Kekernoi Islets are a series of small sea stacks. Some are vegetated on top and some have small sand beaches. As many as 2,000 sea lions have been observed hauled out on the islets. Eight species of seabirds, totalling about 600 birds, nest on the islands. Species include 100 tufted puffins, 100 glaucous-winged gulls, 160 pelagic cormorants, and 80 pigeon guillemots. Brown bear occasionally visit the islands.

Alinchak Bay Islets are low and grassy. Birds present include 270 black-legged kittiwakes, 60 pigeon guillemots, and 10 black oystercatchers.

1. Size - Jute Island is 35 acres; Kekernoi Islets total 6 acres; and Alinchak Bay Islets total 3 acres.
2. Land ownership - The islets are in federal ownership and have not been selected.
3. Natural integrity - Nothing has been known to affect the natural systems of the islets.
4. Apparent naturalness - There are no known signs of human activity on the islets.
5. Outstanding opportunities for solitude - These islets are located in a remote area of Alaska. They are probably rarely visited. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - It is possible to land and camp on most of the islets. Bird watching, photography, and marine mammal observation would all be enjoyable activities. Views of the Alaska Peninsula would be spectacular. However, the islets are too small to offer enough opportunities to be considered outstanding.
7. Special or unique features - The sea lion haul-out on Kekernoi Islets is a unique feature.
8. Outstanding resource values - The sea lion haul-out on Kekernoi Islets is an outstanding resource value. Sea lions are declining drastically throughout Alaska.
9. Existing wilderness boundary adjustment - Kekernoi and Alinchak Bay islets are less than two miles off-shore of the existing Becharof Wilderness Area. Jute Island is equally close to the proposed Island Arm Wilderness which was recommended in the Becharof National Wildlife Refuge Record of Decision (U.S. Fish and Wildlife Service 1986). These islets could all be considered an addition to an existing or proposed wilderness area. They would add marine habitat to the existing wilderness and preserve the off-shore view.

Conclusion - These islets meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. In addition, Kekernoi Islets have special features, which are an optional criterion, and meet the Service's criterion of outstanding resource values. The other islets do not meet the Service's criterion of outstanding resource values. All of the islets are adjacent to an existing wilderness

area or proposed wilderness area. Designation of these areas would be an adjustment of an existing wilderness boundary.

Nagai Rocks - This group of starkly beautiful rock spires and sea stacks are located less than two miles west of Chirikof Island. The rocks are used as a haul-out for 600 sea lions and 300 harbor seals. Seabirds including 1,500 black-legged kittiwakes and 300 cormorants nest on the rocks.

1. Size - Nagai Rocks totals one acre or less.
2. Land ownership - The rocks are in federal ownership and have not been selected.
3. Natural integrity - Nothing has affected the natural systems of the rocks.
4. Apparent naturalness - There are no known signs of human activity.
5. Outstanding opportunities for solitude - Although a family lives on nearby Chirikof Island, few other people ever visit this area. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Bird watching, marine mammal observation, and photography would all be enjoyable from boats. The rocks are not suitable for landing or camping. The rocks are too small to offer outstanding opportunities for recreation.
7. Special or unique features - The sea lion and harbor seal haul-out is a special feature.
8. Outstanding resource values - The sea lion and harbor seal haul-out is an outstanding resource value.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - Nagai Rocks meet the Wilderness Act criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. In addition, they have special features which are an optional criterion. They also meet the Service's criterion of outstanding resource values. They are not adjacent to an existing wilderness area.

GULF OF ALASKA UNIT

PHYSICAL ENVIRONMENT

Geography

The Gulf of Alaska Unit comprises about 800,000 acres and extends over 800 miles from Kodiak Island in southcentral Alaska down to Forrester Island in southeastern Alaska (Figures 60 A-C). It includes the former Tuxedni, St. Lazaria, Hazy, and Forrester islands refuges, which were established before the designation of the Alaska Maritime National Wildlife Refuge by the Alaska Lands Act in 1980.

Tidelands, waters, and submerged lands are managed in Womens Bay and the north half of Middle Bay on Kodiak Island, 9,500 acres, and from Wolcott Reefs to Sturgeon Lagoon in the Karluk area, 5,600 acres. Water and submerged lands are managed around Afognak Island, 403,184 acres, in the former Afognak Forest and Fish Culture Reserve. All other areas in the unit are offshore islands, islets, and rocks. The unit includes the following island groups, from west to east: islands associated with Kodiak and Afognak islands, Barren Islands, islands and rocks in Cook Inlet, Chugach Islands, Pye Islands, Chiswell Islands, and other islands in southeast Alaska.

In the western part of the unit, over 30 islands, islets, and rocks are situated off the coasts of Kodiak and Afognak islands. The Kodiak Mountains dominate this region with summits ranging between 2,000 feet to over 4,000 feet. Over 50 islands, islets, and rocks are associated with the Kenai Peninsula - Cook Inlet region. The Kenai-Chugach mountains form a rugged barrier along the southern edge of the Kenai Peninsula. The Pye and Chiswell islands, off the south and east shore, reflect this mountainous topography and have shorelines which are often jagged and steep-sided. Refuge lands in southeastern Alaska are situated in the Alexander Archipelago Islands. Four islands, islets, and numerous rocks are managed by the refuge in this region. Most islands are forested and range in elevation from 100 feet on most islands to over 1,300 feet on Forrester Island.

Most of the unit is accessible by boat, but in some places the rocky shoreline makes access difficult or impossible. Amphibious planes can provide access to some areas.

See Table 36 in the management alternatives chapter for a complete listing of lands and waters located within the unit.

Land Status

The land status of the Gulf of Alaska Unit changes constantly as selected lands are conveyed, exchanged, or relinquished. Table 31 summarizes land status within the unit as of 11/1/87. Figures 62 A-J show the arrangement of ownership.

Of the approximately 813,194 acres within the congressional refuge unit boundary, about 53 percent has not been selected and will remain in federal ownership. Almost all of the nonselected acres, 418,284, are the Afognak tidelands, submerged lands and water, and the water, tidelands, and submerged lands of Karluk and Womens Bay. Only 16,872 acres of islands have not been selected. The remaining 47 percent has been selected or conveyed. Overselections are extensive throughout the refuge and much of the

The tidelands, submerged lands and water column of Pernosa Bay, and all other marine areas of the former Afognak Forest and Fish Culture Reserve established by Presidental Proclamation in 1892, are part of Alaska Maritime Refuge.

Table 31. Land and water status within the Gu' of Alaska Unit as of 11/1/87.

Ownership	Acres	% of Unit
Nonselected	435,156	53%
Selected (village, regional, state)	38,038	5%
Conveyed	331,000	41%
Native Allotments	9,000	1%
Total	813,194	

(U.S. Fish and Wildlife Service Files 1987)

selected land will also remain in federal ownership. Approximately 2 percent or 8,500 acres of the Gulf of Alaska Unit is currently congressionally designated wilderness.

The Service is also responsible for management of the tidelands, submerged lands, and water column from Wolcott Reef to Sturgeon Lagoon in the Karluk area of Kodiak Island; the tidelands, submerged lands and water column surrounding Afognak Island; and the tidelands, and submerged lands and water column, owned by the U.S. Coast Guard in Womens Bay on Kodiak Island. These marine areas total approximately 418,000 acres. The State of Alaska also asserts ownership of these marine areas.

Climate

Although it does not extend as far south as the Aleutians, the Gulf of Alaska Unit has the most moderate climate among the units in the refuge. It is characterized by mild winters and cool summers with moderate temperatures and heavy precipitation. The climate is most temperate in southeastern Alaska where it is often overcast and the unit seldom experiences the severe winds and summer fog of the other units.

Snowfall is minimal along the coast and occurs mostly in the mountains, inland areas, and at the heads of the mainland fjords. Precipitation, mostly rain, is heaviest in fall and winter. Winter temperatures normally remain above freezing except for lands adjacent to the Kenai Peninsula. See Table 32 for a listing of

Table 32. Yearly temperatures and precipitation of cities in the Gulf of Alaska Unit - 1984.

	Temperature (F)				Annual Precip in inches	
City	High	Low	Avg.	Norm	Total	Snow
Homer	61.1	16.9	37	37	24	55
Seward	63.9	20.4	33	33	55	57
Kodiak	64.3	18.6	39	38	63	72
Yakutat	60.8	26.5	38	36	127	154
Sitka	62.2	34.8	36	34	65	17

(U.S. Fish and Wildlife Service Files 1985)

temperatures and precipitation in the Gulf of Alaska Unit. First frost generally occurs in September or October and lasts until May or June.

Geology

Western region, Gulf of Alaska Unit - This region contains the following areas: Kodiak and Afognak islands, the Kenai Peninsula, and Cook Inlet.

Geologically, the Kodiak-Afognak island area is thought to be an appendage of the Kenai Peninsula; they share the same rocks and structures, and are only 40 miles apart. Before glacial times the two were connected by an unbroken chain of mountains, then separated when Cook Inlet ice eroded the rock in that area to below sea level (Capps 1937).

The islands in the western region of the unit are "accreted" continental parts. That is, they are successive wedges of marine sediments, which accumulated in and near the trench at a convergent plate margin and were subsequently scraped off onto the continental margin and deformed as the oceanic plate was subducted.

Long faults, some thrust and others steep with predominately vertical movement, extend the length of the western region and travel northeast from Kodiak Island to the Kenai

Peninsula (Cobb 1974). Faults in the Cook Inlet area are short and uniformly distributed. The western region, and particularly lower Cook Inlet, is one of the most seismically active zones in the world. In the last 65 years, 13 earthquakes have occurred with magnitudes greater than 6.0 (Coats 1950).

Southeastern region, Gulf of Alaska Unit - This region contains the following areas: St. Lazaria, Hazy, and Forrester islands.

The rock outcrop pattern in this region is dominated by two northwest-trending belts of sedimentary and volcanic rocks. The two belts are separated by a band of Paleozoic bedded rocks. About a third of the region is underlain by igneous rock varying in composition from ultramafic to felsic (Berg and Cobb 1967). Bedded rocks are folded and faulted. The most notable fault lies near the outer shelf and upper slope between Dixon Entrance and Cross Island. The fault cuts across the shelf and joins the onshore Charlotte-Fairweather fault system (Minerals Management Service 1984).

As in other units, the seismic activity in the southeastern region is associated with the physical interaction between the Pacific and North American Plates as the former moves northwestward in a horizontal motion. The intensity of earthquakes is not as great as the western region but major earthquakes have occurred. The 1958 Lituya Bay earthquake was of magnitude 7.9 and the 1972 Sitka earthquake attained 7.3.

Bedrock - Much of the western region is underlain by Cretaceous graywacke, slate, conglomerates, and volcanic rock containing mafic and ultramafic bodies. Continental sedimentary rock and basaltic andesite outcrop on many island shores.

Surficial deposits - Although there are no glaciers present in this unit today, some areas are characterized by glacially deposited material. Much of the region is underlain by: colluvium composed of soil and rubble on bedrock; glacial deposits, including superglacial till; alluvial deposits, including stream gravel, alluvial fans and cones, and glacial outwash; and littoral deposits, consisting of sand and small gravel deposits but none are of sufficient quantity or quality for commercial purposes. There are deposits of chromium, iron, aluminum, and gold on the Kenai Peninsula near the Chugach Islands. Prospects for iron, phosphate, sulfur, copper, and calcium are located near the Tuxedni Unit. Gold deposits are present in the vicinity of Moraine Island. Copper, molybdenum, and gold prospects are located near St. Lazaria. Forrester Island includes prospects for copper and molybdenum. The geology of the southeastern region suggests a low economic mineral potential (Clark et al. 1971). Presently, no economically valuable mineral deposits are known to occur in this unit. However, the unit has not been adequately explored to form a complete picture of its mineral potential.

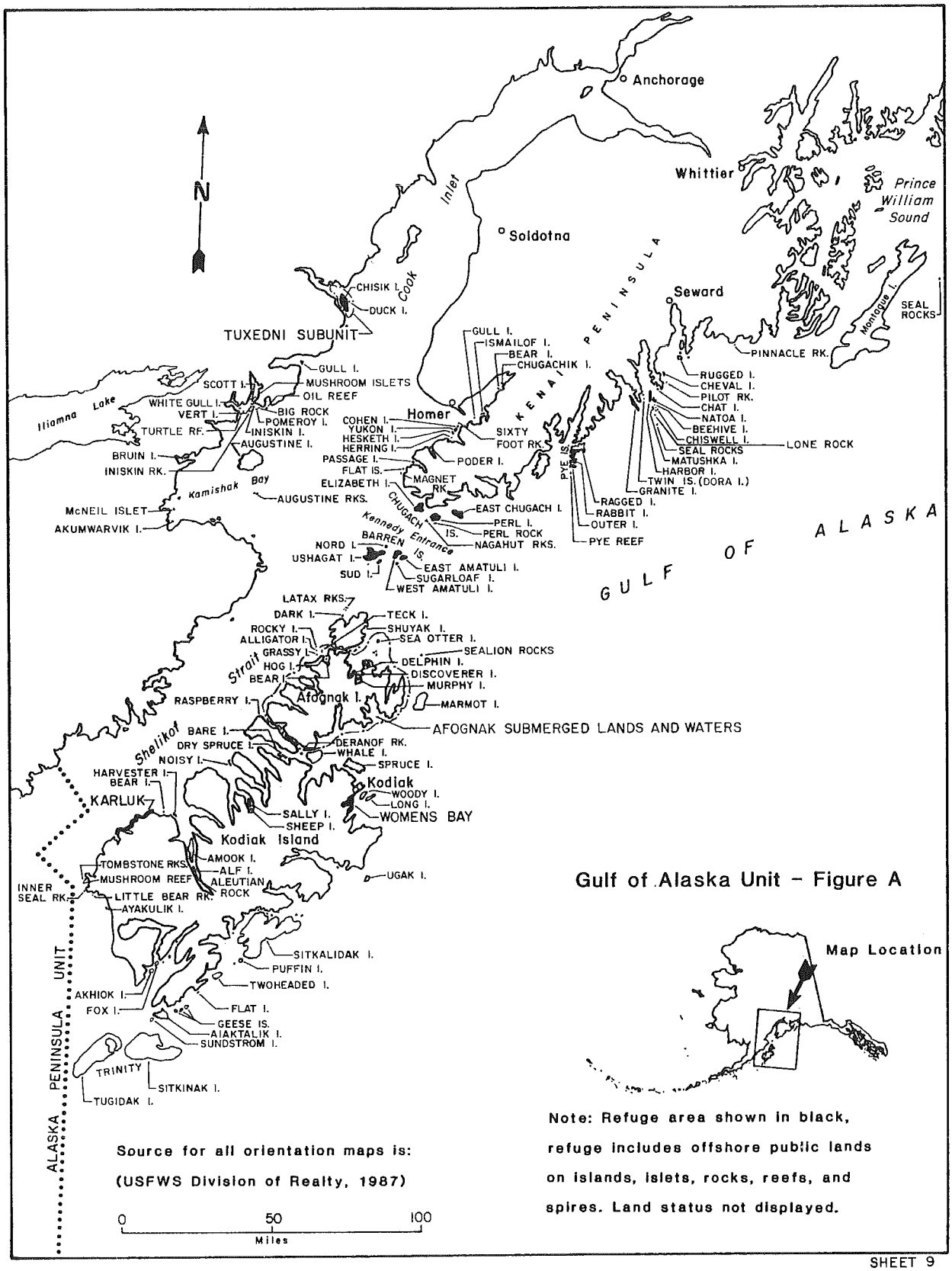
No mining claims are known to occur on refuge lands in this unit.

Oil and gas - The Kodiak, Cook Inlet, and Gulf of Alaska Outer Continental Shelf planning areas are included in the Gulf of Alaska Unit (See Figure 46). Petroleum prospects are favorable along the Kodiak Shelf in the planning area, which encompasses nearly 89 million acres,(Ehm 1983). The recoverable oil and gas volumes are estimated at 0.15 billion barrels of oil, and 2.92 trillion cubic feet of gas. The Minerals Management Service, scheduled four sales in the Kodiak Planning Area. Sales 46, 61, and 99 were cancelled due to lack of industry interest. Sale 127 is scheduled for January, 1991 (Minerals Management Service 1987).

Over five million acres are included in the Cook Inlet Planning Area. The Minerals Management Service has identified the lower Cook Inlet and Shelikof Strait as favorable areas for petroleum. The recoverable oil and gas volumes are estimated at 0.54 million barrels of oil, and 8.34 trillion cubic feet of gas. Three lease sales have been held in the Cook Inlet Planning Area (Sale CI, 10/27/77; Sale 60, 10/29/81; and Sale RS2, 8/5/82). Sale 88, scheduled for 1984, was cancelled due to lack of industry interest. One hundred tracts were leased but none are still active. Thirteen wells were drilled and all were plugged and abandoned (Minerals Management Service 1987).

The Gulf of Alaska Outer Continental Shelf Planning Area encompasses over 132 million

Figure 60 A. Location of the Gulf of Alaska Unit.



SHEET 9

Figure 60 B. Location of the Gulf of Alaska Unit.

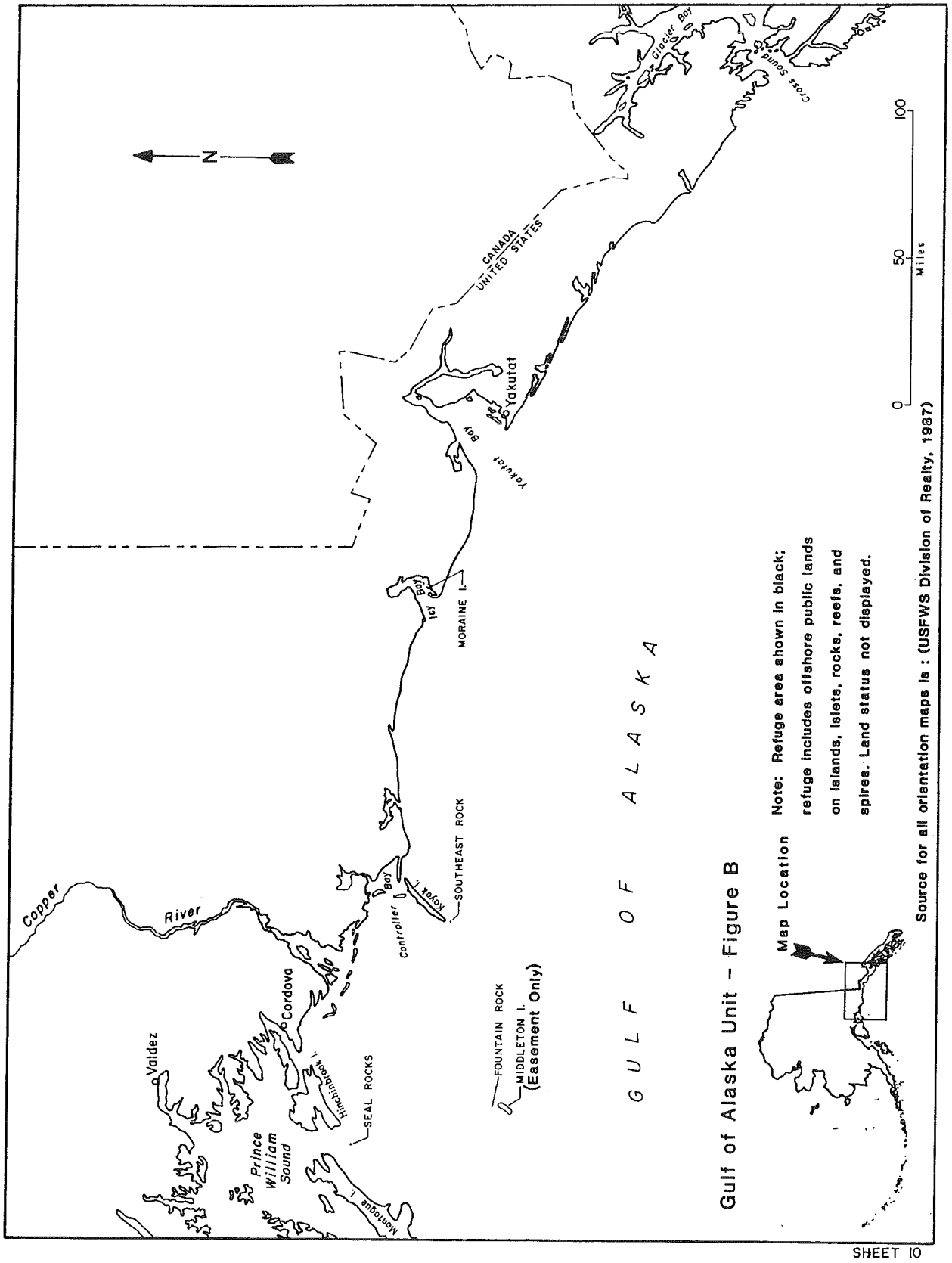


Figure 60 C. Location of the Gulf of Alaska Unit.

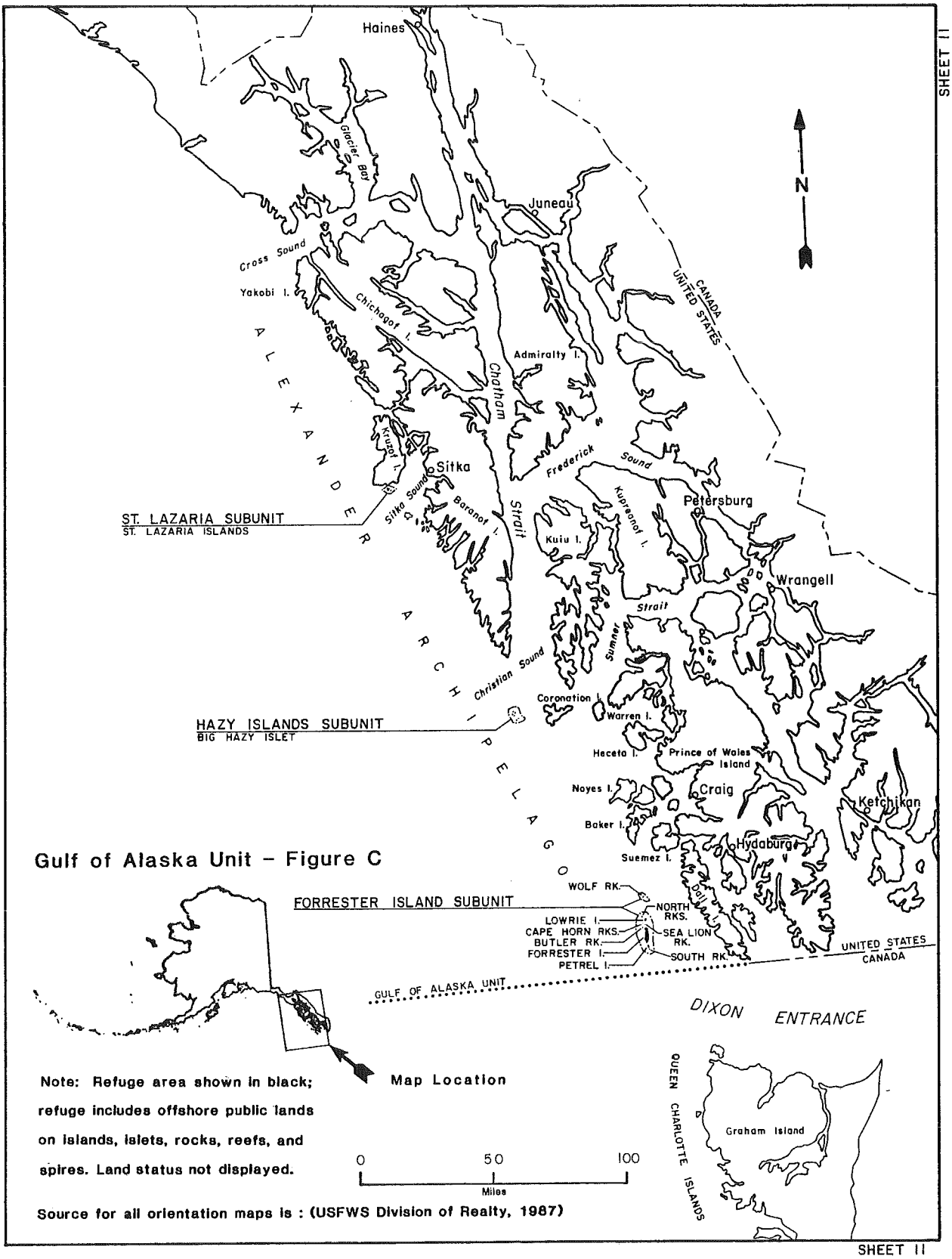
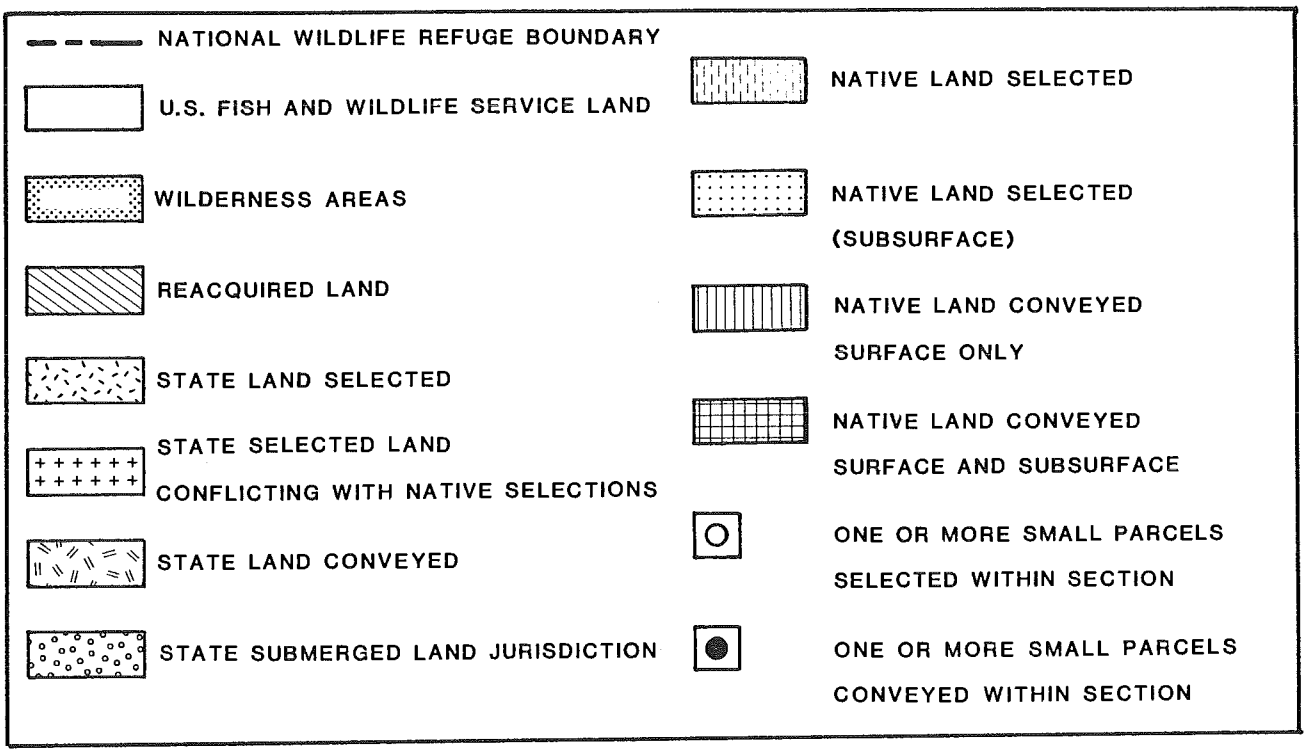
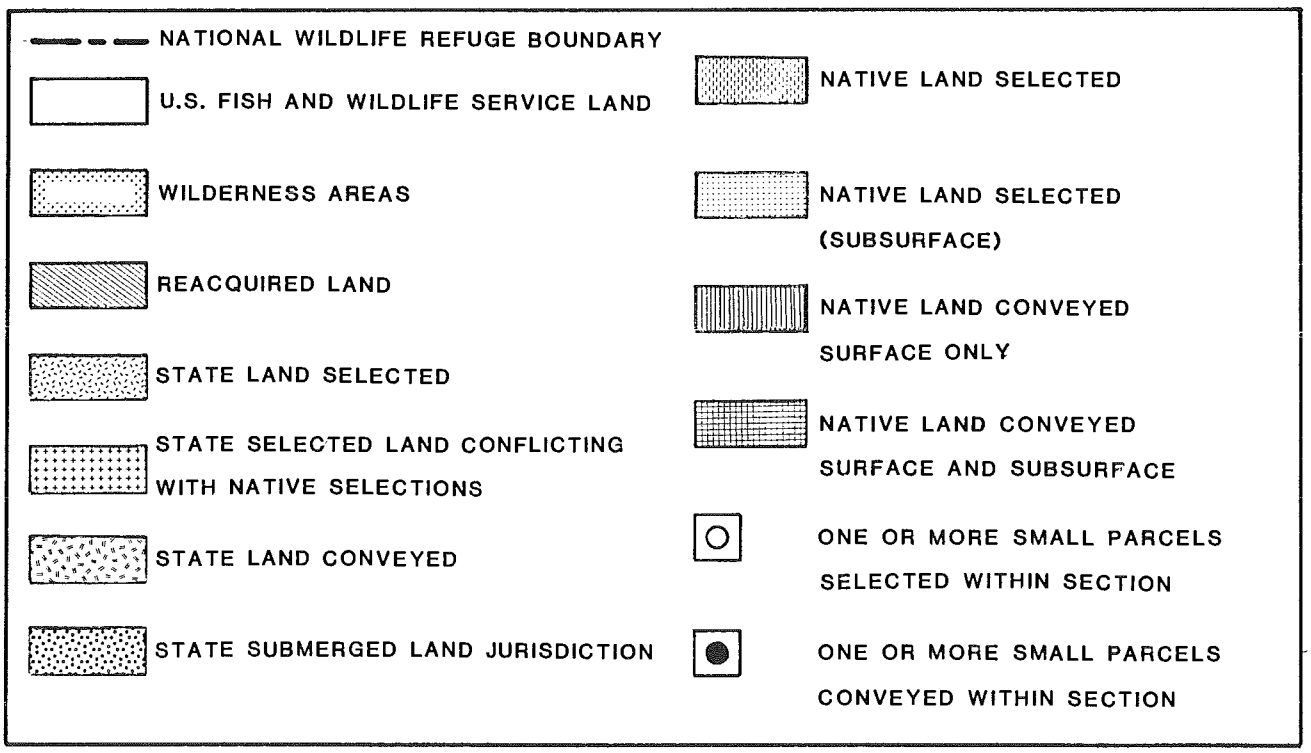


Figure 61. Legends for land status for the Gulf of Alaska Unit.

Legend for Figures 62B, 62C, 62D, 62G, 62I, and 62J.



Legend for Figures* 62A, 62E, 62F, and 62H.



*Figures are reduced 50 percent and land status patterns appear much smaller.

Figure 62 A. Land status in the Gulf of Alaska Unit as of November 1987.

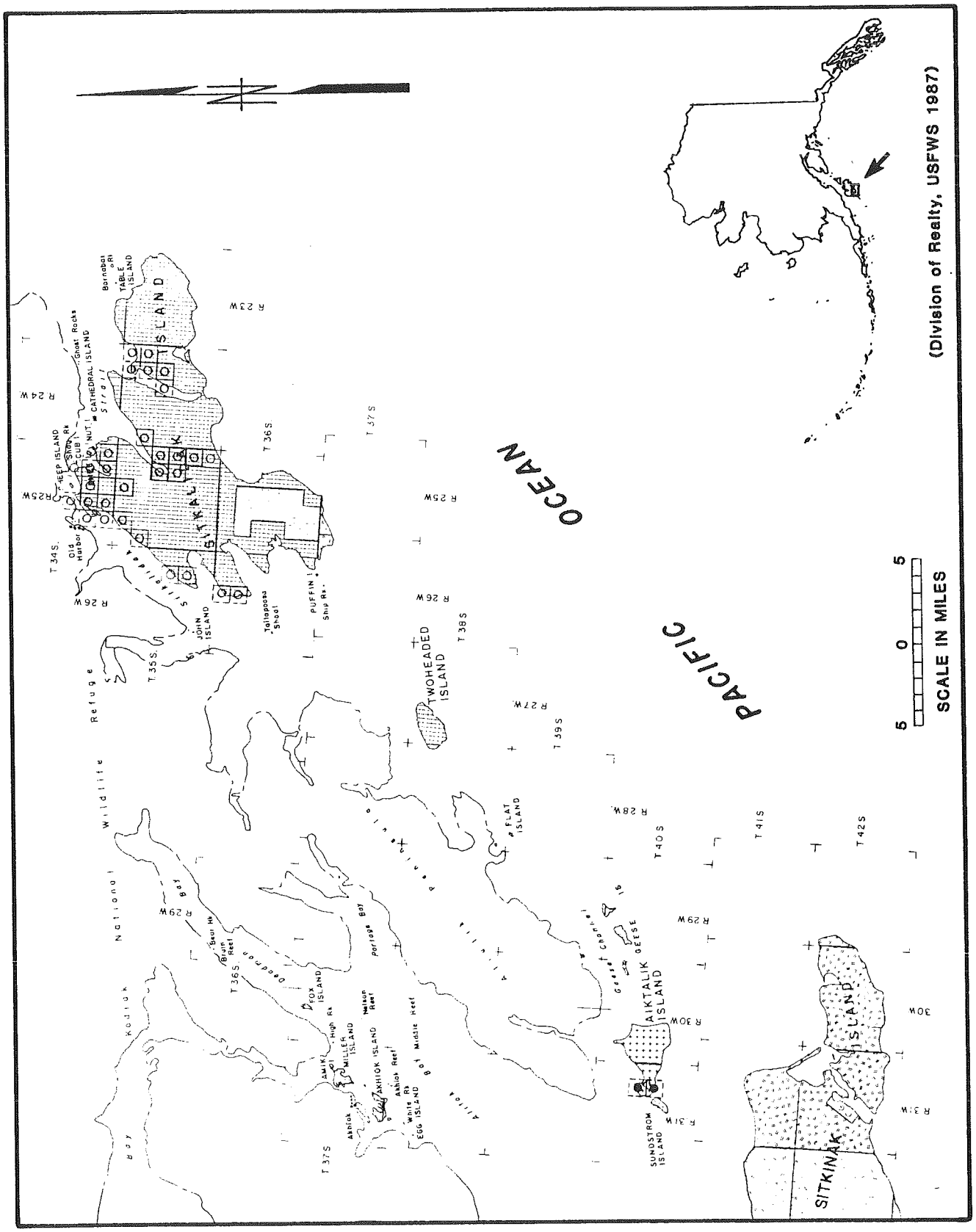


Figure 62 B. Land status in the Gulf of Alaska Unit as of November 1987.

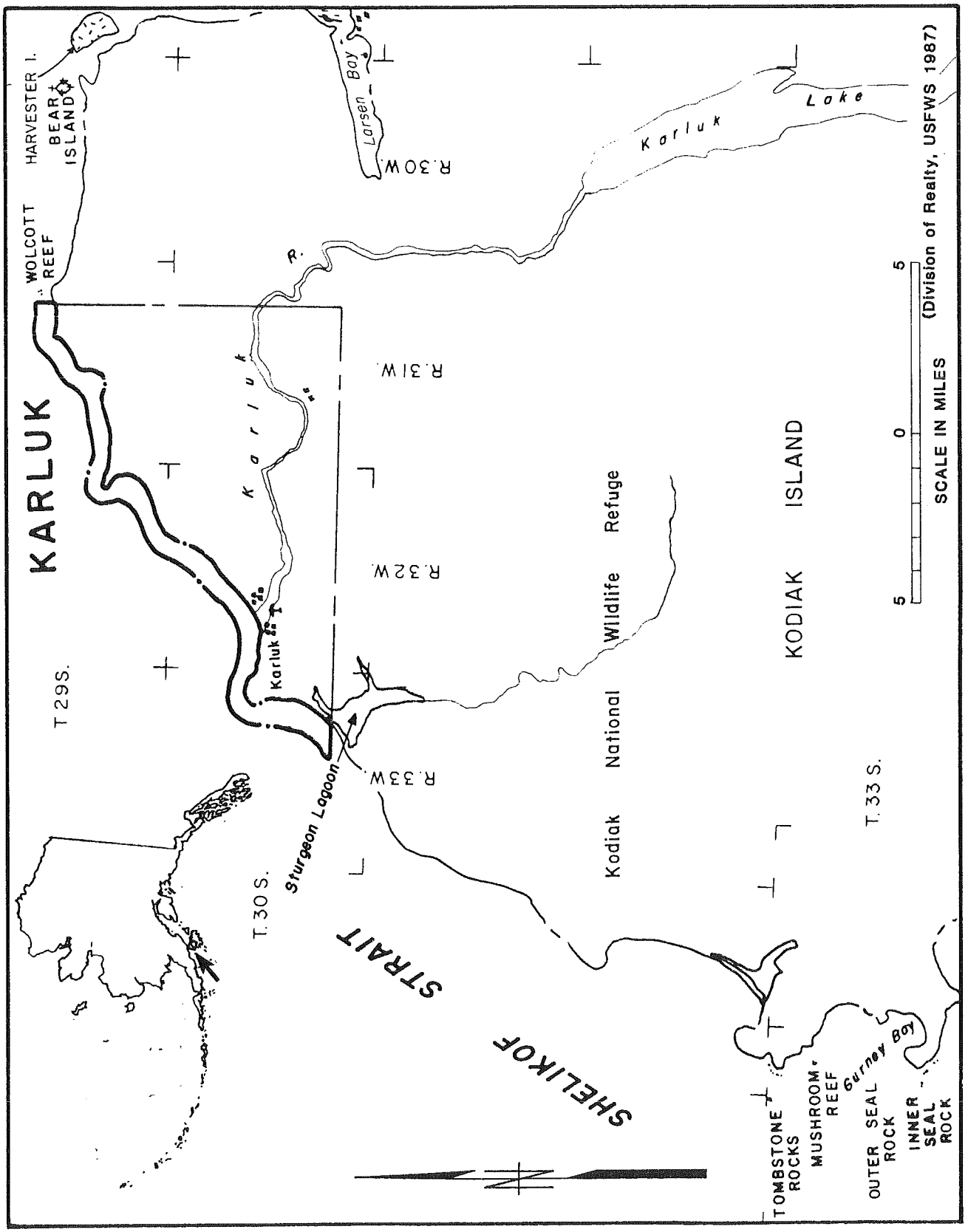


Figure 62 D. Land status in the Gulf of Alaska Unit as of November 1987.

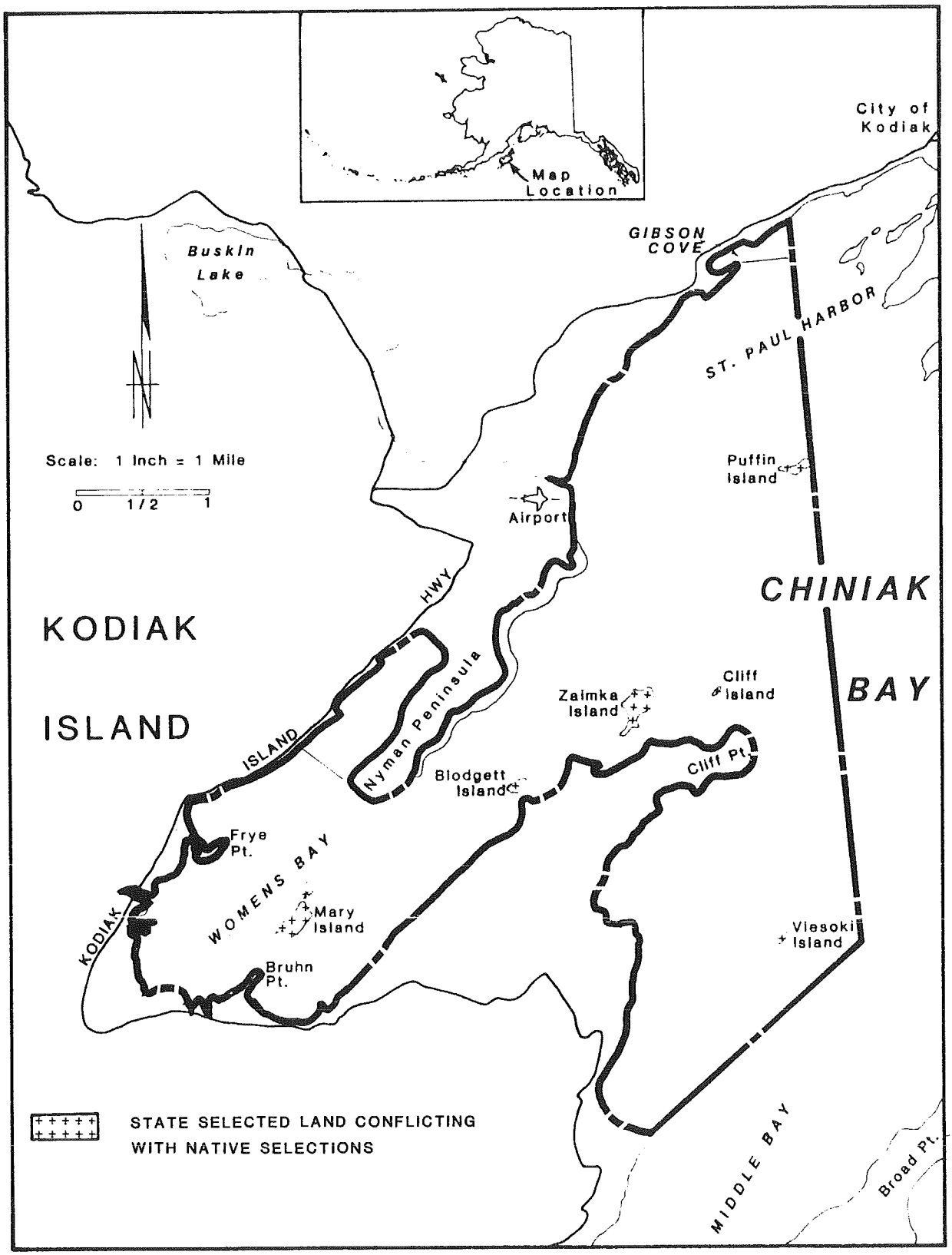


Figure 62 C. Land status in the Gulf of Alaska Unit as of November 1987.

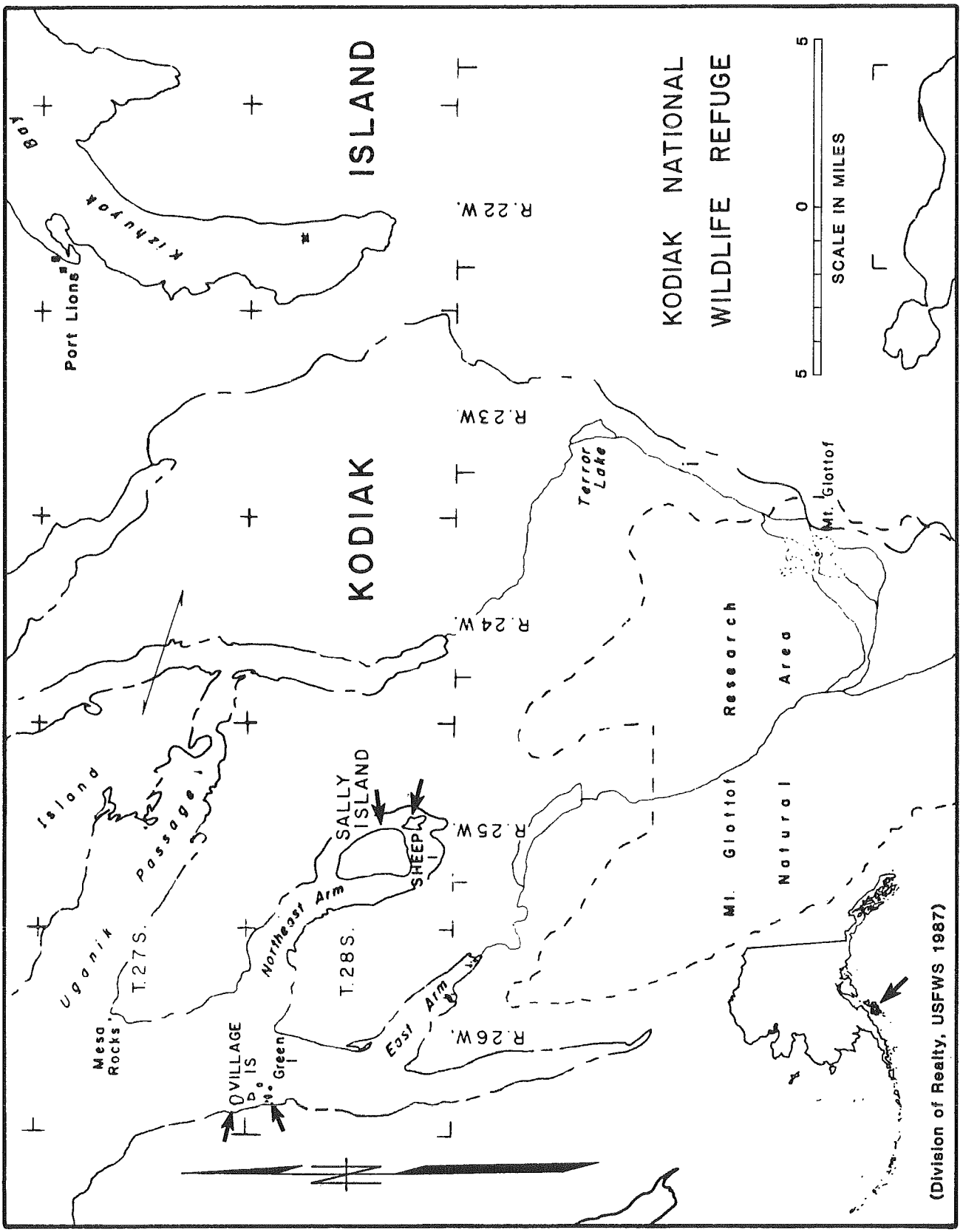


Figure 62 E. Land status in the Gulf of Alaska Unit as of November 1987.

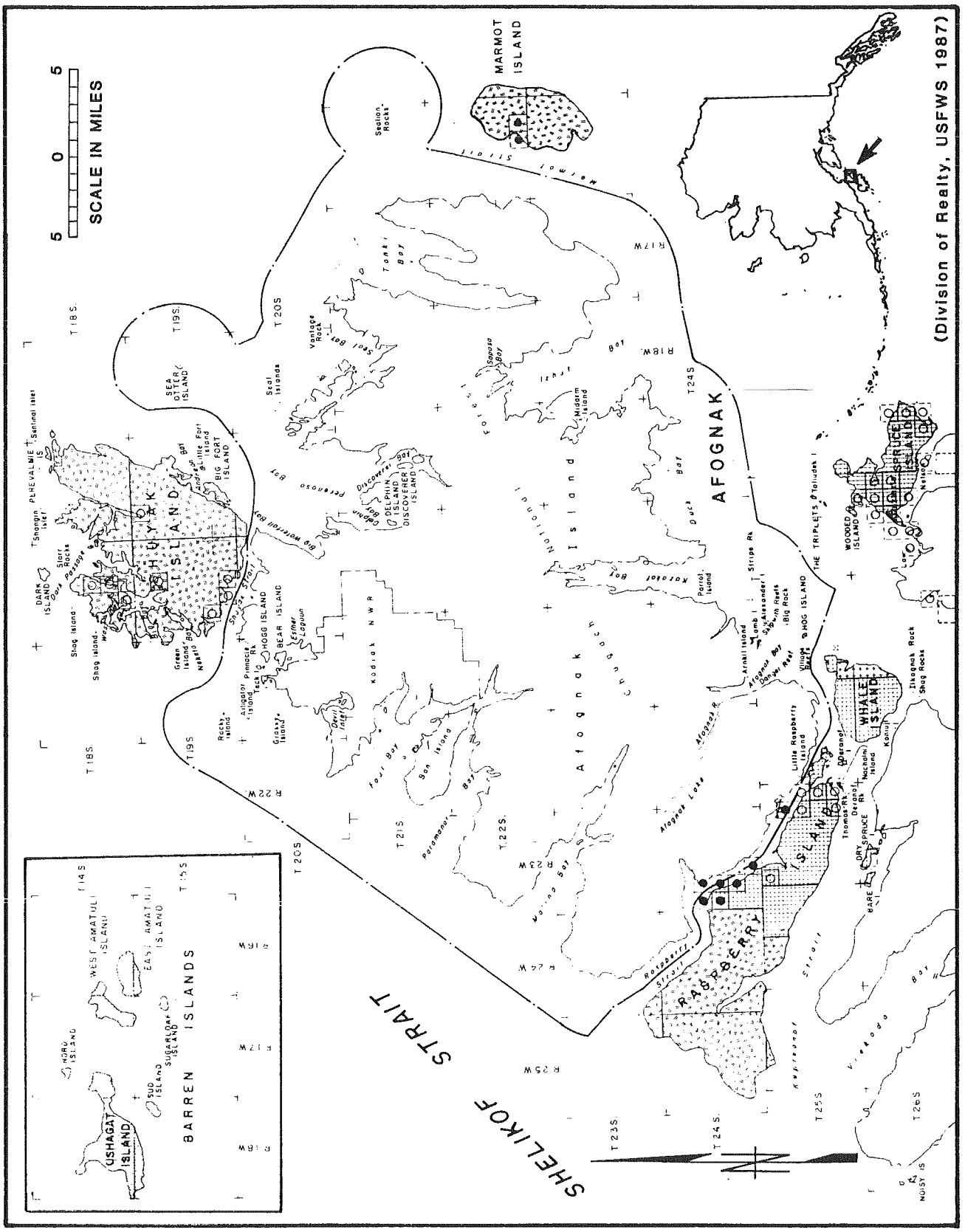


Figure 62 F. Land status in the Gulf of Alaska Unit as of November 1987.

Figure 62 G. Land status in the Gulf of Alaska Unit as of November 1987.

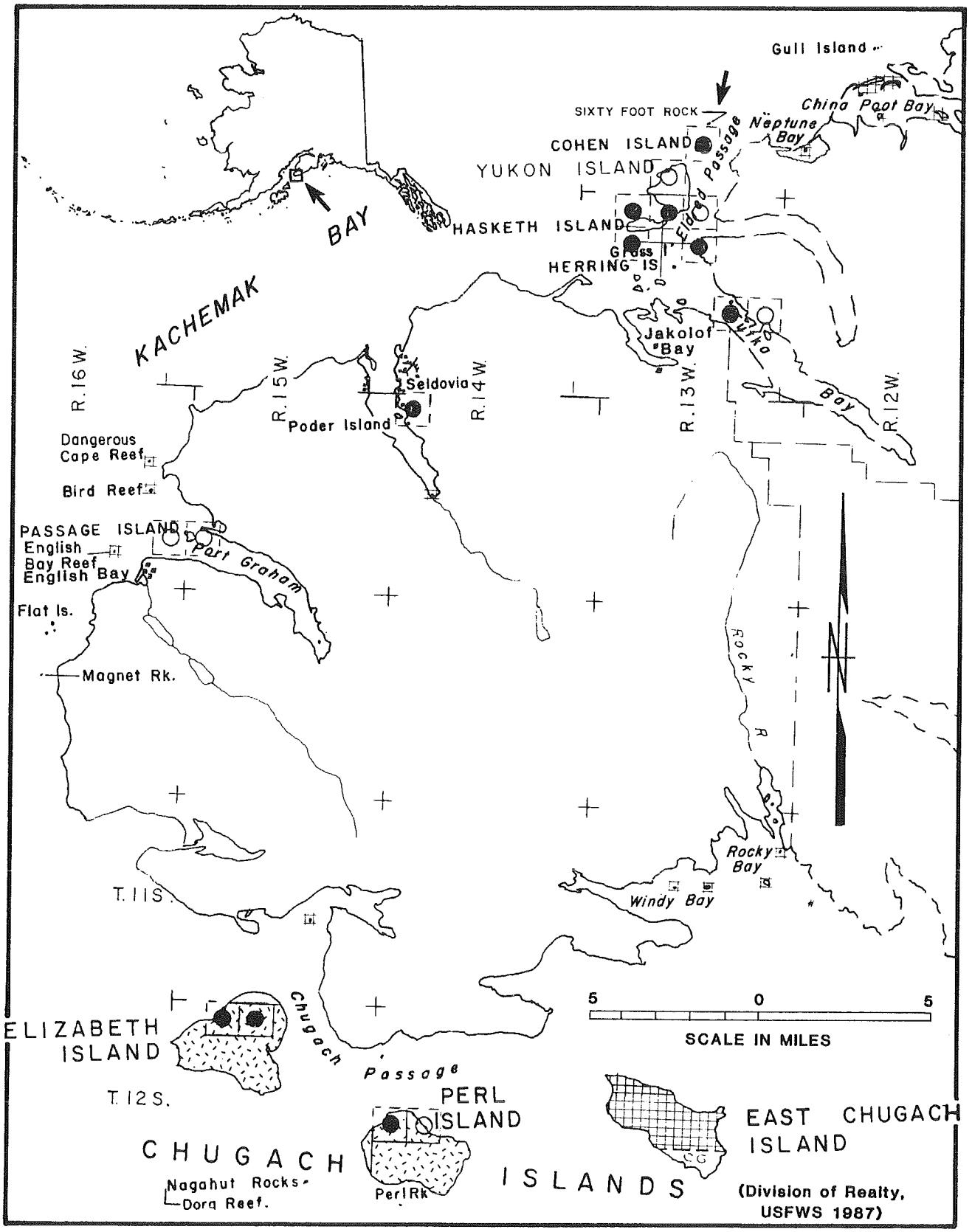


Figure 62 H. Land status in the Gulf of Alaska Unit as of November 1987.

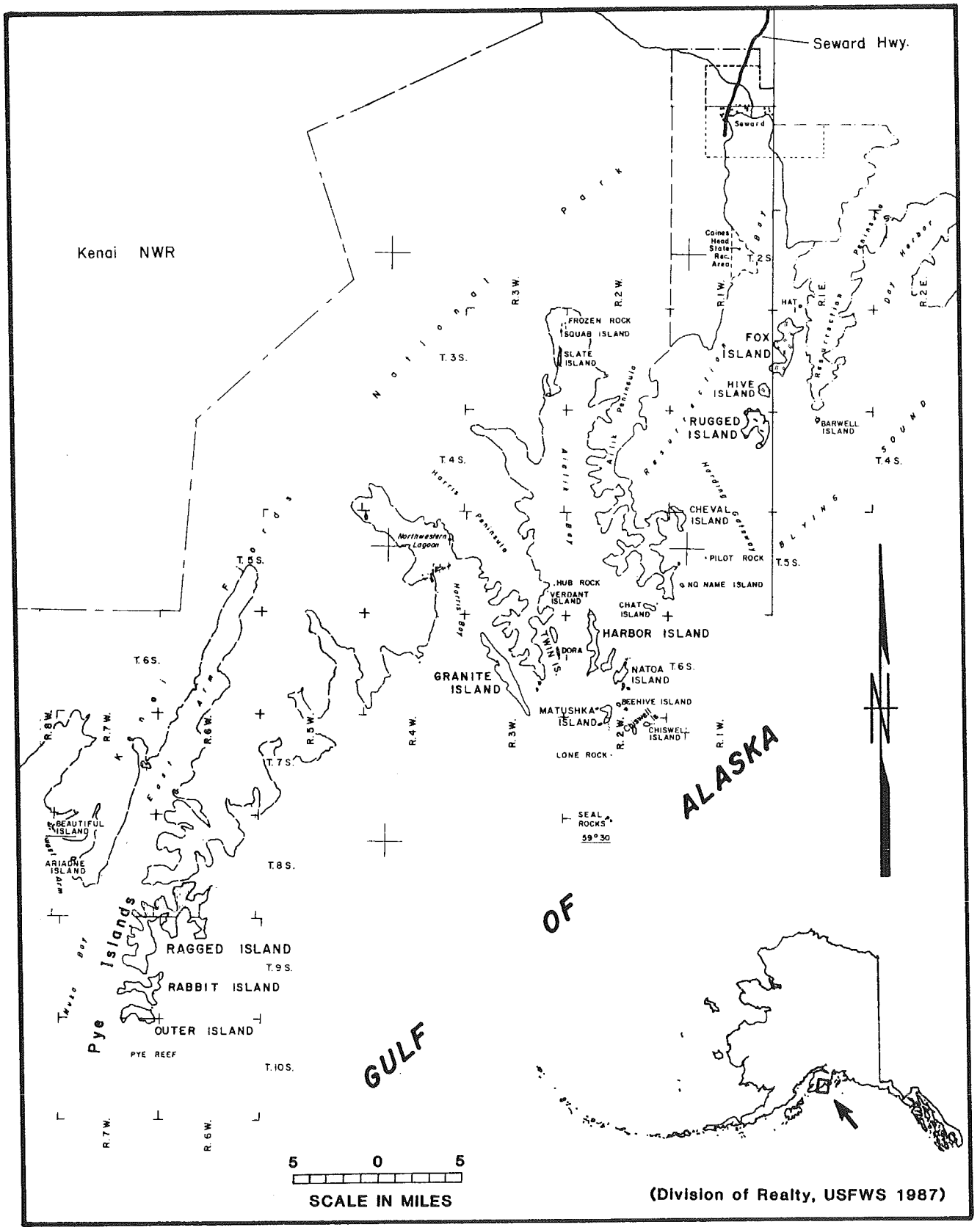


Figure 62 I. Land status in the Gulf of Alaska Unit as of November 1987.

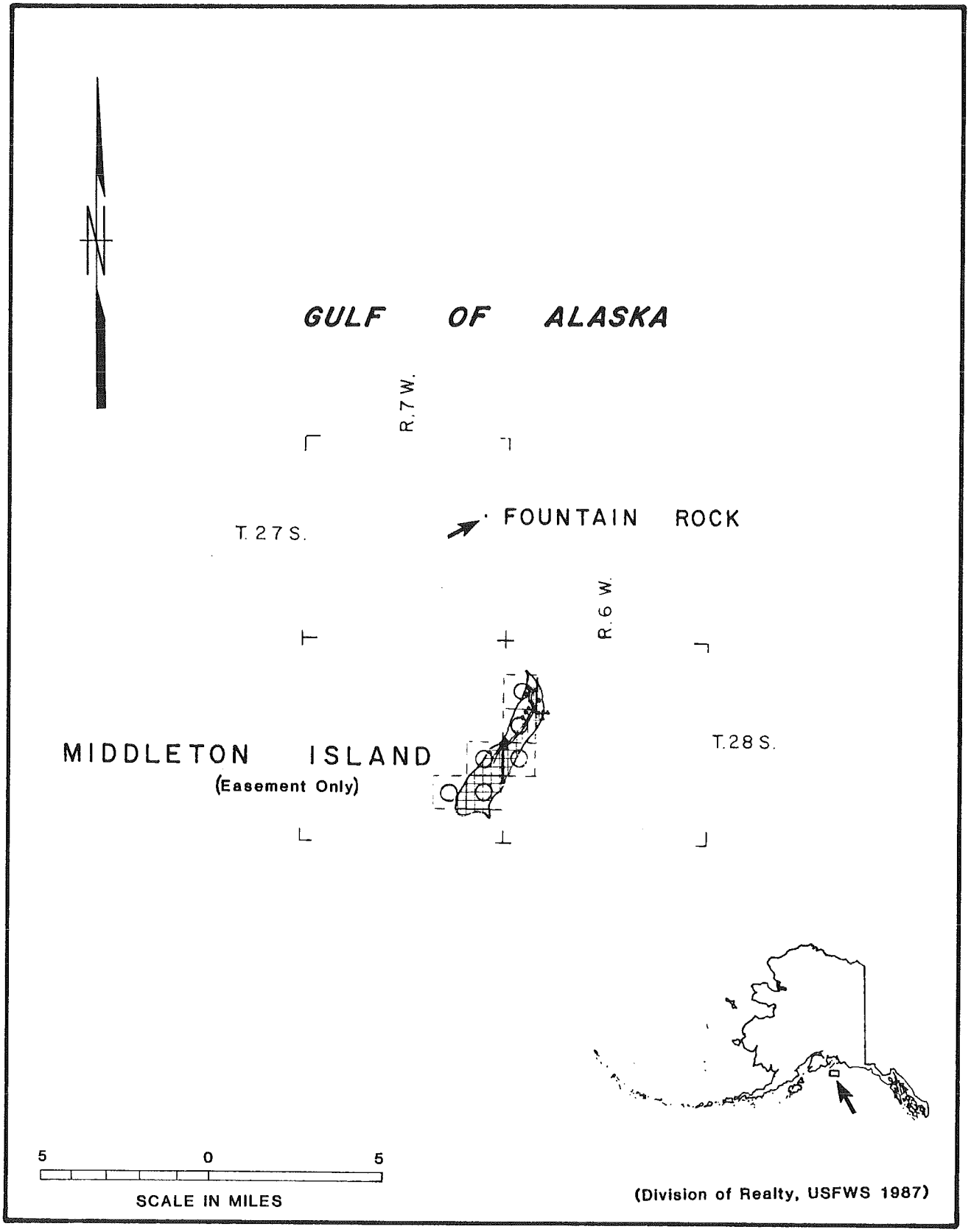
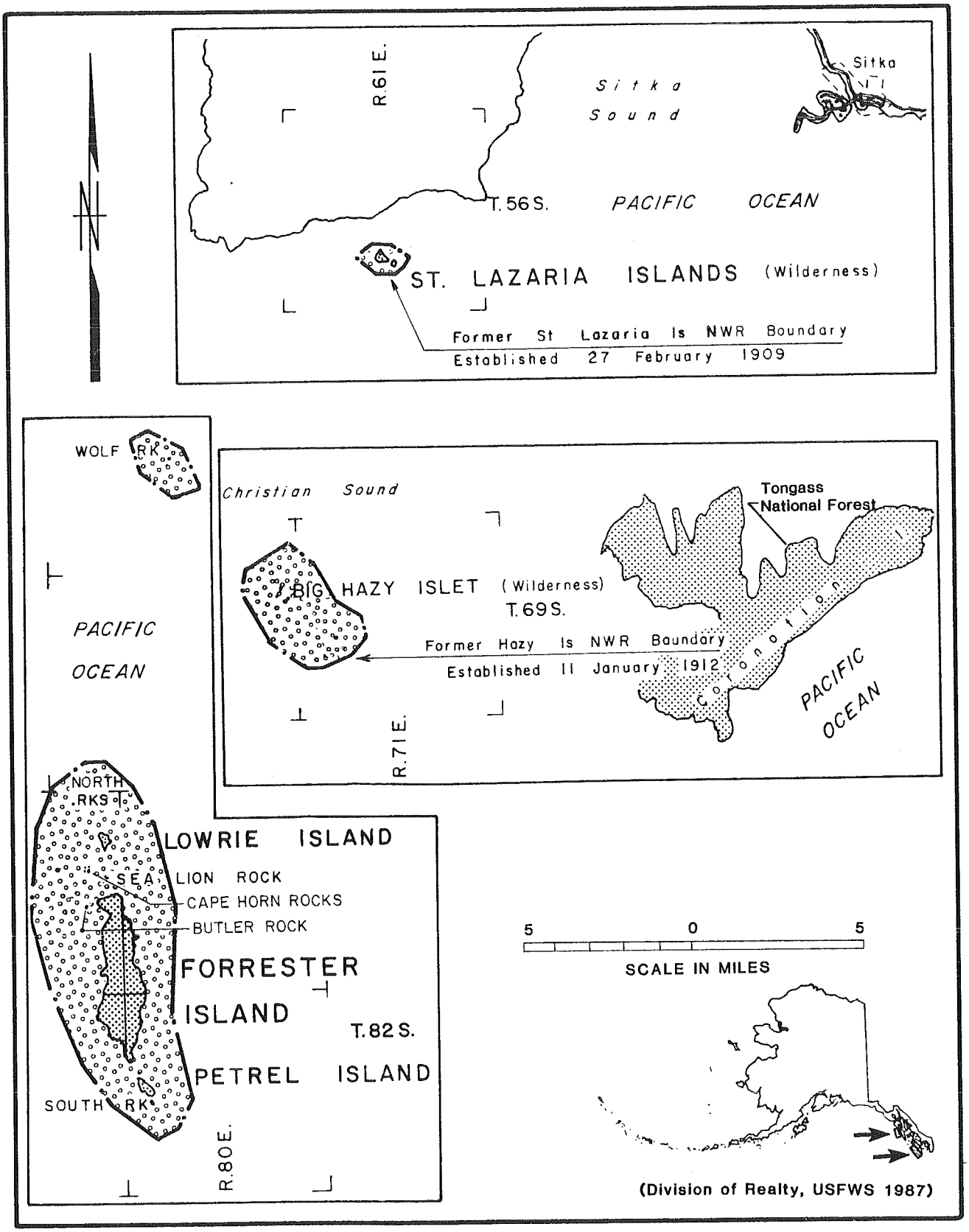


Figure 62 J. Land status in the Gulf of Alaska Unit as of November 1987.



along island shorelines. The Kodiak Island area is especially rich in glacial deposits; it was a local center of ice accumulation from glaciers in the Alaska Peninsula, Cook Inlet, and Kenai Peninsula areas (Capps 1937).

It should be pointed out that the northern Gulf of Alaska, north of Middleton Island, is also considered one of the most seismically active areas in the world. The most recent earthquake was the Great Alaska Earthquake of 1964, magnitude 8.4.

In the southeastern area, Forrester Island is underlain by quartz monzonite and the Hazy Islands by sandstone and limestone (Cobb et al. 1968).

Soils - In the western region of the unit areas with steep terrain, characterized by low-growing shrubs, are comprised of gravelly loam or silty volcanic ash. Hilly areas are also layered with silty volcanic ash but valley bottoms and moraine hills contain deep fibrous or partially decomposed peat. Low undulating areas are dominated by deep fibrous peat with lenses of volcanic ash. Wind erosion is active on soils in this unit and exposed low coastlines have active shoreline erosion.

In the southeastern region of the unit a majority of the land surface is occupied by shallow, gravelly, well-drained acid soils with dark subsoil. Coastal spruce-hemlock grows in this soil at low to moderate elevations (Michaelson 1974).

Mineral occurrences - There is evidence of mineralization throughout the Gulf of Alaska, although there are relatively few occurrences reported from refuge lands. There are stone and gravel pits near the town of Kodiak on Kodiak Island. On the northwest portion of the island there is a gold, silver, lead prospect as well as a past producing placer gold deposit on the beach. Gold is reported near Womens Bay, one mile east of Kizhuyak Point, but not in economically feasible amounts (Berg and Cobb 1967). It has been reported that the Barren Islands group is on trend with a geologic terrane that has potential for lode deposits containing gold and byproduct or minor copper, silver, and chromite. Small deposits of magnetite have been identified on Chisik Island, acres. The Minerals Management Service has identified offshore waters between Middleton Island and Dixon Entrance as favorable for petroleum prospects. The recoverable oil and gas volumes are estimated at 0.21 million barrels of oil, and 0.35 trillion cubic feet of gas. Three lease sales have been held in the Gulf of Alaska Planning Area (Sale 39, 4/13/76; Sale 55, 10/21/80; and Sale RS1, 6/30/81). Sale 114 is currently scheduled for August, 1988. Sale 88 was cancelled May 2, 1986 due to lack of industry interest. One hundred twelve tracts were leased but none are still active. Twelve wells were drilled and all were plugged and abandoned (U.S. Department of the Interior, Minerals Management Service 1987).

See Table 5 for a listing of Outer Continental Shelf planning areas and their estimated reserves and Table 6 for a summary of active leases near the refuge.

The U.S. Department of the Interior, Bureau of Land Management has rated the geological potential for hydrocarbons as none or low for all refuge lands within the Gulf of Alaska Unit with the exception of islands and rocks in Cook Inlet at the mouth of Iniskin and Iliamna bays. Although the geologic potential of these parcels is high, the development potential is rated at low (Teseneer, Seidlitz, and Borkoski 1988).

Geothermal resources - Although several hot-water sites occur on the mainland none occur on refuge lands.

Water Resources

With the exception of run-off from precipitation, water resources in this unit are scarce. Streams occur on Ushagat and East Amatuli islands and in Womens Bay. These streams are small and probably do not support fish populations. A lagoon/marsh complex exists on Ushagat Island and an alpine pond occurs on East Amatuli Island.

BIOLOGICAL ENVIRONMENT

Vegetation

The vegetation of this unit is diverse, varying from heavily forested communities of Sitka spruce and western hemlock in southeastern

Alaska to maritime tundra in the northern portions of the unit. All lie within the maritime climatic zone.

The major vegetation types include: 1) coastal western hemlock-Sitka spruce forest; 2) high brush; 3) alpine tundra; and 4) moist tundra (Joint Federal State Land Use Planning Commission for Alaska 1973).

For southeastern Alaska, the preliminary checklist of the vascular flora lists 1015 taxa (Table 33).

Vegetative descriptions of islands in this unit are listed below.

Forrester Island - Forrester Island, in the southeastern region of the unit, is mountainous and heavily forested (canopy cover 50-95 percent) with Sitka spruce and western hemlock (De Gange et al. 1977). Lodgepole pine occurs in muskegs and western red cedar is found bordering open muskegs. In small ravines and windfalls, a dense scrub develops, composed of salmonberry, blueberries, Pacific red elder, and devil's club.

St. Lazaria Island - St. Lazaria Island is a rugged, low elevation (maximum 160 feet) volcanic island at the entrance to Sitka Sound. The middle one-third of the island is bare rock, which is frequently wave-washed during high tides and storms (Nelson et al. 1982). The two low summits at each end of the island are vegetated with old-growth Sitka spruce and form 20-90 foot cliffs at water's edge. Cliff tops are fringed with lush grasses and wild cherry. Dense thickets of elderberry and salmonberry are found inland.

Middleton Island - Middleton Island is a low-lying (maximum elevation 125 feet) island approximately 120 miles south of Valdez. The vascular flora consists of 116 taxa, primarily low and herbaceous species (Thomas 1957). Much of the natural vegetation was destroyed by a U.S. Air Force establishment in 1955. Habitats described by Thomas (1955) include: beach ridge; freshwater ponds; freshwater pond shore margins; brackish water pond margins; steep bluffs; level wave-cut terraces; poorly drained small slopes between wave-cut terraces; steep bluff margins; bluffs; and areas of sandy soil.

Table 33. Vascular flora of southeastern Alaska.

Life Form	Number of Taxa	Percent
Trees	23	4.8%
Shrubs	95	21.7%
Forbs	628	61.8%
Graminoids	220	9.4%
Ferns and fern allies	49	2.3%
Total	1015	100.0%

(Muller 1982)

Kenai Peninsula area - Most of islands near the southern Kenai Peninsula are dominated by dense Sitka spruce forests. Western hemlock is scarce in the western region, but becomes increasingly common to the east where heavier precipitation occurs (Bailey 1977).

Barren Islands - The Barren Islands (maximum elevation 1,800 feet) are located 18 miles south of the Kenai Peninsula and include seven named islands. Eight community types found below 450 feet on East Amatuli Island (Manuwal 1979) include: beach; marsh; dune; boulder; crowberry; fellfield; meadow; and grassland. The flora is more closely related to Kodiak Island than to the Kenai Peninsula. One hundred thirty seven vascular species of plants occur on the Barren Islands.

For a complete listing of the vegetation found in the units of the Alaska Maritime Refuge refer to "Literature Survey of the Alaska Maritime National Wildlife Refuge, Alaska" (Talbot 1987).

Fishery Resources

Primary marine fishes occurring in the Gulf of Alaska Unit include walleye pollock, salmon, capelin, sandlance, Pacific herring, sablefish, halibut and Pacific cod. Important shellfish include dungeness, king, and tanner crab, and shrimp. The most important commercial finfish species in 1985 were salmon, herring (sac roe), sablefish, and walleye pollock. The most valuable finfish in the area were capelin and sandlance. A small subsistence harvest of capelin occurs in the vicinity of Kodiak Island.

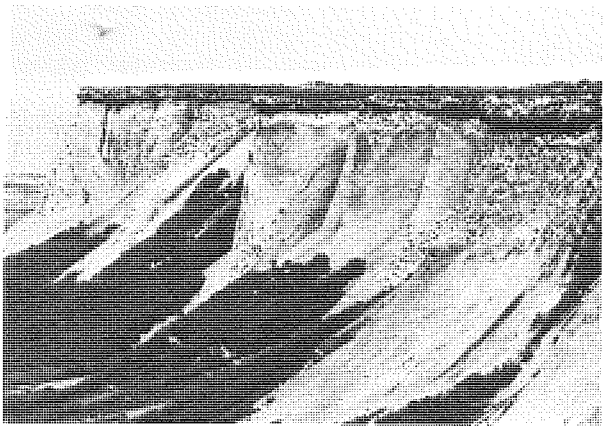
Three islands in the Gulf of Alaska Unit have salmon streams located on refuge lands. Elizabeth Island, off the southern tip of Kenai Peninsula, has a coho salmon stream on the eastern side. Perl Island, just to the southeast, has a pink salmon stream on the western side.

Birds

There are about 2.5 million seabirds representing 23 species that inhabit the Gulf of Alaska Unit (Appendix D). The Forrester Island Subunit in southeast Alaska supports the largest population of breeding seabirds in the unit, with numbers exceeding a million birds. The most numerous species are all nocturnal burrow nesters such as storm-petrels and Cassin's and rhinoceros auklets. Further north, St. Lazaria Island supports 500,000 breeding birds with storm petrels being the most numerous species (U.S. Department of the Interior 1987). The Hazy Islands are the only others in the refuge in Southeast. Although not a large colony, this is one of the few breeding sites for Brandt's cormorants in Alaska (Nelson and Lehnhausen 1983).

Middleton Island, located about 75 miles south-southwest of Cordova, provides breeding habitat for a colony of 150,000 seabirds (USFWS 1987). Black-legged kittiwakes are the most numerous species here (Sowls et al. 1978). The island is also important for other groups of birds, due to its location and their migration route across the Gulf of Alaska. In 1981, Gibson (1982) found 19 distribution records for new or unusual species in the state, including waterfowl, raptors, shorebirds and passerines. Middleton island is privately owned, but the Service retains an easement for seabird protection and study on the island.

The Chiswell Islands, at the mouth of Resurrection Bay, support about 73,000 seabirds. The three most common species include tufted puffins, black-legged kittiwakes, and common murres. This island group is about 35 miles from Seward and is visited daily by tour boats which approach sometimes within 20 feet of the cliff faces.



Middleton Island's cliffs became inland cliffs when the entire island rose during the 1964 earthquake exposing sea floor around the island's edges. It supports the largest kittiwake colony in Alaska.

The Barren Islands support about 500,000 birds representing 18 species and have one of the largest seabird colonies in the unit. Although only 60 miles south of Homer, the islands are seldom visited since they are surrounded by one of the most treacherous stretches of waters in Alaska. Tufted puffins and fork-tailed storm-petrels are the most abundant species. The largest seabird colony in Cook Inlet is found in the Tuxedni Subunit: Chisik and Duck islands. Black-legged kittiwakes and common murres are the two most common species there (Sowls et al. 1978).

Seabirds

Storm-petrels - Leach's and fork-tailed storm-petrels are the most abundant seabirds in the unit, with estimated populations of 780,000 and 500,000 birds respectively (Refuge files). Major colonies of Leach's storm-petrels occur on Petrel and St. Lazaria islands, whereas fork-tailed storm-petrels are important on both islands, East Amatuli, and others in the Barren Islands group (Sowls et al. 1978). More work is needed to describe distribution and abundance at the more inaccessible islands.

Cormorants - Although cormorants do not occur in large concentrations, they are common on many colonies within the unit. Pelagic

cormorants are the most numerous, with an estimated population of 9,000 birds. The colony of 4,600 pelagic cormorants at Middleton Island is the largest in the unit; the only other colony with over a thousand birds is on West Amatuli Island with 1,200 pelagic cormorants. Red-faced cormorants are the next most abundant species with an estimated 2,000 birds. However, individual colonies are relatively small. The two largest colonies include the 400 birds at Granite Island and 300 on West Amatuli Island. Double-crested cormorants are not common, with less than a 1,000 birds in the unit (refuge files). There is a small colony of Brandt's cormorants on the Hazy Islands (Nelson and Lehnhausen 1983). Breeding Brandt's cormorants have also been reported but not confirmed at St. Lazaria and at Seal Rocks near Prince William Sound (refuge files). This cormorant's range is almost entirely south of Alaska; the Hazy Islands colony is the northernmost colony. Other Alaskan sites may only be used on occasional years.

Gulls - Glaucous-winged and mew gulls breed in small colonies on most islands in the unit. Although the most widely distributed seabird in the unit, glaucous-winged gulls generally occur in colonies of less than a thousand birds. This species' population within the Gulf of Alaska Unit is estimated at 44,000 birds (Sowls et al. 1978). Mew gulls occur in several colonies around Kodiak Island and the Kenai Peninsula. These colonies are generally small, with less than a hundred birds. The population of mew gulls is estimated at 1,100 birds (Sowls et al. 1978). Bonaparte's and herring gulls also migrate through the refuge or winter on or adjacent to unit islands.

Black-legged kittiwakes - Kittiwakes do not breed on the refuge in Southeast Alaska, but are common throughout the rest of the unit. The population is estimated at 273,000 with the numbers approaching 150,000 at Middleton Island. Other relatively large colonies of 11,000 to 28,000 birds inhabit cliffs at East Amatuli and Nord islands, in the Barrens, and Chisik Island in Cook Inlet (Sowls et al. 1978, U.S. Fish and Wildlife Service 1987). Due to its cliff nesting habit, the black-legged kittiwake is one of the easiest species of seabirds to monitor. Data from studies at Chiniak Bay, Kodiak Island, and Gull Island near Homer suggest an increasing population in recent years (D. Nysewander, U.S. Fish and Wildlife Service, Anchorage; pers. comm.). Conversely, at Chisik Island a decline was noted. Monitoring is continuing in order to determine whether these colonies naturally undergo fluctuations or whether human factors influence numbers.

Terns - Small colonies of arctic and Aleutian terns are scattered on the unit including around Kodiak and Afognak islands, on the Kenai peninsula, and near Icy Bay. Estimated populations for terns are 2,000 for arctic terns and 1,100 for Aleutian terns (Sowls et al. 1978).

Murres - Common murres are the most abundant murre species in this unit with colonies ranging from Forrester Island in Southeast Alaska to the Kodiak Archipelago. Although not as numerous as in some of the northern units, they are relatively common with an estimated population of 182,000 birds. The three largest colonies in the unit are East Amatuli Island with 88,500 birds, Nord Island with 30,000 birds, and Chisik and Duck islands with 22,500 birds. Thick-billed murres are much less common with a population estimated at 14,000 birds. East Amatuli Island has the largest colony, estimated to be 1,200 birds (refuge files).

Pigeon guillemots - Pigeon guillemots are common in relatively low densities throughout the unit. Since they normally do not form colonies and since they nest in crevices, there are no accurate population estimates for their numbers. Available data suggest a total population of 2,600 birds. The highest recorded counts on the unit were made at East Amatuli and Forrester islands, where 300 birds were observed (refuge files).

Murrelets - Both marbled and Kittlitz's murrelets occur throughout the unit. Only a few nests of either species have ever been discovered. Two nesting records have been made in this unit. A ground-nesting marbled murrelet was discovered on East Amatuli Island in 1978 (Simons 1980). Two years earlier, Bailey (1977) discovered a Kittlitz's nest on Outer Island, one of the Pye Islands.

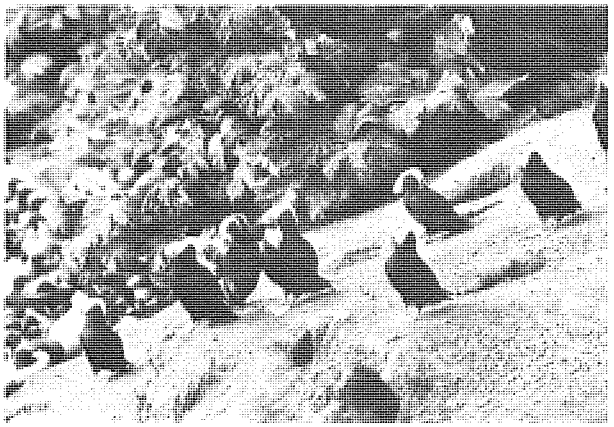
More is known about the ancient murrelet than the previous two species. Although a nocturnal burrow nester, it is a colonial species making it easier to census. The largest known colony of ancient murrelets, 60,000 birds, occurs on Forrester Island. Much smaller populations use St. Lazaria and East Amatuli Island, the only other islands in the unit with this species (Sowls et al. 1978).

Auklets - Cassin's auklets are another small nocturnal burrow nester whose distribution and abundance in Alaska is not well known. The only known colonies of this species in the unit are found in the Forrester Island group where their population is estimated at 32,740 birds. The largest colony is the 23,000 auklets on Petrel Island (refuge files).

Parakeet auklets are near the east end of their range in the Gulf of Alaska, with a population of under 2,000 birds. Nord Island in the Barrens group with 500 birds and Matushka Island with 458 are the two largest colonies in the unit (refuge files).

The 108,000 rhinoceros auklets at Forrester Island comprise the largest colony in the state. Other colonies of 1,000 to 2,000 birds are found on St. Lazaria, Middleton, Matushka, and Sud islands (U.S Department of the Interior, Fish and Wildlife Service 1987). Most of this species occurs from the Gulf of Alaska Unit southward.

Puffins - About 21,000 horned puffins breed on islands within the unit from Southeast Alaska to the Kodiak Archipelago. Colonies are sparse in the Southeast, but may occur near the west edge of the unit, which is near the center of horned puffin abundance (Sowls et al. 1978). A colony of 6,000 birds at Chisik/Duck Islands is the largest in the unit (U.S. Fish and Wildlife Service 1987). Most colonies are generally less than a thousand birds. Tufted puffins are widely distributed throughout the unit. The population, estimated at 433,000 birds, makes it the second most abundant species next to Leach's storm-petrels. As with horned puffins, colonies are more numerous west of Prince William Sound. West and East Amatuli islands in the Barrens group have the two largest tufted puffin colonies in the unit with



Tufted puffins are one of the most abundant species in the Barren Islands.

populations estimated at 93,000 and 74,000 respectively (USFWS 1987).

Waterfowl - Lagoons, bays and coastal waters provide most of the waterfowl habitat on or adjacent to this unit. These habitats are used primarily for wintering and staging areas. Common migrating and wintering ducks around coasts, especially of the Pye and Barren Islands, include black, surf, and white-winged scoters; greater scaup; bufflehead; common goldeneye, and oldsquaw. The common eider is the most numerous species nesting on refuge lands. Migrating geese and brant stop on the Barren Islands. Wetlands suitable for breeding are few in the unit. Ushagat Island in the Barrens has wetlands, but introduced fox prevent most waterfowl from breeding there.

Marsh and waterbirds - Little breeding habitat for loons and grebes exists, except on Ushagat Island in the Barrens. Horned and red-necked grebes, scoters, goldeneyes, and other water birds spend the winter in sheltered bays around the Pye, Chiswell, Barren, and off Kodiak and Afognak islands.

Shorebirds - Twenty-three species of shorebirds are known to use lands on the unit or adjacent tidelands. Ushagat Island in the Barrens is the most heavily used area by migrant shorebirds. Least and western sandpipers are the most numerous species that migrate through

the refuge. Although not occurring in large numbers, American black oystercatchers are found on nearly all of the islands. Shorebird habitats are generally restricted by vertical sea cliffs and abrupt shorelines along most of the unit. Suitable habitat is located on Middleton, Chisik, and the Barren islands as well as Womens Bay on Kodiak Island.

Raptors - Bald eagles are commonly observed throughout the refuge. Over 50 nests have been located along the south side of the Kenai Peninsula, which includes the Pye and Chiswell islands. Additional nests occur on St. Lazaria and Forrester islands in southeast Alaska. Other raptors on the refuge include rough-legged hawks, marsh hawks, short-eared owls, and on forested islands, great-horned owls.

Upland and passerine birds - Fourty-four species of songbirds have been reported in this unit. Common species include winter wren, hermit thrush, common raven, pine siskin, savannah sparrow, golden-crowned sparrow, and fox sparrow. The unit also provides habitat for several species of birds typically associated with the Sitka spruce forest, such as the hairy, downy, and three-toed woodpeckers; tree swallows; brown creepers; red and white-winged crossbills; and pine grosbeaks. Willow, rock, and white-tailed ptarmigan are resident in this part of the refuge.

Mammals

Marine mammals - The number of northern sea lions at rookeries and haul out sites in the Gulf of Alaska during 1974-80 was 103,150 animals; during 1982-84 approximately 20-24,000 animals were counted (Calkins 1986). Major rookeries on the unit occur on Forrester, Sugarloaf (the Barrens), and the Pye islands. The Chiswell Islands' rookeries, although smaller, are the most visited with daily scheduled charter boat tours during the summer. Since other species of marine mammals occurring on the unit are not found in rookeries, their enumeration is more difficult. Species that are known to occur on or adjacent to refuge islands include the following: beluga, humpback, mink , fin, gray, killer, and pilot whales; Pacific white-sided dolphin; harbor and Dall's porpoises; harbor seals; and sea otters (Burt & Grossenheider 1976).

Estimates of sea otters within the Gulf of Alaska unit include: 4,000 - 6,000 in the Kodiak area, including the Barren Islands; 2,500 - 3,500 along the Kenai Peninsula and Cook Inlet, including Kachemak Bay; 4,000 - 6,000 in Prince William Sound; 100 along the coast from Yakutat to Cape St. Elias; and 600 - 800 in southeast Alaska.

Terrestrial mammals - The only large land mammals on the unit are occasional black and brown bears and Sitka black-tailed deer. The bears forage on the islands, but are not resident species. Deer are found on larger islands around Kodiak and Afognak islands.

Several species of small mammals inhabit the unit. Arctic foxes on Ushagat Island are the most significant species. This species was probably introduced to islands in the unit at the same time as fur farming started on many other Alaskan islands. However, fox farming ended during the Great Depression and World War II. Following abandonment of the fox farms, fox apparently were not able to survive and disappeared on most of the islands in the unit. Marmots, rabbits, and ground squirrels were also introduced on several islands such as Sud Island in the Barren Island group. Other species of small mammals and furbearers inhabiting the unit include marten, voles, shrews, river otter, weasel, and mink. The Coronation Island vole, a species with a very small range of a few islands, occurs on Forrester Island (Burt and Grossenheider 1976).

Threatened and endangered species

Humpback and gray whales occur in waters surrounding refuge islands and may occasionally pass through refuge waters. No proposed threatened or endangered birds or plants are known to occur in this unit.

HUMAN ENVIRONMENT

Cultural Resources

The people of the Kodiak Archipelago and nearby parts of the refuge are speakers of a subdialect of the Yupik Eskimo language. Like Eskimos elsewhere, the subsistence base was primarily maritime, including a wide variety of sea mammals and fish. Differences between this area

and other Eskimo areas include the absence of winter sea ice (and hence of ice-hunting techniques), and the presence of comparatively abundant forest resources lacking in the tundra environments elsewhere. Winter dwellings were large, accommodating several families; summer fishing camps, usually not in the same locations, were smaller, with less substantial dwellings.

The Russians first entered the Pacific Eskimo area in 1741; however, at that time, there was no direct contact. George Steller, a naturalist with Bering's expedition, did find dwellings on Kayak Island, and gifts were left for the occupants, who had obviously fled (Clark 1984:187). Trade began in the area around 1763, and the first permanent trading posts were established in the 1780's. Settlement continued to develop through the Russian period and after the American purchase, with the emphasis eventually shifting from the fur trade to fishing.

A large number of archaeological sites have been documented in the Kodiak area; for further discussion of their nature, the reader is referred to the Comprehensive Conservation Plan for the Kodiak National Wildlife Refuge.

One portion of this unit needs to be addressed separately, that is, the St. Lazaria, Hazy, and Forrester islands areas in southeast Alaska. These islands fall within the use areas of the Tlingit Indians, although there is at present no indication that any of these islands were actually occupied. More details on the Tlingit people may be found in Indian Life on the Northwest Coast of North America (Gunther 1972).

Subsistence Uses

Commercial fishing has somewhat displaced the traditional subsistence lifestyle. Homer, Seward, and the rest of the Kenai Peninsula, except for English Bay and Port Graham, do not have subsistence privileges, as they are classified as nonrural communities according to Alaska Department of Fish and Game regulations. Kodiak and Sitka are rural communities, although nearly all residents have wage paying jobs or businesses. The southern Kodiak communities of Akhiok, Larsen Bay, and Karluk exhibit a more traditional subsistence lifestyle and appear more dependent on subsistence resources. Most refuge islands have not been important areas of Native or local subsistence use in recent times. Marine areas in this refuge unit are used for subsistence purposes. Subsistence is discussed in greater detail under the individual communities.

Recreational Uses

Seabird colonies in this unit are probably the most visited in Alaska. Unlike most units, two colonies are readily accessible by charter boat or pleasure craft, St. Lazaria Island 15 miles from Sitka and the Chiswell Islands 35 miles from Seward. About 24,000 visitors on charter boats, cruise ships, the state ferry, fishing charters, and private boats visit the Chiswell Islands, the most popular bird colony. About 2,000 people visit St. Lazaria.

Recreational use also takes place on Chisik Island, the Barren Islands, and the Pye Islands which are accessible from Homer. Charter and recreational fishing and sightseeing also takes place in the waters around Afognak. Kodiak residents sightsee, bird watch, and picnick on the islands and waters of Womens Bay. This use is described in the sections below dealing with each community. Other refuge lands in this unit are relatively remote and rarely visited.

Economic Uses

In the Kodiak Island vicinity, cattle are grazed under permit on Bear and Harvester islands. The Afognak Joint Venture holds the timber rights to Delphin and Discoverer islands. No logging has yet been done. A barge type log transfer facility is located in refuge waters in Discoverer Bay of Afognak Island. Construction of an inclined slide log transfer facility in Kazakof Bay of Afognak Island was recently authorized. A permit has been issued for blue mussel mariculture in refuge waters of Raspberry Strait. The permit has not yet been exercised. Kodiak Reduction, Inc., a seafood by-products plant in Gibson Cove on Kodiak Island has a permit to discharge a maximum of 10,000 gallons of effluent into refuge waters. In Womens Bay, Lash Corporation has a pier for loading barges. Commercial salmon set-net cabins are located on Chisik and Village islands. Charter sightseeing boats visit refuge islands near Sitka, Seward,

and Homer. This use is documented under the following sections for each community.

Military Uses

The only military facility involving refuge land or water is the Coast Guard base in Womens Bay, just south of the city of Kodiak. The Coast Guard occupies virtually all of Nyman Peninsula, within Womens Bay. Base facilities include housing, airstrips, and piers. These are used for large (278-foot) cutters. The Coast Guard also has a boat ramp at the base of Nyman Peninsula. A private boat ramp is also located along the peninsula. The waters of Womens Bay are also the site of a deep water military dumping ground. The U.S. Navy is considering basing one or more ships in Kodiak, Homer, Seward, Sitka, or other sites. If Kodiak is chosen as home port for the Navy's ships, Womens Bay is a probable site for development.

Communities

Within the Gulf of Alaska Unit, four communities are the primary access points to Alaska Maritime Refuge lands: Kodiak, Homer, Seward, and Sitka. These communities are described below.

Kodiak

There are two very different kinds of communities coexisting on the island of Kodiak: the city of Kodiak itself, commonly referred to as Kodiak, and the Borough of Kodiak, which includes populations living in Kodiak, its suburbs, as well as the more remote Native communities of Kodiak Island.

Northern Kodiak area villages - Ouzinkie and Port Lions differ from the villages to the south in at least two important respects. First, they are closer to and within the sphere of influence of the city of Kodiak. Second, both villages experienced more extensive and intensive Russian influence than the other villages, and considerable intermarriage has taken place between the two villages and with non-Natives, producing a more heterogeneous population.

Ouzinkie - Ouzinkie is located on Spruce Island approximately 16 miles from the city of Kodiak, and has a resident population of approximately 10 non-Natives and 160 Koniag. Spruce Island is separated from Kodiak Island by a narrow strait. The community is organized as a second-class city, and also has a Tribal Council. The predominant source of income has been fishing, with halibut, salmon, and crab being the most important species. In 1978, 86 percent of the workforce was reported to be involved with fishing. School related jobs, office and health care help, longshoring, and local construction and transfer payments represent the bulk of the remaining income sources. The village lost its cannery during the 1964 earthquake/tsunami, and the cannery built after the tsunami was destroyed by fire in the mid-1970's and not rebuilt. The nearest permanent processing facilities are in Kodiak. Participation in fishing is declining, due in part to salmon limited entry permit restrictions.

Port Lions - Port Lions is a new village constructed after the earthquake and tsunami of 1964. Its name derives from the International Lions Club, which "adopted" survivors of the destroyed village of Afognak and helped them to resettle on the present site. Port Lions was the first of the island villages to incorporate, when it became a fourth-class city in 1967. It later became a second-class city. It is a robust, well maintained community of 215 residents, which includes approximately 50 non-Natives. The fishing fleet of Port Lions is among the best equipped in the borough. Residents hold approximately 14 salmon permits, and there are approximately 17 limit seiners in the small boat harbor. A growing number of efficient skiffs are used by nonpermit holders to harvest halibut.

Southern Kodiak Island villages - The southern villages, Akhiok and Old Harbor, are more traditional in their orientation and have distinct histories which are reflected in current village living patterns. Both villages are composed primarily of descendants of individuals from small villages which consolidated during the 19th and 20th centuries. Old Harbor was greatly modified by the construction following the 1964 tsunami; Akhiok was affected indirectly through population movement from Kaguyak.

Akhiok - Many of the current residents of Akhiok were residents of, or are descendants

of, at least four other Koniag villages: Aiatalik, Ayakulik, Halibut Point, and Kaguyak. Akhiok itself was not damaged by the 1964 earthquake, but the community was nevertheless dramatically changed by the event: the majority of the Kaguyak village survivors came and settled in the village, substantially increasing the population and changing the social structure. In 1983 the population was 110. The population grows in the summer months as former residents and relatives of local families return for the fishing season. Akhiok incorporated as a second-class city in 1974.

There is a strong sense of Native identity in the village. Subsistence pursuits are valued for their social components, and subsistence foodstuffs are highly valued. A 1978 Kodiak Area Native Association report listed 8 jobs in the community, with 32 other individuals listed as commercial fishers. Residents hold only three salmon permits and control two set-net sites, while non-Natives hold most local sites.

Old Harbor - Old Harbor is built near the location of the first Russian settlement in North America (Three Saints Bay). It is also still a viable community which was incorporated in 1968 as a second-class city. Old Harbor has experienced the greatest increase in population in the mid-20th century of any of the region's communities. Its population had grown to approximately 340 residents by 1980. It is a heterogeneous community of Natives, since the migration of Natives from other communities in the region in the first half of this century.

Old Harbor, according to residents, is "a prime location for any oil development in this region" (Petterson pers. comm. 1986)). Currently, the community is oriented around the salmon, crab, and herring fisheries. The Native residents of the community are primarily fishermen, with 16 nonfishery related jobs reported in the community in 1978. This community is economically better off than Ouzinkie, Karluk, Larsen Bay, or Akhiok because fishers are relatively well equipped in terms of vessel size, range, and capacity, and hold a significant number of valuable permits in the salmon fishery. They have an excellent small boat harbor, a floating processor at the dock for crab, and on-grounds tenders and processors for salmon. The village has more community facilities than any other village except Port Lions. Built after the 1964 tsunami, these include a theater and pool hall, a city dock, two general stores, an airstrip, a post office building, a fuel delivery service, a community hall, 45 additional Housing and Urban Development-sponsored houses, a two-mile road and bridge connecting the two housing areas, an office building, a health clinic, a library, a high school, and a gym.

Western Kodiak Island villages - The villages of Karluk and Larsen Bay, located on the far western edge of Kodiak Island, are both oriented toward the fishing industry, but are quite distinct in other respects.

Larsen Bay - The present village is relatively new, located on the site of a cannery that was built in 1911 after the company moved from the less protected coast of Karluk. The area around the village was inhabited for most of the last 2,000 years. Its population in 1961 was reported as 82; in 1978, 118; and in 1980, 168, with more individuals ready to move to the village as soon as housing became available. In 1980, 71 percent of the population was Native. It is the only village on the island with processing plants in operation. Almost all males over 12 years of age fish, as do some of the females.

Karluk - Karluk was a thriving fishing port at the turn of the century, with a population of over 1,000. Non-Natives outnumbered Natives by more than five to one. Under the Russians the village had been an important fur trading center, and as early as 1867 salmon was being salted commercially in the community. At one point the largest salmon cannery in the world was located in Karluk, and the river was known as the greatest red salmon stream in the world. No commercial canning has been done, however, since the local cannery moved to Larsen Bay in 1911. Fishing is the primary source of income in the community. The population has steadily declined since the peak salmon years of 1935 and 1936, with the 1980 census showing 94 residents. Karluk is not incorporated, having retained its formal Indian Reorganization Act council which, in 1939, was one of the first to be formed in Alaska. The village, in a move mandated by the Tribal Council, changed location in 1979 to a site

three-fourths of a mile upstream from the old village.

Population trends and composition - The total population of the region, according to a 1982 Kodiak Island Borough Special Census, was 12,714. The bulk of this population, approximately 10,900, resides in or near the city of Kodiak (including Cape Chiniak [185], Bell's Flats [521] and other road-connected suburbs). The Kodiak Coast Guard Station represents a total of 1,995 residents and the city of Kodiak another 5,873 residents. The remainder of the Borough consists of isolated population sites with a total population of around 1,000. The communities which compose the remainder of the Kodiak Borough include Old Harbor, Port Lions, Ouzinkie, Larsen Bay, Akhiok, and Karluk.

The population of Old Harbor can also be expected to grow by about 9 percent over the next five years due to its attractive location with regard to the region's fishery resources. The populations of Karluk, Ouzinkie, and Larsen Bay are expected to increase only modestly over the 10 year projection period, while the population of Akhiok may actually decline over that period due to the lack of a local economic resource base (Petterson pers. comm. 1986).

Sociocultural systems - The city of Kodiak itself is made up of three primary ethnic groups; white (3,337), Koniag (573) and Filipino (554). The primary ethnic identification of the villages is Koniag; Ouzinkie is 94 percent, Port Lions 75 percent, Old Harbor 93 percent, Larsen Bay 75 percent, Karluk 100 percent, and Akhiok 98 percent Koniag (few distinguish among Koniag, Suspiaq, and Aleut)(U.S. Census data).

Community infrastructure - The city of Kodiak was incorporated as a first class city in September 1940 around the Alaskan city manager/council model. It has a six-member council and an elected mayor. The city forms a part of the Kodiak Island Borough and is the seat of the borough itself. The borough was established in 1963 and includes all of the communities and populations of Kodiak and Afognak Islands. The borough government is organized around a Borough Mayoral/Assembly political system, has the power to tax, plat and zone, and has the responsibility for education, health, and planning. The regional offices of the Koniag Native Corporation, Kodiak Area Native Association, and Natives of Kodiak Village Corporation are also located in the city of Kodiak (Alaska Consultants 1979a, 1979b; Cultural Dynamics 1985). Various federal agencies have offices in the city of Kodiak as well. These include the Federal Aviation Administration, the U.S. Fish and Wildlife Service Kodiak Refuge Headquarters, National Oceanic and Atmospheric Administration, National Guard Armory, Coast Guard Service, and U.S. Postal Service. State agencies represented in Kodiak include the Department of Fish and Game, the Court system, the departments of Transportation, Motor Vehicles, Corrections and Social Services, and Public Safety.

Economy - Kodiak has, for the last several decades, been dependent primarily on the commercial harvest of marine resources in the waters of the Gulf of Alaska and Shelikof Strait. Kodiak has been one of the top three U.S. ports in value of fish landed for the last several years and was the number one port in 1981. Almost every commercial enterprise in the city depends directly or indirectly on fishing for survival. The commercial economy of Kodiak was negatively affected by the virtual demise of the king crab fishery, but has rebounded with the surge of bottomfishing by the Kodiak fleet.

Tourism is important to the Kodiak economy. However, the tourism industry is small compared to that in other popular tourist destinations of similar size, such as Homer and Seward. The lack of mainland road access, and its position as a final link in the Alaska Marine Highway may account for this circumstance. Silver salmon and steelhead sport fishing and brown bear and deer hunting on Kodiak are legendary activities among both resident and nonresident enthusiasts.

Subsistence - Harvesting subsistence resources is an extremely important activity in the rural communities. Salmon is the most important species harvested in terms of percentage of households participating (72 to 100 percent) and percentage of pounds consumed per year (33 to 67 percent) (Kodiak Area Native Association 1983). Deer, other fish, invertebrates, and marine mammals are also important subsistence resources. Ninety percent

or more of the households surveyed in 1983 reported harvesting at least one species of fish or game.

Harvesting wild game is also important to residents of the road connected communities in Kodiak. At least 74 percent of the households surveyed reported harvesting one or more species (Kodiak Area Native Association 1983). Salmon was also the most important species harvested by residents of the road connected communities.

Most subsistence activities do not occur on Alaska Maritime Refuge lands, since most of the small islands in the refuge do not support many deer or salmon. Some clamming and fishing is done in Womens Bay. Fishing occurs in the refuge waters surrounding Afognak.

Recreation - Although Kodiak Island is an important recreation area, little of the activity takes place on Alaska Maritime Refuge lands, which are relatively remote, are primarily islands or water, and can be visited only by plane or boat. Most islands do not have deer, bear, or salmon populations which most recreational visitors to Kodiak seek. However, islands and tidelands in Womens Bay are utilized by local and nonlocal people for bird watching, picnics, and sightseeing. The refuge waters and islands surrounding Afognak are utilized by sport anglers, sea kayakers, bird watchers, and sightseers. Lodges are developing on Afognak Island which will increase recreational use of that area.

Homer

Homer was first settled on the Spit in 1886. Initially Homer prospered as a coal mining town. This boom came to an end, and Homer all but ceased to exist between 1902 and 1915. After this period, the economy shifted from emphasis on mining and trapping to farming and fishing. The Sterling Highway, Homer's link to Anchorage and the rest of the Kenai Peninsula, was opened in 1951. Road access has had the greatest effect on the growth of Homer. During the 1970's and the first half of the 1980's, Homer grew at a rapid rate, nearly seven percent per year. This is attributed to successive improvements to the Sterling Highway, oil development, and Anchorage's phenomenal growth. In 1982, Homer's population was 2,897 with 4,966 residents in the total Homer area. Population projections done in 1983 project a 1995 population of between 4,500 and 10,400 for the city of Homer and 8,000 and 20,000 for the overall area (Pacific Rim Planners 1983). The recent economic downturn has undoubtedly slowed growth.

Homer is a community that is strongly Euro-American in ethnic composition. As of 1978, less than three percent of Homer's residents were Natives or other minorities. Homer was not the site of a Native village at the time of the founding of the modern town.

Sociocultural systems - Homer does not have a subsistence orientation since most residents came from somewhere else. Most use of local resources is either commercially-oriented or sport-oriented. Many households in Homer neither hunt nor fish, and the hunting and fishing activity that does take place is usually scheduled around wage paying jobs. However, fishing and hunting are perceived to be part of a country-like way of life, which is highly valued by many residents.

Homer is a regional service center, as 10 percent of its income comes from sales to other communities (Pacific Rim Planners 1983). Additionally, Homer is tied to other Kenai Peninsula communities through joint planning action under the auspices of the Kenai Peninsula Borough government. Homer also is tied to Anchorage in several ways, as it is from and through Anchorage that most of the visitors come who make up such a large portion of Homer's economy.

Community infrastructure - As a first-class city, it is responsible for the full range of municipal services, and features a city council-city manager form of government. Water, sewage, and electrical service is provided by the city as well. There is a 17-bed hospital in the community, along with two clinics. Homer is a well developed port, with facilities capable of servicing both a commercial and sport fishing fleet, along with being a major transportation center. Homer is connected to Anchorage via Sterling Highway (227 highway miles) and several airline flights per day. Homer is also connected to Seward and Kodiak via the Alaska Marine Highway system.

Economy - Over the past decade, the economy of Homer has expanded greatly beyond its past dependence upon fishing. As the local fisheries stagnated, Homer fishermen diversified into more distant fisheries, and the economy of Homer in general diversified. Fishing accounted for 43-45 percent of the income in Homer in 1983 (Pacific Rim Planners 1983). Government spending, the second largest source of income, accounted for approximately 25 percent. The third and fourth largest sources of revenue were sales to nearby communities and sales to tourists and visitors. Revenues from sales to tourists and visitors may have been underestimated. There are currently around 50 charter companies operating out of Homer with over 100 boats. It is estimated that approximately 55 percent of the charter tourist business is made up of Alaska residents, mainly from Anchorage. One of the larger operations, which conducts natural history tours out of Homer, had 3,000 customers in 1984.

Homer is planning for its future based on an approximate growth rate of 5 percent per year through the year 2000. The largest change anticipated in Homer's economy is an increased reliance on tourism. It is also anticipated that Homer's role as a transportation and service center for the south Kenai Peninsula will expand, and that the proportion of the population that is retired or commuting will expand as well.

Subsistence - Homer is classified as a nonrural community by the Alaska Department of Fish and Game. Residents do not have subsistence privileges. English Bay and Port Graham are the only communities in the area that are classified as rural. No known harvest activity takes place on refuge lands near Homer.

Recreation - There are several small portions of the Alaska Maritime Refuge that are accessible from Homer by either boat or aircraft. Gull Island, just one mile from Homer, no longer belongs to the refuge, but its reaquisition is planned. Sightseeing charters, the ferry to Halibut Cove, the China Poot Bay Society - an educational group, and private boats visit Gull Island to observe and photograph seabirds. One of the larger charter companies took 2,656 people to Gull Island in 1984. Some fishing also occurs around Gull Island. Sixty-foot Rock, which is in the refuge, is also visited by sightseeing charters and the ferry to Seldovia. A charter service has taken tourists to the Barren Islands, but no trips have been scheduled there since 1981.

One Homer air charter takes kayakers out to the Kenai Fjords-Pye Islands area, but most use occurs in the protected waters of the fjords. In 1984, approximately 50 people utilized this service, but only two groups of six to eight people each actually landed on the Pye Islands which are part of the refuge. Approximately half of these people were from Alaska. A limited amount of recreational use occurs on Chisik Island which is across Cook Inlet from Homer. A number of set-net salmon fishers have cabins on Chisik and undoubtedly some of them engage in recreational activities on the island. Boats out of Homer or Kenai occasionally visit the island.

Maritime Helicopters, Inc., during 1984 was issued a special use permit to provide helicopter access on East Amatuli and Ushagat islands in the Barren Islands group. About two or three trips per year are made to take sightseers to the island to beachcomb and view sea lions and seabirds. Occasionally larger halibut charter boats will fish in the vicinity of the Barren Islands and some sightseeing is probably incidental to this use.

Seward

The recent development and historical importance of Seward is due to its geographical location at the head of the ice free harbor of Resurrection Bay. The community had its origins during the period of railway expansion at the beginning of this century. Seward was laid out and constructed by the Alaska Central Railroad in 1903, one of the first planned communities in Alaska. The U.S. Congress authorized the purchase of the railway itself in 1915 and by 1923 had completed construction of rail lines to Anchorage and Fairbanks.

Population trends and composition - By the time of World War II, the population of Seward had risen to over 1,000. The population declined from a high of around 2,000 in 1950 to a low of 1,600 in 1960 rising to about 1,700

residents in 1970 and to approximately 1,800 residents in 1980. By 1985 the population was 2,072 with an anticipated population of 3200 by 1990 (City of Seward 1985). Seward, like many other Alaskan communities, has a disproportionate number of males and residents under the age of 40.

Sociocultural systems - Seward has never been a Native community. Nearly 90 percent of the community is white and the bulk of the Native residents have been largely incorporated into the dominant culture. Most Natives in Seward have come from somewhere else and as a result, do not form a cohesive ethnic group.

The community is highly educated and, for it size, has a disproportionate number of post-secondary education facilities. The Kenai Peninsula Community College is located in Seward as is the Alaska Vocational Technical Center. The concern of Seward residents for maintaining the quality of their social and physical environment is both strong and uniform throughout the community.

Community infrastructure - Seward was incorporated on June 1, 1912. It is a home rule city with a six-member elected council, mayor, and professional city manager. The Kenai Peninsula Borough includes a 25,600 square-mile area which encompasses Seward. The borough holds the powers of assessment, tax collection, education, and planning (platting and zoning). The city of Seward has a one percent sales tax in addition to the borough's two percent sales tax.

The Seward General Hospital is owned by the city and is operated by a private firm. Electrical power is purchased from Chugach Electric, and telephone service is provided by General Telephone Company of Alaska. The commercial dock facilities are owned by the Alaska Railroad and the airport is operated by the state. The city is also responsible for providing water and sewer services.

Economy - The state of Alaska maximum security prison with an eventual staff of about 200 opened in Seward in 1988. The Alaska Vocational Technical Center was established in Seward in 1970 and has enjoyed over a decade of growth. The Seward Marine Industrial Center will mean increased local employment and an increased role for Seward in marine transport and related maritime services. Seward also has small fish processing operations which are highly seasonal and a timber mill, which has suffered recently from low prices. Jobs are expected to increase faster than the population, resulting in an improved ratio of jobs to residents.

The local Seward trade and services sector has shown a relatively constant 1 percent annual increase in employment which is expected to continue. Sand and gravel mining and contract construction are also expected to provide an increasing number of jobs.

Tourism is a growing force in the local economy and among the most promising future development options. Seward is the headquarters location for the new Kenai Fjords National Park which has seen an increase in visitation from 5,649 in 1981 to over 60,000 in 1987. Cruise ship calls have increased dramatically since the first ship visited in 1983 to 20 in 1987 and an expected 30 in 1988 (Kaye, National Park Service pers. comm. 1987). Numerous companies offer sightseeing and/or fishing charters. Sailboat charters, a sailing school, and a sea kayak sales and rental shop also take advantage of the interest in marine recreation. Some charter operators are now investigating increasingly diversified activities, including scuba diving tours to the underwater reefs and spires offshore. The client composition of sightseeing charters is estimated at between 50 percent to 75 percent out-of-state residents. The average period of stay in Seward is about two days per individual and the contribution of these visits to the local economy have been significant. See the recreation section below for more information.

Subsistence - Seward residents do not have subsistence privileges as Seward is classified as a nonrural community by Alaska Department of Fish and Game. The islands near Seward are among the very few in the refuge that have not been important areas of Native or local subsistence utilization.

Recreation - Interest in marine oriented recreation is rapidly accelerating in Seward as documented for commercial enterprises in the economy section. Private boating is also

rapidly expanding. Seward has a small boat harbor which is heavily used by both local and nonlocal Alaskans. The military maintains recreational boats in Seward for use by military personnel. The total sport fishing use-days both private and commercial for Resurrection Bay in 1983 was 40,144, down slightly from previous years. Salmon fishing accounted for most of the use (Ted McHenry, Alaska Department of Fish and Game pers. comm. 1985). Interest in sea kayaking has also grown since the Alaska Sea Kayaking Symposium, held in Seward in 1986 and 1987, focused attention on the area. Kenai Fjords National Park estimated that sea kayaking visits have grown from 160 in 1982 to 1,300 in 1987.

The refuge lands closest to Seward are the Chiswell Islands off the coast of the Kenai Fjords National Park. The refuge islands are only accessible by sea and most are steep, making landing difficult. However, the seabird and marine mammal colonies on these islands are important tourist attractions for the sightseeing charter boats and cruise ships. About half of the cruise ships which visit Seward travel west past the Chiswell Islands. In addition, the state ferry cruises past the Chiswells. Principal use, however, is from the sightseeing charters which have increased from 630 visitors in 1982 to 12,600 in 1987 (Kaye, National Park Service, pers. comm. 1987). Sport halibut and bottom fishing off refuge islands also occurs. Some kayakers utilize the islands, although most kayak use occurs in the protected fjords of the park. Total use from all types of boats, both commercial and private, is estimated at 24,000 use days per year.

Sitka

Sitka is located on the west coast of Baranof Island on Sitka Sound in southeast Alaska. Sitka is a 20-minute flight from Juneau.

Population trends and composition - Sitka is a relatively large community of approximately 7,803 residents according to 1980 census figures. The largest ethnic group is white (5,768), followed by Tlingit Indian (1,506), Filipino (156), Eskimo (95), Aleut (68), Japanese (63), and Black (44). No significant change in this ethnic balance is anticipated during the forecast period. Despite the numerical predominance of white residents, most of the population considers Sitka to be one of the most important Tlingit communities in Alaska. Sitka is not expected to grow appreciably over the next few years or until an alternative source of employment to the pulp industry develops in the community (Petterson pers. comm. 1985).

Sociocultural systems - The community is relatively prosperous and well educated, with nearly 25 percent of persons between 18-24 years of age currently enrolled in some form of post-secondary education. Sitka is also an unusually stable community, with over 40 percent of its population born in Alaska. Sitka is a multicultural, but well integrated and hard working community. The number of political, social, and cultural organizations represented in Sitka is unusual by any standard. Its population is highly individualistic, with a very high regard for the environment.

Community infrastructure - Sitka was incorporated in December 1971 with the city of Sitka and the Greater Sitka Borough unified under a home rule charter as the City and Borough of Sitka. The government is comprised of a seven-person elected borough assembly (including an elected mayor) and a professional administrator. All utilities and borough facilities are owned by the city and borough of Sitka (Greater Sitka Chamber of Commerce 1979, 1983). The basic infrastructure is relatively insulated from the effects of a brief downturn within a single economic sector. However, if the world pulp market fails to recover, a gradual reduction in available public services, or at least a pause in the pace of growth, will occur.

Water carriers serving Sitka include Foss Alaska Line (year-round), Samson Tug and Barge (bi-weekly to Seattle), and Alaska Marine Highway (weekly to Seattle and Prince Rupert). Scheduled jet air service is provided by Alaska Airlines (two daily flights northbound and one daily southbound), while unscheduled air taxi service is available by float planes, Beavers, and helicopters (Greater Sitka Chamber of Commerce 1983).

Economy - The largest single employer in Sitka is government. The federal government

employees 514, the state of Alaska 230, and local government agencies 375 out of a total employment of 2,258 (Alaska Department of Labor 1982). Total annual earned income for this group is $28 million of a total earned income for the entire community of $88 million. The U.S. Government, since the early 1940's, has operated the Mt. Edgecumbe Health Service hospital in Sitka. The U.S. Forest Service selected Sitka as the site of their headquarters for the North Tongass National Forest. A U.S. Coast Guard station was moved to Sitka in 1977 (225 Guardsmen and family members).

Sitka is an important regional center for Alaska's wood products industry. Alaska Lumber and Pulp Co., a Japanese-owned company, operates the local pulp mill. This mill employs a local work force which is at times in excess of 500, representing nearly 17 percent of all earned income. The mill also supports employment through its several contract logging camps. This mill, and other wood products firms throughout Alaska and the Pacific Northwest, has experienced economic problems in the last four to five years as the price of pulp has declined while costs have increased (Sitka Economic Base Study 1984).

Tourism has played an important role in the growth and diversification of the local economy. Sitka has historical interest as the site of the old Russian capital and is one of the most attractive communities in Alaska. Sitka is a port-of-call for nearly 100 major cruise ships each year while an additional 200 hotel rooms have been added to the local economy since 1978. This has had widespread economic benefits in terms of employment and local sales. The number and frequency of scheduled air traffic to Sitka has also expanded significantly over the last five years.

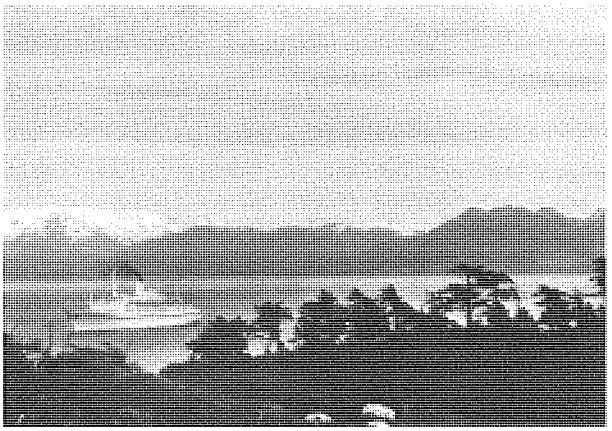
Fishing is the third most important component of Sitka's economy. Sitka is centrally located in relation to the offshore fisheries of both the Gulf of Alaska and the Pacific Northwest. Sitka has two fish processing plants with an estimated annual production in 1982 of around 18 million pounds. The growing importance of the halibut longline fishery and the emergent potential of the groundfish fishery are favorable signs for Sitka's economic future.

Sitka is likely to continue to grow at a relatively brisk pace based on growth during the past decade. The manufacturing, government, and tourist sectors of the economy have all shown significant and relatively constant growth during the last ten years. However, even though Sitka's economy has become increasingly diversified, it has nevertheless suffered significantly as a result of the decline in the price of wood pulp in the last five years. Cost reduction efforts by the mill have allowed production to continue, but real earnings from this industry, the primary industry of the community, dropped more than 30 percent from 1980 to 1985. The long term viability of the community depends on the continued growth of the support sectors of the economy, government, tourism, and fishing. Tourism has increased consistently over the last five years and is expected to continue as long as the U.S. economic outlook remains positive (Petterson pers. comm. 1985). Government employment, which accounts for nearly one-third of the workforce, will undoubtedly decline with decreases in federal and state budgets.

Subsistence - Sitkans of all backgrounds make extensive use of wild resources. A 1985 study (Gmelch and Gmelch, 1985) found that over 80 percent of the households had fished in the past year, 56 percent had hunted, 60 percent had gathered beach foods, and 77 percent had gathered plant materials. Almost none of this use occurs on or near refuge land. The exception is halibut and salmon fishing in the vicinity of St. Lazaria Island, the only refuge land easily accessible to Sitka.

Use of St. Lazaria itself has declined since 1980. This seems to have been due largely to the misinterpretation of regulations regarding access to the island. Most people questioned (28 out of 34 local, mostly Native residents) believed that "it is illegal to be on the island at all." The following information is based on people's recollection and current uses believed to be illegal (Petterson pers. comm. 1985).

Traditional use of the island concentrated on picking sea gull eggs and picnicking. An occasional seal might be taken and, "in the very old days" puffin beaks, part of the Tlingit regalia, would be collected. Some use was made



Approximately 70,000 tourists on cruise ships visit Sitka each year. Some ships such as this one, pass close enough to view St. Lazaria Island.

of the small intertidal area, lagoon, and of the island portion of the underground sea cave. The island is the favorite traditional spot for finding excellent seaweed during specific times of the year. Some people used to fish for halibut from shore while most remembered picking berries. It does not seem likely that local Natives will reinstitute traditional resource use pattern on St. Lazaria (Petterson pers. comm. 1985).

Recreation - The portion of the refuge nearest to Sitka is St. Lazaria Island. Visits to Hazy and Forrester Islands out of Sitka are extremely rare. The Forrester Island subunit is more easily accessed from Hydaburg than from Sitka. Local authorities report that Craig, Klawock, Hydaburg, and possibly Ketchikan residents make similar uses of Forrester Island, although less frequently due to greater distance.

St. Lazaria is only accessible by boat during fair weather, due to a lack of beaches or protected bays for float plane landings. Only inflatable boats or small skiffs are capable of landing on the island.

The predominant nonlocal use made of the island is by tour boats for birdwatchers during the summer months. These tours do not land on the island but circle as close as safety permits to allow the passengers an opportunity to photograph the seabirds. Charter and private halibut sport fishing boats frequently visit the island because the adjacent waters are considered excellent halibut habitat. An estimated 3,000 visitor use days for sightseeing and fishing occur over a 12 week season. Commercial fishing boats frequently anchor off the small bight on the lee side of the island at night or during storms (Petterson pers. comm. 1985).

Although the outdoor recreation segment of the tourist industry is important, the recreation industry in Sitka is focused on cultural and arts activities. The marine recreation potential of Sitka has clearly not been met, and no information is available that would permit forecasting the growth of such an industry.

WILDERNESS REVIEW

This evaluation will determine what lands, if any, in the Gulf of Alaska Unit meet the criteria necessary for wilderness designation. Those criteria are explained in the wilderness review section of the Overview.

A few areas do not meet the wilderness criteria and will not be evaluated further. Aiktalik, Akhiok, Elizabeth, Perl, and East Chugach islands do not meet the size criterion in that they are less than 5,000 acres, and there is private land on the islands. Karluk tidelands, submerged lands, and watercolumn, Womens Bay tidelands and watercolumn, and Afognak submerged lands and water do not meet the naturalness criterion in that commercial fishing, shipping, fish hatcheries, off road vehicle use, and structures such as docks and piers are already located in these areas. Bear, Harvester, and Sixty-foot Rock do not meet the naturalness criterion in that there are buildings, set net sites, and off road vehicle trails on Bear and Harvester and a Coast Guard light which dominates one acre Sixty-foot Rock. Middleton Island will not be considered for wilderness, because the Service only owns a public access easement on this island.

Approximately 75 percent of the areas which meet the criteria in the Gulf of Alaska Unit have been Native or state selected (Table 7). They can not be proposed for wilderness at this time, because their eventual ownership is uncertain.

Should the selections be relinquished, a wilderness proposal for those areas meeting the criteria could be evaluated. Delphin and Discoverer islands off the coast of Afognak also meet the criteria, but the right to the timber on these islands was conveyed by the Alaska Lands Act to the Afognak Joint Venture. Should this right be reacquired, these islands could be reconsidered for wilderness.

Tuxedni Subunit - Chisik and Duck islands, St. Lazaria Subunit, Hazy Islands Subunit, and Forrester Island Subunit are already designated wilderness.

Uganik Bay islands and islets - Sally, Sheep, Village, Green, Noisy, and unnamed islands - These islands are located in Uganik Bay off the northwest coast of Kodiak Island. Sally, the largest island, tops out at 1,000 feet. Most of the other islands are low and rolling,. The dominant vegetation on Sally, Sheep, and most other islands is alder brush with some cottonwoods and birch. Deer, eagle, red fox, and snowshoe hare are found on most of the islands. Brown bear are found on Sally Island and occasionally visit the smaller islands. Gulls and eider nest on the small islets.

1. Size - Sally Island - 1,560 acres, Sheep Island - 80 acres, Noisy Island - 40 acres, Village Island - 55 acres, Green Island and islets - 95 acres, and unnamed islands and islets - 55 acres.
2. Land ownership - The islands are in federal ownership and have not been selected.
3. Natural integrity - Nothing has been known to have affected the natural systems of the islands. Grazing has occurred on some of the Green Islands and an islet in East Arm but it is not known if the plant communities have been altered.
4. Apparent naturalness - An abandoned cabin and docks are located on Sheep Island. The cabin is not noticeable and does not affect the naturalness of the remainder of the island. A Coast Guard light is located on the west shore of Noisy Island. It affects the immediate area but is not visible from the rest of the island. A house and several outbuildings, which are occupied most of the year, are located on Village Island. A cabin occupied in summer is located on the island south of Noisy. These cabins do affect the naturalness of those islands. There are no known signs of human activity on the other islands.
5. Outstanding opportunities for solitude - A closed cannery is located about one mile across the arm from Sally Island. Should the cannery start up again, some people may visit these islands. Several cabins, which are occupied at least part of the year, are located in the vicinity of Village and Green islands and islets. These people may visit the islands occasionally and boats would be frequently seen and heard. However, it is unlikely that a visitor to the islands would encounter anyone else. Solitude is outstanding except on the Village islands.
6. Outstanding opportunities for primitive recreation - Hunting, camping, clam digging, sea kayaking, and photography are possible on these islands. The quality of these activities is limited by the small size of most of the islands. Sally is larger but lacks outstanding features or resources. Recreational opportunities on these islands are good but not outstanding.
7. Special or unique features - There are no known special features.
8. Outstanding resource values - Resource values are not outstanding.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - All of these islands except for Village Island and the unnamed island south of Noisy meet the wilderness criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. They do not meet the Service's criterion of outstanding resource values and are not adjacent to an existing wilderness area.

Afognak Island group - Grassy, Alligator, Rocky, Sea Otter, and Dark islands and Sealion and Latax rocks - Grassy, Alligator, and Rocky islands are located within one-half to three miles of the northwest shore of Afognak Island. Grassy is a group of small islets which are home to 200 tufted puffins, 20 glaucous-winged gulls, 10 cormorants and probably some nocturnal nesting birds. Vegetation is limited to grasses and low shrubs on Grassy, Alligator, and Rocky. Seals and sea lions haul out on reefs and rocks near all these islands.

Sea Otter Island is a grassy, treeless island east of Shuyak Island. A four acre pond in the center of the island provides nesting habitat for teal, mallard, gadwall, and merganser. An unknown number of nocturnal seabirds nest on the island as well as 3,000 diurnal seabirds including tufted puffin, horned puffin, parakeet auklet, pelagic cormorant, and glaucous-winged gull. About 30 northern sea lions have been observed hauled out on the island and sea otters and harbor seals are also common in the area. Brown bear occasionally swim out to the island to feed on the bird colonies.

Dark Island is northeast of Shuyak Island. Teal, mallard, merganser, and red-throated loon nest on the two ponds on the island. Three hundred mew gulls, bald eagles, tufted puffins, pigeon guillemots, and parakeet auklets also nest on the island. Bears frequent the island to raid bird nests.

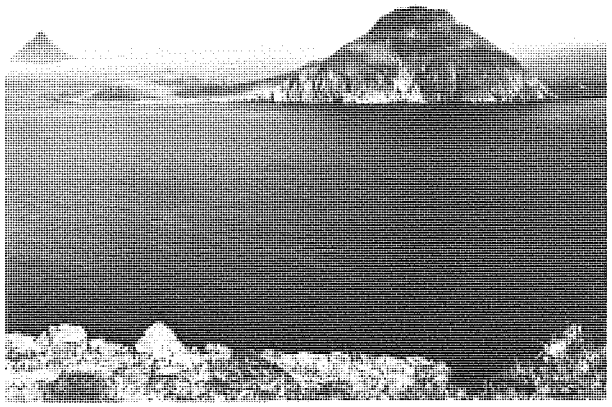
Latax Rocks are located a few miles north of Shuyak Island. This group includes rocks, reefs, and islets the largest of which is eight acres in size with a peak elevation of 32 feet. The rocks are an important marine mammal area. Harbor seals, sea otters, and 5,400 northern sea lions haul out on the rocks. Some sea lions also pup there. About 1,000 seabirds nest on the rocks including black-legged kittiwakes, black oystercatchers, pigeon guillemots, tufted puffins, horned puffins, and parakeet auklets (Bailey, 1983).

Sealion Rock is located east of Afognak Island. Glaucous-winged gulls and at least 2,000 black-legged kittiwakes nest on the rocks.

1. Size - Grassy Island - 10 acres; Alligator Island - 20 acres; Rocky Island - 5 acres; Sealion Rocks - 5 acres; Sea Otter Island - 45 acres; Latax Rocks - 20 acres; and Dark Island - 200 acres.
2. Land ownership - The islands are all believed to be in federal ownership and have not been selected.
3. Natural integrity - Fox were introduced to Dark Island but have since died out. Ground squirrels, which were also introduced but have not died out, have undoubtedly reduced the populations of ground nesting birds on Dark Island. Nothing has been known to affect the natural systems of the other islands and rocks.
4. Apparent naturalness - A deteriorating cabin is located on Dark Island. It is not obvious and does not affect the naturalness of the island. A channel marker is located on Alligator Island. There are no other known signs of human activity on the islands.
5. Outstanding opportunities for solitude - All of these islands are located in remote areas. It is unlikely that a visitor would encounter anyone else on these islands. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Camping is possible on the islands but not on the rocks. Dark Island and all of the islets on the northwest side of Afognak would be suitable for sea kayaking. Bird watching and marine mammal observation would be enjoyable in many areas. However, the islands all either lack diverse features or are too small to offer outstanding opportunities for recreation.
7. Special or unique features - The sea lion colony on Latax Rocks is a unique feature.
8. Outstanding resource values - Only Latax Rocks has outstanding resource values. The sea lion haul-out and pupping area is significant particularly because of the recent and dramatic decline in sea lion populations.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - All of the islands meet the wilderness criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. Latax Rocks also meets the optional special features criterion and the Service's criterion of outstanding resource values. None of the islands are adjacent to an existing wilderness area.

Barren Islands - Carl, Sugarloaf, Sud, and Nord islands - The Barren Islands are located between Afognak Island and the Kenai Peninsula, 60 miles south of Homer. The three largest Barrens, Ushagat, West Amatuli, and East Amatuli islands have been selected. The three selected islands have outstanding wilderness values including impressive aggregations of seabirds - more than a quarter million birds on East Amatuli, waterfowl, marine mammals, salmon



Sud Island and Sugarloaf (in the distance) are two of the Barren Islands which are proposed for wilderness designation. Ten thousand seabirds nest on Sud and 30,000 on Sugarloaf. Sugarloaf also has the second largest sea lion rookery in the Gulf of Alaska.

streams, and dramatic scenery including long sand beaches, cliffs, lakes, and mountains. Should these selections be relinquished, Ushagat, West Amatuli, and East Amatuli should be included in a wilderness proposal for the Barrens.

Carl, Sugarloaf, Sud, and Nord islands are small, steep and rocky with good cliff nesting habitat. Sugarloaf and Sud islands have gravel beaches. Vegetation is similar to Kodiak, primarily grasses and crowberry with no trees. Carl Island, the smallest of the four, has about 1,000 seabirds principally tufted puffins, red-faced cormorants, and horned puffins. About 400 sea lions have been observed hauled out on the island.

Sugarloaf has the second largest sea lion rookery in the Gulf of Alaska: 8,000 animals in 1986 down from 12,000 animals in 1976 (refuge files). Northern fur seals also stop at the island during migration. About 30,000 seabirds nest on Sugarloaf including 10,000 fork-tailed storm-petrels, 8,000 tufted puffins, 300 glaucous-winged gulls, and lesser numbers of pigeon guillemots, black oystercatchers, and cormorants.

There are about 10,000 seabirds on Sud Island including 1,500 rhinoceros auklets, fork-tailed storm-petrels, glaucous-winged gulls, tufted puffins, horned puffins, and parakeet auklets. Harbor seals are found along the coastline.

Nord Island has the largest black-legged kittiwake colony in the Barrens with 30,000 birds. About 30,000 other seabirds nest on Nord mainly murres with lesser numbers of tufted puffins.

1. Size - Carl is 30 acres, Sugarloaf is 180 acres, Sud is 300 acres, and Nord is 85 acres.
2. Land ownership - Carl, Sugarloaf, Sud, and Nord are in federal ownership and have not been selected.
3. Natural integrity - Marmots were introduced to Sud Island but they do not seem to significantly affect the populations of ground nesting birds. Otherwise nothing has affected the natural systems of these islands.
4. Apparent naturalness - A small 10 by 10 foot foldable cabin is located on Sugarloaf Island. The cabin was used to monitor marine mammal harvest for about 10 years. It does not affect the natural appearance of the island. Remnants of a concrete bunker from World War II can be seen from the air on the top of Sud Island. It affects the naturalness of the immediate area but cannot be seen from anywhere else on the island. There are no other known signs of human activity on these islands. They appear natural.
5. Outstanding opportunities for solitude - These islands are rarely visited. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - All of these islands can be landed on and camped on except for Nord Island. A charter boat operator and a helicopter flight-seeing operator have had permits to operate in the Barrens. They are also viewed from the ferry which runs from Homer to Kodiak twice a week during summer. It is likely that sightseeing use of these islands will increase as a result of the phenomenal growth of the Homer tourist industry in spite of the bad weather and

rough seas which have been limiting factors so far. These four islands have outstanding opportunities for bird watching and marine mammal observation and photography. Overall, primitive recreation opportunities are outstanding.

7. Special or unique features - The sea lion rookery on Sugarloaf and haul-out on Carl are unique features. This rookery is particularly important because sea lions are declining precipitously on this rookery and throughout their range. The large size of the kittiwake colony on Nord Island and the total number of seabirds on such small islands are also significant features.
8. Outstanding resource values - These islands have outstanding resource values due to the special features described above.
9. Existing wilderness boundary adjustment - Not applicable.

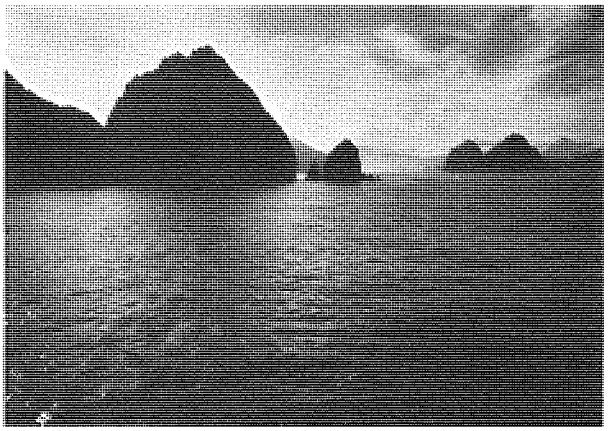
Conclusion - The Barren Islands meet the wilderness criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. They also have special features which is an optional criterion and meet the Service's criterion of outstanding resource values. They are not adjacent to any existing wilderness areas.

Pye Islands - Pye Reef, Outer, and Rabbit islands - The Pye Islands are located less than a mile south of the Kenai Peninsula east of Nuka Bay. Ragged Island, the largest of the Pyes, also meets wilderness criteria, but half of it has been Native selected. Should this selection be relinquished, it should be considered for inclusion in any wilderness proposal for the Pye Islands.

With the exception of wave-washed, Pye Reef, the Pyes are steep and heavily wooded with Sitka spruce. Outer Island has the largest seabird population with about 8,000 diurnal birds and a greater number of nocturnal birds. Principle species are fork-tailed storm-petrel, Kittlitz's murrelet, marbled murrelet, glaucous-winged gull, and black-legged kittiwake. The sea lion rookery on Outer is the largest on the south side of the Kenai Peninsula, 913 pups were counted in 1986 (Calkins 1986). Rabbit Island has eagles, river otters, and about 50 puffins and cormorants.

1. Size - Pye Reef is about five acres, Outer is 800 acres, and Rabbit is 900 acres.
2. Land ownership - These islands are all in federal ownership and have not been selected.
3. Natural integrity - Nothing has affected the natural systems of the islands.
4. Apparent naturalness - A World War II observation site is located at the top of Outer Island above the 1,000 foot level. Remnants of a rail track, a wood stairway, and a 100 person barrack are concealed in the trees. These ruins cannot be seen for more than 100 yards and have no affect on the natural appearance of the remainder of the island. There are no known signs of human activity on the other islands. The islands appear natural.
5. Outstanding opportunities for solitude - These islands are rarely visited. The dense forest cover would screen visitors from each other. Solitude is outstanding.
6. Outstanding opportunities for primitive recreation - Bird watching, sea kayaking, marine mammal observation, camping, and photography are all possible on or around these islands. Views of the Kenai Mountains across Nuka Bay are spectacular. Recreational opportunities are outstanding.
7. Special or unique features - The sea lion rookery on Outer Island is a unique feature. This rookery is particularly important because sea lion pupping seems to be increasing on this rookery (400 pups in 1976 and 913 in 1986 [Calkins 1986]) although they are declining elsewhere in their range.
8. Outstanding resource values - Outer Island has outstanding resource values because of its sea lion rookery.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - The Pye Islands meet the wilderness criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. Outer Island also meets the optional special features criterion and the Service's criterion of outstanding resource values. The islands are not adjacent to any existing wilderness area.



All but two of the Chiswell Islands, a total of 3,480 acres, are proposed for wilderness designation in the Services' preferred management alternative. These are some of the only islands in Alaska where mammalian predators were never introduced.

Chiswell Islands - Granite, Twin, Dora, Harbor, Natoa, Beehive, Matushka, Chiswell, Lone Rock, Seal Rocks, Chat, Cheval and unnamed islands - The entire Chiswell Island group is under consideration for wilderness except for Rugged Island and Pilot Rock which have been selected. The Chiswells are a rugged group of small mountainous islands, sea stacks, rock spires, and reefs located off-shore of Kenai Fjords National Park between Harris Bay and Resurrection Bay. During the summer, several tour boats a day visit the islands from Seward, only 35 miles away.

These islands have always been sanctuaries for seabirds and marine mammals, because there are no native or introduced mammalian predators. About 73,000 seabirds nest in the Chiswells with the greatest concentrations on Beehive Islands - 35,000 birds, Matushka Island, and Natoa Island. Principle species include one of the largest and northernmost colonies of rhinoceros auklets, parakeet auklets, the easternmost colony of fulmars, fork-tailed storm-petrels, double-crested, pelagic, and red-faced cormorants, tufted and horned puffins, marbled murrelets, murres, black-legged kittiwakes, and glaucous-winged gulls. Bald eagles nest on several of the islands. Sea lions haul out on at least four of the islands and pup on Chiswell Island.

1. Size - The islands under consideration for wilderness total 3,480 acres. Individual island acreages are as follows: Granite - 1,560, Twin - 185 acres, Dora - 50 acres, Harbor - 670 acres; Natoa - 270 acres, Beehive - 20 acres, Matushka - 200 acres, Chiswell - 15 acres, Lone Rock - 5 acres, Seal Rocks - 15 acres, Chat - 100 acres, and Cheval - 190 acres.
2. Land ownership - The islands under consideration are in federal ownership and have not been selected. Rugged Island and Pilot Rock have been selected.
3. Natural integrity - Nothing has affected the natural integrity of the islands.
4. Apparent naturalness - There are no known signs of human activity on the islands.
5. Outstanding opportunities for solitude - Chiswell, the Beehives, Cheval, and some of the other islands on the east end are visited by several tour boats a day during the summer in good weather. Recreational and fishing boats also frequent these islands. However, few people land on the islands. Solitude opportunities remain outstanding.
6. Outstanding opportunities for primitive recreation - Bird watching, marine mammal observation, photography, and sea kayaking would all be outstanding activities on these islands. Some, such as Granite, have excellent camping opportunities but others are impossible to land on. The islands have numerous scenic features including sea stacks, rock spires, bird cliffs, and the sheer granite walls of Taz Basin on Granite Island. In addition, views of the fjords, glaciers, and peaks of nearby Kenai Fjords National Park are spectacular. Due to the rapid growth of the tour boat business in Seward, the Chiswells have the most visited marine mammal site and one of the most visited seabird colonies in the state. Interpretive opportunities are outstanding. Overall, primitive recreational opportunities are outstanding.
7. Special or unique features - The sea lion rookery, the rhinoceros auklet colony, the fulmar colony, and the granitic walls of Taz Basin are all unique features.

8. Outstanding resource values - The Chiswell Islands have outstanding resource values due to the special features described above. In addition, they provide a rare opportunity to interpret seabirds and marine mammals to a large audience.
9. Existing wilderness boundary adjustment - Not applicable.

Conclusion - The Chiswell Islands meet the wilderness criteria of size, naturalness, and outstanding opportunities for solitude or primitive recreation. They also meet the optional special features criterion and the Service's criterion of outstanding resource values. The islands are not adjacent to any existing wilderness area.

MANAGEMENT ALTERNATIVES

This chapter consists of three parts: 1) a description of the management categories that make up each alternative; 2) a description of the management directions common to all of the alternatives; and 3) a description of the alternatives themselves. In addition, this chapter identifies areas that the Service recommends as suitable for wilderness designation under each of the management alternatives. All of these sections form the core of the draft Alaska Maritime Refuge Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review.

MANAGEMENT CATEGORIES

According to the Alaska National Interest Lands Conservation Act (Alaska Lands Act) the comprehensive plan for Alaska Maritime Refuge must: (1) designate areas within the refuge according to their respective resources and values, (2) specify management programs to conserve fish and wildlife resources in each area, and (3) specify uses within each area that may be compatible with refuge purposes. Comprehensive planning must also comply with the National Environmental Policy Act, which requires that reasonable alternatives be considered.

To develop management alternatives that meet the requirements of the Alaska Lands Act, four management categories, ranging from designated wilderness to intensive management, were identified for Alaska Maritime Refuge. A management category is a set of refuge management directions applied to an area in light of its resources and existing and potential uses to facilitate management and accomplish refuge purposes. Each alternative is composed of a different mosaic of land and water areas in the different management categories. Table 34 describes what management activities, public uses and economic uses would be permitted in each management category on land. Table 35 describes what activities would be permitted in each management category in a marine environment including tidelands, submerged lands, and the water column.

It may be helpful to think of these categories as indicative of levels of development rather than levels of management. For example, "intensive management" potentially permits a variety of high impact development activities, rather than indicating areas of prime importance for wildlife. Similarly "minimal management" allows little human development of important habitat.

The management categories used in developing management alternatives for Alaska Maritime Refuge are described below.

Intensive Management (I)

This least protective category encompasses areas that have a potential public or economic use and require an intensive management effort. Most refuge lands with this management designation on Alaska Maritime Refuge are military installations. Regulated hunting, fishing and trapping are permitted. Fisheries development, which may include habitat modification or fish stocking for the purpose of managing or restoring fish populations, is permitted.

Timber may be managed for commercial harvest on Delphin and Discoverer Islands. Administrative facilities are allowed in this category. Oil and gas studies may be permitted subject to site-specific compatibility determinations. Oil and gas leasing may be permitted subject to an assessment of potential, a national interest determination, and a compatibility determination. Refuge lands managed in this category may be available for sand and gravel extraction, subject to site-specific compatibility determinations and stipulations to avoid all significant impacts to fish and wildlife. Traditional motorized access is permitted for traditional activities.

In marine environments, effluent discharge, floating seafood processors, and mariculture may be permitted in intensive management areas subject to the provisions of applicable law, the National Environmental Policy Act, and a compatibility determination. Floating structures and navigation aids may be permitted. Docks will be permitted subject to the provisions of section 1110 of the Alaska Lands Act. Log transfer facilities and piers

may be permitted subject to the provisions of section 1110 of the Alaska Lands Act.

Moderate Management (II)

This category reduces the extent of allowable human developments from that permitted in intensive management, while maintaining or restoring fish and wildlife populations in areas that receive public pressure. Most refuge lands with this management designation on Alaska Maritime Refuge buffer military installations. Regulated hunting, fishing, and trapping are permitted. Sand and gravel extraction is prohibited. Refuge lands in this category will not have interpretive facilities. Habitat management is permitted on a site-specific basis to restore target wildlife habitat. Fisheries development, which may include habitat modification or fish stocking for the purpose of managing or restoring fish populations, is permitted. Management for commercial timber harvest may be permitted under this category. Oil and gas studies may be permitted subject to site-specific compatibility determinations. Oil and gas leasing may be permitted subject to an assessment of potential, a national interest determination, and a compatibility determination. Traditional motorized access is permitted for traditional activities.

In marine environments, effluent discharge, floating seafood processors, and mariculture may be permitted subject to the provisions of applicable law, the National Environmental Policy Act, and a compatibility determination. Because of the effect of "finfish farming" on the quality of water and bottom life, this type of mariculture may not be compatible in all moderate management areas of the refuge. Floating structures and navigation aids may be permitted. Docks will be permitted subject to the provisions of section 1110 of the Alaska Lands Act. Log transfer facilities and piers may be permitted subject to the provisions of section 1110 of the Alaska Lands Act.

Minimal Management (III)

Management under this category is directed at protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels. No facilities such as visitor centers are to be built and public programs are kept to a minimum. Natural fish and wildlife population dynamics and habitats are emphasized although eradication of introduced predators and rodents, fishery development, and regulated hunting, fishing, and trapping are allowed. Management for commercial timber harvest will not occur under this category. Management activities will focus on biological monitoring, eradication of introduced predators and rodents, and research and regulation. Oil and gas studies may be permitted subject to site-specific compatibility determinations. Oil and gas leasing is not permitted. Traditional motorized access is permitted for traditional activities.

In marine environments, floating seafood processors, mariculture, and effluent discharge are not permitted. Floating structures and navigation aids may be permitted. Docks will be permitted subject to the provisions of section 1110 of the Alaska Lands Act. Log transfer facilities and piers may be permitted subject to the provisions of section 1110 of the Alaska Lands Act.

Designated Wilderness (IV)

Approximately 56 percent of the Alaska Maritime Refuge is now congressionally designated wilderness. These lands, and any additional lands designated by Congress, will be managed as outlined in Table 36 later in this chapter. The designated wilderness category is similar to the minimal management category for permitted administrative and public uses. Differences occur in the use of motorized equipment, oil and gas policy, commercial uses, and requirements for routing transportation or utility systems.

The use of motorized equipment in wilderness areas is governed by the Wilderness Act, the Alaska Lands Act, and 50 CFR 35.5. Generally, motorized equipment is prohibited by the Wilderness Act. The Alaska Lands Act makes exceptions for snow machines, motorboats, and airplanes in section 1110(a). In addition, section 811 allows for subsistence use of other means of surface transportation traditionally employed for such purposes, subject to reasonable regulation. Regional policy allows rural residents engaged in subsistence activities to use chainsaws, but other motorized equipment is not allowed.

Oil and gas leasing is not allowed in wilderness areas. Oil and gas studies involving mechanized equipment are not permitted in wilderness except when conducted by or for a Department of the Interior agency under the provisions of section 1010 of the Alaska Lands Act. Transportation or utility system route proposals would require presidential concurrence and congressional approval.

In marine environments, commercial fishing is not permitted. Mariculture, seafood processors, and effluent discharge are not permitted. The submerged lands surrounding the Semidi Islands and the water column and tidelands surrounding Simeonof Island are already congressionally designated wilderness. No additional marine environments are proposed for wilderness designation in any alternative in the plan.

The minimal management category can be changed in future plan revisions; wilderness, once designated by Congress, can only be altered by Congress.

COMMON MANAGEMENT DIRECTIONS FOR ALL ALTERNATIVES

The National Wildlife Refuge Administration Act, the Alaska Lands Act and several other laws, treaties and regulations govern administration of national wildlife refuges in Alaska. Regardless of which alternative is selected, management of the Alaska Maritime Refuge will comply with these laws and regulations. As a result the alternatives share a set of common management directions described below.

Cooperation with other Government Agencies

The Service will continue to work closely with other federal, state, and local agencies whose programs affect or are affected by the Alaska Maritime Refuge. Examples of cooperative efforts include fire management, water quality management, law enforcement, search and rescue, fish and wildlife management, land exchange, land management, management of tidelands, submerged lands, and water columns, identification and preservation of cultural resources, construction and maintenance of administrative facilities, and provision of public facilities such as a visitor contact station. Whenever possible, the Service will share equipment and vessel costs, conduct joint wildlife surveys, exchange data, and conduct research to meet mutual management needs.

The Service and the state of Alaska will cooperatively manage the fish and wildlife resources of the Alaska Maritime Refuge. A Memorandum of Understanding between the Service and the Alaska Department of Fish and Game defines the cooperative management roles of each agency (Appendix F). The Department of the Interior, Fish and Wildlife Policy: State and Federal Relationships (43 CFR 24) further addresses intergovernmental cooperation in the protection, use, and management of fish and wildlife resources. Other possible topics for cooperative management agreements with the state include Revised Statute (R.S.) 2477 rights of way, navigable waters, and submerged lands. The closely related responsibilities of protecting habitat and wildlife utilization require close cooperation of the Alaska Department of Fish and Game, the Service, and all resource users.

The Service believes management of the commercial fisheries of the Karluk, Afognak, and Womens Bay marine areas is adequately covered by the existing Memorandum of Understanding with the Alaska Department of Fish and Game (Appendix F). Since the state has already developed the policies and procedures for managing these activities the Service would like to use their expertise to continue management of these areas. The Service would like to develop stepdown management plans for these areas that would include input from the various local and state governments, as user pressures increase.

The Service will cooperate with regional and local advisory councils to provide resource information and resolve user conflicts.

Cooperation with Existing Military Installations

The U.S. Navy has a Naval Air Station at Adak Island and radar facilities on Amchitka Island, the U.S. Air Force has a base at Shemya Island and a small facility at Cape Lisburne, and the U.S. Coast Guard has a LORAN station at Attu Island. All sites are located on refuge land, except the Air Force facility at Cape Lisburne. Public Land Orders and/or Memorandums of Understanding as to management of these lands

Table 34. Management activities, public uses, and economic uses permitted in management categories.

MANAGEMENT CATEGORY	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Designated Wilderness (IV)
HABITAT/POPULATION MANAGEMENT ACTIVITIES				
Research and Management Studies Collection of data necessary for refuge management decisions or to further science. Priority will be given to studies that contribute to the conservation and management of native fish and wildlife populations and their habitats. Studies may be conducted by the Service, ADF&G, or by other researchers in cooperation with the Service.	Will be routinely practiced as long as the studies do not conflict with refuge purposes	Same as (I)	Same as (I)	Same as (I)
Ecological Monitoring Activities or studies that address how fish and wildlife and their habitats are changing, due to either natural or human causes.	Will be routinely practiced	Same as (I)	Same as (I)	Same as (I)
Fish and Wildlife Inventories Using acceptable management techniques to obtain information on species distributions, habitats, and population dynamics to meet refuge objectives.	Will be routinely practiced	Same as (I)	Same as (I)	Same as (I)
Marking and Banding To contribute information on population trends, survival, and movements necessary for the overall management of the species. Cooperation with ADF&G and other institutions will be stressed.	Will be routinely practiced as long as the activities do not conflict with refuge purposes	Same as (I)	Same as (I)	Same as (I)
Habitat Improvement				
Mechanical manipulation including activities such as large scale tree crushing and water impoundments, diversions, etc.	May be permitted on a case by case basis subject to provisions of NEPA and a compatibility statement	Same as (I)	May be considered subject to appropriate plan revision	Not permitted
Prescribed burning.	May be permitted on a case by case basis subject to provisions of NEPA, a compatibility determination, and an approved fire management plan	Same as (I)	Same as (I)	Same as (I)
Minor habitat improvements including nesting devices, temporary actions to protect habitat, beaver dam removal, etc.	May be permitted subject to provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I), subject to the minimum tool concept
Timber Management A way of maintaining a sustained yield for long-range subsistence needs, for house logs and firewood. May entail designation of areas for cutting and the issue of special use permits.	May be permitted, subject to reasonable regulations	Same as (I)	Same as (I)	Same as (I)
Exotic Wildlife Species Introduction Introduction of species not native to North America.	Not permitted	Same as (I)	Same as (I)	Same as (I)
Native Wildlife Species Introduction Introduction of species native to North America outside their original range.	May be permitted on a case by case basis	Same as (I)	Same as (I)	Same as (I)

Table 34. Management activities, public uses, and economic uses permitted in management categories continued.

MANAGEMENT CATEGORY	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Designated Wilderness (IV)
HABITAT/POPULATION MANAGEMENT ACTIVITIES CONT.				
Wildlife Stocking Re-establishing, augmenting, or maintaining native species within their original breeding range. Specific policies apply for various wildlife groups.	May be permitted	Same as (I)	Same as (I)	Same as (I)
Predator Control Relocation or removal of predators to favor other wildlife populations or to protect reintroduced, threatened, or endangered species.	May be permitted on a case by case basis subject to the provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I)
Pest Control Relocation or removal of organisms that threaten human health and property or survival of native fish and wildlife species.	Normally will not occur except to control exotic species; native species may be controlled where severe resource danger is likely or where public health or safety is jeopardized	Same as (I)	Same as (I)	Same as (I)
Disease Prevention and Control Management practices directed at controlling pathogens that threaten fish, wildlife, and people. Includes rabies and parasite control.	Normally will not occur except where severe resource damage is likely or where public health and safety is jeopardized	Same as (I)	Same as (I)	Same as (I)
Fire Management Prescribed burning and actions taken to suppress wildfires, in accordance with refuge's fire management plan.	Natural fires may be permitted to burn, except where they threaten human life and property or reach excessive size; prescribed burning will be used for hazardous fuel reduction or restoration of natural vegetation patterns	Same as (I)	Same as (I)	Same as (I)
Water Quality and Quantity Monitoring of water quality and quantity to enable the Service to propose mitigation of adverse effects that originate on or off the refuge.	Will be routinely practiced	Same as (I)	Same as (I)	Same as (I)
Administrative Facilities Primitive structures built for administrative use, primarily to to facilitate field work logistics. Available for emergency use by public.	Permitted	Same as (I)	Same as (I)	May be built if needed for the protection of public health and safety
FISHERIES DEVELOPMENT[1]				
Collection of data and information on fish populations and their habitats, modification of fish habitat, fish hatchery programs and related activities, fishery regulation, supplemental production, and other activities designed to accomplish management goals and objectives.				

Table 34. Management activities, public uses, and economic uses permitted in management categories continued

MANAGEMENT CATEGORY	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Designated Wilderness (IV)
HABITAT/POPULATION MANAGEMENT ACTIVITIES (FISHERIES DEVELOPMENT CONT.)				
Fish Passes The construction or installation of a fish ladder, removal of a barrier (e.g., beaver dam), or other activity to enable fish to get past a natural or man-made barrier and reach inaccessible habitat; the fish pass may be either temporary or permanent.	May be permitted on a case by case basis subject to the provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I) except permanent facilities will normally not be permitted
Fish Weirs The construction and installation of an instream fish counting facility. Weirs may be either permanent or temporary. Permanent weirs have a permanent instream anchoring device while temporary weirs do not. The above water structure for both types of weirs would be removed after the season of use.	May be permitted on a case by case basis subject to the provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I) except permanent facilities will normally not be permitted
Spawning Channels The construction and maintenance of an artificial gravel laden channel where water quality and quantity is controlled to facilitate spawning by fish.	May be permitted on a case by case basis subject to the provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I) except permanent facilities will normally not be permitted
Physical Habitat Modifications Activities designed to physically modify aquatic habitats, for the purpose of affecting production of a target fish species, such as bank stabilization or installation of instream structures. The change may be either temporary or permanent.	May be permitted on a case by case basis subject to the provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I) except permanent facilities will normally not be permitted
Native Fish Reintroductions Reintroduction of native species for the purpose of re-establishing historic populations.	May be permitted	Same as (I)	Same as (I)	Same as (I)
Native Fish Introductions Introduction of fish species native to North America outside of their original range.	May be permitted on a case by case basis	Same as (I)	Same as (I)	Same as (I)
Exotic Fish Introductions Introduction of species not native to North America.	Not permitted	Same as (I)	Same as (I)	Same as (I)
Fish Hatcheries The construction and operation of required facilities for incubation of fish eggs and/or rearing of fish fry, fingerlings, or smolts. A fish hatchery can be either permanent or temporary. A permanent fish hatchery could be operated either seasonally or year-round and would be permanently maintained. A temporary fish hatchery would be operated seasonally and is project related (removed when project is completed).	May be permitted on a case by case basis subject to the provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I) except permanent facilities will normally not be permitted
Fish Rearing Pond The use of natural ponds for rearing fry or fingerling fish to a larger size.	May be permitted on a case by case basis subject to the provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I)

Table 34. Management activities, public uses, and economic uses permitted in management categories continued.

MANAGEMENT CATEGORY	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Designated Wilderness (IV)
HABITAT/POPULATION MANAGEMENT ACTIVITIES (FISHERIES DEVELOPMENT CONT.)				
Supplemental Fish Production Planting fertilized or eyed eggs, fed or unfed fry, fingerlings, presmolts, or smolts, which have been incubated, hatched, fed, and/or reared at a hatchery or temporary rearing facility and are subsequently introduced into the species' natural environment.	May be permitted on a case by case basis subject to the provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I)
Fish Egg Taking Site Installation and operation of a temporary facility that uses adult spawning fish to take eggs for the establishment of a brood stock or for use in supplemental production. Both the facilities and activities would be on an "as needed" basis.	May be permitted on a case by case basis subject to the provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I)
Chemical Habitat Modification Introduction of either organic or inorganic chemicals on an annual or temporary basis to an aquatic environment to control the production of a target fish species.	May be permitted on a case by case basis subject to the provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I)
Predator/Competitor Control Removing or reducing predator and/or competitor fish species for the purpose of controlling the production of a target fish species.	May be permitted on a case by case basis subject to the provisions of NEPA and a compatibility determination	Same as (I)	Same as (I)	Same as (I)
SUBSISTENCE				
Fishing, Hunting, Trapping, and Berry Picking The taking of fish and wildlife and other natural resources for personal consumption, or as provided by law. Allows use of traditionally used camping areas.	Permitted subject to reasonable regulation	Same as (I)	Same as (I)	Same as (I)
Access Use of snowmobiles, motorboats, and other means of surface transportation traditionally employed for subsistence purposes.	Permitted subject to reasonable regulation and the provisions of ANILCA 811	Same as (I)	Same as (I)	Same as (I)
House Log and Firewood Collection Collection for personal or extended family use.	Permitted subject to reasonable regulation	Same as (I)	Same as (I)	Same as (I)
Cabins (Private) Small, primitive structures necessary for health and safety and necessary to provide for continuation of ongoing subsistence activity; not for recreational use.	May be built under a special-use permit	Same as (I)	Same as (I)	Same as (I)
PUBLIC ACCESS (restrictions subject to provisions of ANILCA 1110; access for subsistence purposes [ANILCA 811] is discussed in SUBSISTENCE above)				
Nonmotorized Access Access by foot, dogsled, kayaks, rafts, etc. on waterways, trails, and crosscountry.	Permitted; access may be restricted at certain times for resource protection or public safety	Same as (I)	Same as (I)	Same as (I)

Table 34. Management activities, public uses, and economic uses permitted in management categories continue

MANAGEMENT CATEGORY	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Designated Wilderness (IV)
PUBLIC USES				
Pack Animals Surface transportation using domestic dogs, horses, and other pack or saddle animals.	Permitted for traditional activities, subject to reasonable regulation (50 CFR 36.21b)	Same as (I)	Same as (I)	Same as (I)
Motorboats Includes in-board and out-board power boats and jet boats that provide access to the refuge. Excludes air boats and air-cushion vehicles.	Permitted for traditional activities, subject to reasonable regulation	Same as (I)	Same as (I)	Same as (I)
Airplanes Includes all fixed-wing planes that provide access to the refuge.	Permitted for traditional activities, subject to reasonable regulation	Same as (I)	Same as (I)	Same as (I)
Helicopters All rotary-wing aircraft that provide access to the refuge.	Permitted only by special use permit	Same as (I)	Same as (I)	Same as (I)
Snowmobiles All snowmachines weighing under 1000 pounds and with an overall width of less than 46 inches, driven by tracks or skis in contact with the snow and steered by a ski or skis in contact with the snow.	Permitted for traditional activities on or off designated trails, in periods of adequate snow cover, subject to reasonable regulation	Same as (I)	Same as (I)	Same as (I)
Other Motorized Vehicles Includes all other motorized vehicles (e.g., cars, 4x4's, tracked vehicles, off-road vehicles, airboats, and air-cushion vehicles).	Permitted only on designated routes or areas; airboats and air-cushion vehicles not permitted	Same as (I)	Same as (I)	Not permitted per 43 CFR 36.11(g)(2)
Hunting, Fishing, Trapping Forms of outdoor recreation and fish and wildlife population control.	Permitted; pertinent state and federal regulations apply	Same as (I)	Same as (I)	Same as (I)
Primitive Camping Sites selected by users to pitch tents overnight. The Service will not maintain or improve these sites.	Permitted	Same as (I)	Same as (I)	Same as (I)
Wildlife Observation Wildlife, wildlife habitat, and landscape features viewed and enjoyed in their natural setting. Includes photography and bird watching.	Permitted	Same as (I)	Same as (I)	Same as (I)
Interpretation and Environmental Education To broaden public awareness and appreciation of fish and wildlife resources and their habitats, cultural resources, and resource management practices. To inspire visitors to further their own comprehension of wildlife habitat and resource issues as they relate to society's needs and to foster wildlife and wildland stewardship.	Interpretive materials and facilities may be provided, including posted nature trails, wildlife/wildland facilities, and wildlife displays	Interpretive materials may be provided; other facilities not provided	Same as (II)	Same as (II)

Table 34. Management activities, public uses, and economic uses permitted in management categories continued.

MANAGEMENT CATEGORY	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Designated Wilderness (IV)
PUBLIC FACILITIES				
Improved Campsites Permanent sites that may include fire rings, shelters, and sanitary facilities.	May be provided if needed to confine resource degradation	Same as (I)	Same as (I)	Same as (I)
Visitor Contact Facilities A variety of staffed and unstaffed structures where the public can obtain information on the refuge and its resources.	May be provided	Not permitted	Same as (II)	Same as (II)
Boat Launch Sites Designated access sites where boats can be put into lakes and rivers. Sites may vary from simple clearings to permanent ramps.	May be permitted	Same as (I)	No permanent sites permitted	Same as (III)
Foot Trails Designated routes restricted to walking. Not cleared or maintained	May be provided	Same as (I)	Same as (I)	Same as (I)
Roads Designated, maintained corridors that provide access for motorized vehicles. Includes cleared strips, gravel roads, and asphalt roads.	Not provided; may be permitted subject to Title XI of ANILCA	Same as (I)	Not permitted except subject to Title XI of ANILCA	Same as (III)
Airstrips Designated sites that provide access for aircraft.	Primitive airstrips may be designated; no new construction allowed subject to Title XI of ANILCA	Same as (I)	Same as (I)	Same as (I)
Navigation Aids/Remote Weather Stations Includes air and water navigation aids, facilities for national defense, and facilities for weather, climate, and fisheries research and monitoring.	Permitted on a site-specific basis subject to reasonable regulation	Same as (I)	Same as (I)	Same as (I)
Other Temporary Facilities[1] Establishment and use of tent platforms, shelters, and other temporary facilities and equipment directly related to the taking of fish and wildlife.	May be permitted under the provisions of ANILCA 1316; a special use permit may be required per 50 CFR 27.92	Same as (I)	Same as (I)	Same as (I)
ECONOMIC USES				
Surface Geology Studies Includes surface rock collecting and geological mapping activities (includes helicopter or fixed-wing access).	May be permitted subject to refuge special use permit conditions	Same as (I)	Same as (I)	Same as (I)
Core Sampling Helicopter-transported motorized drill rig (does not include drilling of exploratory wells).	May be permitted subject to refuge special use permit conditions	Same as (I)	Same as (I)	Not permitted unless conducted by or for a DOI agency under ANILCA 1010(g)
Seismic (Geophysical) Studies Usually involves mechanized surface transportation, but may be helicopter supported.	May be permitted subject to refuge special use permit conditions	Same as (I)	Same as (I)	Not permitted unless conducted by or for a DOI agency under ANILCA under ANILCA 1010 (g)

Table 34. Management activities, public uses, and economic uses permitted in management categories continued

MANAGEMENT CATEGORY	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Designated Wilderness (IV)
ECONOMIC USES CONT.				
Other Geophysical Studies Helicopter supported gravity and magnetic surveys and other minimal impact activities that do not require mechanized surface transport.	May be permitted subject to refuge special use permit conditions	Same as (I)	Same as (I)	Same as (I)
Oil and Gas Leasing Drilling and extraction of oil and gas for commercial purposes. Includes all associated above and below ground facilities.	May be permitted subject to an assessment of potential, a national interest determination, and a compatibility determination	Same as (I)	Not permitted	Same as (III)
Sand and Gravel Removal Extraction of sand and gravel for commercial purposes.	May be permitted	Not permitted	Same as (II)	Same as (II)
Other Mineral Leasing Includes the extraction of coal, pumice, pumicite, cinders, clay, potassium, sodium, phosphate, sulfur, or other minerals for commercial purposes.	Not permitted	Same as (I)	Same as (I)	Same as (I)
Hydroelectric Power Development Includes low-head and major hydroelectric developments and associated facilities (e.g. dam, impoundment area, penstock, powerhouse, and tailrace).	Not permitted	Same as (I)	Same as (I)	Same as (I)
Transmission Lines/Pipelines Includes telephone and electrical power lines, oil and gas pipelines, and other necessary related facilities. Does not include facilities associated with on-refuge oil and gas development.	May be permitted on a site specific basis subject to restrictions on road access and methods of transmission/pipeline placement, and subject to Title XI of ANILCA	Not permitted subject to the provisions of ANILCA Title XI	Same as (II)	Same as (II)
Guiding, Outfitting, Transporting Licensed big game guides, outfitters, sport-fishing guides, air-taxi operators, and all other commercial operators that provide services to recreationists on the refuge. Includes all activities of the operator and facilities used by the operator on the refuge (e.g., tent camps, landing strips,and access methods).	Permitted by special use permit, subject to reasonable stipulations (e.g., duration of trips, timing, and party size)	Same as (I)	Same as (I)	Same as (I)
Grazing Grazing of domestic animals, including reindeer, for commercial purposes.	No new or increased levels of grazing will be permitted; current grazing will be managed within proper range management guidelines	Same as (I)	Same as (I)	Same as (I)
Agriculture Introducing plant species to maintain or increase native wildlife populations.	Not permitted	Same as (I)	Same as (I)	Same as (I)

Table 34. Management activities, public uses, and economic uses permitted in management categories continued.

MANAGEMENT CATEGORY	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Designated Wilderness (IV)
ECONOMIC USES CONT.				
Commercial Fishing Includes all land-based sites, activities , and facilities in the refuge (e.g. campsites, cabins, motorized vehicles, and landing strips).	May be permitted subject to reasonable regulation in accordance with provisions of ANILCA	Same as (I)	Same as (I)	Same as (I)
Commercial Timber Harvesting Harvest of timber for sale.	May be permitted subject to reasonable regulation	Same as (I)	Not permitted	Same as (III)
Remote Navigation/Communication Sites Remote, unattended facilities to provide navigation or communication capabilities.	May be permitted subject to reasonable regulation in accordance with the provisions of ANILCA 1310	Same as (I)	Same as (I)	Same as (I)
National Defense Facilities and Sites Reasonable access to and operation and maintenance of facilities and sites for national defense purposes and related air and water navigation aids.	May be permitted subject to reasonable regulation in accordance with the provisions of ANILCA	Same as (I)	Same as (I)	Same as (I)
National Defense Exercises Includes on-refuge activities by military personnel or machines.	May be permitted subject to reasonable regulation in accordance with the provisions of ANILCA	Same as (I)	Not permitted	Same as (III)

[1]Any structure or man made improvement which can be readily and completely dismantled and removed from the site when the period of authorized use terminates.

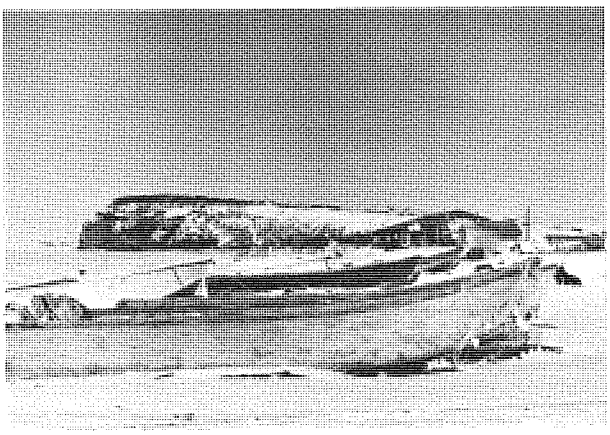
Note: Management of activities occurring on navigable waters will be coordinated with the appropriate State agency.

are found in Appendix G. Military facilities have been designated for intensive management in all alternatives. Some of the undeveloped lands within bases have been designated moderate or minimal management in some of the alternatives.

The waters and submerged lands of Womens Bay are under the jurisdiction of the Service and were included in the refuge by the Alaska Lands Act. The Coast Guard has asked that the Service coordinate with them before issuing any permits which might interfere with their primary functions.

Cooperation with Owners of Refuge Inholdings and Adjacent Lands

The Service will work in a spirit of cooperation with its neighbors. Specifically, the Service will keep the public informed about refuge management policies and activities; consult periodically with landowners, communities, special interest groups, and other constituents who have expressed an interest in or are affected by refuge programs; and respond promptly to conflicts arising in refuge programs. Cooperative efforts with adjacent landowners may include water quality monitoring, and fish and wildlife management.



Cape Stephens, near the village of Stebbins, is one of the few refuge areas in Norton Sound that has not been selected by village or regional Native corporations. Students from Stebbins wrote letters to the planning team about their use of the area.

The Service will seek cooperative agreements with owners of lands adjacent to or near the refuge whenever necessary to achieve refuge goals. As set forth in section 304(f)(1)(2) of the Alaska Lands Act, under these agreements the Service may provide technical and management assistance in certain cases, in exchange for an agreement to manage the land in a manner compatible with refuge purposes and to permit the Service reasonable access to refuge lands.

Middleton Island has lands owned by a private individual, Chugach Alaska, and the Federal Aviation Administration. The Service has an easement on parts of the island owned by Chugach Alaska and will develop an agreement with them concerning the management of these lands.

Native Conveyed 22(g) Lands

When Congress enacted the Alaska Native Claims Settlement Act (Settlement Act) in 1971, it permitted village corporations to select and obtain title to the surface estate of lands within established national wildlife refuges, such as the Alaska Maritime Refuge, to satisfy their entitlements under the Act. These private lands have a unique status under federal law. Congress attempted to balance "the real economic and social needs" of Alaska Natives for acquiring refuge lands against those of the nation in preserving the natural resources values of the National Wildlife Refuge System. Under section 22(g) of the Settlement Act, requirements were enacted to ensure that the Native corporations' use and enjoyment of their lands would not defeat the purposes for which the wildlife refuges in Alaska had been established. One of the requirements of section 22(g) is that refuge lands conveyed to the village corporations remain subject to the laws and regulations governing use and development of the refuge. Thus, although the Native village corporation lands are privately owned and no longer part of the refuge, the Service retains residual controls on the use and development of former refuge lands conveyed to village corporations under the Settlement Act. The Service is concerned with protecting the important resource values of these private lands as they relate to the purposes of the refuge, while also enabling the Native landowners to derive economic benefits from their land. The Service is developing a process for implementing section 22(g) in consultation with a Alaska Federation of Natives 22(g) work group.

Atka Island is the primary place affected by section 22(g) in the Alaska Maritime Refuge. There are also areas subject to 22(g) on Unimak Island.

Pribilof Terms and Conditions

The "Terms and Conditions for Acquisition and Establishment of Pribilof Islands Subunit of Alaska Maritime National Wildlife Refuge," (Terms) was signed on January 16, 1981, by Tanadgusix, Inc., Tanaq, Inc., the Aleut Corp. and the Secretary of the Interior. This document defined the terms and conditions under which the United States reacquired the bird cliffs on St. Paul and St. George islands.

Under section 8 of the Terms, the Service will grant Native residents of the Pribilofs who meet the criteria and standards for employment a preference in hiring for positions to manage the Pribilof Subunit. In accordance with section 11, Tanadgusix and Tanaq shall have the right of first refusal with respect to contracts for services required by the Service to manage the Pribilof Subunit.

Table 35. Marine environment management activities, public uses, and economic uses permitted in management categories.

This table provides specific guidance on activities and uses found only in marine environments and not addressed in Table 34.

MANAGEMENT CATEGORY	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Designated Wilderness (IV)
ECONOMIC USES				
Seismic (Geophysical) Studies Geophysical surveys in marine waters, conducted using energy sources that have been demonstrated to be harmless to fish, waterfowl, seabirds, and marine mammals.	May be permitted subject to refuge special use permit conditions	Same as (I)	Same as (I)	Not permitted unless conducted by or for a DOI agency under ANILCA 1010(g)
Log Transfer Facilities A facility constructed, in whole or part, in waters of the United States which is utilized for the purpose of transfering commercially harvested logs to or from a vessel or log raft.	May be permitted on a case by case basis subject to the provision of ANILCA 1110	Same as (I)	Same as (I)	Same as (I)
Pier or Bulkhead Construction Developments in or over the water, such as piers, docks and protection structures located, designed and maintained in a manner that prevents adverse impacts upon the water quality, fish, wildlife, and vegetative resources, and minimizes interruption of water circulation patterns, coastal processes, and navigation.	May be permitted on a case by case basis subject to the provisions of ANILCA 1110	Same as (I)	Same as (I)	Same as (I)
Effluent Discharge Effluent discharge located where currents can disperse effluents and where the cumulative impact does not violate state and federal water quality standards.	May be permitted on a case by case basis subject to the provisions of applicable law, NEPA and a compatibility determination	Same as (I)	Not permitted	Same as (III)
Commercial Fishing All commercial fishing activities recognized and regulated by state or federal law.	Permitted subject to provisions of applicable treaties, laws, state regulations and ANILCA 304(d)	Same as (I)	Same as (I)	Not permitted per Wilderness Act
Mariculture Captive culture of shellfish, fin fish, and sea vegetables in the marine environment. Includes shorebased facilities, upland tie downs, anchor points, and any associated use required in conjunction with the operation.	May be permitted on a case by case basis subject to the provisions of law, NEPA, and a compatability determination	Same as (I)	Not permitted	Same as (III)
Seafood Processing Floating processors that prepare fin fish and shellfish for market.	May be permitted on a case by case basis subject to the provisions of applicable law, NEPA, and a compatability determination	Same as (I)	Not permitted	Same as (III)

Table 35. Marine environment management activities, public uses, and economic uses permitted in management categories continued.

MANAGEMENT CATEGORY	Intensive Management (I)	Moderate Management (II)	Minimal Management (III)	Designated Wilderness (IV)
ECONOMIC USES CONT.				
Remote Navigation/Communication Sites Remote facilities to provide navigation or communication capabilities.	May be permitted subject to reasonable regulations in accordance with the provisions of ANILCA 1310	Same as (I)	Same as (I)	Same as (I)
Commercial Charter Operations Charter boats, planes, and other commercial guide services.	Permitted by special use permit subject to reasonable stipulations	Same as (I)	Same as (I)	Same as (I)
PUBLIC ACCESS				
Floating Structures A non-powered houseboat or barge with living quarters that is anchored. Requires a Corps of Engineers permit for mooring. Can not be permanently moored in refuge waters. Facility is generally rented out as a commercial enterprise.	A permit may be issued subject to refuge special use permit conditions and a compatability determination	Same as (I)	Same as (I)	Same as (I)
Private Docks Developments in or over water providing access to private land; located, designed, and maintained in a manner that prevents adverse impacts upon water quality, fish, wildlife, and vegetative resources, and minimizes interruption of water circulation patterns, coastal processes and navigation.	Permitted subject to reasonable regulation and the provisions of ANILCA 1110	Same as (I)	Same as (I)	Same as (I)

Section 10 provides for Tanadgusix and Tanaq to each supply the refuge with an administrative site and building on St. Paul and St. George, respectively. The Service plans to use a portion of each building as a visitor center.

The Terms call for the study of both islands to assess the need for and location of facilities for cultural and natural resource interpretive programs. The study was to occur upon appropriation by Congress of not less than $300,000 for such study. This money has never been appropriated.

Land Exchanges

Land exchanges will be recommended for the refuge in a stepdown plan based on the need to consolidate land ownership patterns, simplify management, and protect fish and wildlife habitat. Only the minimum amount of land necessary to reach management objectives will be considered for negotiations and care will be taken to minimize the impacts to all parties concerned. Native corporations may have overselected lands within the refuge boundary; if so, these lands will probably remain as part of the refuge. All of the possible relinquishments or exchanges will occur independently of the management alternative selected for Alaska Maritime Refuge.

Through the Alaska Lands Act, many lands were included in the refuge which had ongoing domestic livestock grazing. Some of these lands have low wildlife values. Domestic livestock grazing lands with low wildlife values will be traded where possible for lands with higher wildlife values. Through this type of trade, the Service will attempt to acquire the timber rights on Delphin and Discoverer islands.

The Service has identified land trade priorities for the Alaska Maritime Refuge. Three parcels of land have been identified for acquisition in the Chukchi Sea Unit, ranging in size from 1,000 to 5,600 acres. Fifty-four parcels have been identified for acquisition in the Aleutian Islands Unit ranging in size from 5 to 24,300 acres. The Service wishes to acquire 10 parcels in the Bering Sea Unit and 28 parcels ranging in size from 5 acres to 21,000 acres in the Alaska Peninsula Unit. Forty-six parcels of land have been identified for acquisition in the Gulf of Alaska Unit ranging from 4 to 42,000 acres in size. In total the Service would like to acquire 141 parcels of land and 559,992 acres for the Alaska Maritime Refuge. All of these lands are within the refuge boundary. Lands would only be acquired from willing sellers or through voluntary exchanges.

Access to Inholdings

In accordance with section 1110(b) of the Alaska Lands Act, the state and private interests with valid surface or subsurface rights on or surrounded by Alaska Maritime Refuge are entitled to reasonable access. This is especially important in the Afognak Island area. Stipulations may be added to the permits to ensure that refuge resources and public health and safety are protected.

Section 17(b) Easements and Nonexclusive Use Easements

Sites and linear access easements may be reserved on Native corporation lands that are within or adjoin the Alaska Maritime Refuge, as authorized by section 17(b) of the Alaska Native Claims Settlement Act. The Service will be responsible for management of the public access easements inside the refuge and for those assigned to the Service outside the unit. The purpose of 17(b) easements is to provide access to public lands. The routes and location of these easements are identified on maps contained in the conveyance documents. The conveyance documents also specify the terms and conditions of use including periods and methods of public access.

The Service will work cooperatively with the affected Native corporations and other interested parties, including the state of Alaska, to develop a management strategy for easements. Management of these easements will be in accord with specific terms and conditions of the individual easement and applicable refuge regulations. As easements are reserved and the Service assumes management responsibilities for them, the locations, mileages and acreages will be compiled and management strategies will be formulated. This information will be maintained at refuge headquarters.

As authorized in the Department of the Interior Departmental Manual, part 601 DM 4.3G, the physical location of an easement may be adjusted to rectify a usability problem or to accommodate the surface and or subsurface landowner's development of the lands, if both the Service and the landowner agree to the relocation. Easements also may be expanded, if an acceptable alternate easement or benefit is offered by the landowner and the exchange would be in the public interest. An easement may be relinquished to the landowner if an alternative easement has been offered by the landowner or termination of the easement is required by law. Such actions would require a full land exchange procedure that meets applicable legal requirements.

The Service may also propose to place additional restrictions (to those authorized in the conveyance document) on the use of an easement, if existing uses are in conflict with the purposes of the refuge.

In all cases where a change is proposed in authorized uses or location from the original conveyance, the Service will give adequate public notice and opportunity to participate and comment to the affected Native corporation and other interested parties, including the state of Alaska. Service proposals for changing the terms and conditions of 17(b) easements will include justification for the proposed change, an evaluation of alternatives considered, if any, and an evaluation of potential impacts of the proposed action.

The Iditarod Trail

The Iditarod Trail was designated by Congress in 1978 as a National Historic Trail in the National Trails System. Segments of this trail

are within the Alaska Maritime Refuge at Bluff and Safety Sound near Nome.

The Service has entered into an interagency agreement with the U.S. Forest Service and the Bureau of Land Management (Bureau) concerning the Iditarod National Historic Trail. In this agreement, "the agencies agree to encourage and protect continued public use of trail segments in a manner which recognizes the historic values of the [trail], utilizing right-of-way, easements, management corridors, cooperative agreements with adjacent land owner, and access improvements and side trails as appropriate." The Bureau serves as the federal coordinator for the trail and recently published the Iditarod National Historic Trail Comprehensive Management Plan (U.S. Bureau of Land Management 1986). Trail segments in the Alaska Maritime Refuge were proposed in the trail plan for "active management." Specific management actions include: consider nomination to the National Register of Historic Places, survey and mark the route, and establish a 1,000 foot right of way. The route over the Safety Sound parcel uses the Nome Council Road right of way.

Other Historic Roads and Trails

Revised Statute (R.S.) 2477, formally codified as 43 USC 932 and enacted in 1866, provides that: "The right-of-way for the construction of highways over public lands, not reserved for public uses, is hereby granted." The Act was repealed by Public Law 94-570 as of October 21, 1976, subject to valid existing rights, including rights-of-way established under R.S. 2477. The validity of these rights-of-way will be determined on a case-by-case basis.

Private parties or the state of Alaska may identify and seek recognition of R.S. 2477 rights-of-way within the refuge. Supporting material regarding those rights-of-way identified by the state may be obtained through the Alaska Department of Transportation and Public Facilities or the Alaska Department of Natural Resources.

Identification of potential rights-of-way does not establish the validity of these R.S 2477 rights-of-way and does not necessarily provide the public the right to travel over them. All R.S. 2477 rights-of-way within the refuge shall be subject to appropriate state and federal laws and regulations.

The various types of access routes discussed above may overlap. For example, a valid R.S. 2477 right-of-way may overlap an easement reserved under section 17(b) of the Alaska Native Claims Settlement Act. Management strategies, where this occurs, will reflect valid existing rights and other considerations unique to the situation. The Service will work cooperatively with interested parties to assure that management is compatible with the purposes of the refuge. Overlap situations will be dealt with on a case-by-case basis in conformance with the management policies outlined in other sections of this plan.

Fish and Wildlife and Habitat Management

The Service will fulfill its the Alaska Lands Act obligations to maintain natural diversity by managing indigenous populations so that they do not decline unnaturally below the levels that existed on December 2, 1980, when the refuge was established. According to legislative history, the term "natural diversity" reflects an intent to maintain the flora and fauna on the refuge in a healthy and natural combination, and not to emphasize management activities favoring some species to the detriment of others. Although it stresses use of natural means, avoiding artificial development and habitat manipulation programs, the term is not intended to restrict the Service's authority to manipulate habitat for the benefit of fish or wildlife populations within a refuge, or for the benefit of the use of such populations by people as a part of the balanced management program mandated by the Alaska Lands Act and other laws. The term is also not intended to preclude predator control on refuge lands in appropriate instances (Congressional Record - H 12352 1980; S 15131 1980).

If the Service and the Alaska Department of Fish and Game mutually agree that mechanical habitat manipulation or other large scale management action is necessary in a minimal management area, the plan would have to be revised in compliance with the National Environmental Policy Act. At a minimum, an environmental assessment would be required, including public

participation. Each such action would be appended to the plan.

The Service will emphasize protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels. Fish and wildlife management will focus on monitoring and on eradication of introduced wildlife. Present levels of public and traditional use would be maintained. Fishing, hunting, and trapping will be managed to maintain fish and wildlife populations at natural levels.

Population management will concentrate on increasing the numbers and range of the endangered Aleutian Canada goose. This species was formerly abundant on many islands in the Aleutian Islands and Alaska Peninsula units. Introduction of red and arctic foxes eliminated the geese from every island except Buldir, Chagulak, and Kaliktagik islands by 1960. The Aleutian Canada Goose Recovery Plan (Aleutian Canada Goose Recovery Team 1982) calls for restoration of breeding populations of 50 or more pairs on at least three additional widely separated islands, and a total population of at least 1,200. Small new colonies are currently being monitored on four islands, and birds are being transplanted from Buldir to a new site on Amchitka.

Eradication of introduced red and arctic foxes on islands of the Alaska Maritime Refuge is essential to allow natural populations of birds to reestablish themselves. Birds were severely reduced on many islands by these predators. Aleutian Canada geese were eliminated on all but three islands, and other waterfowl were reduced to very small numbers. Species of seabirds that nest on sheer cliffs (murres, kittiwakes, and cormorants) partially escaped the impact of foxes, but most species (fulmars, puffins, auklets, storm-petrels, and others) were severely reduced or eliminated. Indigenous birds have increased by up to 600 percent after eradication of introduced foxes on Alaid/Nizki.

Natural predator populations will be maintained in the future. Naturally-occurring fox populations (as on St. Matthew Island) will not be manipulated, and no new introductions of exotic species will be permitted.

Information is needed on bird populations on the refuge. Seabird populations need to be monitored in a sample of colonies throughout the refuge in order to establish natural population trends, determine interactions of birds with their prey, assess impacts of human activities such as disturbance, commercial fishing, and oil development, and propose Service responses to changes caused by man. Yearly observations are needed over a long period, because bird populations and breeding success in the north fluctuate widely according to weather and sea-ice conditions; changes over one or two years must be compared with long-term trends in order to evaluate their causes. Seven sites in the Chukchi Sea, Bering Sea, Alaska Peninsula, and Gulf of Alaska units are currently being monitored for yearly breeding populations and for breeding success of major species. Some of these sites are monitored by refuge personnel, others by the Alaska Office of Fish and Wildlife Research or by cooperators. Two additional sites (one each in the Alaska Peninsula and Gulf of Alaska units) would be added to the monitoring program. In the Aleutian Island Unit, seabird monitoring would be conducted on select islands in the western, central and eastern portion of the chain. Agattu Island has been tentatively selected as the primary monitoring site in the western Aleutians with Attu, Buldir and Alaid/Nizki as alternate sites. Monitoring of bird life on Kiska and Rat islands since fox eradication will continue in the future to document recovery of their populations. The primary monitoring site in the central Aleutians is Adak Island with Kasatochi and Chagulak as alternate sites. In the eastern Aleutians, Aiktak Island is the primary monitoring site with Ugamak and Bogoslof islands as alternate sites. Periodic monitoring of migratory bird populations will also be conducted on islands from which fox are eradicated in the future. Refuge ability to monitor seabird populations satisfactorily will be greatly enhanced by the use of the refuge vessel M/V Tiglax. Some research will continue into improving the reliability of population estimates for difficult species such as those that nest in burrows.

Disturbance of nesting by wildlife viewing, low-flying aircraft, commercial uses, subsistence users and others may be a potential

threat at some colonies. Birds at some colonies are tolerant of close viewers or outside activity while others are not. In other cases, when the colonies are approached adult birds flee, accidentally kicking eggs and chicks from the nest (a particular problem for cliff nesting species) and exposing the nest to predators. Because of the variability in predicting behavior, the Service will take a protective stance on the issue of disturbance. As time, manpower, and dollars allow, the Service will study the disturbance issue on a case-by-case basis. This has already been done in the Pribilofs and at Cape Lisburne. Burrows of species that nest underground can be destroyed by a footstep. Some colonies on small islands in the Aleutian and Gulf of Alaska units would be severely disturbed if people walked or operated machinery among the closely-spaced nests.

Research on interactions between seabirds and the prey on which they depend is needed if effects of human-caused changes in prey populations are to be assessed. Seabird feeding habits and locations also must be known if mitigation is to be proposed for impacts of oil development, changes in prey populations due to commercial fishing, or bird mortality in fishnets. Most research on Alaska Maritime Refuge is carried out by the Alaska Office of Fish and Wildlife Research or by cooperators, but refuge support and participation will be important particularly the provision of time on the Service vessel. Information will continue to be collected on some critical topics such as prey species on which birds depend (information is particularly lacking in the Aleutians and southeast Alaska) and on distribution of important prey species at sea.

Information on seabird population trends and seabird-prey interactions is essential to effectively coordinate with other government agencies, the state, private landholders and developers, and management organizations such as the North Pacific Fisheries Management Council.

Recreation and public use of the refuge will be continued. Hunting, fishing, and trapping take place on a few sites, primarily Adak, Atka and Cape Lisburne. Recreational salt water fishing also occurs in refuge waters in Womens Bay and around Afognak Island. These will be managed to maintain fish and game populations at their natural levels, or in the case of introduced species such as fox and caribou on Adak, at manageable levels.

Marine mammals that are managed by the Service include sea otters, walrus, and polar bears. Management will consist of monitoring numbers and subsistence harvest of these species on and adjacent to refuge lands. Information on other marine mammals that haul out on refuge lands or use the adjacent waters (northern fur seals, northern sea lions, and seals) is collected cooperatively by the Service and other agencies. Primary management responsibility for these species is held by the National Marine Fisheries Service. The Service cooperates with that agency and with state and private representatives in the management of all marine mammals.

Fishery resources of the refuge will be managed to maintain healthy populations while providing for wildlife needs and subsistence, commercial, and sport harvests. The emphasis of management over the next several years will be directed toward protecting forage fish species of importance to seabird populations, providing sport fishing and subsistence opportunities for local residents, and collecting data needed to provide a baseline on the dynamics of fish populations.

To protect forage fish populations, the Service will more actively work with and participate in local and international management bodies such as the Minerals Management Service, National Marine Fisheries Service, Alaska Department of Fish and Game, and the North Pacific Fisheries Management Council to ensure that refuge concerns are understood and considered as the area develops.

Baseline fishery data collection will occur primarily in freshwater habitats that are thought to have significant resource value or may be open to development in the near future. The emphasis of these surveys will be to document species composition, distribution and abundance.

Fisheries concepts, defined below, are used to describe the type(s) of fishery management proposed under the different alternatives.

Sustained yield - This concept ap waters where management is primarily directed toward providing the opportunity to harvest fish. Sustained yield fisheries can be managed by stocking, but the yield is a fish which grows to catchable size in the wild. The opportunity to catch trophy fish, and unique species of fish is not a major intent of this concept, even though sustained yield fisheries are supported by natural reproduction, and trophy and unique fish species occasionally enter the catch.

Wild concept - This concept applies to waters where management is primarily directed toward providing the opportunity to catch fish from a fishery totally supported by natural reproduction. The wild concept will include only those waters specifically designated for wild fisheries management and not those sustained yield waters presently supported by natural reproduction. In a wild fishery fishing pressure or harvest would be limited in lieu of supplemental stocking. Waters managed under the wild concept should meet the following criteria: be relatively free of human influence; exhibit excellent water conditions and habitat; support densities of fish capable of sustaining a fishery without stocking; have limited public access; and be able to be evaluated.

Commercial wild - This concept applies to waters where management is directed toward maintaining long-term commercial fisheries relying upon existing refuge stocks. Harvest should be regulated to insure adequate escapement levels to sustain the current fishery. Limited or no harvest of adults is expected to be permitted in spawning areas. Sport and subsistence harvest of the commercial species may or may not occur.

Research on Marine Resources

One of the purposes of the Alaska Maritime Refuge is to provide "a program of national and international research on marine resources." The Service, with the addition of the M/V Tiglax, is presently maximizing marine resource research. In addition to providing support for Service programs, the Service is using the vessel to support work of other agencies and universities in furthering research. The Service will continue to make the refuge and its facilities available to researchers working in the marine environment. The Service will not only continue its present research program, but will actively seek out others who can add to the knowledge of the marine environment.

Service biologists study fisheries and water quality to help fulfill the purposes of the refuge.

Proposed Transfer of Lands to Other Refuges

Unimak Island, 932,484 acres, is proposed for transfer to Izembek Refuge in Cold Bay. Unimak Island's habitats are an extension of the habitats managed by Izembek Refuge on the Alaska Peninsula. Species found on the island also are similar to those found on the Alaska Peninsula. Unimak Island has historically been managed by Izembek Refuge. Seal Cape, 8,200 acres, is proposed for transfer to the Alaska Peninsula Refuge. Seal Cape is a geologic and habitat extension of the Castle Cape area of the Alaska Peninsula Refuge. Both Seal Cape and Castle Cape are proposed for wilderness designation. They would be managed most efficiently as one wilderness area by one refuge. Several near shore islands, Sally, Sheep and Sitkalidak, are proposed for transfer to adjacent Kodiak Refuge. The wildlife resources and human uses of these islands are closely linked to adjacent Kodiak Refuge lands and should be managed under the same refuge regulations.

Subsistence

One of the purposes of the Alaska Maritime Refuge, as described in Title III of the Alaska Lands Act, is to provide the opportunity for continued subsistence uses by local residents. Title VIII of the Alaska Lands Act further states that the opportunity for continued subsistence use will be provided for rural Alaskan residents using refuge resources for traditional purposes. Subsistence uses on the refuge will be given preference over other consumptive uses when restrictions on harvests are necessary to assure the continued viability of fish and wildlife populations.

Title VIII of the Alaska Lands Act authorizes the state to manage subsistence use of fish and wildlife on federal lands if it provides for subsistence preference and if it assures local involvement in management of subsistence resources. The Service will support the state in meeting those responsibilities under all alternatives, however, the taking of fish and wildlife for subsistence and other purposes on Maritime Refuge will be as prescribed by regulations established by the Alaska Boards of Fish and Game. If the state fails to comply with the subsistence provisions of the Alaska Lands Act the federal government will assume management of subsistence resources on federal lands in Alaska.

Although the state's program for subsistence management and use generally governs subsistence uses of fish and wildlife on the refuge, other duties remain vested in the Department of the Interior. Among the most important of these statutory duties are those required by section 806 of the Alaska Lands Act. Under all alternatives the Service will monitor the status of fish and wildlife populations harvested for subsistence uses and the state fish and game regulatory system. For fisheries monitoring the Service will complete a map of subsistence use areas broken down by species. Monitoring is intended to identify potential problems before populations of fish and wildlife become depleted and to ensure that preference is given to subsistence users as required by law. The Secretary can close an area to subsistence use to assure the continued viability of a particular fish or wildlife population.

The Service has developed, with other federal land management agencies and the state, subsistence monitoring guidelines. The Service will participate in cooperative subsistence monitoring efforts with the Alaska Department of Fish and Game, local fish and game advisory committees, the regional councils, and the Boards of Fish and Game. The Service will attend meetings of these organizations to provide information on the status of subsistence resources and management of the refuge, to identify data needs related to subsistence, to become aware of concerns regarding subsistence uses and refuge programs, and to provide comments to the boards on regulatory proposals that affect subsistence uses of fish and wildlife on the refuge.

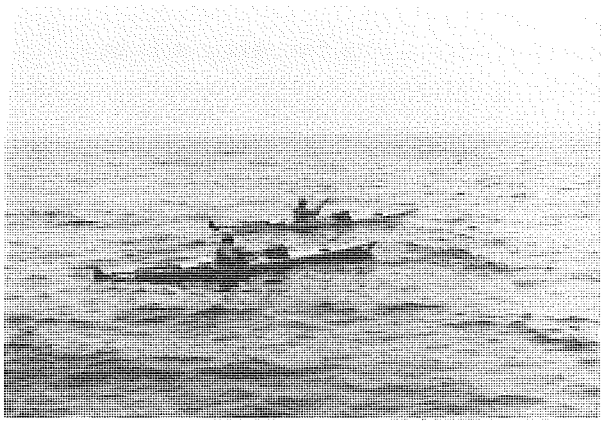
The Service will also evaluate the effects of proposed actions on subsistence uses under all alternatives in compliance with section 810 of the Alaska Lands Act. When a decision is to be made on "whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition" of refuge lands, the Service will evaluate the effect of the proposed action on subsistence uses and needs, note the availability of lands for the proposed activity, and consider other alternatives to the proposed action. The Service will work with the Alaska Department of Fish and Game Subsistence Division and other appropriate local sources in determining whether a proposed action "significantly restricts" subsistence uses. If a proposed action is likely to adversely affect subsistence use, the Service will follow the formal procedures specified in section 810 before further considering the proposed action.

Access to refuge lands by traditional means will be permitted for subsistence purposes in accordance with section 811 of the Alaska Lands Act. Traditional means, as defined in Service regulations (50 CFR 36), include snowmachines, motorboats, dog teams and other means of surface transportation traditionally used by local rural residents engaged in subsistence activities. Use of snowmachines will be limited to periods of adequate snow cover. Use of off-road vehicles will be limited to designated areas of traditional use. Four such areas occur on the refuge: refuge land on Kodiak Island between Wolcott Reef and Sturgeon Lagoon below mean high

designated ORV areas

tide, areas of Harvester Island below the 200 foot contour (Figure 62 B), the routes on Atka Island (Figure 79), and on St. Paul Island (Figure 71). These areas were identified through interviews with local residents. Additional routes can be designated if new information shows additional areas of traditional use. Air boats and air-cushion boats will be prohibited throughout the refuge, in accordance with Service policy (43 CFR 36.11). Under section 816 of the Alaska Lands Act, the Service may close the refuge to the taking of fish and wildlife if necessary for reasons of public safety, administration, or to assure the continued viability of particular populations of fish or wildlife. Emergency closure to subsistence taking would occur only after other consumptive uses competing for the resource are eliminated.

Although Titles III and VIII of the Alaska Lands Act require the Service to maintain opportunities for, and give preference to, subsistence harvest, these requirements are subject to all other applicable laws.



These two kayakers voyaged from Nome to Barrow during the summer of 1987. Increasing numbers of adventurous people are expected to visit even remote areas of the refuge in the future.

Wilderness

Approximately 56 percent of the refuge is already designated as wilderness. Three wilderness areas were created by section 704 of the Alaska Lands Act, the Aleutian Islands Wilderness, the Semidi Islands Wilderness, and Unimak Wilderness. In addition Bogoslof Island, Simeonof Island, the St. Matthew Island group, Chamisso and Puffin islands, Tuxedni Subunit, St. Lazaria Subunit, Hazy Islands Subunit, and Forrester Island Subunit are wilderness areas which predate the Alaska Lands Act. The submerged lands surrounding the Semidi Islands and the water column and tidelands around Simeonof Island are included in the wilderness area. These areas will continue to be managed according to the provisions of the Wilderness Act as amended by the Alaska Lands Act. Uses permitted in wilderness areas are explained in the designated wilderness management category and in Tables 34 and 35. Management of these lands or marine areas will not vary across the alternatives.

Section 1317 of the Alaska Lands Act requires the Service to study the remainder of the refuge to determine if any other areas are suitable for designation and subsequently to recommend areas for inclusion in the National Wilderness Preservation System. The wilderness review section of the affected environment chapter presents an evaluation of wilderness suitability. Numerous areas as shown in Table 7 meet the criteria for wilderness suitability but are not recommended in any alternative because they are Native selected lands. Many of these lands will remain in Service ownership, because they are overselections. On those areas where selections are relinquished, wilderness designation could be considered.

The alternatives recommend varying amounts of the refuge for wilderness designation. The areas recommended for wilderness in the preferred alternative will be managed under the minimal management category until the President sends the wilderness recommendation to Congress. After the presidential recommendation, the proposed wilderness areas would be managed according to the provisions of the Wilderness Act as amended by the Alaska Lands Act. Should congressional designation be denied, the areas would no longer be proposed wilderness areas and would be managed under the minimal management category.

Recreational Access

Reasonable access onto the refuge will be ensured so visitors can participate in wildlife-oriented recreation. Under all alternatives, nonmotorized access will be encouraged. The use of snowmachines, motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities is permitted on the refuge under section 1110(a) of the Alaska Lands Act. Although these activities are subject to reasonable regulation to protect the natural and other values of the refuge, they cannot be prohibited unless it is determined that they would be detrimental to the resource values of the refuge. In addition, before regulations prohibiting these uses are instituted, the Service must hold public hearings in the vicinity of the refuge. Therefore, any access restrictions or prohibitions that may be proposed will be implemented only after procedures for the establishment of refuge regulations (including public hearings) are met. Any management of activities occurring on navigable waters will be coordinated with the appropriate state agency.

Use of off road vehicles on areas other than established roads and parking areas is prohibited, except on routes or in areas designated by the refuge manager or pursuant to a valid permit (43 CFR 36.11). In addition, the Service:

> ...is authorized to issue permits for the use of off road vehicles on existing off road vehicle trails located in areas (other than in areas designated as part of the National Wilderness Preservation System) upon a finding that such off road vehicle use would be compatible with the purposes and values for which the area was established ...

The process by which such routes and areas can be designated is explained in 43 CFR 36.11(h)(5) as follows:

> In determining whether to open an area that has previously been closed pursuant to the provisions of this section, the appropriate Federal agency shall provide notice in the Federal Register and shall, upon request, hold a hearing in the affected vicinity and other locations as appropriate prior to making a final determination.

The route on St. Paul Island illustrated in Figure 71 is the only such route designated for recreational purposes on the refuge. The definition of off road vehicle includes four-wheel drive or low-pressure-tire vehicles, motorcycles, and related two-, three-, or four-wheeled vehicles, amphibious machines, ground-effect or air-cushioned vehicles, airboats, and recreational vehicle campers (50 CFR 36.21).

Recreational hunting and fishing, as well as other wildlife-oriented recreational activities (e.g., hiking, primitive camping, photography, wildlife viewing, kayaking, cross-country skiing) will be allowed throughout the refuge. The Service will manage recreation to avoid overcrowded conditions and minimize adverse impacts to fish and wildlife, wilderness, historical, cultural, and other special values through informational programs and voluntary compliance. In particular, an education program will be developed for those areas where public use may cause disturbance to nesting seabirds. Communities such as Sitka, St. George, and St. Paul would be targeted for education programs. In particular, St. Lazaria Island near Sitka, may have a potential problem with increased tourism. Islands which have dense wildlife populations could be irreparably damaged by unchecked visitation. If education does not work to avoid people/seabird conflicts, then the Service would consider seasonal closures (April 1 - September 30) on St. Lazaria or other areas where conflicts occur. Other actions that may be taken to minimize these and other impacts include working with fish and game advisory boards and Alaska Department of Fish and Game to change hunting regulations, consulting with local people so that they and the Service understand each other's concerns, and encouraging responsible behavior by all users through educational and interpretive programs.

Recreational use by unguided visitors will be managed through informational programs and voluntary compliance. Direct restriction of use will be avoided unless voluntary methods fail. If the Service must restrict access, all restrictions will be subject to the provisions of section 1110(a) of the Alaska Lands Act.

Commercial recreational use (i.e., guided parties) will continue to be regulated by permits, as required by Service policy.

Interpretation and Education

The success of most of the management activities outlined in this plan will depend to a large extent on the actions of refuge users, adjacent landowners, local residents and other interested citizens. The Service will consult with local people to ensure that each group understands the other's concerns, to disseminate information about the Service's responsibilities, and to foster cooperative management efforts. An effective education and interpretation program will help avoid potential problems by increasing public understanding and support of refuge management goals and actions. The Service will also inform visitors from other places about local uses of the refuge and about private lands adjacent to it, and encourage users to respect private land.

The Alaska Maritime Refuge is the focal point for the Service's education program on seabirds and the marine ecosystem. The refuge presently has several ongoing and planned activities. In a joint effort with the National Park Service the refuge helped produce two permanent displays in Seward. The Adak Wildlife Center provides interpretation and environmental education for the Aleutian Islands. Teacher workshops are held on Adak and are planned for Atka and Unalaska. The refuge produced a seabird identification and awareness poster which is available throughout the state through the Alaska Natural History Association. In addition, the refuge is first in refuge sales of environmental material through the Alaska Natural History Association. A traveling exhibit has been developed and an airport exhibit for Unalaska. Other exhibits will be developed for use throughout the state. Sitka, Unalaska, St. Paul, and St. George are only a few of the communities that have requested exhibits.

An expanded visitor center complex/headquarters is planned for Homer to meet the needs of local residents and tourists. Under the terms of the Pribilof Terms and Agreement (Terms), Tanadgusix and Tanaq are each to supply the refuge with an administrative site and building on St. Paul or St. George, respectively. The Service plans to use a portion of each building as a visitor center. In addition, the Terms call for the study of both islands to assess the need for and location of facilities for cultural and natural resource interpretive programs. The refuge also works with charter boat operators in Homer and Sitka. This effort will be enlarged to include charter boats working out of Seward and also the state ferry system.

Cabins

Fish and Wildlife Service regulations on existing cabins within Alaskan refuges (50 CFR 36.33 [b] [1]) state that traditional and customary use of these cabins will be allowed to continue if the Service determines the uses are compatible with the purposes for which the refuge was established. Non-transferable, renewable, five-year permits may be issued for these existing cabins. No special use permits shall be issued to authorize the use of an existing cabin constructed for private recreational use. Also, section 1303 of the Alaska Lands Act prohibits the construction of new cabins for private recreational use.

Non-transferable, five-year permits may be issued by the Service for construction of small, primitive cabins if a determination is made that the proposed use, construction and maintenance of any such cabin is compatible with the purposes for which the refuge was established, and that the use of the cabin is necessary for the continuation of an ongoing subsistence use or for public health and safety.

Oil and Gas Studies and Leasing

Section 1008(a) of the Alaska Lands Act directs the Secretary to establish an oil and gas leasing program on federal lands in Alaska except where prohibited by law or on those units of the National Wildlife Refuge System where oil and gas development would be incompatible with refuge purposes.

Studies - In existing wilderness areas, 56 percent of the refuge, and in proposed wilderness areas after they have been designated by Congress, an additional 3 percent of the refuge in the preferred alternative, no exploration activities involving surface

disturbance or mechanized transportation will be allowed except for those conducted by or for an Interior Department agency under the provisions of section 1010 of the Alaska Lands Act. These provisions require regulations to ensure that activities do not result in lasting environmental impacts and are compatible with refuge purposes.

In other parts of the refuge, geological and geophysical studies including seismic activities will be permitted where site-specific stipulations can be designed to ensure compatibility with refuge purposes and consistency with the management objectives of this plan. Decisions will be made on a case by case basis in all areas including minimal management areas and proposed wilderness areas prior to Congressional designation. However, seismic activities will not be permitted on the refuge prior to the issuance of a record of decision on this plan.

Leasing - Oil and gas leasing is not permitted in existing wilderness areas. Leasing will not be permitted on any proposed wilderness areas after the President forwards the recommendation to Congress.

On the remainder of the refuge, oil and gas leasing will not be permitted until completion of 1) an assessment of potential; 2) a national interest determination; and, 3) a compatibility determination. A detailed assessment of the oil and gas potential of the refuge and the viability of development has been completed indicating a low probability as discussed in the geology section of the affected environment chapter (Teseneer et al. 1988).

The next step is for the Secretary to consult with the Secretary of Energy to determine the national interest in developing oil and gas on refuge lands. In addition, the Secretary shall seek the views of the state of Alaska, local governments, Native regional and village corporations, the Alaska Land Use Council, representatives of the oil and gas industry, conservation groups, and other interested individuals to determine the public interest in or opposition to oil and gas exploration and leasing activities.

After having considered the national interest in producing oil and gas, the Secretary will determine if oil and gas leasing would be compatible with the purposes for which Alaska Maritime Refuge was established. These purposes were defined by the Alaska Lands Act and are listed in the summary chapter.

The process described above will not be completed until after this plan is done and a record of decision issued. A determination that oil and gas development would be in the national interest and would be compatible with refuge purposes could cause this plan to be modified. If this occurs, the Service would revise the plan in compliance with the National Environmental Policy Act process, providing opportunities for public involvement.

In minimal management areas where: 1) it is later determined that it would be in the national interest to open those lands to oil and gas leasing and development; and 2) it is also determined that oil and gas can be made compatible with the purposes for which the refuge was established, the area will be reclassified (i.e., taken out of minimal management and placed in moderate or intensive management) before leasing is permitted. This would require an amendment of the plan, including public review of the proposed amendment. No such revision would be required to open intensive or moderate management areas to leasing.

Geothermal and Coal Leasing

Geothermal leasing is not allowed on the refuge under Section 1014(c) of the Geothermal Steam Act (30 U.S.C. 1001-1021). Coal mining is also prohibited under Section 16 of the Federal Coal Leasing Amendment Act of 1975 (P.L. 94-377).

Mineral Assessment

Section 1010 of the Alaska Lands Act requires that all federal lands be assessed for their oil, gas, and other hardrock mineral potential. Mineral assessment techniques that do not have lasting impacts, such as side-scanning radar, will be permitted throughout the refuge under all alternatives. The Service will issue

permits for assessment work, with stipulations to ensure that the assessment program is compatible with refuge purposes. For example, stipulations may limit access during nesting, calving, spawning, or other times when fish and wildlife may be especially vulnerable to disturbance.

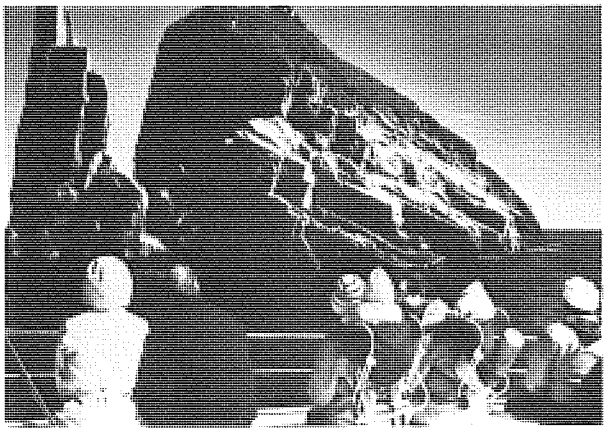
Mining Operations

There is only one mining claim located on refuge lands. One lode claim (AVI 9850610), located at T. 64 S., R. 104 W., sec. 34, is situated on the western end of Unimak Island near the coastguard facility in the Aleutian Islands Unit. Development of this claim would be subject to applicable state regulations, including water quality regulations. No new claims may be filed because the refuge has been closed to mineral entry by the Alaska Lands Act (section 304[c]). Recreational panning for gold will be permitted where conflicts with wildlife will not occur.

Transportation and Utility Systems

Under Title XI of the Alaska Lands Act, transportation and utility systems could be constructed on or across refuges, including through wilderness (with Congressional approval), in all management categories under all alternatives. Any proposed system would be evaluated to determine its environmental impacts and would be permitted if it were determined that such a system would be compatible with the purposes for which the refuge was established, and there is no economically feasible and prudent alternative route for the system.

The Service is aware of the importance of Title XI in relation to residents of the Kodiak/Afognak area. Many of the private lands on Afognak Island are surrounded by refuge waters which require a Title XI permit for access or construction of permanent facilities such as docks, piers, etc. Permits have already been issued to Lash Corporation for construction of a bulkhead in Womens Bay at Kodiak, to the U.S. Coast Guard for dock construction and improvement, and to Afognak Native Corporation for a log transfer facility in Kazakof (Danger) Bay.



Approximately 25 sightseeing charters visit the Chiswell Islands each week during the summer. This island group offers the most accessible viewing opportunities for marine mammals and seabird concentrations in the state.

Commercial Uses

Airtaxi operators, birdwatching guides, tour operators, commercial photographers, wilderness guides, sport fishing guides, and hunting guides are required to obtain refuge permits under 50 CFR 27.97. The Service will attach stipulations to these permits to ensure that camps, travel methods, and activities are consistent with the selected alternative. If problems arise relating to guided parties, such as disturbance of seabird nesting areas or marine mammal haulouts, the Service may modify or terminate use under the special use permit stipulations. Big game hunting guides and their guiding areas are also regulated by the State Guiding Board.

Under section 304(d) of the Alaska Lands Act the Service will continue to permit individuals with valid commercial fishing rights or privileges to operate on the refuge. The use of campsites, cabins, motorized vehicles, and aircraft landings on refuge lands in support of commercial fishing is subject to reasonable regulation. Section 304(d) further specifies that commercial fishing rights may not be granted if the use is determined to be inconsistent with the purpose of the refuge and to be a "significant expansion of commercial fishing activities within such unit beyond the

level of such activities during 1979." The Service recognizes that fisheries' levels are cyclic and will take that into consideration when applying the "1979 level" criteria. Any new fishery will have to meet the compatibility standards.

Mariculture may be permitted on a case-by-case basis in moderate or intensive management areas subject to the provisions of state and federal law, the National Environmental Policy Act, and a compatibility determination. A special use permit would be required in addition to the permits normally required.

Permits for grazing have been issued for eight islands. Grazing is presently allowed at the levels occurring in 1979 on seven leases on Wosnesenski, Bear, Harvester, Hagemeister, Chirikof, Unalaska, Umnak, Akutan, and Akun islands. Hagemeister Island has reindeer grazing while the other islands are grazed by cattle. Atka has "feral" reindeer on it since ownership has not been executed by Atka residents. If these animals are reduced to private ownership through marking or branding a special use permit will be issued. Reindeer are also on St. Paul and St. George and a special use permit will be issued to cover the grazing if it is determined that they graze refuge lands. New grazing operations will not be permitted on refuge lands.

A special use permit has been issued to Kodiak Reduction, Inc., to allow discharge of effluent in the Gibson Cove area. This plant processes fish offal from fish processing plants. The effluent must meet the standards required by the Environmental Protection Agency and the Department of Environmental Conservation. In addition, a Title XI right-of-way was issued to Lash Corporation for enlarging their loading bulkhead in Womens Bay. Lash is also the recipient of a special use permit for mooring bouys off the bulkhead.

All these permits were issued to pre-existing users of the area. The Lash right of way permit was to increase the size of an existing structure and the Kodiak Reduction, Inc. operation was in existence before the refuge was given jurisdiction over Womens Bay.

No commercial timber harvesting will be allowed except for harvesting under the valid existing rights to the timber on Delphin and Discoverer islands. The Service will attempt to acquire these rights through trade with the Afognak Joint Venture.

Fire Management

Wildfires on federal lands will be allowed to burn naturally where they do not endanger life or property. Private lands and inholdings will be protected. There will be no prescribed burning.

Air and Water Protection

One of the major purposes of Alaska Maritime Refuge as described in the Alaska Lands Act is to preserve water quality and quantity and air quality required to fulfill refuge objectives. This is necessary to maintain natural diversity and healthy populations of fish and wildlife. The Clean Air Act designated parts of the refuge that must meet certain air quality standards as discussed below.

Water rights - The water resources of the Alaska Maritime Refuge will be managed to maintain the primary purposes of the refuge, as stated in section 301(1)(B) of the Alaska Lands Act, and in other statutory mandates.

Specific water resource requirements for the primary purposes of the refuge will be identified and the reasonable amount of water necessary to maintain these purposes will be quantified in cooperation with the state of Alaska. Once Federal Reserved Water Rights have been quantified, the Service will record this information with the state Department of Natural Resources. Water for secondary purposes and other uses not provided for by Federal Reserved Water Rights will be applied for in accordance with Alaska Statutes (A.S.) 46.15.

Following adoption of the comprehensive conservation plan for the Alaska Maritime Refuge, a water resource study will be prepared. This study will identify streams, lakes, and other water bodies whose protection has highest priority and will outline procedures for quantifying their Federal Reserved Water

Rights. The Service will cooperate with the state in obtaining these data.

Instream flow studies will investigate the full annual range of flow, as both flood and low-water stages are essential, or even critical, in the life cycles of wetland and aquatic species. Extreme flood and drought years also will be included in the analysis, as both are important to the renewal of aquatic habitats. Once year-round instream flow requirements have been quantified, the Service will continue to monitor streams that may be subject to modification outside the refuge. The Service will contact other water users if the Service determines that a proposed project threatens refuge waters, fish, or wildlife. Reductions in instream flows, lake elevations, or groundwater levels below the Federal Reserved Water Rights will be reported to the appropriate state or federal agencies so that action can be taken to maintain the purposes for which the refuge was established.

Water quality - To protect water quality on the refuge, contaminant baseline data will be collected and the effects of activities on and off the refuge will be monitored. Some water quality monitoring has been done in Womens Bay, and on Kiska, Agattu, Great Sitkin, and Adak islands. All activities on the refuge will comply with pollution control standards set by the Clean Water Act, the Federal Water Pollution Control Act, their amendments, and other state and federal laws and regulations (see Refuge Manual 5RM11). The Service will cooperate with the state and other appropriate agencies responsible for establishing and enforcing water quality standards.

A water resource management plan will be written, as described earlier, and will include important water quality measurements. It is essential to collect baseline data as soon as feasible so that changes due to human activity can be documented and corrected. The Service will cooperate with adjacent landowners in collecting these data.

To ensure that the results have legal standing, sampling programs will be designed, carried out and analyzed by Service-approved agents. Important parameters to measure in all samples include: temperature, pH, conductivity, alkalinity, hardness, suspended solids (turbidity), percent fines in the gravel of fish spawning streams, and settleable solids (sediment). Other parameters to measure depend on the suspected sources of pollution, but include levels of at least ten heavy metals, petroleum hydrocarbons, several nutrients, dissolved gases, and fecal coliform bacteria. Selected fish and wildlife should also be tested for accumulated contaminant levels if pollution is suspected. Some important indicator species on Alaska Maritime Refuge are Dolly Varden and sticklebacks.

Service divers are studying sediment and benthic biota to determine contaminant sources and levels and to assess the impacts on resources in Womens Bay.

The highest priority for collection of baseline marine water quality data will be given to tidelands, submerged lands, and the water column around Afognak Island and in Womens Bay.

Commercial timber harvesting has occurred and is occurring on Afognak Island. This activity can lead to negative effects on water quality of freshwater and marine systems. In addition, log transfer facilities will result in losses of upland, intertidal, and, possibly, subtidal habitats, all of which support fish and wildlife resources. Comprehensive planning for siting log transfer facilities on Afognak Island should receive priority, thus reducing the total number necessary and the cumulative habitat impacts.

Strict adherence to the U.S. Fish and Wildlife Service Mitigation Policy during permitting would ensure no net loss of habitat values.

A variety of commercial and military activities in and near Womens Bay represent potential contaminant sources. Baseline sampling of sediment and biota in the vicinity commenced in 1987 and will continue through 1988. Further contaminant sampling and any rectification would be dependent on results of the two-year baseline effort. The Service recognizes the potential for fuel and oil spills in and near the refuge, especially at Womens Bay. The sensitive nature of refuge resources, and the difficulty of containing spills on water, make oil and fuel spills of special concern. To minimize the danger to refuge resources, the Service will work with other federal and state agencies in preparing for and responding to spills and in developing an interagency oil spill contingency plan for the refuge, and will contribute as agreed under such a plan.

Mariculture projects in the Kodiak and Afognak vicinity are expected to increase in number and size. Permitting activities will include determination of baseline conditions and monitoring of expected changes to water quality and affected habitats and resources.

Surveys of marine habitat types should focus on substrate types, selected ecologically-important biota, and water quality parameters. The purposes of data collection should be: (1) mapping of intertidal and subtidal substrates and resources, (2) establishment of the long-term natural variability in measured parameters (water quality and biota abundance), and (3) correlation of water quality parameters and substrates with selected biota. For determination of long-term variability, priority should be given to areas that are 1) presently undisturbed and expected to remain so, and 2) similar to areas expected to receive manipulation.

Refuge staff will advise adjacent landowners to ensure awareness of potential pollution threats and to coordinate protection of water quality among all concerned. Any pollution of refuge waters will be reported to appropriate state and federal agencies.

Air quality - All activities on the refuge will comply with the Clean Air Act, its amendments and all applicable state and federal laws, regulations and orders. The Service will cooperate with the Alaska Department of Environmental Conservation and other appropriate agencies responsible for establishing and enforcing air quality standards.

The following designated wilderness areas are classified Class One air quality areas in the Alaska Maritime Refuge: Chisik Island/Duck Island, the Tuxedni subunit, the St. Matthew Island group, Simeonof Island, and the Semedi Islands. The remainder of the refuge is classified a Class Two air quality area (Clean Air Act, Title 42, sections 7470-7479).

The refuge has established an air monitoring survey on Chisik Island. The monitoring will be used to determine if the Nikiski oil refineries or the Anchorage metropolitan area are degrading the Class One air at Chisik Island. The other areas with Class One air quality are not exposed to the same outside pollution sources and are not, at this time, targeted for air quality monitoring.

Hazardous Material Control

In May 1985 the Service undertook a system-wide survey to identify contaminant issues associated with the refuge system. A summary list of contaminant issues was prepared and information specific to each issue and refuge was identified; additional issues are added as they are identified. Action plans have been prepared for each contaminant issue. Three issues were identified on the Alaska Maritime Refuge: 1) monitoring military clean-up of 10 sites, 2) monitoring military and civilian unpermitted discharge in Womens Bay on Kodiak Island, and 3) Chisik Island air quality monitoring (discussed above). Action plans outlining the Service's proposed course of action relative to these issues have been developed and implementation is occurring. The plans will be updated on an annual basis as part of the Service's contaminant program.

Shorelands, Tidelands, and Submerged Lands

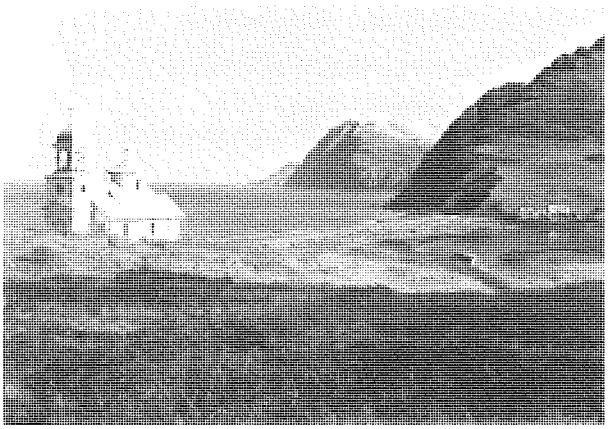
In most cases, the Submerged Lands Act of 1953, the Alaska Statehood Act of 1958, and the state

constitution provide for state ownership of water (subject to the reservation doctrine discussed in the water rights section), shorelands (the beds of navigable waters), tidelands (lands subject to tidal influence), and submerged lands (lands seaward from tidelands). In those cases federal jurisdiction stops at mean high tide. However, some tidelands, submerged lands and waters were retained in federal ownership at the time of statehood. The Service has jurisdiction over the submerged lands surrounding the Semidi Islands; the water column and tidelands surrounding Simeonof Island; the tidelands, submerged lands, and water column from Wolcott Reef to Sturgeon Lagoon in the Karluk area of Kodiak Island; the tidelands, submerged lands and water column surrounding Afognak Island; and the U.S. Coast Guard owned tidelands, submerged lands, and water column in Womens Bay. The state of Alaska asserts that these marine areas are in state ownership; this issue will most likely be resolved in the courts. Cooperative management agreements may be pursued by either the state or the Service when a case by case resolution of management issues proves unacceptable to either party.

Within Alaska Maritime Refuge, the Bureau of Land Management has determined the navigability of the portions of streams and lakes which are within lands selected by Native corporations or by the state of Alaska. Pursuant to Section 901(g) of the Alaska Lands Act, those determinations are for the purpose of determining title to lands beneath navigable waters as between the United States and the state of Alaska. No fresh water bodies within this refuge have been determined to be navigable. See the lands section of the Affected Environment Chapter for a more complete discussion of land ownership patterns.

Water Columns

The Service has authority to regulate certain activities on water columns to protect refuge lands, and for conservation purposes. These authorities stem from two provisions of the United States Constitution (the property clause and the commerce clause), the Alaska Lands Act, and other authorities including the National Wildlife Refuge Administration Act of 1968, the 1899 Rivers and Harbors Act, the Fish and



Near Karluk, on Kodiak Island, the Service has jurisdiction over a 3,000 foot wide strip of tidelands, submerged lands, and the water column extending from Wolcott Reef to Sturgeon Lagoon. This area was part of an Indian reservation established in 1943; reservation status was revoked when local residents chose to participate in the Alaska Native Claims Settlement Act land selection process.

Wildlife Coordination Act of 1958, and the Migratory Bird Treaty Act. The state of Alaska also has authority to manage water based on the laws cited in the section on shorelands above. These laws provide for water management by both the state and the Service.

The Service will oppose any uses of waterways that will adversely affect water quality or the natural abundance and diversity of fish and wildlife species in the refuge. The Service will work with the state on a case-by-case basis to resolve issues concerning the use of the various waterways where management conflicts arise. Cooperative agreements for the uses on the water will be pursued if a case-by-case resolution of management proves unacceptable to the Service and the state.

Visual Resource Management

In all alternatives the Service will identify and maintain the natural scenic values of the refuge and minimize the visual impacts of developments. Refuge facilities will be designed to blend into the landscape. The Service will cooperate with state agencies to

prevent significant deterioration of visual resources.

Litter and Waste Control

Under Service regulations (50 CFR 27.94) littering, disposing or dumping of garbage, refuse, sewage, or other debris on refuges is prohibited except at points or locations designated by the refuge manager. Litter disposal is the responsibility of individual refuge users. If waste disposal and litter control problems occur on the refuge the Service will increase its public education and law enforcement efforts.

Historical and Cultural Resources

Federal laws and regulations serve to minimize and prevent damage to sites impacted by development activities. These authorities are contained primarily in sections 106 and 110 of the National Historic Preservation Act of 1966, as amended, and in the regulations of the Advisory Council on Historic Preservation, 36 CFR 800.

When any federal undertaking is contemplated that has the potential to directly or indirectly effect any archaeological or historic site, including any action funded or permitted by the federal government, several steps must be taken. First the Service will determine if there are any such sites in existence. This includes an examination of existing records, consultation with knowledgeable local residents, and frequently, an examination of the area by qualified archaeologists. If no sites are found that may be impacted, the project may continue. If any sites are found, they will be evaluated against the standards for eligibility for inclusion on the National Register of Historic Places (36 CFR 60). For sites that are determined to be eligible, the Service assesses the effect of the proposed undertaking. If there is no effect, the project may continue.

If an effect is identified, a process of consultation is initiated that includes several parties, including but not limited to, the Service, the Advisory Council on Historic Preservation, the Alaska State Historic Preservation Officer, local governments, Native groups, and the National Park Service. This consultation will result in a course of action causing the least possible impact on the site or sites in question. The minimization of the impacts may be accomplished in a variety of ways, such as mitigation through information collection, relocation of a project, redesign of a project, or cancellation of a project if no other alternatives are feasible.

This Navy PV-1 Ventura patrol aircraft crashed on Aggatu Island. Historic aircraft and other World War II material may be collected on refuge lands only as authorized by a special use permit issued to a qualified organization or individual.

In addition to these project-specific obligations, the Service has long-term responsibilities for cultural resources on refuge lands that include a responsibility to inventory and evaluate all such resources. Due to the limitations of time, funding, and staffing, the Service must designate priorities in evaluating all refuge lands for their cultural resources.

When funds become available for the Alaska Maritime Refuge, the first priority will be to prepare a substantial and comprehensive cultural resource overview and a detailed predictive model describing possible sites within the refuge. After field testing, this overview will be used to guide the Service in selecting future inventory and evaluation projects for funding. The Service will also encourage archaeologists and historians from educational institutions or other government agencies to pursue their

research interests on refuge lands with the long-term objective of meeting these goals. Further information on cultural resources management can be found in the Service's Cultural Resources Management Handbook (U.S. Fish and Wildlife Service 1985).

It is illegal to collect vertebrate paleontological remains on the refuge without a permit issued under the provisions of the Antiquities Act of 1906. The Alaska state historic preservation statute prohibits such collection on state-owned lands, some of which fall within the exterior boundary of the refuge.

Historic aircraft and other World War II material will be managed in accordance with a policy published December 20, 1985, in the Federal Register (FR 50:51952-51953). These materials may be collected on refuge lands only as authorized by a special use permit issued to a qualified organization or individual.

Refuge Administration and Facilities

The Alaska Maritime Refuge maintains two offices, the refuge headquarters in Homer and the Aleutian Islands Unit office in Adak. In addition, an office is staffed on Amchitka Island during the construction phase (two years) of Navy activity on the island. A 121-foot refuge vessel, M/V Tiglax, is home ported in Homer. The Homer staff consists of a refuge manager, an assistant refuge manager, supervisory biologist, four refuge biologists, a budget assistant, clerk-typist, vessel master, vessel engineer, vessel mate, and a vessel cook/seaman. The Kenai Fisheries Assistance office also provides one person for six months to work on Alaska Maritime projects. The Adak staff, which is supervised by the Alaska Maritime Refuge Manager, consists of a refuge (unit) manager, an assistant refuge (unit) manager, assistant refuge (Amchitka) manager, a refuge biologist, an outdoor recreation planner, two clerk typists, a maintenance worker, a temporary biological technician, and a temporary laborer. The Amchitka Assistant Manager position will be maintained during Navy construction on Amchitka; after construction the work will be handled out of the Adak office.

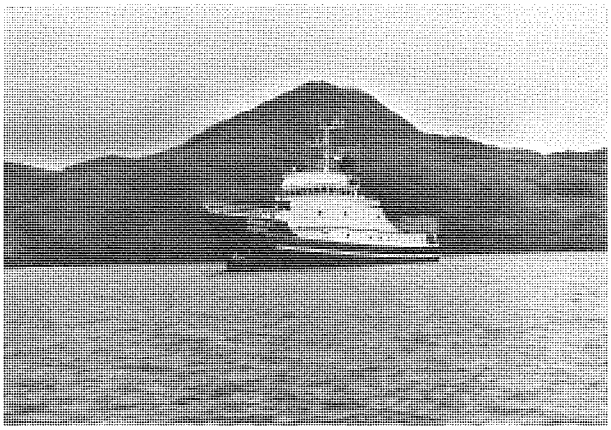
In addition, the refuge utilizes over 35 seasonal and volunteer employees. Many of these temporary employees work for the refuge only during the summer. In 1988 a permanent Outdoor Recreation Planner will be transferred from the Regional Office to the Homer office. A staffing study conducted by the Division of Personnel Management recommended the addition of another clerk/typist, a refuge manager trainee, and a permanent bio-tech. Other staff increases will depend on the alternative selected.

In Homer the Service rents refuge office and warehouse space. The office has a small visitor contact station downstairs and limited displays upstairs. A new visitor center/headquarters complex is planned for Homer. The Service owns the office on Adak. It has an extensive visitor center with an associated Alaska Natural History Association sales outlet. This outlet has the highest sales of the refuges in the state. The office contains storage space and repair shops for equipment. The Service also has three single residences and two duplexes for housing personnel on Adak. The Service has five administrative cabins on Adak, one on Amchitka, one on Buldir, and three on Attu. A new bunkhouse is being constructed on Adak for temporary employees and volunteers. The Service has a permanent informational display in Seward in conjunction with Kenai Fjords National Park.

In addition, the Pribilof Terms and Agreements provided for land and buildings on St. George and St. Paul for administrative use. These buildings, to be provided by Tanaq and Tanadqusix respectively, will combine office, visitor contact station, and bunkhouse facilities. Construction of trails, observation points, and other interpretive facilities is also outlined in the Pribilof Terms and Agreements. The construction of other facilities will depend on which management alternative is selected in the planning process.

Management of Selected Lands

Approximately 19 percent of the refuge (1,363,000 acres) has been selected but not yet conveyed to Native village and regional corporations, and the state of Alaska. Much of this land will never be conveyed due to overselections. The Service retains management responsibility for these lands, though the appropriate Native corporation or state agency would be consulted prior to implementing a



The new Fish and Wildlife Service vessel, M/V Tiglax, will support refuge management activities throughout coastal Alaska.

management program or issuing any special use permits. Management directions for these lands would be the same as on the adjacent refuge lands.

Refuge Management Plans

Following adoption of the comprehensive conservation plan, more detailed management plans will be prepared. These later plans will specify actions to take in implementing the general directions outlined in the comprehensive conservation plan. They will also form the basis for annual work planning and budgeting. Appropriate public involvement will be continued through the completion of detailed management plans. The Service will work closely with other federal and state agencies, village and regional corporations, and other interested parties in the development of the refuge management plans.

DESCRIPTION OF THE ALTERNATIVES

Based on the legislative purposes, resources, issues, and opportunities found on Alaska Maritime Refuge, three management alternatives have been formulated to guide management of the refuge. The alternatives are general in nature and provide broad strategies for management of refuge resources and uses. Each of the three alternatives designates a different mix of the management categories described earlier. Although the alternatives share some common strategies, each alternative differs slightly in overall emphasis. All of the alternatives are consistent with the purposes of the refuge, and comply with existing laws, regulations and Service policies. Table 36 illustrates the placement of management categories for all three alternatives.

After the draft plan was published the Service received comments from federal agencies, the state of Alaska, Native corporations, interest groups, local residents, and other interested individuals. These comments varied considerably in their emphasis and recommendations (see Appendix I). Most comments focused on the wilderness review or management of marine areas around Afognak Island and in Womens and Middle bays.

As a result of comments received, the Service has modified the management proposals in this final plan.

Changes are:

- o all alternatives propose transfer of Sally, Sheep, and Sitkalidak islands to Kodiak Refuge;
- o in Alternative C, the Preferred Alternative, the moderate management areas previously proposed for the marine areas around Afognak Island and in Womens and Middle bays have been reclassified for intensive management; the minimal management designations for these areas remain the same.

Changes in other parts of the plan are described in the revisions to the plan section of the introduction chapter.

Alternative A (Current Situation Alternative)

This alternative, the "current situation" alternative, would maintain the existing range and intensity of management and recreational and economic uses. It is assumed that existing laws, executive orders, regulations and policies governing Service administration and operation of the National Wildlife Refuge System would remain in effect.

Alternative A emphasizes protection of existing fish and wildlife populations and habitats and natural diversity while restoring endangered and other species to natural levels. Fish and

wildlife management focuses on monitoring and on eradication of introduced predators. Continued public use of the refuge would be allowed using existing access methods and routes. Opportunities for hunting, fishing, and other recreational uses would be maintained, as would scientific research, wildlife and wildland observation opportunities, trapping, and subsistence uses.

The following management directions summarize Alternative A. Alternative A would:

- o maintain the existing mix of undeveloped habitats and developed military and commercial use sites;
- o protect seabird colonies and marine mammal haulouts;
- o emphasize protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels;
- o focus fish and wildlife management on monitoring and on eradication of introduced predators;
- o accommodate the existing military installations on Adak, Shemya, Attu, and Amchitka islands and at Cape Lisburne;
- o provide for continued subsistence use of refuge resources;
- o maintain traditional access opportunities;
- o maintain opportunities for hunting, fishing, and wildlife observation;
- o maintain trapping opportunities;
- o recommend no additional areas for wilderness designation; 56 percent of the refuge is already designated wilderness.

Table 36 shows the location of management categories in Alternative A. Table 37 lists acreages and the proportion of the refuge placed in each management category. Approximately one percent of the refuge is in intensive management, one percent is in moderate management, 42 percent is in minimal management, and 56 percent is existing wilderness.

Figures 63-71 illustrate the locations of management categories in Alternative A for the waters of the Womens Bay and Afognak areas; Unimak Island; the military installations on Attu, Shemya, Amchitka, and Adak islands; and Atka Island. Figure 70 and 71 show the location of off road vehicle routes being used on Atka and St. Paul islands.

Fish and wildlife management - The Service would emphasize protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels. Fish and wildlife management will focus on monitoring and on eradication of introduced predators. Present levels of public and traditional use would be maintained. Fishing, hunting, and trapping would be managed to maintain fish and wildlife populations at natural levels.

Under this alternative the fishery program on the refuge would be administered with staff currently working at the Kenai Fisheries Assistance Office. Primary activities would include coordination with other state and federal agencies to ensure that refuge concerns are clearly understood and considered when management strategies affecting refuge fish and wildlife resources are developed. In addition, a five-year fishery management plan for the refuge would be developed. Little would be done to monitor population trends or obtain baseline fishery data.

Population management is concentrated on increasing the numbers and range of the endangered Aleutian Canada goose. This species was formerly abundant on many islands in the Aleutian Islands and Alaska Peninsula units. Introduction of red and arctic foxes eliminated the geese from every island except Buldir, Chagulak, and Kaliktagik by 1960. The Aleutian Canada Goose Recovery Plan (Aleutian Canada Goose Recovery Team 1982) calls for restoration of breeding populations of 50 or more pairs on at least three additional widely-separated islands, and a total population of at least 1,200. Reintroduced populations are currently being monitored on Agattu, Alaid/Nizki, and Amchitka islands. Transplants from Buldir to target islands are still being accomplished.

Eradication of introduced red and arctic foxes on islands of the Alaska Maritime Refuge is essential to allow natural populations of birds to reestablish themselves. Birds were severely reduced on many islands by these predators. Aleutian Canada geese were eliminated on all

Table 36. Management category designations by alternative.

NOTE: THESE ACREAGE FIGURES ARE APPROXIMATE AND INCLUDE ALL SELECTED LANDS. SOME BUT NOT ALL OF THE SELECTED LANDS WILL BE CONVEYED INTO PRIVATE OWNERSHIP.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
CHUKCHI SEA UNIT (from north to south)			
Seahorse Islands	120 acres minimal	120 acres proposed wilderness	Same as A
Pt. Franklin	1,240 acres minimal	Same as A	Same as A
Islets in west Peard Bay	30 acres minimal	30 acres proposed wilderness	Same as A
Icy Cape	5,130 acres minimal; 2,244 acres state; 2,891 acres private	5,130 acres proposed wilderness; 2,244 acres state; 2,891 acres private	Same as A
Ann Stevens/ Cape Lisburne	104,000 acres minimal; 40 acres intensive includes military site on north end; 12,480 acres private; 1,280 acres military	70,739 acres proposed wilderness; 40 acres intensive includes military site on north end; 33,261 acres minimal 12,480 acres private; 1,280 acres military	Same as A
Cape Thompson	88,000 acres minimal; 200 acres intensive includes Chariot site on south end; 48,672 acres private	38,756 acres proposed wilderness; 200 acres intensive includes Chariot site on south end; 49,244 acres minimal; 48,672 acres private	Same as A
Stepping Lagoon Barrier Islands	20 acres minimal	20 acres proposed wilderness	Same as A
Tasikpak Lagoon Barrier Island	40 acres minimal	40 acres proposed wilderness	Same as A
Pusaluk Lagoon Barrier Island	50 acres minimal	50 acres proposed wilderness	Same as A
Tugik Lagoon Barrier Island	20 acres minimal	20 acres proposed wilderness	Same as A
Kavrorak Lagoon Barrier Island	20 acres minimal	20 acres proposed wilderness	Same as A
Ekichuk Lake Islands	250 acres minimal	Same as A	Same as A
Puffin Island	5 acres existing wilderness	Same as A	Same as A
Chamisso Island	435 acres existing wilderness	Same as A	Same as A
Sinnachiak Peninsula	700 acres minimal	Same as A	Same as A
Lopp Lagoon Barrier Islands	3,800 acres minimal; 1,400 acres private	Same as A	Same as A

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
BERING SEA UNIT (north to south)			
Norton Sound Islands and capes			
Sledge Island	700 acres minimal	Same as A	Same as A
Safety Sound Barrier Island	1,100 acres minimal; road right of way intensive	Same as A	Same as A
Topkok Head	1,100 acres minimal	Same as A	Same as A
Bluff	8,700 acres minimal	Same as A	Same as A
Lands east of Cape Darby	1,400 acres minimal	Same as A	Same as A
Besboro Island	620 acres minimal	Same as A	Same as A
Egg Island	60 acres minimal	Same as A	Same as A
Whale Island	50 acres minimal; 2 acres private	Same as A	Same as A
Beulah Island	5 acres minimal	Same as A	Same as A
Cape Stephens	80 acres minimal	Same as A	Same as A
Sand Islands			
Krekatok Island	2,170 acres minimal	2,170 acres proposed wilderness	Same as A
Neragon Island	1,700 acres minimal	1,700 acres proposed wilderness	Same as A
Kikegtek Island	200 acres minimal	200 acres proposed wilderness	Same as A
Pingurbek Island	930 acres minimal	930 acres proposed wilderness	Same as A
Kwigluk Island	20 acres minimal	20 acres proposed wilderness	Same as A
Hagemeister Island	60,000 acres minimal	60,000 acres proposed wilderness	Same as A
St. Matthew Island group			
Hall Island	3,565 acres existing wilderness	Same as A	Same as A
St. Matthew Island	77,602 acres existing wilderness	Same as A	Same as A
Pinnacle Island	250 acres existing wilderness	Same as A	Same as A
Pribilof Islands			
St. Paul Island	2,324 acres minimal; 27,600 acres private; 1 acre intensive includes Antones road r.o.w.	Same as A	Same as A
Walrus Island	30 acres minimal	30 acres proposed wilderness	Same as B
Otter Island	152 acres minimal	152 acres proposed wilderness	Same as B
St. George Island	4,805 acres minimal; 17,342 acres private	Same as A	Same as A

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
ALEUTIAN ISLANDS UNIT (from west to east)			
Near Islands			
Attu Island	1,800 acres intensive, includes Coast Guard facility and roads; 8,166 acres minimal, bordering intensive area; 213,846 acres existing wilderness	Same as A	Same as A
Agattu Island	55,535 acres existing wilderness	Same as A	Same as A
Alaid Island	1,468 acres existing wilderness	Same as A	Same as A
Nizki Island	1,707 acres existing wilderness	Same as A	Same as A
Shemya Island	3,520 acres intensive	Same as A	Same as A
Rat Islands			
Buldir Island	4,915 acres existing wilderness	Same as A	Same as A
Kiska Island	1,940 acres minimal, includes Kiska Harbor; 67,658 acres existing wilderness	Same as A	Same as A
Sobaka Rock	10 acres existing wilderness	Same as A	Same as A
Little Kiska Island	1,843 acres existing wilderness	Same as A	Same as A
Tanadak Island	30 acres existing wilderness	Same as A	Same as A
Segula Island	8,192 acres existing wilderness	Same as A	Same as A
Khvostof Island	614 acres existing wilderness	Same as A	Same as A
Pyramid Island	40 acres existing wilderness	Same as A	Same as A
Davidof Island	819 acres existing wilderness	Same as A	Same as A
Rat Island	6,861 acres existing wilderness	Same as A	Same as A
Little Sitkin Island	15,701 acres existing wilderness	Same as A	Same as A
Amchitka Island	10,472 acres intensive, includes road, military sites, and sampling stations; 42,588 acres minimal in center, east, and west end; 22,152 acres existing wilderness	36,738 acres intensive on east and west end; 16,322 acres proposed wilderness center of island; 22,152 existing wilderness	Same as B
Bird Rock	72 acres existing wilderness	Same as A	Same as A
Semisopochnoi Island	56,013 acres existing wilderness	Same as A	Same as A
Delarof Islands			
Amatignak Island	8,533 acres existing wilderness	Same as A	Same as A
Tanadak Island	50 acres existing wilderness	Same as A	Same as A
Ulak Island	7,646 acres existing wilderness	Same as A	Same as A

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Delarof Islands continued			
Unalga Island	512 acres existing wilderness	Same as A	Same as A
Dinkum Rocks	12 acres existing wilderness	Same as A	Same as A
Kavalga Island	3,618 acres existing wilderness	Same as A	Same as A
Gareloi Island	16,964 acres existing wilderness	Same as A	Same as A
Ogliuga Island	389 acres minimal on north end; 2,000 acres existing wilderness	389 acres proposed wilderness; 2,000 acres existing wilderness	Same as B
Skagul Island	956 acres existing wilderness	Same as A	Same as A
Tag Island	54 acres existing wilderness	Same as A	Same as A
Ilak Island	307 acres existing wilderness	Same as A	Same as A
Gramp Rock	30 acres existing wilderness	Same as A	Same as A
Andreanof Islands			
Tanaga Island	774 acres minimal on south end; 127,226 acres existing wilderness	765 acres proposed wilderness; 127,226 acres existing wilderness; 9 acres minimal on selected site	Same as B
Kanaga Island	91,716 acres existing wilderness	Same as A	Same as A
Bobrof Island	1,980 acres existing wilderness	Same as A	Same as A
Ringgold Island	273 acres existing wilderness	Same as A	Same as A
Staten Island	239 acres existing wilderness	Same as A	Same as A
Argonne Island	102 acres existing wilderness	Same as A	Same as A
Dora Island	239 acres existing wilderness	Same as A	Same as A
North Island	137 acres existing wilderness	Same as A	Same as A
South Island	30 acres existing wilderness	Same as A	Same as A
Green Island	40 acres existing wilderness	Same as A	Same as A
Ina Island	5 acres existing wilderness	Same as A	Same as A
Crone Island	239 acres existing wilderness	Same as A	Same as A
Island north of Elf	205 acres existing wilderness	Same as A	Same as A
Elf Island	649 acres existing wilderness	Same as A	Same as A
Adak Island	11,000 acres intensive, includes naval station and roads; 50,000 acres moderate, includes area surrounding intensive area; 119,941 acres existing wilderness includes all offshore islands	Same as A	Same as A
Kagalaska Island	29,355 acres existing wilderness	Same as A	Same as A

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Andreanof Islands, continued			
Little Tanaga Island	17,852 acres existing wilderness	Same as A	Same as A
Chisak Island	137 acres existing wilderness	Same as A	Same as A
Umak Island	9,796 acres existing wilderness	Same as A	Same as A
Aziak Island	341 acres existing wilderness	Same as A	Same as A
Tanaklak Island	853 acres existing wilderness	Same as A	Same as A
Asuksak Island	410 acres existing wilderness	Same as A	Same as A
Kanu Island	853 acres existing wilderness	Same as A	Same as A
Tagadak Island	649 acres existing wilderness	Same as A	Same as A
Great Sitkin Island	700 acres minimal in southwest; 38,519 acres existing wilderness	700 acres proposed wilderness; 38,519 acres existing wilderness	Same as B
Igitkin Island	4,710 acres existing wilderness	Same as A	Same as A
Anagaksik Island	102 acres existing wilderness	Same as A	Same as A
Ulak Island	205 acres existing wilderness	Same as A	Same as A
Chugul Island	4,301 acres existing wilderness	Same as A	Same as A
Tagalak Island	3,516 acres existing wilderness	Same as A	Same as A
Ikiginak Island	580 acres existing wilderness	Same as A	Same as A
Oglodak Island	785 acres existing wilderness	Same as A	Same as A
Kasatochi Island	717 acres existing wilderness	Same as A	Same as A
Koniuji Island	273 acres existing wilderness	Same as A	Same as A
Salt Island	444 acres existing wilderness	Same as A	Same as A
Atka Island	109,444 acres minimal on north end, mouth of Korovin Bay, center of island, southeast tip; 81,988 acres existing wilderness on west end of island; 59,365 acres private	12,300 acres minimal includes selected land and parcel at south end of Korovin Bay, and southeast tip; 97,144 acres proposed wilderness includes Mt. Kliuchef area, parcel at north end Korovin Bay, and area in center of the island 81,988 acres existing wilderness on west end of island; 59,365 acres private	42,960 acres minimal includes parcels at north and south end of Korovin Bay, parcels on west and east sides Mt. Kliuchef, selected lands, area in center of island, and southeast tip; 66,484 acres proposed wilderness include Mt. Kluichef and parcel adjacent to wilderness boundary; 81,988 acres existing wilderness on west end of island; 59,365 acres private
Egg Island	102 acres minimal	102 acres proposed wilderness	Same as B
Amlia Island	107,930 acres existing wilderness; 4,050 acres private	Same as A	Same as A
Sagagik Island	5 acres existing wilderness	Same as A	Same as A
Tanadak Island	50 acres existing wilderness	Same as A	Same as A
Agligadak Island	5 acres existing wilderness	Same as A	Same as A
Seguam Island	52,292 acres existing wilderness	Same as A	Same as A

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Islands of Four Mountains			
Amukta Island	12,425 acres existing wilderness	Same as A	Same as A
Chagulak Island	2,082 acres existing wilderness	Same as A	Same as A
Yunaska Island	43,520 acres existing wilderness	Same as A	Same as A
Herbert Island	13,790 acres existing wilderness	Same as A	Same as A
Carlisle Island	10,718 acres existing wilderness	Same as A	Same as A
Chuginadak Island	42,257 acres existing wilderness	Same as A	Same as A
Uliaga Island	2,321 acres existing wilderness	Same as A	Same as A
Kagamil Island	10,342 acres existing wilderness	Same as A	Same as A
Fox Islands			
Samalga Island	410 acres minimal; 940 acres private	Same as A	Same as A
Adugak	140 acres minimal	Same as A	Same as A
Umnak Island	212,000 acres minimal; 209,000 acres private; 10,000 acres state	Same as A	Same as A
Vsevidof Island	478 acres existing wilderness	Same as A	Same as A
Kigul Island	137 acres existing wilderness	Same as A	Same as A
Ogchul Island	50 acres existing wilderness	Same as A	Same as A
Pustoi Island	25 acres existing wilderness	Same as A	Same as A
Emerald Island	55 acres existing wilderness	Same as A	Same as A
Bogoslof Island	155 acres existing wilderness	Same as A	Same as A
Fire Island	5 acres existing wilderness	Same as A	Same as A
Unalaska Island	483,000 acres minimal; 150,000 acres private	Same as A	Same as A
Baby Islands	250 acres minimal	250 acres proposed wilderness	Same as B
Wislow Island	5 acres minimal	5 acres proposed wilderness	Same as B
Round Island	20 acres minimal	20 acres proposed wilderness	Same as B
Tanaskan Bay Islets	5 acres minimal	5 acres proposed wilderness	Same as B
Dushkot Island	30 acres minimal	30 acres proposed wilderness	Same as B
Erskine Bay Islets	5 acres minimal	5 acres proposed wilderness	Same as B
Kisselen Bay Islets	10 acres minimal	10 acres proposed wilderness	Same as B
Peter Island	128 acres minimal	128 acres proposed wilderness	Same as B

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Fox Islands continued			
Buck Island	430 acres existing wilderness	Same as A	Same as A
Ogangen Island	600 acres existing wilderness	Same as A	Same as A
Sedanka Island	20,900 acres minimal; 4,100 acres private	Same as A	Same as A
Egg Island	115 acres existing wilderness	Same as A	Same as A
Únalga Island	800 acres minimal; 5,600 acres private	Same as A	Same as A
Krenitzin Islands			
Akutan Island	21,100 acres minimal; 50,200 acres private	Same as A	Same as A
Akun Island	13,640 acres minimal; 24,800 acres private	Same as A	Same as A
Avatanak Island	8,200 acres existing wilderness; 300 acres private	Same as A	Same as A
Tigalda Island	23,067 acres minimal	Same as A	Same as A
Kaligagan Island	207 acres existing wilderness	Same as A	Same as A
Aiktak Island	307 acres minimal	307 acres proposed wilderness	Same as B
Ugamak Island	1,900 acres minimal, east half; 1,300 acres existing wilderness	1,900 acres proposed wilderness includes east half; 1,300 acres existing wilderness;	Same as B
Round Island	20 acres minimal	20 acres proposed wilderness	Same as B
Amak Island and Sealion Rocks	2,893 acres existing wilderness	Same as A	Same as A
Unimak Island	22,484 acres minimal on east and west ends; 910,000 acres existing wilderness; 45,855 acres private; 235 acres state	14,484 acres minimal; 8,000 acres proposed wilderness; 910,000 acres existing wilderness; 45,855 acres private; 235 acres state	Same as B
ALASKA PENINSULA UNIT (from west to east)			
Sankin Island	15 acres minimal	Same as A	Same as A
Sanak Islands			
Long Island	1,480 acres existing wilderness	Same as A	Same as A
Rabbit Island	80 acres existing wilderness	Same as A	Same as A
Wanda Island	50 acres existing wilderness	Same as A	Same as A
Elma Island	716 acres existing wilderness	Same as A	Same as A
Inikla Island	80 acres existing wilderness	Same as A	Same as A
Umla Island	50 acres existing wilderness	Same as A	Same as A

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Sanak Islands continued			
Caton Island	4,414 acres existing wilderness	Same as A	Same as A
Other islets and rocks	existing wilderness	Same as A	Same as A
Egg Island	15 acres minimal	15 acres proposed wilderness	Same as B
Amagat Island	285 acres minimal	Same as A	Same as A
Sandman Reefs includes islets and rocks plus Goose, Little Goose, Midun, High, Shushilnoi, Hunt, and Umga islands	270 acres minimal	270 acres proposed wilderness	Same as B
Sozavarika Island	45 acres minimal	Same as A	Same as A
Buyan Island	5 acres minimal	Same as A	Same as A
Patton Island	15 acres minimal	Same as A	Same as A
Sarana Island	65 acres minimal	Same as A	Same as A
Rona Island	20 acres minimal	Same as A	Same as A
Deer Island	29,000 acres minimal; 5,700 acres private	Same as A	Same as A
Fox Island	300 acres minimal	Same as A	Same as A
Pavlof Islands			
Inner Iliasik Island	1,280 acres minimal; 470 acres private	Same as A	Same as A
Outer Iliasik Island	2,240 acres minimal	Same as A	Same as A
Goloi Island	1,920 acres minimal	Same as A	Same as A
Dolgoi Island	8,300 acres minimal; 16,850 acres private	Same as A	Same as A
Poperechnoi Island	3,390 acres minimal	Same as A	Same as A
Ukolnoi Island	11,520 acres minimal	Same as A	Same as A
The Pinnacle	10 acres minimal	10 acres proposed wilderness	Same as A
Wosnesenski Island	7,500 acres minimal	Same as A	Same as A
Omega Island	3 acres minimal	3 acres proposed wilderness	Same as A
Kennoys Island	15 acres minimal	15 acres proposed wilderness	Same as A
Jude Island	20 acres minimal	20 acres proposed wilderness	Same as A
Shumagin Islands			
Unga Island	23,000 acres minimal; 79,000 acres private	Same as A	Same as A
Gull Island	10 acres minimal	Same as A	Same as A

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Shumagin Islands continued			
Egg Island	20 acres minimal	Same as A	Same as A
Popof Island	6,700 acres minimal; 14,500 acres private	Same as A 14,500 acres private	6,060 acres minimal; 640 acres intensive;
Henderson Island	5 acres minimal	Same as A	Same as A
Korovin Island	14,500 acres minimal; 1,300 acres private	Same as A	Same as A
Guillemot Island	700 acres minimal	Same as A	Same as A
Karpa Island	610 acres minimal	610 acres proposed wilderness	Same as B
Andronica Island	3,605 acres minimal	Same as A	Same as A
The Whaleback	2 acres minimal	Same as A	Same as A
The Haystacks	35 acres minimal	Same as A	Same as A
Nagai Island	60,100 acres minimal; 6,900 acres private	Same as A	Same as A
John Island	150 acres minimal	Same as A	Same as A
Near Island	520 acres minimal	Same as A	Same as A
Twin Islands	50 acres minimal	Same as A	Same as A
Turner Island	1,395 acres minimal	Same as A	Same as A
Bendel Island	3,088 acres minimal	Same as A	Same as A
Spectacle Island	1,860 acres minimal	Same as A	Same as A
Peninsula Island	400 acres minimal	Same as A	Same as A
Big Koniuji Island	21,526 acres minimal	Same as A	Same as A
Castle Rock	50 acres minimal	Same as A	Same as A
Murre Rocks	15 acres minimal	Same as A	Same as A
Hall Island	85 acres minimal	Same as A	Same as A
Herendeen Island	192 acres minimal	Same as A	Same as A
Little Koniuji Is.	14,055 acres minimal	Same as A	Same as A
Atkins Island	608 acres minimal	Same as A	Same as A
Bird Island	4,314 acres minimal	Same as A	Same as A
Chernabura Island	7,440 acres minimal	Same as A	Same as A
Simeonof Island and islets	10,000 acres existing wilderness	Same as A	Same as A
Simeonof Island water columns and tidelands	15,600 acres existing wilderness	Same as A	Same as A

307/72

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Chiachi Islands			
Leader Island	10 acres minimal	10 acres proposed wilderness	Same as A
Jacob Island	2,790 acres minimal	Same as A	Same as A
Paul Island	3,720 acres minimal; 780 acres private	Same as A	Same as A
Chiachi Island	4,495 acres minimal	Same as A	Same as A
Chiachi Islets	100 acres minimal	Same as A	Same as A
Petrel Island	10 acres minimal	Same as A	Same as A
Shapka Island	100 acres minimal	Same as A	Same as A
Pinusuk Island	200 acres minimal	Same as A	Same as A
Brother Islands	122 acres minimal	Same as A	Same as A
Spitz Island	86 acres minimal	Same as A	Same as A
Mitrofania Island	11,100 acres minimal	Same as A	Same as A
Seal Cape	8,200 acres minimal	8,200 acres proposed wilderness	Same as B
Chankliut Island	930 acres minimal	Same as A	Same as A
Gull Island	5 acres minimal	Same as A	Same as A
Nakchamik Island	4,960 acres minimal	Same as A	Same as A
Kak Island	50 acres minimal	50 acres proposed wilderness	Same as A
Atkulik Island	300 acres minimal	300 acres proposed wilderness	Same as A
Unavikshak Islands	750 acres minimal	Same as A	Same as A
Unnamed Islands S. of Cape Kumlik	40 acres minimal	Same as A	Same as A
Kumlik Island	700 acres minimal	Same as A	Same as A
Garden Island	40 acres minimal	Same as A	Same as A
Eagle Island	10 acres minimal	Same as A	Same as A
Sutwik Island	21,219 acres minimal	Same as A	Same as A
Hydra Island	25 acres minimal	Same as A	Same as A
Long Island	225 acres minimal	Same as A	Same as A
Central Island	95 acres minimal	Same as A	Same as A
Ugaiushak Island	485 acres minimal	Same as A	Same as A
Semidi Islands			
Aghiyuk Island	3,380 acres existing wilderness	Same as A	Same as A
Chowiet Island	3,565 acres existing wilderness	Same as A	Same as A

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Semidi Islands continued			
All other islands and islets in the group	1,175 acres existing wilderness	Same as A	Same as A
Semidi submerged lands	350,280 acres existing wilderness	Same as A	Same as A
Chiginagak Bay Islets	200 acres minimal	Same as A	Same as A
Derickson Island	120 acres minimal	Same as A	Same as A
Aiugnak Columns	1 acre minimal	1 acre proposed wilderness .	Same as A
David Island	465 acres minimal	Same as A	Same as A
Poltava Island	300 acres minimal	Same as A	Same as A
Navy Island	30 acres minimal	Same as A	Same as A
Ashiiak Island	35 acres minimal	Same as A	Same as A
Agripina Bay Islets	100 acres minimal	Same as A	Same as A
Kilokak Rocks	10 acres minimal	Same as A	Same as A
Imuya Bay Islets	60 acres minimal	Same as A	Same as A
Wide Bay Islands			
Titcliffe Island	500 acres minimal	Same as A	Same as A
Hartman Island	500 acres minimal	Same as A	Same as A
Terrace Island	500 acres minimal	Same as A	Same as A
West Channel Island	200 acres minimal	Same as A	Same as A
East Channel Island	100 acres minimal	Same as A	Same as A
Unnamed islands	300 acres minimal	Same as A	Same as A
Jute Island	35 acres minimal	35 acres proposed wilderness	Same as B
Kekernoi Islets	6 acres minimal	6 acres proposed wilderness	Same as B
Alinchak Bay Islets	3 acres minimal	3 acres proposed wilderness	Same as B
Chirikof Island	29,000 acres minimal	Same as A	Same as A
Nagai Rocks	1 acre minimal	1 acre proposed wilderness	Same as A
GULF OF ALASKA UNIT (west to east)			
Islands and submerged lands associated with Kodiak Island			
Sundstrom Island	300 acres minimal	Same as A	Same as A
Aiktalik Island	4,680 acres minimal; 120 acres private	Same as A	Same as A
Geese Islands	700 acres minimal	Same as A	Same as A

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Akhiok Island	70 acres minimal; 400 acres private	Same as A	Same as A
Flat Island	15 acres minimal	Same as A	Same as A
Sitkalidak Island	7,680 acres minimal; 65,976 acres private; 960 acres state	Same as A	Same as A
Fox Island	80 acres minimal	Same as A	Same as A
Karluk area Tidelands, submerged lands, and water column from Wolcott Reef to Sturgeon Lagoon	5,600 acres minimal	Same as A	Same as A
Bear Island	50 acres intensive	Same as A	Same as A
Harvester Island	600 acres intensive	Same as A	Same as A
Noisy Island	40 acres minimal except Coast Guard lighthouse	40 acres proposed wilderness	Same as A
Unnamed islands adjacent to Noisy I.	40 acres minimal	40 acres proposed wilderness	Same as A
Islets at head of Northeast Arm	15 acres minimal	15 acres proposed wilderness	Same as A
Sally Island	1,560 acres minimal	1,560 acres proposed wilderness	Same as A
Sheep Island	80 acres minimal	80 acres proposed wilderness	Same as A
Village Island	55 acres minimal	Same as A	Same as A
Green Island and islets	95 acres minimal	95 acres proposed wilderness	Same as A
Womens Bay Islets			
Mary	30 acres minimal	Same as A	Same as A
Viesoki	5 acres minimal	Same as A	Same as A
Blodgett	6 acres minimal	Same as A	Same as A
Zaimka	30 acres minimal	Same as A	Same as A
Cliff	2 acres minimal	Same as A	Same as A
Puffin	5 acres minimal	Same as A	Same as A
Womens Bay submerged lands, tidelands, and water column	560 acres intensive, along the shore; 8,940 acres minimal	Same as A	6,020 acres intensive; 3,480 acres minimal at head of bay

317,608

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Islands and submerged lands associated with Afognak Island			
Afognak tidelands, submerged lands and water column	11,544 acres intensive includes Discoverer, Kazakof, and Kitoi bays; 640 acres moderate in Raspberry Strait; 391,000 acres minimal	11,544 acres intensive includes Discoverer, Kazakof, and Kitoi bays; 20,768 acres moderate in Raspberry Strait; 370,872 acres minimal	335,984 acres intensive 67,200 acres minimal off Kodiak Refuge
Grassy Island	10 acres minimal	10 acres proposed wilderness	Same as A
Alligator Island	20 acres minimal	20 acres proposed wilderness	Same as A
Rocky Island	5 acres minimal	5 acres proposed wilderness	Same as A
Delphin Island	80 acres intensive	Same as A	Same as A
Discoverer Island	200 acres intensive	Same as A	Same as A
Sealion Rocks	5 acres minimal	5 acres proposed wilderness	Same as A
Sea Otter Island	45 acres minimal	45 acres proposed wilderness	Same as A
Latex Rocks	20 acres minimal	20 acres proposed wilderness	Same as B
Dark Island	200 acres minimal	200 acres proposed wilderness	Same as A
Carl Island	20 acres minimal	20 acres proposed wilderness	Same as B
Ushagat Island	7,000 acres minimal	Same as A	Same as A
Sugarloaf Island	180 acres minimal	180 acres proposed wilderness	Same as B
Sud Island	300 acres minimal	300 acres proposed wilderness	Same as B
Nord Island	85 acres minimal	85 acres proposed wilderness	Same as B
West Amatuli Island	1,720 acres minimal	Same as A	Same as A
East Amatuli Island	1,065 acres minimal	Same as A	Same as A
Islands and rocks in Cook Inlet			
Bruin Island	240 acres minimal	Same as A	Same as A
Mushroom Islets	1 acre minimal	Same as A	Same as A
White Gull	1 acre minimal	Same as A	Same as A
Turtle Reef	1 acre minimal	Same as A	Same as A
Iniskin Rock	1 acre minimal	Same as A	Same as A
Vert Island	1 acre minimal	Same as A	Same as A
Scott Island	5 acres minimal	Same as A	Same as A
Iniskin Island	1 acre minimal	Same as A	Same as A
Pomeroy Island	2 acres minimal	Same as A	Same as A
Big Rock	1 acre minimal	Same as A	Same as A

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Oil Reef	1 acre minimal	Same as A	Same as A
Gull Island	2 acre minimal	Same as A	Same as A
Tuxedni Subunit			
Duck and Chisik islands	160 acres moderate on north end of Chisik 5,548 existing wilderness	Same as A	Same as A
Sixty-foot Rock	1 acre minimal	Same as A	Same as A
Chugach Islands			
Elizabeth Island	3,600 acres minimal; 200 acres private	Same as A	Same as A
Perl Island	2,977 acres minimal; 123 acres private	Same as A	Same as A
East Chugach Island	500 acres minimal; 2,700 acres private	Same as A	Same as A
Perl Rock	1 acre minimal	Same as A	Same as A
Naguhut Rocks	1 acre minimal	Same as A	Same as A
Pye Islands			
Pye Reef	5 acres minimal	5 acres proposed wilderness	Same as A
Outer Island	800 acres minimal	800 acres proposed wilderness	Same as B
Rabbit Island	900 acres minimal	900 acres proposed wilderness	Same as A
Ragged Island	4,900 acres minimal	Same as A	Same as A
Chiswell Islands			
Granite Island	1,560 acres minimal	1,560 acres proposed wilderness	Same as B
Twin Islands	185 acres minimal	185 acres proposed wilderness	Same as B
Dora Island	50 acres minimal	50 acres proposed wilderness	Same as B
Harbor Island	670 acres minimal	670 acres proposed wilderness	Same as B
Natoa Island	270 acres minimal	270 acres proposed wilderness	Same as B
Beehive Islands	20 acres minimal	20 acres proposed wilderness	Same as B
Matushka Island	200 acres minimal	200 acres proposed wilderness	Same as B
Chiswell Islands	15 acres minimal	15 acres proposed wilderness	Same as B
Lone Rock	5 acres minimal	5 acres proposed wilderness	Same as B
Seal Rocks	15 acre minimal	15 acres proposed wilderness	Same as B
Chat Island	100 acres minimal	100 acres proposed wilderness	Same as B
Cheval Island	190 acres minimal	190 acres proposed wilderness	Same as B

323483

Table 36. Management category designations by alternative, continued.

REFUGE UNIT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C PREFERRED ALTERNATIVE
Rugged Island	990 acres minimal	Same as A	Same as A
Pilot Rock	1 acre minimal	Same as A	Same as A
Unnamed islands	200 acres minimal	200 acres proposed wilderness	Same as B
Other islands of the Gulf of Alaska and Southeast			
Middleton Island easement only	40 acres minimal	Same as A	Same as A
Moraine Islands	150 acres minimal	Same as A	Same as A
St. Lazaria Subunit	65 acres existing wilderness	Same as A	Same as A
Hazy Islands Subunit	32 acres existing wilderness	Same as A	Same as A
Forrester Island Subunit	2,832 acres existing wilderness	Same as A	Same as A

323,683 proposed wilderness

islands but three, and other waterfowl were reduced to very small numbers. Species of seabirds that nest on sheer cliffs (murres, kittiwakes, and cormorants) partially escaped the impact of foxes, but most species (fulmars, puffins, auklets, storm-petrels, and others) were severely reduced or eliminated. Foxes are currently being eradicated on six islands in the Aleutians and Alaska Peninsula units by means of shooting and trapping. Compound 1080 is being used on Kiska on an experimental basis. The Service hopes to have 1080 registered for use in the Aleutians as a predicide. Two other islands are the site of experiments in biological control, to determine whether newly-introduced sterilized red foxes will eliminate arctic foxes. Eight islands in the unit have now been freed of introduced foxes, and recovery of goose and seabird populations is being monitored. New nesting populations of geese have been established on Aggatu and Alaid/Nizki, and the seabird population on Alaid/Nizki has increased 600 percent since fox removal.

Fox eradication in the Aleutians will continue. It will be implemented on selected islands in the future to the extent that money, staffing and work priorities allow. If 1080 is registered the process would require less time and be less labor intensive. It would also allow work in larger islands; without toxicants it would be nearly impossible to rid larger islands such as Great Sitkin or Semisopochnoi of foxes. Fox management is described in more detail in the Common Management Directions. Natural predator populations will be maintained

in the future. Naturally-occurring fox populations (as on St. Matthew Island) will not be manipulated, and no new introductions of exotic species will be permitted.

Information is needed on bird populations of the refuge. Seabird populations need to be monitored in a sample of colonies throughout the refuge in order to establish natural population trends, determine interactions of birds with their prey, assess impacts of human activities such as disturbance, commercial fishing, and oil development, and propose Service responses to changes caused by humans. Yearly observations are needed at selected sites over a long period, because bird populations and breeding success in the north fluctuate widely according to weather and sea-ice conditions; changes over one or two years must be compared with long-term trends in order to evaluate their causes. Seven sites in the Chukchi Sea, Bering Sea, Alaska Peninsula, and Gulf of Alaska units are currently being monitored for yearly breeding populations and for breeding success of major species. Some of these sites are monitored by refuge personnel, others by the Alaska Office of Fish and Wildlife Research or by cooperators. Four additional sites (one each in the Alaska Peninsula and Gulf of Alaska units and two in the Aleutian Islands Unit) would be added to the monitoring program. Additional sites may be monitored every two to five years to provide an indication of large population changes. Refuge ability to monitor seabird populations satisfactorily has been greatly enhanced by use of the refuge vessel. Some research would continue into improving the reliability of population estimates for difficult species such as those that nest in burrows.

Disturbance of nesting seabirds by people or by low-flying aircraft is a potential threat at some colonies as described in the common management directions. Monitoring is being done in the Pribilof Islands and at Cape Lisburne. Additional sites will be monitored as necessary.

Research on interactions between seabirds and the prey on which they depend is needed if effects of human-caused changes in prey populations are to be assessed. The location and behavior of seabirds while feeding at sea also must be known if mitigation is to be proposed for impacts of oil development, changes in prey populations due to commercial fishing, or mortality of birds in fishnets. Most research on Alaska Maritime Refuge is carried out by the Alaska Office of Fish and Wildlife Research or by cooperators, but refuge support and participation will be important, particularly through providing time on the vessel. Information will continue to be collected on critical topics such as prey species on which birds depend (information is particularly lacking in the Aleutians and southeast Alaska) and on distribution of important prey species at sea.

Information on seabird population trends and interactions with the prey on which they depend will be important during interactions with other government agencies, the state, private landholders and developers, and management organizations such as the North Pacific Fisheries Management Council.

Marine mammals that are managed by the Service include sea otters, walrus, and polar bears. Management will consist of monitoring numbers and subsistence harvest of these species on and adjacent to refuge lands. Information on other marine mammals that haul out on refuge lands or use the adjacent waters (northern fur seals, northern sea lions, and seals) is collected cooperatively by the Service and other agencies. Primary management responsibility for these species is held by the National Marine Fisheries Service. The Fish and Wildlife Service cooperates with that agency and with state and private representatives in the management of all marine mammals.

Military installations - The existing military presence would be maintained as described in the section on common management directions.

Subsistence use management - Subsistence use would be managed the same way under each alternative, as described in the section on common management directions. Subsistence activities are important in certain local areas, especially on Atka Island, in Womens Bay, around Afognak Island, and, to a lesser extent, at Cape Lisburne and Cape Thompson. Almost all refuge lands in the Chukchi Sea and Bering Sea units receive at least some subsistence use.

Table 37. Summary of management category designations by alternative.

These acreage figures are approximate and include all selected lands, tidelands, submerged lands, and waters.

REFUGE UNIT	ALTERNATIVE A		ALTERNATIVE B		ALTERNATIVE C PREFERRED ALTERNATIVE	
Chukchi Sea Unit						
Intensive	240		240		240	
Moderate	0		0		0	
Minimal	203,420		88,495		203,420	
Existing wilderness	440		440		440	
Proposed wilderness	0		114,925		0	
Unit total	204,100					
Bering Sea Unit						
Intensive	1		1		1	
Moderate	0		0		0	
Minimal	86,146		20,944		85,964	
Existing wilderness	81,417		81,417		81,417	
Proposed wilderness	0		65,202		182	
Unit total	167,564					
Aleutian Islands Unit						
Intensive	26,792		53,058		53,058	
Moderate	50,000		50,000		50,000	
Minimal	941,831		797,463		828,123	
Existing wilderness	1,348,652		1,348,652		1,348,652	
Proposed wilderness	0		118,102		87,442	
Unit total	2,367,275					
Unimak Island - proposed for transfer to Izembek Refuge						
Intensive	0		0		0	
Moderate	0		0		0	
Minimal	22,484		14,484		14,484	
Existing wilderness	910,000		910,000		910,000	
Proposed wilderness	0		8,000		8,000	
Unit total	932,484					
Alaska Peninsula Unit						
Intensive	0		0		640	
Moderate	0		0		0	
Minimal	324,501		314,952		314,722	
Existing wilderness - land	24,990		24,990		24,990	
Existing wilderness - water, tidelands and/or submerged land	365,880		365,880		365,880	
Proposed wilderness	0		9,549		9,139	
Unit total	715,371					
Gulf of Alaska Unit						
Intensive	13,034		13,034		342,934	
Moderate	800		20,928		160	
Minimal	450,401		422,368		116,256	
Existing wilderness	8,477		8,477		8,477	
Proposed wilderness	0		7,905		4,885	
Unit total	472,712					
Management category totals						
Intensive	40,067	1%	66,333	1%	396,873	8%
Moderate	50,800	1%	70,928	2%	50,160	1%
Minimal	2,028,783	42%	1,658,706	34%	1,562,969	32%
Existing wilderness - land	2,373,976	48%	2,373,976	48%	2,373,976	48%
Existing wilderness - water, tidelands and/or submerged land	365,880	8%	365,880	8%	365,880	8%
Proposed wilderness	0	0%	323,683	7%	109,648	3%
TOTAL	4,859,506	100%	4,859,506	100%	4,859,506	100%

Figure 63. Alternatives A and B - Womens Bay Area.

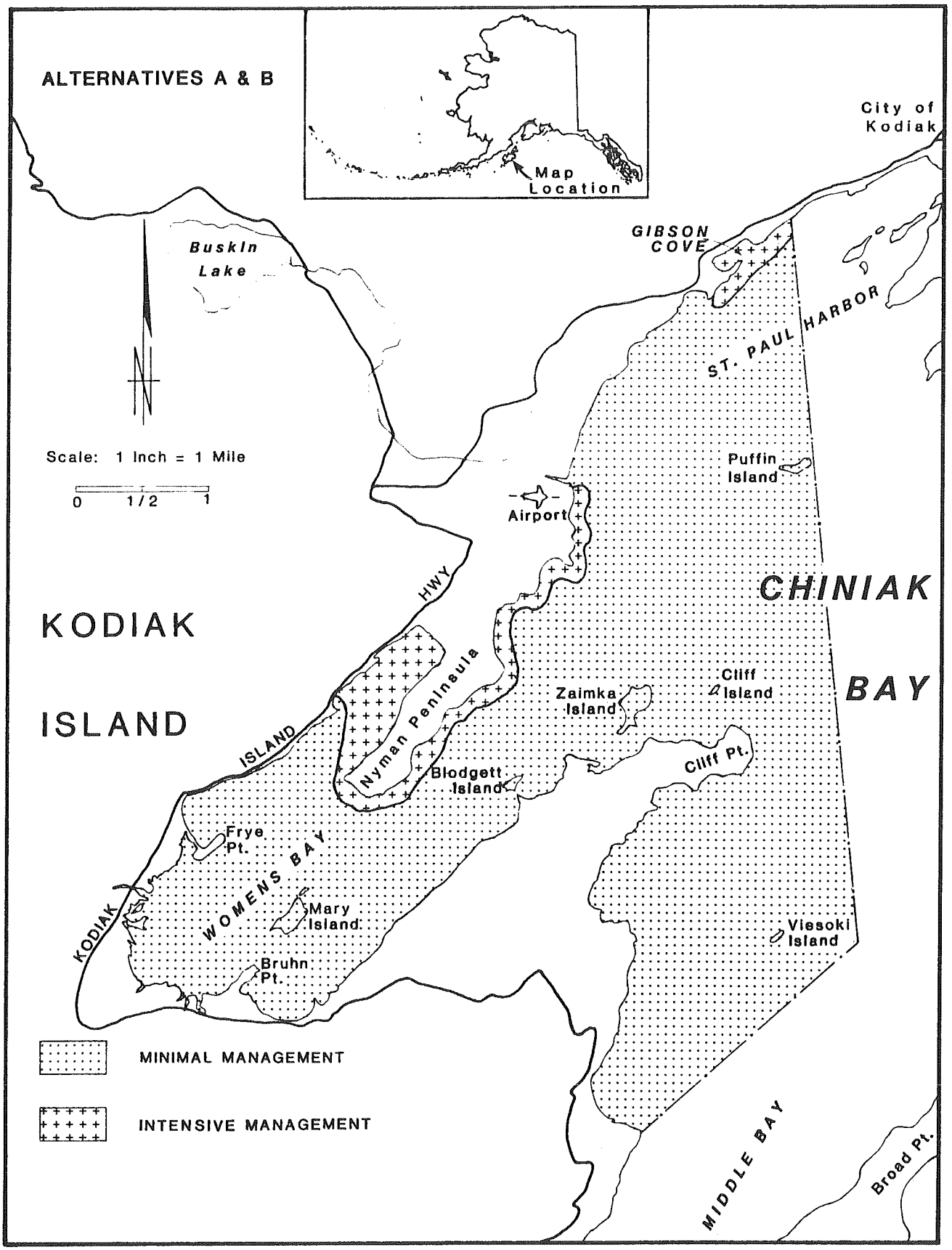


Figure 64. Alternative A - Afognak Area.

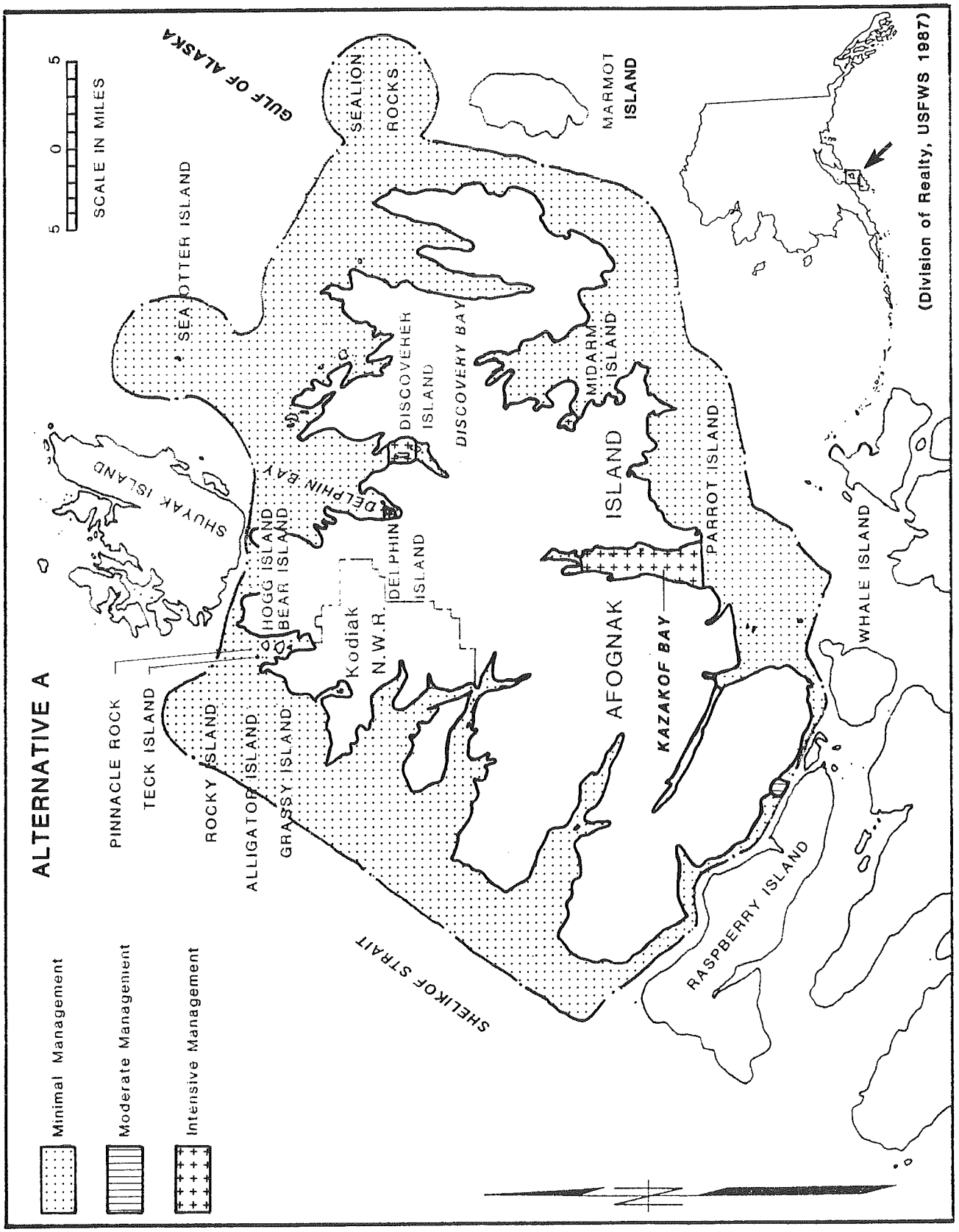


Figure 65. Alternative A - Unimak Island.

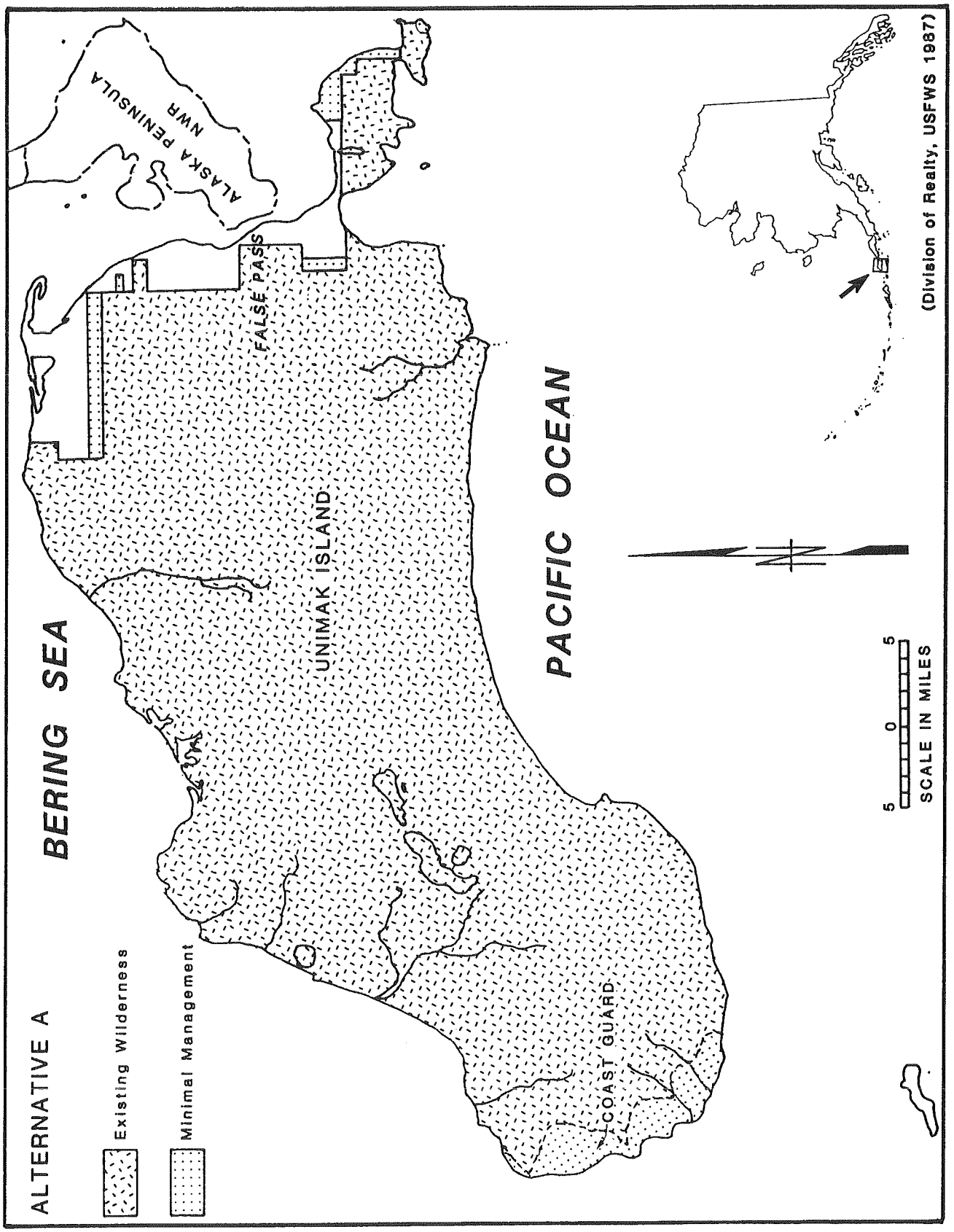


Figure 66. Alternatives A, B, and C - Attu Island.

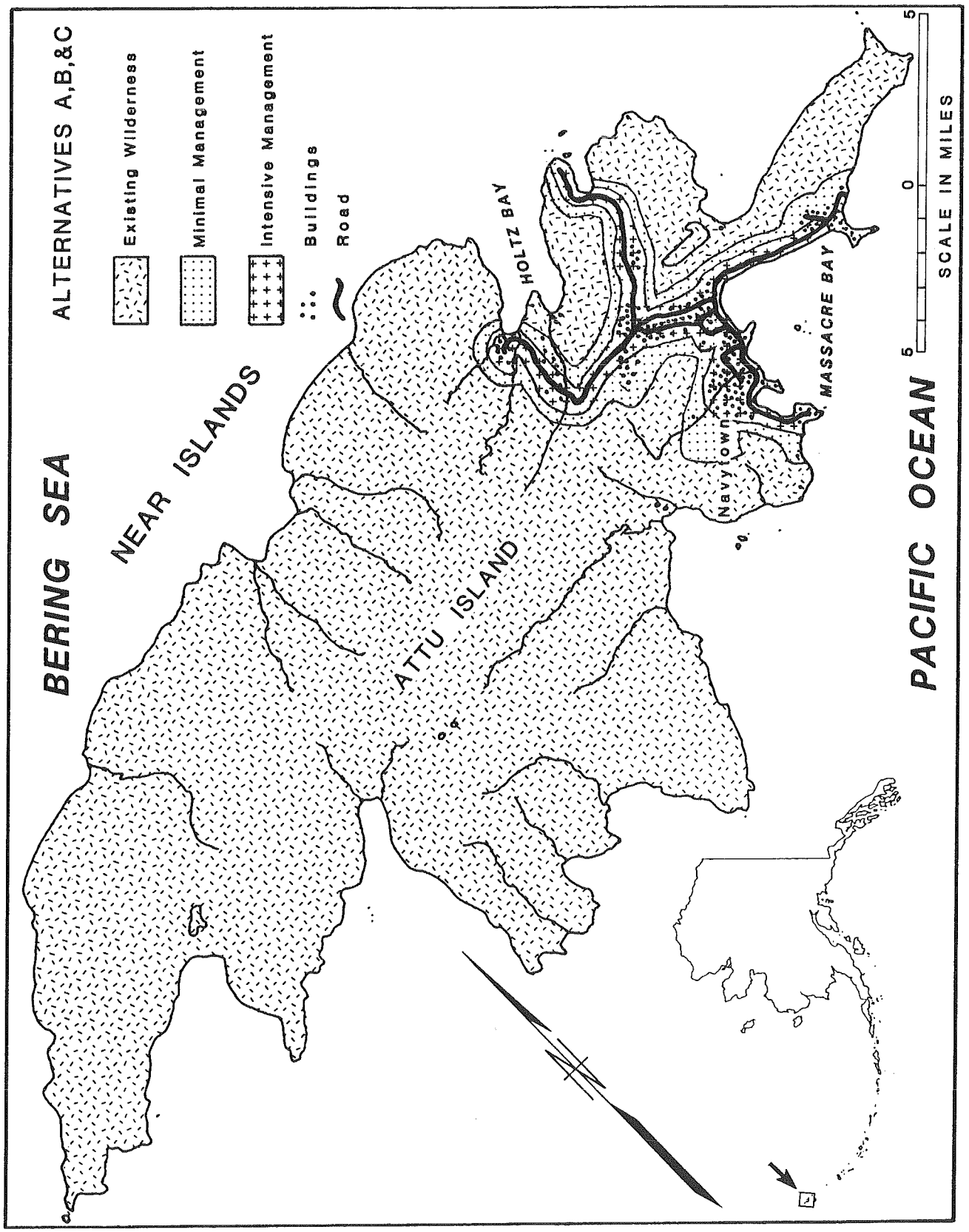


Figure 67. Alternatives A, B, and C - Shemya Island.

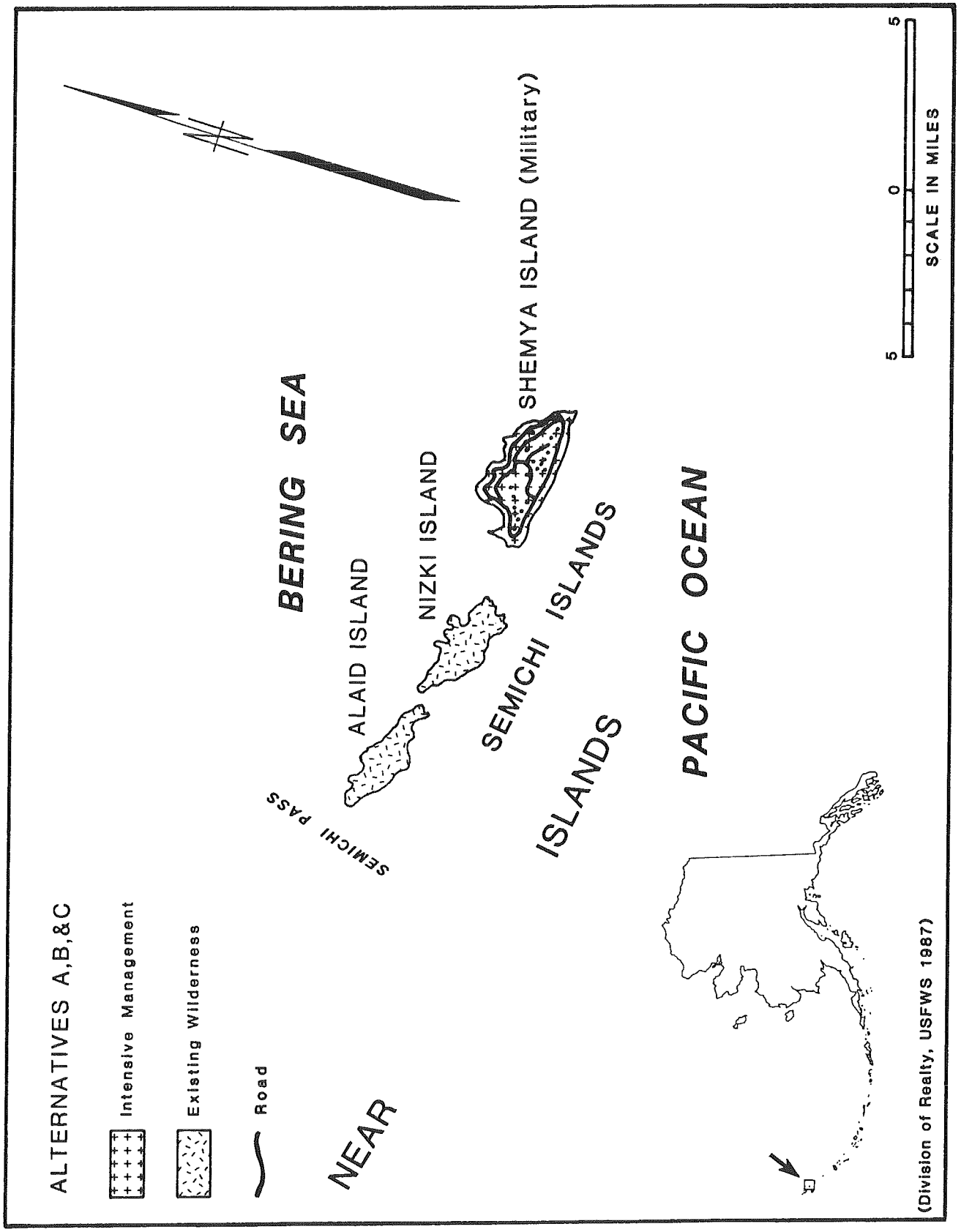


Figure 68. Alternative A - Amchitka Island.

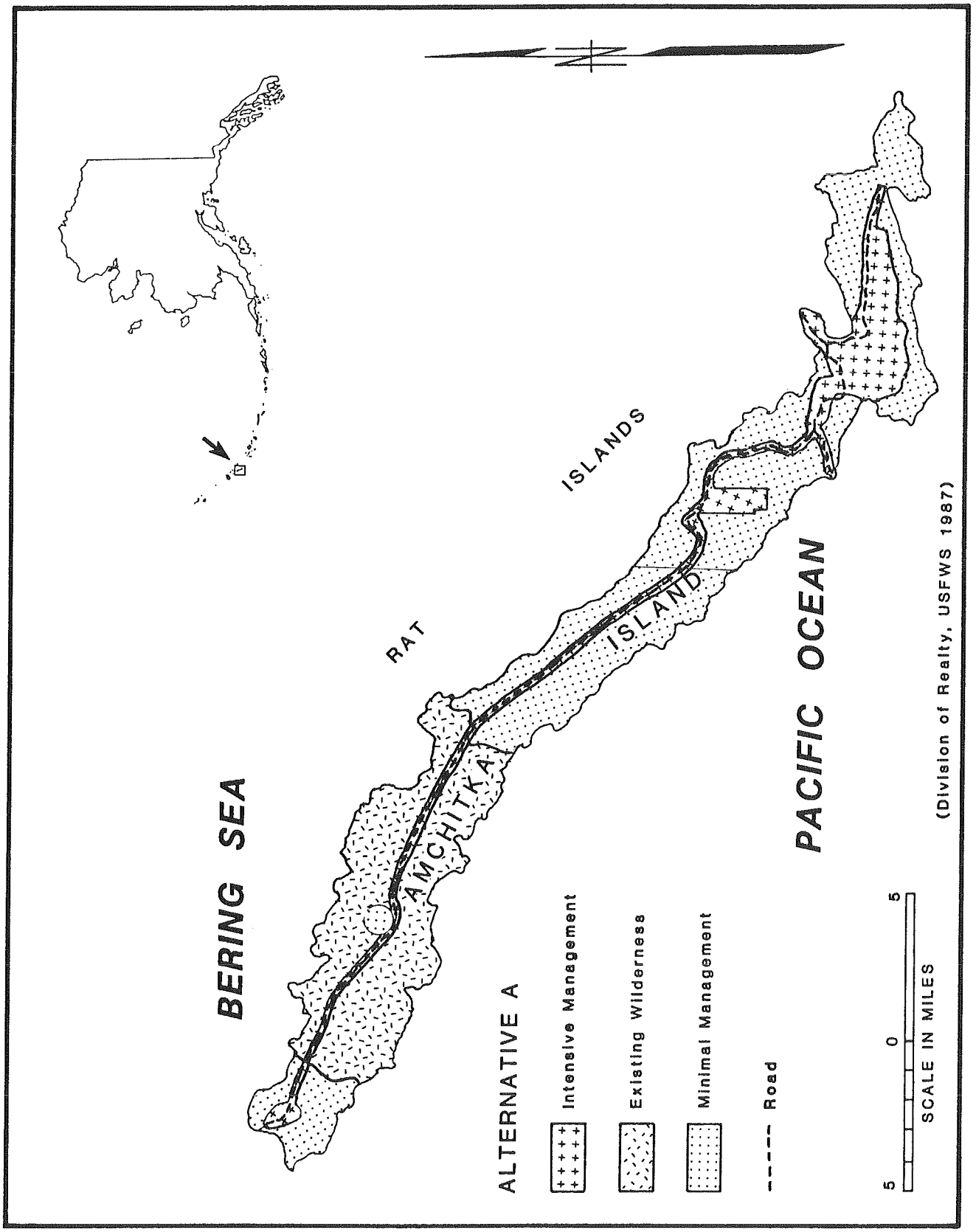


Figure 69. Alternatives A, B, and C - Adak Island.

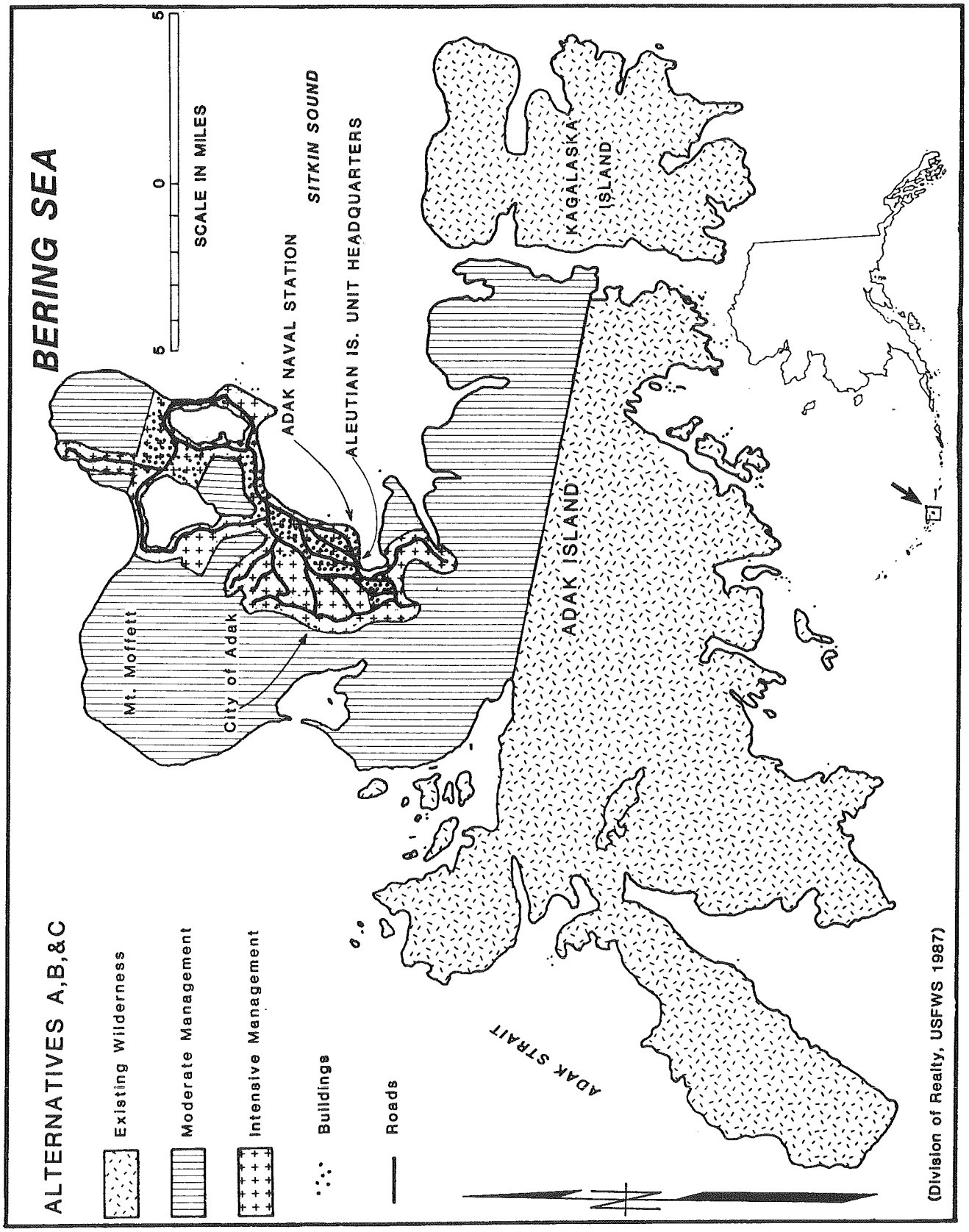


Figure 70. Alternative A - Atka Island and off road vehicle routes.

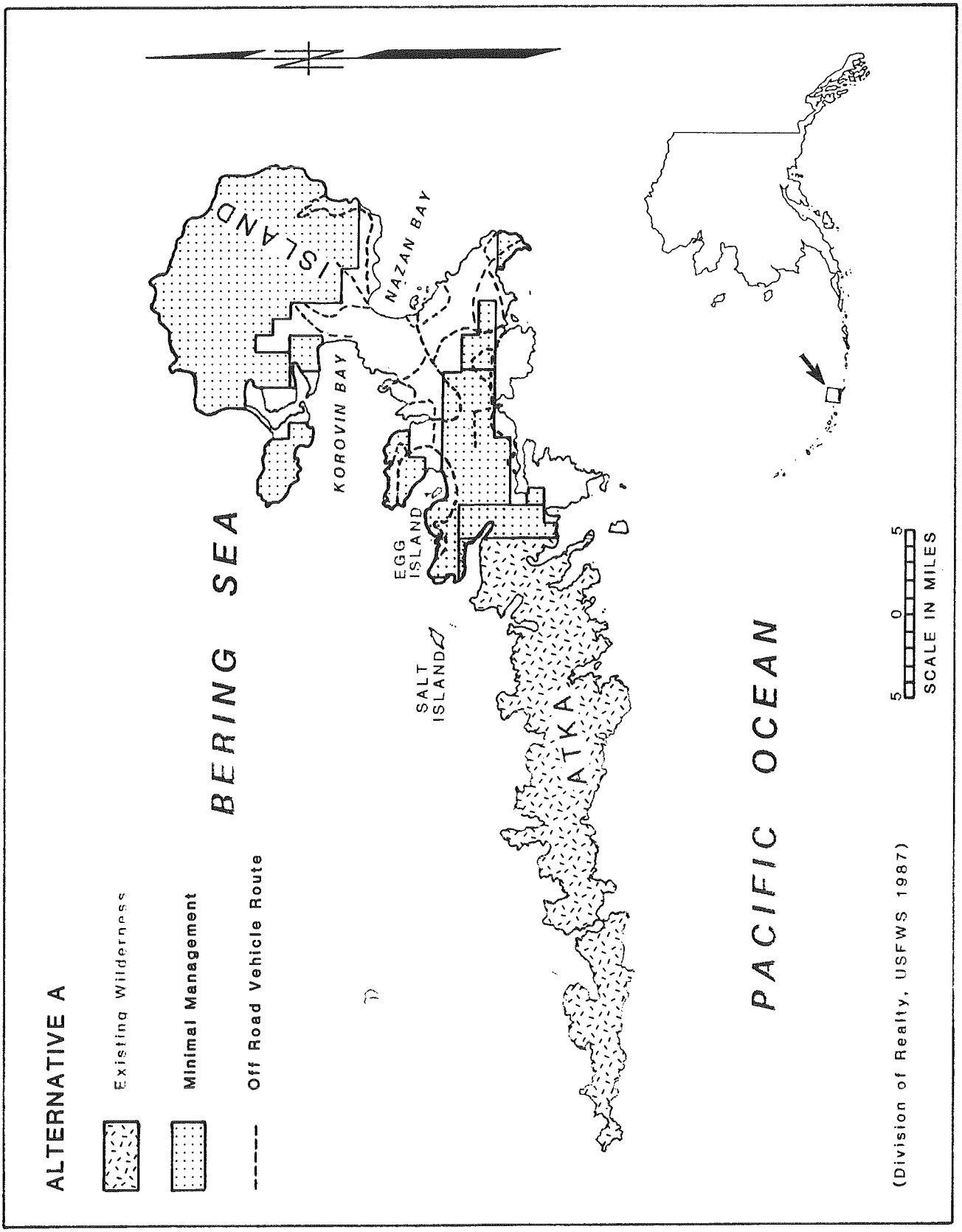
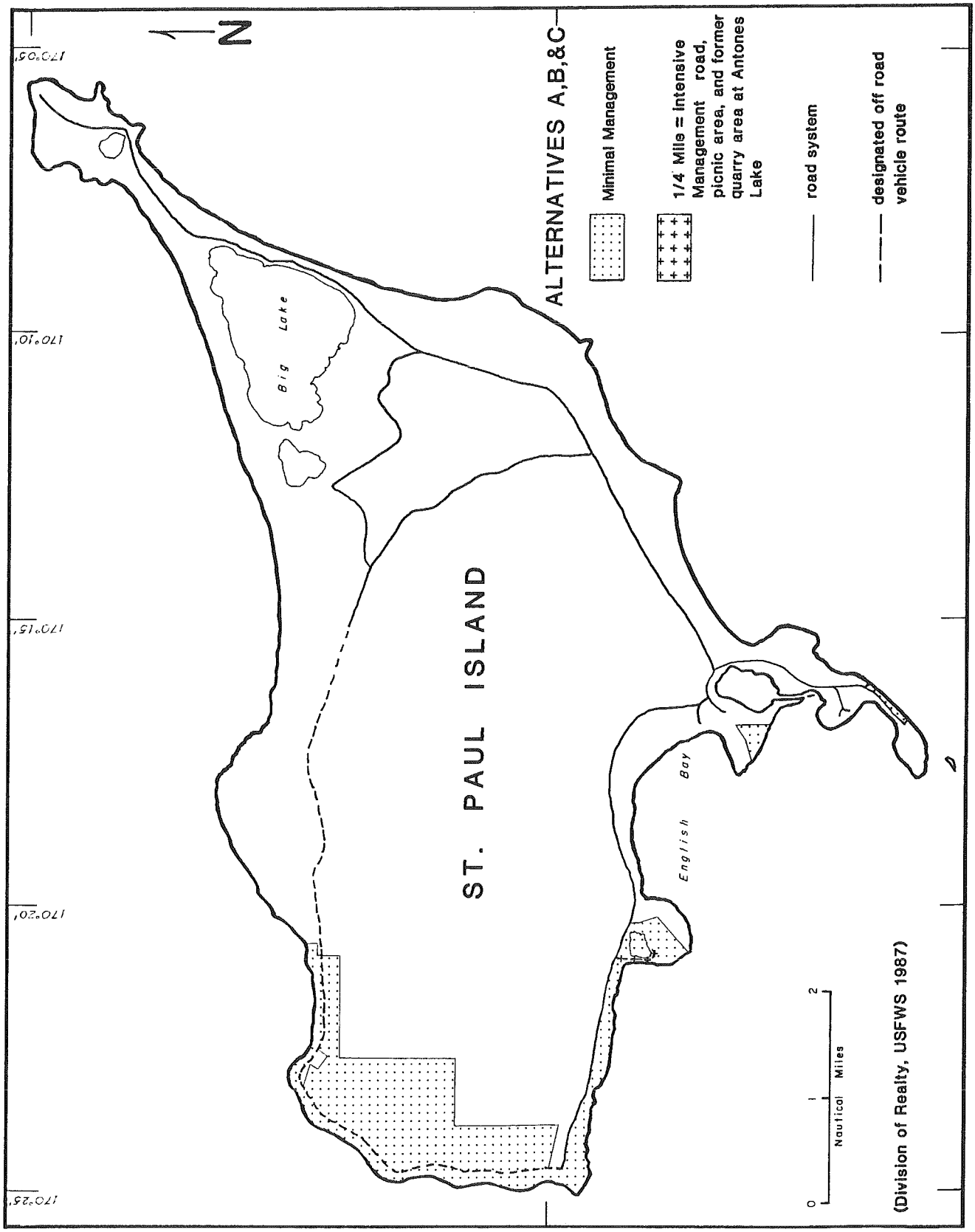


Figure 71. Alternatives A, B, and C - St. Paul Island and off road vehicle routes.



Public use and access management - Table 34 describes how public use and access would be managed. Most visits to the refuge would be primarily for bird watching. Numerous tourists view seabird colonies in the Chiswell Islands, St. Lazaria Island, and at Sixty-foot Rock, primarily from charter boats. The number of visitors to the Pribilof Island world-famous bird cliffs is increasing, despite the island group's remoteness. The Adak Wildlife Center would be maintained. A refuge visitor center based on the Alaska marine ecosystem would be constructed in Homer. Aircraft, motorboats, and snowmobiles would be allowed throughout the refuge for the pursuit of traditional activities, although regulations may be promulgated to close traditionally used areas on a seasonal basis if necessary to protect sensitive wildlife species. All access restrictions would meet the provisions outlined in section 1110(a) of the Alaska Lands Act and 50 CFR 36.42.

Wilderness review - This alternative would propose no additional areas of the refuge for wilderness designation.

Fire management - There would be no wildfire management aside from protecting private property, and no prescribed burning.

Timber management - Commercial timber harvest would be permitted on Delphin and Discoverer Islands per section 1427(m) of the Alaska Lands Act. Log transfer facilities may be permitted as required by the Alaska Lands Act section 1110.

Commercial use management - All types of geophysical and geological studies would be allowed in nonwilderness portions of the refuge, subject to reasonable stipulations. Only non-surface-disturbing oil and gas studies would be allowed in existing wilderness. Oil and gas leasing would not be allowed in existing wilderness or on the 42 percent of the refuge in minimal management. Leasing may be allowed on the two percent of the refuge in moderate or intensive management subject to an assessment of potential, a national interest determination, and a compatibility determination; however, some of these areas are military installations where national security would take precedence. Guiding and transporting would be permitted throughout the refuge under special use permits. Ongoing grazing permits would be honored until subject grazing lands could be traded for lands of higher wildlife value.

Management costs - The refuge staff, to fully implement this alternative (Figure 72), would consist of 31 permanent employees, which includes the refuge vessel M/V Tiglax crew, and up to 45 seasonal and/or volunteer employees; an increase of nine positions over current staff level. Where possible, local hire would be used to meet refuge needs. A new refuge office, including storage, a workshop and a visitor center would be built in Homer as well as a bunkhouse to house seasonal employees and volunteers. The total annual refuge budget to fully implement Alternative A would be $2,340,000. This level of funding would support the basic programs discussed above under fish and wildlife management. In addition, a one time expenditure of $10,000,000 would be required for construction of the visitor center and headquarters complex in Homer. The actual budget for Fiscal Year 1988 totals $1,361,000; congressional add-ons would increase the budget to $1,861,000.

Alternative B

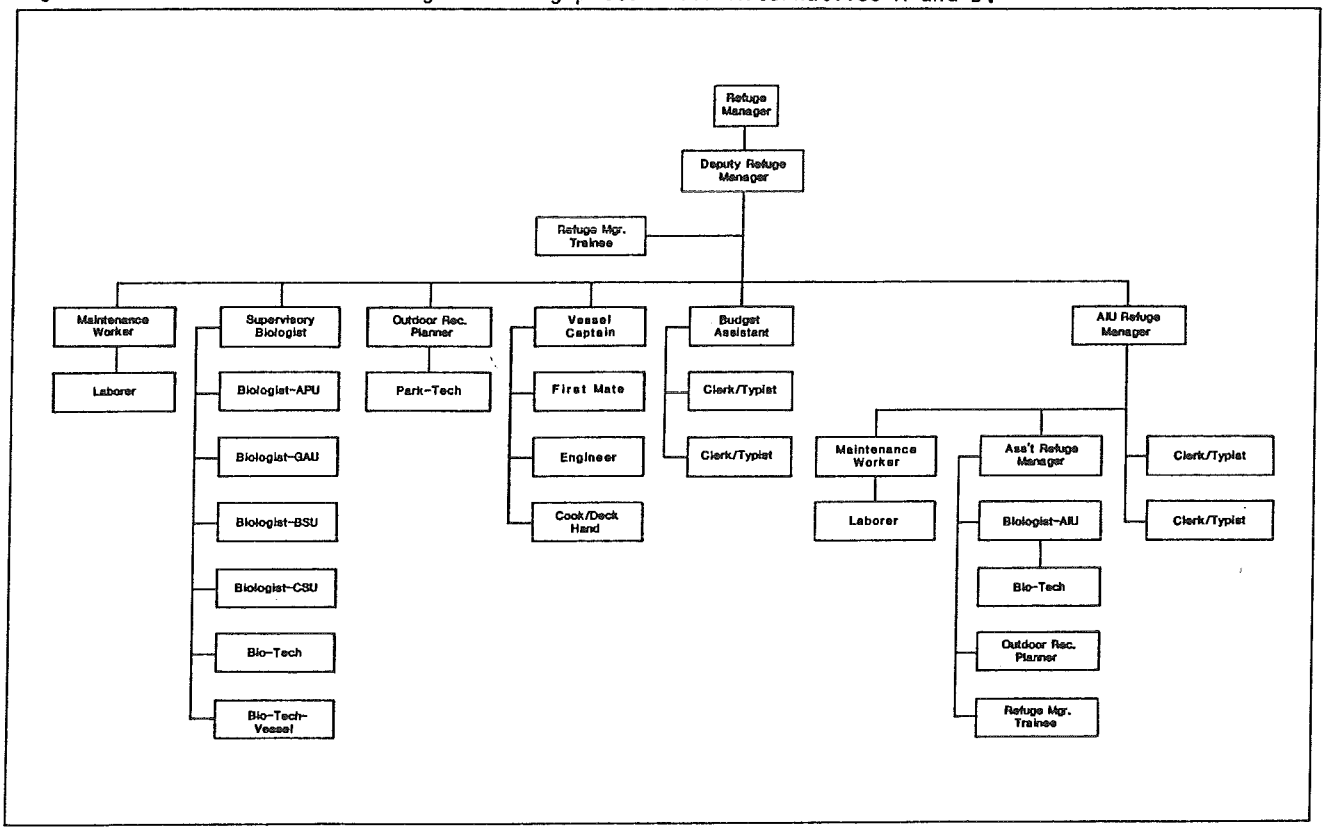
This alternative is similar to Alternative A, the current situation alternative, except that all additional areas that qualify are proposed for wilderness designation.

Alternative B emphasizes maintenance of wilderness values, protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels. Fish and wildlife management would focus on monitoring and on eradication of introduced predators. Opportunities for hunting, fishing, and other recreational uses would be maintained, as would scientific research, wildlife and wildland observation opportunities, trapping, and subsistence uses. There would be an increased focus on interpretation and environmental education.

Alternative B has the following management directions in common with Alternative A:

- o maintain the existing mix of undeveloped habitats and developed military and commercial use areas;

Figure 72. Alaska Maritime Refuge staffing pattern for Alternatives A and B.



- o protect seabird colonies and marine mammal haulouts;
- o emphasize protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels;
- o focus fish and wildlife management on monitoring and on eradication of introduced predators;
- o accommodate the existing military installations on Adak, Shemya, Attu and Amchitka islands, and at Cape Lisburne;
- o provide for continued subsistence use of refuge resources;
- o maintain traditional access opportunities;
- o maintain opportunities for hunting, fishing, and wildlife observation;
- o maintain trapping opportunities;
- o 56 percent of the refuge is already designated wilderness.

In addition, Alternative B would:

- o recommend for wilderness designation the additional six percent of the refuge which qualifies;
- o designate 20,768 acres of tidelands, submerged lands and water column for moderate management in Raspberry Strait;
- o designate an additional 26,266 acres of Amchitka Island for intensive management to accommodate additional radar facilities.

Table 36 shows the management category and wilderness proposal in Alternative B. Table 37 lists the acreage and the proportion of the refuge placed in each management category. Approximately one percent of the refuge would be in intensive management, two percent would be in moderate management, 35 percent would be in minimal management, 56 percent is in existing wilderness, and six percent would be proposed for wilderness designation.

Figures 63, 66, 67, 69, 71, 73, 74, 75, and 76 illustrate the locations of management categories in Alternative B for the waters of the Womens Bay and Afognak areas; Unimak Island; the military installations on Attu, Shemya, Amchitka, and Adak islands; and Atka Island. Figure 76 and 71 show the location of off road vehicle routes being used on Atka and St. Paul islands.

Fish and wildlife management - The Service would emphasize protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels. Fish and wildlife management will focus on monitoring and on eradication of introduced predators. Present levels of traditional use would be maintained; increased interest in wildlife observation would be accommodated through an increased emphasis on interpretation and environmental education. Fishing, hunting, and trapping would be managed to maintain fish and wildlife populations at natural levels.

Under this alternative the fishery management program would be administered and coordinated as noted under Alternative A. In addition, a part-time employee would be hired and baseline studies on salmon and resident fish species would be conducted on one to two sites of importance from a sport fishery or development standpoint each year. These studies would include work on developing or improving sport fishing on Attu, Shemya, Amchitka, Adak, and Great Sitkin islands.

Management of the Aleutian Canada goose would be the same as under Alternative A, focusing on eradication of introduced predators and monitoring of recovery. Young geese would be transplanted to islands as called for in the recovery plan.

Introduced foxes would continue to be eradicated from selected islands on the refuge, and recovery of waterfowl and seabird populations would be monitored as under Alternative A. Introduced rodents (voles and ground squirrels) have also caused severe impacts on vegetation of several islands, and are suspected of inflicting direct mortality on burrow-nesting birds by predation. Under this alternative the options for eliminating exotic rodents would be studied.

Monitoring sites for seabird populations would be increased in order to give reliable information in all parts of the refuge. Monitoring would be expanded to three additional (total of five) colonies in the Aleutian Islands Unit, distributed throughout the archipelago. Additional sites are also needed in the Alaska Peninsula Unit, where four new sites would be added, and in the Gulf of Alaska Unit, where two more would be monitored. Monitoring in the Bering Sea and Chukchi Sea units is satisfactory at present. Research into methods for censusing and measuring breeding success of burrowing and crevice-nesting species would be intensified, making the first reliable estimates of these populations for the refuge possible.

Studies on the effects of disturbance on breeding seabirds would be intensified as in Alternative A. Several new study plots would be established in the Pribilofs specifically for this purpose, in addition to monitoring multi-purpose plots as at present.

Seabird-prey interactions would be monitored and evaluated as outlined under Alternative A. Monitoring at sites where current populations are known would be expanded so that yearly food habits of the seabirds were also assessed. This would allow evaluation of the adequacy of the birds' diet to support successful breeding. Baseline studies of diet would be made at a number of locations, especially in the Aleutian Islands and Gulf of Alaska units where data are inadequate. Research by cooperators, in many cases using the Service vessel, would concentrate on locating essential feeding areas and prey stocks of breeding seabirds in three or four critical parts of the refuge.

Recreation and public use of the refuge would be continued. Wildlife viewing opportunities may be enhanced somewhat by the addition of interpretive personnel at central refuge offices. Management of game populations and of marine mammals would continue as outlined under Alternative A.

Military installations - The existing military presence would be maintained under this alternative as described in the section on common management directions. Additional radar facilities could be accommodated on Amchitka Island.

Subsistence use management - Subsistence use would be managed the same way under each alternative, as described in the section on common management directions. In the areas proposed for wilderness, most types of power tools and equipment such as generators would not be allowed. However, chainsaws (for subsistence

Figure 73. Alternative B - Afognak Area.

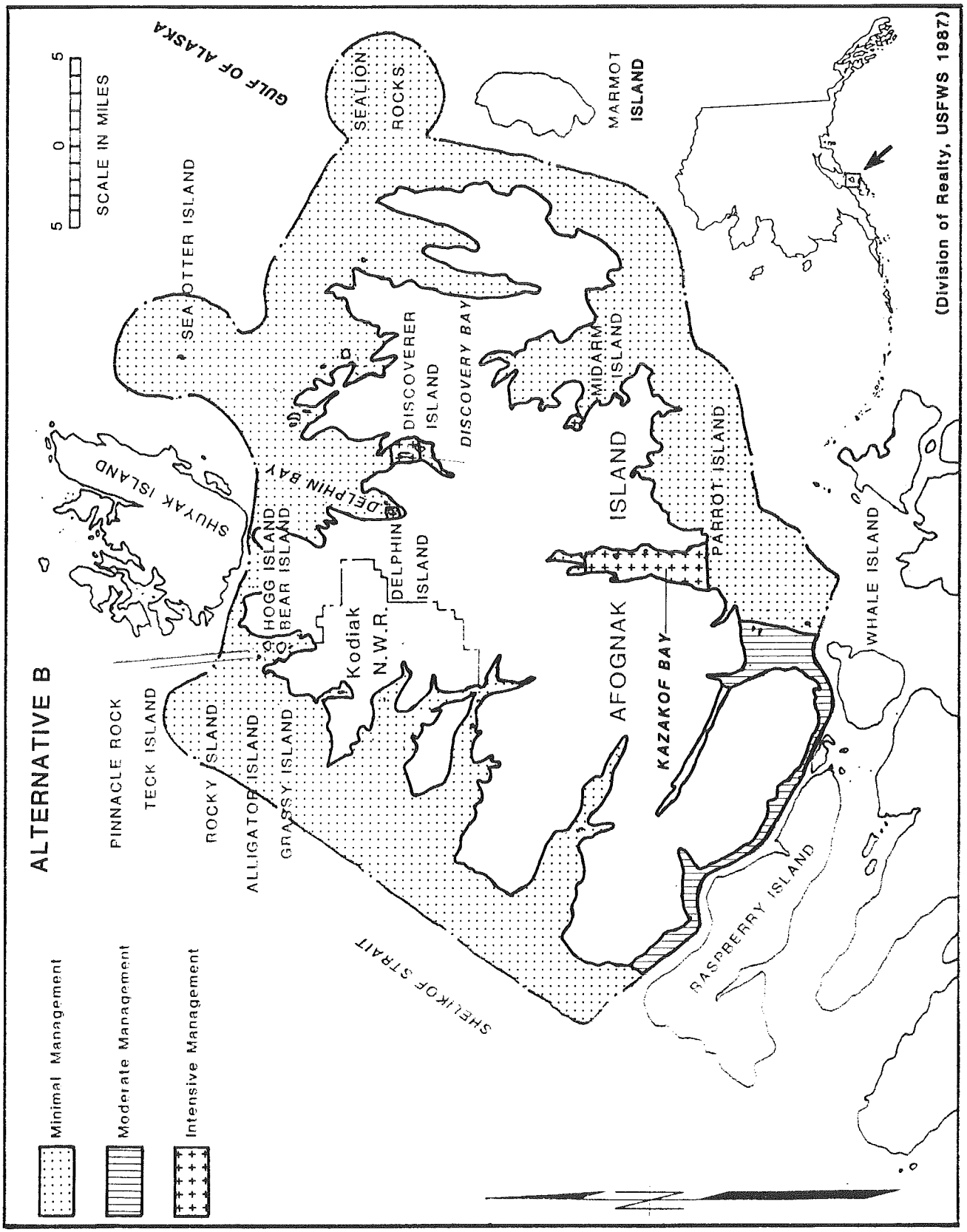


Figure 74. Alternatives B and C - Unimak Island.

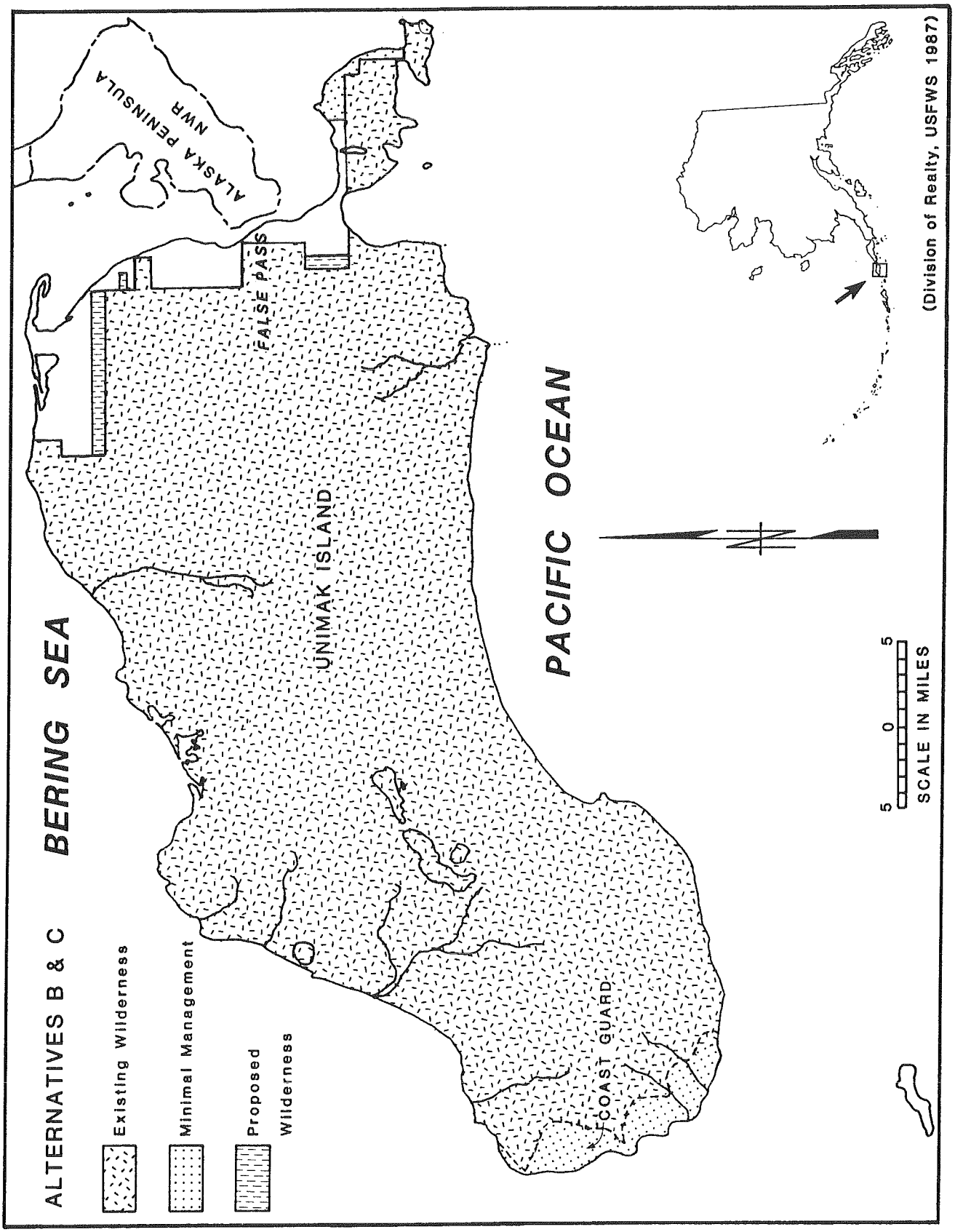


Figure 75. Alternatives B and C - Amchitka Island.

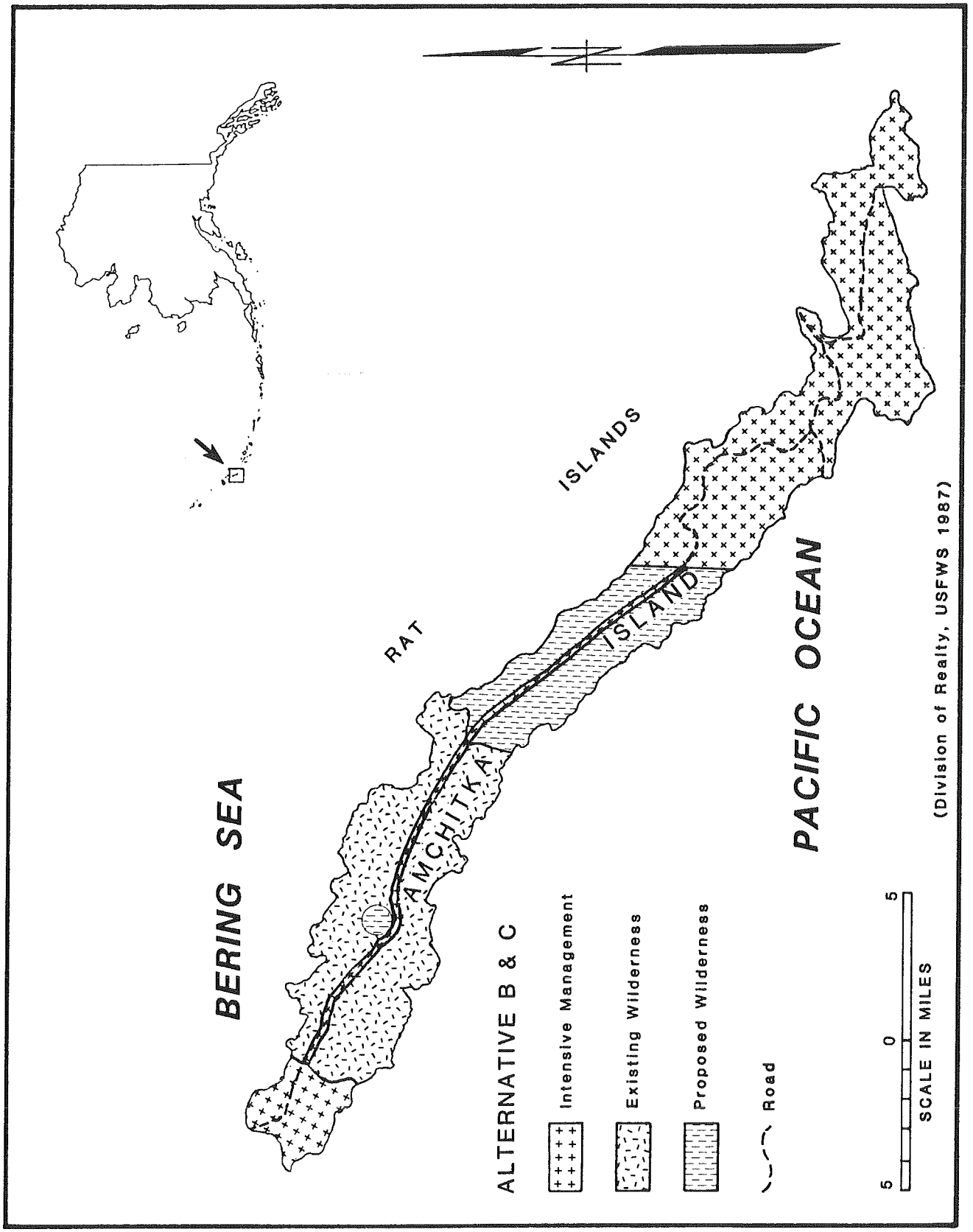
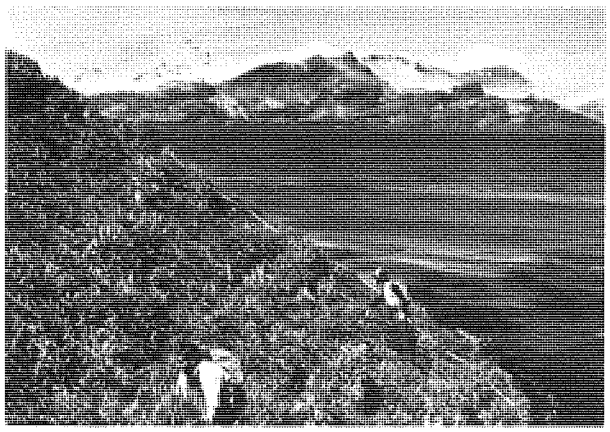


Figure 76. Alternative B - Atka Island and off road vehicle routes.



Biologists have set up plots to monitor puffin populations in the Baby Islands near Unalaska. Present staffing levels limit monitoring to a few carefully selected sites within the refuge.

users only), airplanes, motorboats, and snowmobiles are allowed in wilderness.

Public use and access management - Table 34 describes how public use and access would be managed. Most visits to the refuge would be as described for Alternative A. The Adak Wildlife Center would be maintained and additional interpretation and environmental education would be conducted in Homer and in the Pribilof Islands. Eight interpretive displays would be developed for Juneau, Sitka, Sand Point, Dutch Harbor, St. George, St. Paul, Kotzebue, and the Marine Highway System. Except as outlined in the Pribilof Terms and Agreements, no trails would be developed on the refuge. Aircraft, motorboats, and snowmobiles would be allowed throughout the refuge for the pursuit of traditional activities, although regulations may be promulgated to close traditionally used areas on a seasonal basis if necessary to protect sensitive wildlife species. All access restrictions would meet the provisions outlined in section 1110(a) of the Alaska Lands Act and 50 CFR 36.42.

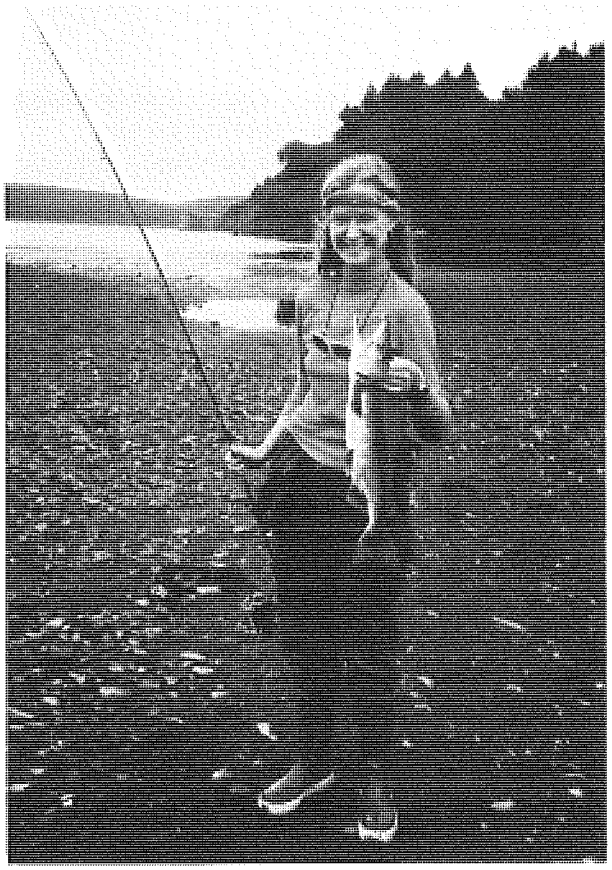
Wilderness review - An additional six percent of the refuge, all of the areas suitable for wilderness designation, would be proposed for wilderness designation. Designation would depend on the approval of Congress; if approved, a total of 62 percent of the refuge would be wilderness.

Fire management - There would be no wildfire management aside from protecting private property, and no prescribed burning.

Timber management - Commercial timber harvest would be permitted on Delphin and Discoverer Islands per section 1427(m) of the Alaska Lands Act. The Service would try to trade other lands for the timber rights on these two islands. Log transfer facilities may be permitted as required by section 1110 of the Alaska Lands Act.

Commercial use management - All types of geophysical and geological studies would be allowed in nonwilderness portions of the refuge, including proposed wilderness, subject to reasonable stipulations. Only non-surface-disturbing oil and gas studies would be allowed in existing wilderness. Oil and gas leasing would not be allowed in existing wilderness, on the six percent of the refuge proposed for wilderness designation, or on the eight percent of the refuge in minimal management. Leasing could be allowed on the two percent of the refuge in moderate or intensive management subject to an assessment of potential, a national interest determination, and a compatibility determination. However, some of these areas are military installations where national security would take precedence. Guiding and transporting would be permitted throughout the refuge under special use permits. Existing grazing permits would be honored until subject grazing lands could be traded for lands of higher wildlife value.

Seafood processors may be permitted on a case by case basis subject to applicable law, the provisions of the National Environmental Policy Act, and a compatibility determination in the intensive and moderate management areas of Womens Bay and Afognak tidelands, submerged lands and waters; other sources of effluent discharge may also be permitted in marine minimal management areas. Mariculture may be permitted on a case by case basis subject to applicable law, the provisions of the National Environmental Policy Act, and a compatibility determination in intensive or moderate



Mariculture (captive culture of shellfish, finfish, or sea vegetables) is distinct from Alaska's existing ocean ranching program which involves raising salmon to the juvenile stage for release to intermingle with wild stocks. The returning salmon contribute to the common property fisheries for commercial, sport, subsistence, and personal use.

management areas in the marine areas around Afognak Island.

Management costs - The refuge staffing pattern in Alternative B would be identical to Alternative A (See Figure 72). The management costs to fully implement this alternative would be similar to those for Alternative A, with the addition of five temporary employees and an additional $115,000 for operational funds. Construction of facilities on Adak and development of interpretive displays for eight sites would require one time funding of $930,000.

Alternative C - The Preferred Alternative

This alternative is similar to Alternatives A and B for most of the refuge. Major differences occur in the Afognak and Womens Bay areas where increased acreage is designated for intensive management. Intensive management in Womens Bay from Blodgett Island to the mouth of the bay could accommodate additional commercial uses of the bay such as mariculture or seafood processing; areas important for herring spawning, subsistence and recreation would remain in minimal management. The large area of intensive management around Afognak Island would allow for the maximum commercial use of those waters tidelands and submerged lands compatible with refuge purposes. Wilderness recommendations would be limited to three percent of the refuge, including only minor boundary adjustments to existing wilderness and islands with outstanding resource values.

In addition, Alternative C emphasizes protection of existing fish and wildlife populations and habitats, restoration of endangered and other species to natural levels, and increased opportunities for wildlife viewing and other non-consumptive uses. Fish and wildlife management would focus on increased monitoring, improvement of information on seabird-prey interactions, and an increased eradication effort aimed at introduced predators. Opportunities for hunting, fishing, and other recreational uses would be maintained, as would scientific research, wildlife and wildland observation opportunities, trapping, and subsistence uses. Public use management would focus on increased interpretation and environmental education.

Alternative C has the following management directions in common with Alternatives A and B:

- o protect seabird colonies and marine mammal haulouts;
- o emphasize protection of existing fish and wildlife populations and habitats, and restoration of endangered and other species to natural levels;
- o fish and wildlife management would focus on monitoring and on eradication of introduced predators;

- o accommodate the existing military installations on Adak, Shemya, Attu and Amchitka islands and at Cape Lisburne;
- o provide for continued subsistence use of refuge resources;
- o maintain traditional access opportunities;
- o maintain opportunities for hunting, fishing, and wildlife observation;
- o maintain trapping opportunities;
- o 56 percent of the refuge is already designated wilderness.

As in Alternative B, Alternative C would:

- o designate an additional 26,266 acres of Amchitka Island for intensive management to accommodate additional radar facilities.

In addition, Alternative C would:

- o recommend an additional three percent of the refuge for wilderness designation;
- o designate 640 acres on Popof Island for intensive management;
- o designate 6,020 acres of Womens Bay tidelands, submerged lands, and water column for intensive management;
- o designate 335,984 acres of Afognak tidelands, submerged lands and waters for intensive management, including most of the area around Afognak Island except the area offshore from Kodiak Refuge.

Table 35 shows the management category and wilderness proposal for Alternative C. Table 36 lists the acreage and the proportion of the refuge placed in each management category. Approximately eight percent of the refuge would be in intensive management, one percent would be in moderate management, 32 percent would be in minimal management, 56 percent is in existing wilderness, and three percent would be in proposed wilderness.

Figures 66, 67, 69, 71, 74, 75, 77, 78, and 79 illustrate the locations of management categories in Alternative C for the waters of the Womens Bay and Afognak areas; Unimak Island; the military installations on Attu, Shemya, Amchitka, and Adak islands; and Atka Island. Figures 79 and 71 show the location of off road vehicle routes being used on Atka and St. Paul islands.

Fish and wildlife management - The Service would emphasize protection of existing fish and wildlife populations and habitats, restoration of endangered and other species to natural levels, and increased opportunities for wildlife viewing and other nonconsumptive uses. Fish and wildlife management will focus on monitoring, improvement of information on seabird-prey interactions, and eradication of introduced predators and rodents. Present levels of traditional use would be maintained. Fishing, hunting, and trapping would be managed to maintain fish and wildlife populations at natural levels.

Under this alternative the fishery management program would be administered and coordinated through a cooperative effort between the Kenai Fisheries Assistance Office and a marine fishery biologist, stationed at Homer, under the supervision of the refuge manager. In general, the staff of the Kenai Fisheries Assistance Office would be responsible for conducting studies requiring an intensive effort using several biologists. The refuge fishery biologist would handle day to day administrative activities and conduct less intensive studies. In addition, one to two part-time employees would be hired and baseline studies on salmon and resident fish species would be conducted on two or three sites of importance in the Aleutians each year. With over 400 anadromous fish streams there, the importance of this resource to the refuge has never been intensively studied.

Management of the Aleutian Canada goose would be similar to that under Alternative A and in the common management directions.

Introduced foxes would continue to be eradicated from selected islands as under Alternative A. Recovery of waterfowl and seabird populations would be monitored, and this would be extended to two additional islands. Ten new islands would be freed of introduced foxes. Methods of eradicating introduced rodents would be evaluated, as under Alternative B, and in addition, feasible methods would be used to remove rodents.

Monitoring of seabird populations and breeding success would be carried out as described under

Figure 77. Alternative C - Womens Bay Area.

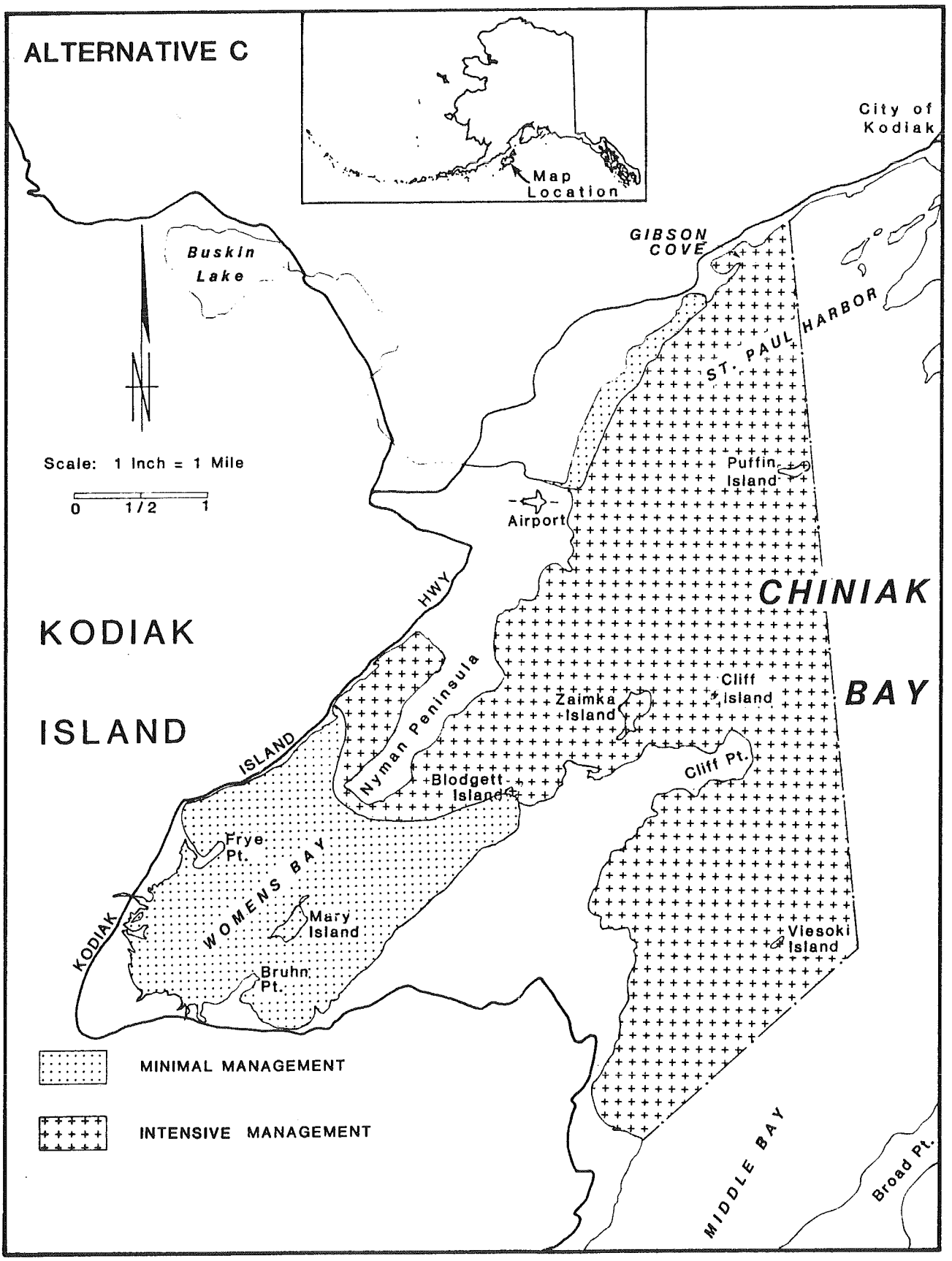


Figure 78. Alternative C - Afognak Area.

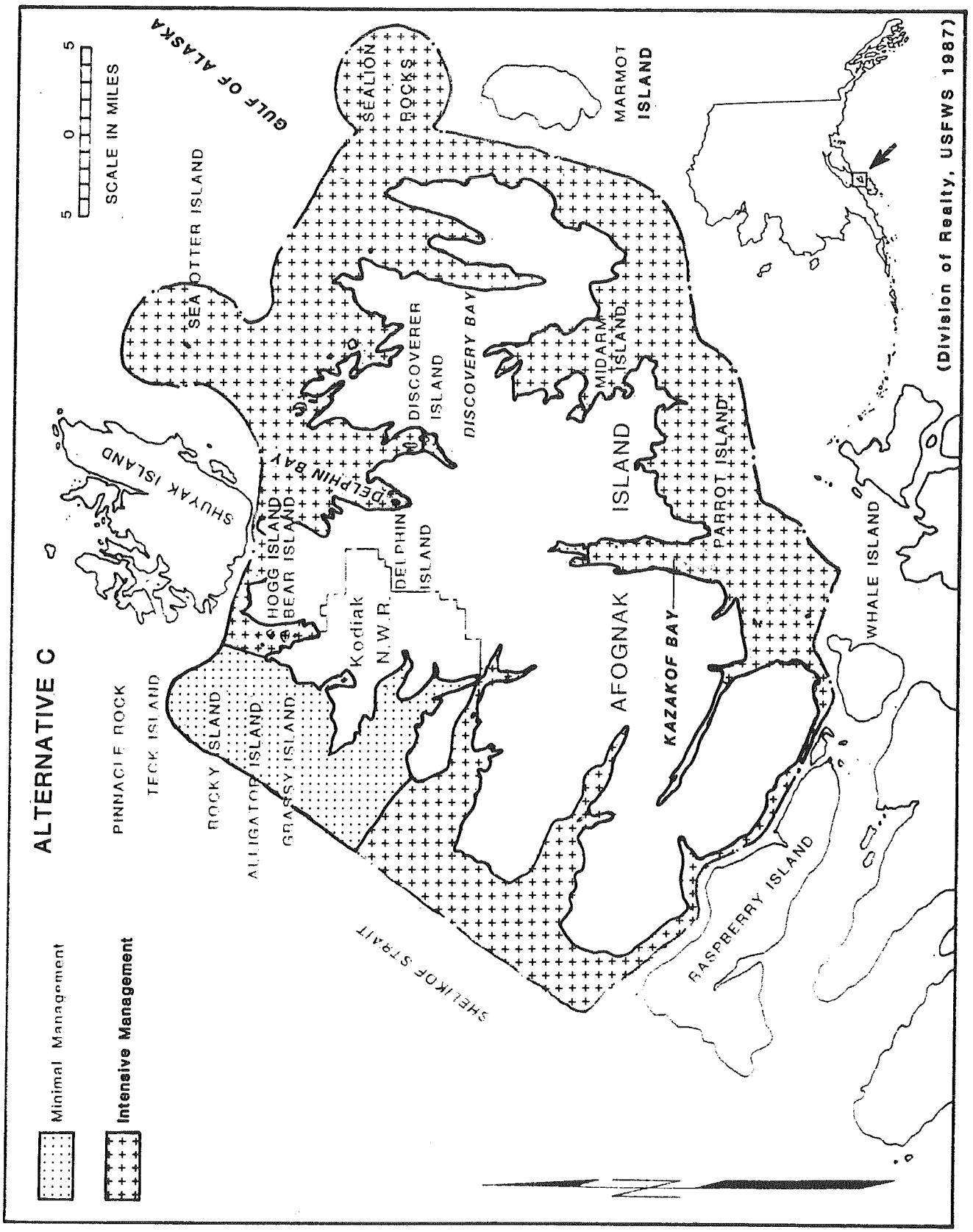
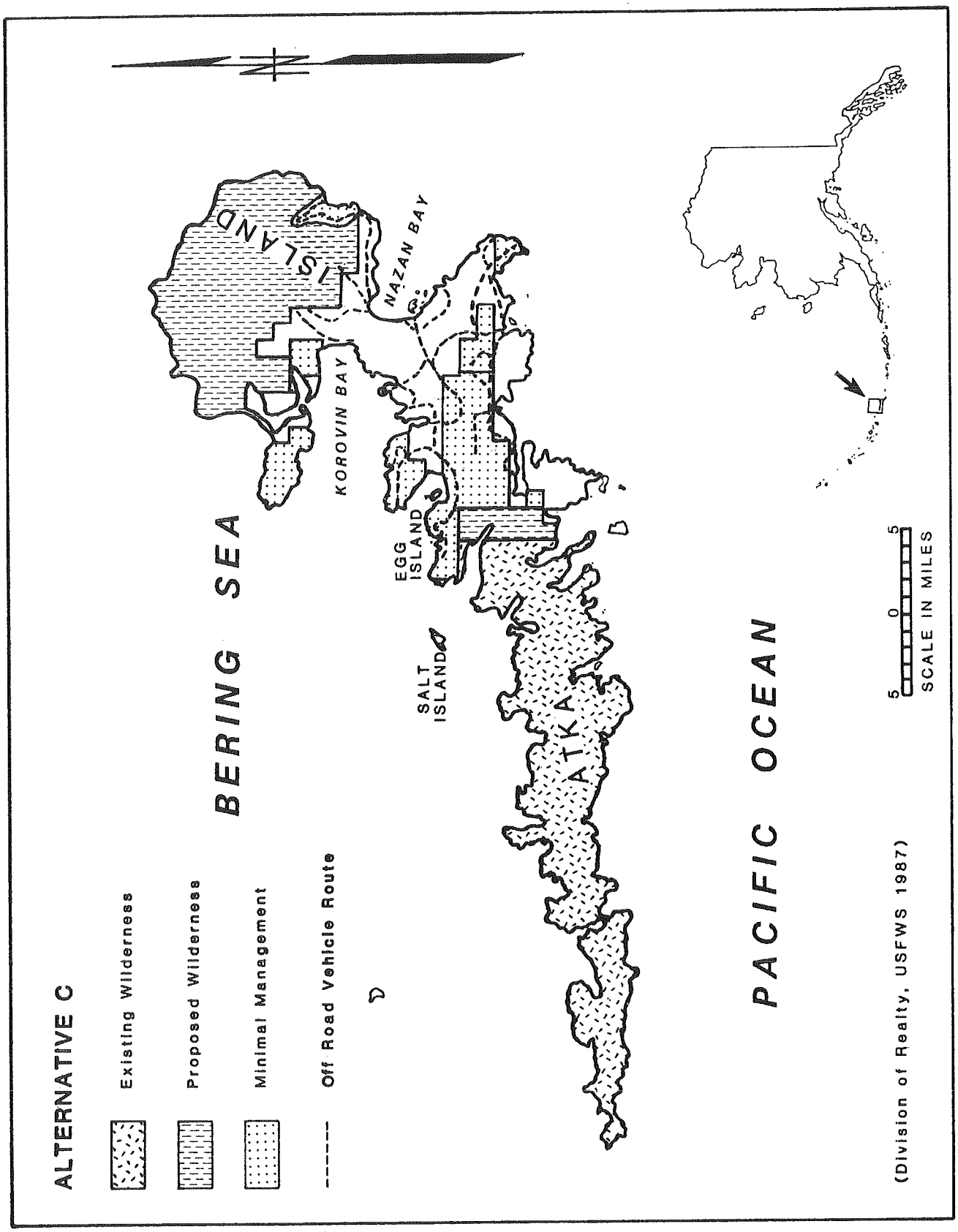


Figure 79. Alternative C - Atka Island and off road vehicle routes.



Alternative B, with the addition of eleven new sites to those that are presently visited yearly. In addition, monitoring sites would be established in the eastern Aleutians to gather baseline data on colonies that would be affected by possible oil terminals on Akun and Unalaska. An integrated program to gather data on the effect of high seas gill net mortality on seabirds of the western Aleutians would be emphasized. This would consist of monitoring colonies on Buldir and Agattu as well as offshore work using the refuge vessel M/V Tiglax. Disturbance of seabirds by visitors or aircraft would be studied as described in Alternative B.

Research on seabird-prey interactions would be expanded to enable major changes in the food chain on which these birds depend to be explained. This would for the first time enable mitigation to be proposed if human activities such as commercial fishing or development caused significant changes in the prey base of these birds. Breeding success and diet of the birds would be monitored yearly at all monitoring sites, and diets of birds in all major parts of the refuge would be described, as outlined in Alternative B. Feeding areas of breeding seabirds and the size and location of their principal prey populations would be determined for all major areas of the refuge where these data are not available. Food resources and feeding locations in autumn when young birds are first at sea, in winter, and in spring just before the breeding season are also vital to seabird welfare; research into these factors would be undertaken under Alternative C. Most research would be carried out by a team of seabird and fish experts from the refuge, Alaska Office of Fish and Wildlife Research, and Fisheries Research. Coordination would take place with other agencies that gather data on marine conditions and fish populations, which has not hitherto been feasible in single comprehensive studies.

Recreation and public use of the refuge would be continued. Management of game populations and of marine mammals would continue as outlined under Alternative A.

Military installations - The existing military presence would be maintained under each alternative, as described in the section on common management directions. Additional radar facilities would be accommodated on Amchitka.

Subsistence use management - Subsistence use would be managed the same way under each alternative, as described in the section on common management directions. In the areas proposed for wilderness, most types of power tools and equipment such as generators would not be allowed. However, chainsaws (for subsistence users only), airplanes, motorboats, and snowmobiles are allowed in wilderness.

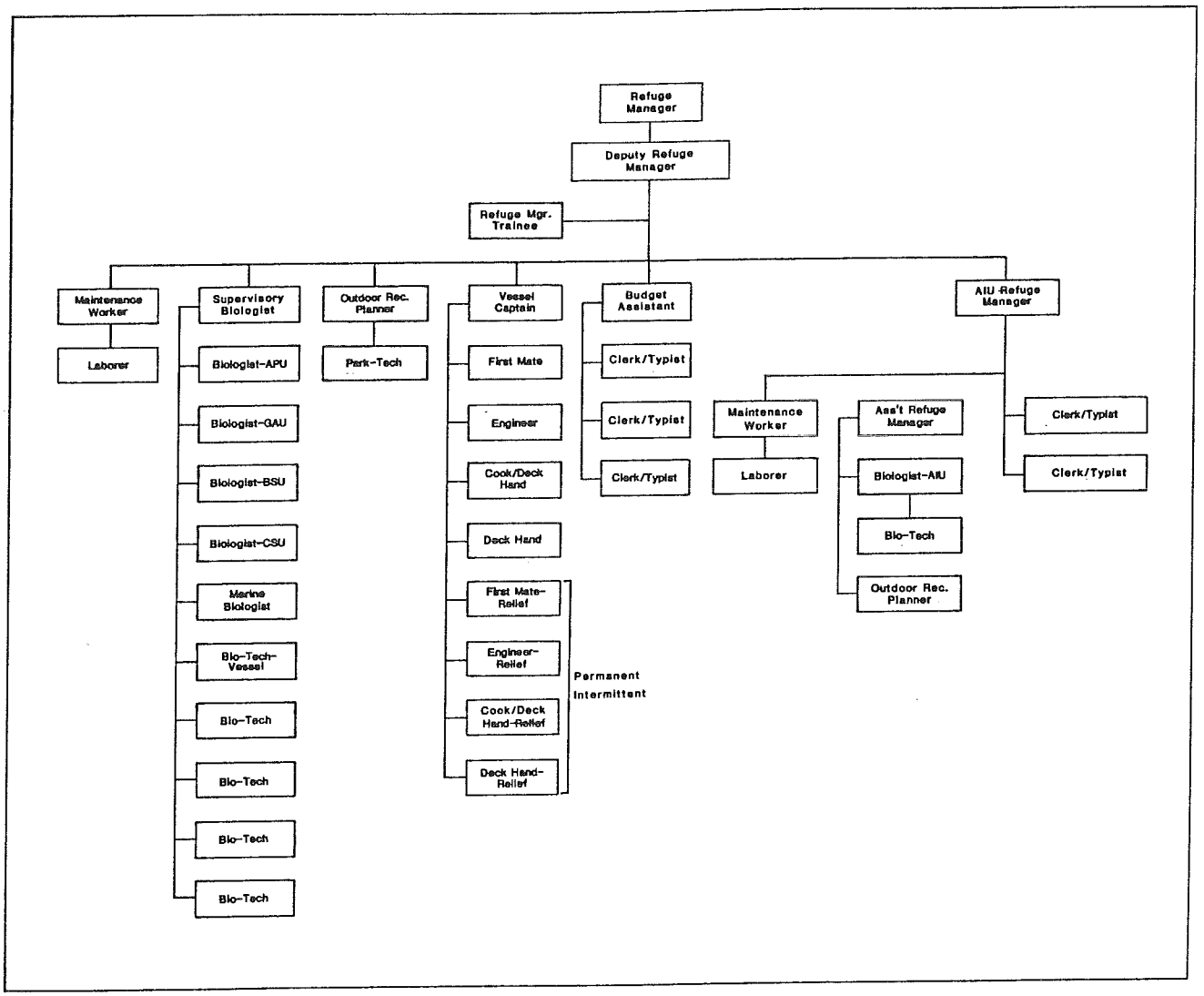
Public use and access management - Table 34 describes how public use and access would be managed. Most visits to the refuge would be as described in Alternative A. The Adak Wildlife Center would receive additional part-time staffing, and additional interpretation and environmental education would be conducted in Homer, in cooperation with the Alaska Marine Highway, and in the Pribilof Islands. Eight interpretive displays would be developed for Juneau, Sitka, Sand Point, Dutch Harbor, St. George, St. Paul, Kotzebue, and the Marine Highway System. Aircraft, motorboats, and snowmobiles would be allowed throughout the refuge for the pursuit of traditional activities, although regulations may be promulgated to close traditionally used areas on a seasonal basis if necessary to protect sensitive wildlife species. All access restrictions would meet the provisions outlined in section 1110(a) of the Alaska Lands Act and 50 CFR 36.42.

Wilderness review - An additional three percent of the refuge would be proposed for wilderness designation. Designation would depend on the approval of Congress. If approved, a total of 59 percent of the refuge would be designated wilderness.

Fire management - There would be no wildfire management aside from protecting private property, and no prescribed burning.

Timber management - Commercial timber harvest would be permitted on Delphin and Discoverer Islands per section 1427(m)of the Alaska Lands Act. The Service would try to trade other lands for the timber rights on these two islands. Around Afognak Island, log transfer facilities may be permitted subject to

Figure 80. Alaska Maritime refuge staffing pattern for Alternative C.



the provisions of section 1110 of the Alaska Lands Act.

Commercial use management - All types of geophysical and geological studies would be allowed in nonwilderness portions of the refuge, subject to reasonable stipulations. Only non-surface-disturbing oil and gas studies would be allowed in existing wilderness. Oil and gas leasing would not be allowed in existing wilderness, on the three percent of the refuge that is proposed wilderness, or on the 32 percent of the refuge in minimal management. Leasing could be allowed on the nine percent of the refuge in moderate or intensive management subject to an assessment of potential, a national interest determination, and a compatibility determination. However, some of these areas are military installations where national security would take precedence. Guiding and transporting would be permitted throughout the refuge under special use permits. Ongoing grazing permits would be honored until subject grazing lands can be traded for lands of higher wildlife value. Seafood processors and other sources of effluent discharge and mariculture may be permitted on a case by case basis subject to applicable law, the provisions of the National Environmental Policy Act, and a compatibility determination in the intensive management areas of Womens Bay and Afognak submerged lands and waters.

Management costs - Because of increased needs for information due to more permit applications and other activities associated with more moderate and intensive management areas, staffing needs to fully implement this alternative would increase (Figure 80). In addition to the staff described for Alternative A, more biological technicians would be added. Because of the heavy use made of the refuge vessel M/V Tiglax due to integrated studies, a second crew (relief) would be hired; in addition to these permanent intermittent employees, the vessel would require an accelerated maintenance program. A marine fisheries biologist would be added to the refuge staff to fulfill data needs generated by integrated colony/offshore seabird work. This would increase annual costs. The intensive management areas around Afognak would greatly increase the need to gather marine ecosystem information and result in a need for more vessel time. Mariculture permit applications would be expected to increase both biological and administrative work loads. The refuge would require $2,980,000 for annual operations to implement this alternative and $10,930,000 for one time facilities construction. This is $930,000 more than the one time construction costs for Alternative A, and an annual budget increase of 27 percent over the costs to fully implement Alternative A.

The effects of disturbance on breeding seabirds need further study. Several new study plots would be established in the Pribilof Islands specifically for this purpose.

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This section identifies and compares the biological, socioeconomic, and wilderness impacts that would result from implementing each of the management alternatives for Alaska Maritime Refuge.

Plan Scenarios

To provide a basis for assessing the alternatives, likely development activities on the refuge for the life of the plan (10-15 years) are described for each alternative. In all of the scenarios it is assumed that reasonable management practices and the best available technology would be applied. All scenarios assume that regulation by the Alaska Boards of Fisheries and Game will avoid excessive harvest of fish and wildlife.

The federal government is currently responsible for marine mammals management. The Marine Mammals Protection Act of 1972 provides for transfer of management to the state of Alaska. Since it is not known if or when this might occur, this assessment assumes continuation of existing federal management. Should the state assume management responsibility, management options might range from continuing present management to allowing regulated harvest of particular species.

The Service's selection of a preferred alternative does not imply that all activities outlined in the scenarios will necessarily occur in the manner and to the extent specified. The scenarios are simply sets of reasonable assumptions upon which the assessments are based. Some of the assumptions such as population growth or actions of inholders or adjacent landowners will affect refuge resources but are not the result of Service actions or policies. In the future, more detailed site-specific environmental assessments will assess proposed projects and actions.

Scenarios for Wilderness Evaluation

Unlike the plan, wilderness recommendations for the refuge will not be reviewed every decade. It is a one time, long term decision. The consequences of designating or not designating wilderness must be evaluated over a longer time frame than the life of the plan. For this reason additional long term (more than 15 years) scenarios have been prepared to be considered along with the short term scenarios in wilderness evaluation. These scenarios are based on the best available information at this time but are essentially highly speculative since it is very difficult to make assumptions about the political, economic, technological, and social climate 20 or more years in the future.

Definitions of Degree of Impact

Because of the general nature of the assessment and the lack of numerical information on refuge resources, impacts are expressed in general terms. For the purpose of analysis, human use levels have been estimated. Changes resulting from implementation of the plan may be either beneficial or detrimental. The meanings of the terms used are as follows:

For fish:

- o major impact - affecting a regional or local population of a species sufficiently to cause a decline in abundance or a change in distribution beyond which natural recruitment would not likely return that population to its former level within several generations.
- o moderate impact - affecting a portion of a regional or local population sufficiently to result in a change in abundance or distribution over more than one generation, but unlikely to affect the integrity of the regional population as a whole.
- o minor impact - affecting a specific group of individuals of a population in a localized area for one generation or less; the integrity of the regional population is not likely to be affected.
- o negligible impact - the degree of anticipated biological impact is considered less than minor.

For wildlife:

- o major impact - an increase or decrease of more than 30 percent
- o moderate impact - an increase or decrease of 15 to 30 percent
- o minor impact - an increase or decrease of 5 to 15 percent
- o negligible impact - an increase or decrease of 0 to 5 percent

For water quality:

- o Major impact - extensive changes in the physical, chemical, or biological parameters of a waterbody, on the level of several orders of magnitude, to a degree that renders the waterbody unacceptable for use by humans or fish and wildlife species, creates a health hazard, or otherwise impairs the beneficial uses of the waterbody.

- o Moderate impact - a statistically significant change in the physical, chemical, or biological parameters of a waterbody that cannot be overcome without corrective measures.

- o Minor impact - a change in some or all of the normal measures of water quality, such as oxygen content, temperature, transmittance, trace metal concentrations, and hydrocarbon levels, but the change is either not statistically different from ambient conditions or the change deviates significantly but can be readily overcome by the waterbody's natural withstanding capacity.

- o Short term impact - a change that persists for one year or less.

- o Long term impact - a change that persists for more than one year.

Differences in the expected types of change are discussed in each assessment. When duration and extent of change are not specified, the change is expected to last throughout the planning period (ten years) and to affect the entire refuge.

Subsistence 810 Evaluation

The subsistence 810 evaluation examines the potential effect of each of the three alternative management plans on subsistence use factors. The analysis will address potential effects in each of the five units of the refuge: the Bering Sea, Chukchi Sea, Aleutian Islands, Alaska Peninsula, and Gulf of Alaska units. Where possible, the Service has identified the particular communities which would have the highest potential for social, economic, or cultural effects because of geographic proximity, traditional use patterns, or cultural identification with refuge lands.

Three factors have been considered in determining if a significant restriction of subsistence uses and needs would result from the alternative management plans. These include:

- o the potential of the management alternative to reduce or inhibit physical access to a traditional subsistence resource base;

- o the effect of the management alternative on the abundance of harvestable subsistence resources;

- o the effect of the management alternative on the geographical distribution and seasonal accessibility of traditional subsistence species.

Regulatory changes that threaten to restrict continued access of local rural residents to traditional resource bases are not being considered. All of the proposed management alternatives provide for, and assume, continued access of local Native residents to their traditional subsistence resources.

The two most profound socioeconomic trends that will bear directly on subsistence use patterns over the next decade are (1) the declining commitment of federal resources to rural Alaskan communities; and (2) the declining state revenues resulting from the recent precipitous drop in world oil prices.

Table 38. Summary of management category designations by alternative for the Chukchi Sea Unit.

Management Category	Alternative A % of Unit	A % of Refuge	B % of Unit	B % of Refuge	C % of Unit	C % of Refuge
Intensive	1%	1%	1%	1%	1%	1%
Moderate	0%	0%	0%	0%	0%	0%
Minimal	99%	4%	43%	2%	99%	4%
Existing Wilderness	1%	1%	1%	1%	1%	1%
Proposed Wilderness	0%	0%	56%*	2%*	0%	0%

Note: These percentages are approximate and include all selected lands, tidelands, submerged lands, and waters. Refuge wide percentages do not include Unimak Island (932,484 acres - 19% of refuge) which is proposed for transfer to Izembek Refuge.

* 100% of suitable wilderness area

ALTERNATIVE A (CURRENT SITUATION)

Scenario for the Life of the Plan (10-15 years)

In this alternative, this unit would be managed as it currently is. Less than one percent of the unit can be categorized as intensive management, none of the unit as moderate management, 99 percent as minimal management, and less that one percent is already designated wilderness. No additional areas would be proposed for wilderness designation. See Table 38.

Although oil and gas leasing may be permitted on the 40 acres of the refuge presently managed as intensive management, none is expected due to low potential. Geological and geophysical studies may be permitted on the nonwilderness portion of the unit and studies which do not involve mechanized equipment may be permitted on the wilderness portion. No studies are expected due to low potential.

There is a 20 percent chance of finding economically recoverable hydrocarbons in the Chukchi Sea. Gas production is not considered economic at this time. It is assumed that if commercial quantities of oil were found, seven oil spills of at least 1,000 barrels would occur over the 20 year life of the field (Minerals Management Service 1987). Almost all spill risk would occur during production after 1999.

It is assumed that exploration and delineation wells would be drilled from 1989 to 1996. Oil would be produced from nine platforms installed in 1997 and 1998; drilling of the production and service wells would occur between 1997 and 1999. Pipelines would carry the produced oil to an onshore pipeline that connects to the Trans-Alaska Pipeline. Minerals Management Service (1987) has identified Pt. Belcher, between Wainwright and Pt. Franklin, as a likely site for on-shore facilities (see scenario for Seahorse Islands and Peard Bay Islets).

There is a two percent chance of finding commercial quantities of hydrocarbons in the Hope Basin. At this time, any find of gas is not expected to be economic. If the mean case oil resource of 0.17 billion barrels were found, there would be a 36 percent chance of one or more spills of at least 1,000 barrels occurring. The most likely number of spills would be zero.

It is assumed that the Canadian oil industry would be shipping 2.5 million barrels of crude oil per year starting in 1988 and continuing though 1995, from the Canadian Beaufort Sea, through the Beaufort, Chukchi, and Bering seas, past the Aleutians, to Pacific Rim markets. This would require approximately four tanker trips per year. Oil spills are not anticipated from this level of traffic.

No mining would occur on lands in the unit, because there are no claims, and the refuge is closed to further claim activity.

No commercial fishing occurs on refuge lands and none is anticipated for the future. Commercial fishing in the Chukchi Sea area is limited to salmon. Chum salmon is the primary species of interest. It is anticipated that commercial fishing in the Chukchi Sea would increase no more than 10 percent during the life of the plan.

Pt. Franklin, Seahorse Islands and Peard Bay Islets - Pt. Belcher, approximately eight miles southwest of these refuge lands, has been identified as a potential site for shore-based facilities for oil development (Minerals Management Service 1987). This facility is assumed to include a five-meter deep channel to be dredged in Peard Bay. The normal Corps of Engineers permits would be required and the Service would make specific recommendations to protect wildlife and habitat at that time. For the purposes of this analysis, it is assumed that dredged material would be used to construct small artificial islands and shallow areas suitable for eelgrass habitat.

The Seahorse Islands would be considered for inclusion in the Regional Shorebird Reserve Program and would be monitored once every ten years.

Cape Lisburne - Blasting at the U.S. Air Force quarry on Alaska Maritime Refuge lands would continue. Operations would be limited to a designated quarry area (less than five acres) as far as possible from seabird nesting areas. Previous beach roads to old blast sites would be removed, and charge size would be limited to 2,000 pounds of 60 percent nitroglycerine. These stipulations would further minimize disturbance to a seabird colony which has been healthy and increasing in recent years (Byrd 1986). The total area impacted by the quarry, including visual and auditory impacts, is approximately 40 acres.

Recreational use of refuge lands in the Chukchi Sea Unit is limited by the remote location and lack of facilities. At Cape Lisburne, people working at the U.S. Air Force station are the main visitors. This base has decreased from over 100 people a few years ago to a crew of eight. In summer numbers are about 20 with the addition of temporary maintenance crews. The number of personnel will probably decrease even further with continued advances in electronics. Their use of refuge areas is primarily short walks near the U.S. Air Force station and beach-combing. Bears, grizzly in summer and polar bears in winter, are common and human encounters occur. Garbage is incinerated to avoid attracting bears.

Tourists rarely visit the Cape Lisburne and Cape Thompson bird cliffs by boat. In 1987 two sea kayakers traveled from Kotzebue to Barrow. The Cape Lisburne and Cape Thompson seabird colonies were highlights of their trip. Sea kayaking would probably increase in the area as the outstanding opportunities become better known. Four groups of two people each would be expected each year within ten years.

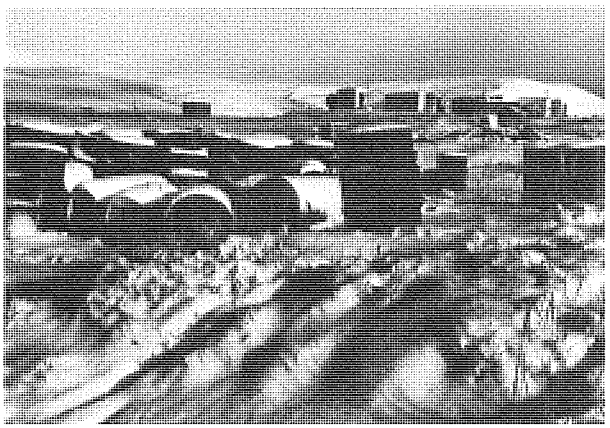
One guide operates hunting and nonhunting trips in the Cape Thompson-Cape Lisburne areas. He guides approximately 25 people a year that might enter refuge areas. Their use of refuge lands varies depending on the desires of particular clients and the location of migratory wildlife species. Hunting efforts, particularly for brown bear, are expected to increase 20 to 30 percent over the life of the plan.

Recreational use of the Cape Thompson-Cape Lisburne areas would total approximately 250 visitor use days per year during the life of the plan.

Natives from Pt. Hope and Pt. Lay visit Cape Lisburne and Cape Thompson by boat in summer and occasionally by snow machine in winter. Subsistence hunting of walrus, caribou, and collection of murre and black-legged kittiwake eggs are the main subsistence activities. Egg collecting has diminished in recent years and is expected to remain at current levels or lower. The current level of egg collecting does not appear to have a significant impact on populations.

Seabird plots near the quarry area at Cape Lisburne would be monitored annually and the entire colony would be monitored every five to ten years.

Cape Thompson - This scenario assumes that the U.S. Army Corps of Engineers would clean up the old buildings, runways, barrels, and equipment left from the abandoned Project Chariot in 1988-1989. Project Chariot was a



Trash at Cape Thompson from the Atomic Energy Commission "Project Chariot" site is scheduled for clean-up by the U.S. Army Corps of Engineers. Project Chariot was a proposal, never implemented, to build a harbor with a nuclear explosion.

study of the Cape Thompson area as a possible site to build a harbor with an atomic blast. Known hazardous materials at the site include petroleum product residues in barrels and asbestos insulation. Debris and hazardous materials would be removed. The runways and two buildings would be retained. Bulldozers, graders, and "weasels" would also be left because clean up funds are available only for dangerous and hazardous materials. These vehicles are considered historic. Although the Palmer Transportation Museum has expressed an interest in them, no funds are available for their transfer.

See the Cape Lisburne scenario for a discussion of recreational use.

Seabird populations at Cape Thompson would be monitored once every five years.

Icy Cape - Two state oil and gas lease sales have been proposed for areas adjacent to refuge lands at Icy Cape, although neither of these is on the state's current 5-year lease schedule. State Sale 53, "Icy Cape," is an on-shore area adjacent to Kasegaluk Lagoon. It is thought to have low to moderate oil potential. State Sale 58, "Offshore Icy Cape," is directly offshore of refuge islands and is estimated to have negligible oil potential, based on available seismic data (Minerals Management Service 1987). This scenario assumes that neither of these areas would be leased during the life of the plan due to low potential.

Barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons - It is assumed that beach gravel would be mined near Kivalina for their airport expansion project. This would occur approximately 14 miles from the nearest refuge lands.

All of these barrier islands and the lagoon would be considered for participation in the Regional Shorebird Reserve Program.

Chamisso and Puffin islands - These islands are visited by about five small recreational boats a year, with an average of five people per boat. Most of these visitors are from Kotzebue who go to the islands to camp and collect seabird eggs. The number of boats visiting the island is expected to triple in the life of the plan as numbers of people coming to see the wildlife increases. Egging pressure is expected to remain the same or decline.

Natives from Kotzebue, Deering, and Buckland collect seabird eggs at Puffin Island (Jerry Stroeble pers comm. 1987). Black-legged kittiwakes and common and thick-billed murres are the principal species whose eggs are collected (Nelson and Sowls 1985). Egging for seabird eggs has become primarily a 4th of July event and is not expected to increase in the future.

Coal would be mined on the Seward Peninsula near Chicago Creek. It would be hauled by small draft barge past Chamisso Island to Kotzebue. Between 6 and 12 barges per year would be expected.

It is anticipated that seabird populations at Chamisso Island would be monitored once every five years. If puffin populations appear to be dropping, monitoring intensity would increase.

Scenario for Long Term (more than 15 years) Wilderness Impacts

The long term scenario is used only for analyzing the long term impacts of the

wilderness proposal, in this case, no wilderness, on the areas suitable for wilderness. There are 92,506 acres of refuge land in this unit which are suitable for wilderness status. (See Wilderness Review for the Chukchi Sea Unit in Chapter II, Affected Environment, for analysis of suitable areas.) The suitable areas are the Seahorse Islands and the Peard Bay Islets, the barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons and portions of Icy Cape, Ann Stevens/Cape Lisburne and Cape Thompson. This scenario only includes activities which would affect those areas.

There is a 20 percent chance of discovering economically recoverable oil resources in the Chukchi Sea. Production and the associated risk of oil spills would continue 20 years into the future. See scenario for the life of the plan for discussion of oil production activities.

Commercial fishing in the Chukchi Sea Unit is not likely to increase substantially over the long term. Fishing in this area is constrained by ice cover during most of the year and remote location from major markets.

The Pt. Belcher oil support development would cause loss of important lagoon habitat nearby because of dredging. Dredge material would be used to create new islands which could provide additional nesting habitat. Dredge material would also be used to construct additional eelgrass habitat.

Use of the quarry at Cape Lisburne is likely to remain constant or decrease in size and use over time as U.S. Air Force activities in the area decreases.

Recreational use of refuge lands suitable for wilderness is limited primarily to the Cape Lisburne-Cape Thompson area. Although the number of visitors from outside the area would increase, the visits by personnel from the U.S. Air Force station would decrease. A net increase of 50 percent would be expected over the next 20 years. This would result in a total of 375 visitor use days per year.

Information on the use of refuge resources for subsistence purposes is not documented. However, because of increase in the demand for these products it would be reasonable to assume an increase in subsistence use of refuge lands is primarily egging and hunting at at Cape Lisburne and Cape Thompson. It would be expected to increase up to 100 percent over the long term.

Additional biological studies would be conducted on eiders, shorebirds, and ducks which utilize the Chukchi Sea Unit.

Biological Impacts of Alternative A - Chukchi Sea Unit

Fish - Although little is known about fishery resources on the refuge, the Service has proposed no management actions which are likely to impact their populations or habitats. Commercial fishing does not currently occur on the refuge holdings in this unit and is not expected to occur in the future.

Seabirds and marine mammals - Management actions proposed by the Service under this alternative consist of monitoring studies designed to increase knowledge of these species and to enhance efforts to manage their populations and habitats.

Quarry activities at Cape Lisburne were monitored in 1987 (Sowls pers. comm. 1987) and there was only minor disturbance to seabirds. Future quarry activities are expected to remain stable or decline. In addition, the quarry activities would be located farther from the nesting cliffs. Negligible impacts on seabirds are anticipated.

During the life of the plan, recreational use of refuge lands is expected to increase to a total of 250 visitor use days. This use occurs primarily at Puffin Island, Cape Thompson and Cape Lisburne. Most of this use would be beachcombing and birdwatching. These activities are would have negligible impacts on seabirds and marine mammals.

Egging for seabird eggs has become primarily a 4th of July event and is not considered to be adversely affecting populations.

The Pt. Belcher oil support development would cause loss of important lagoon habitats near refuge lands because of dredging. Important

eelgrass beds and habitats for bottom-dwelling organisms could be lost. Dredging would not occur directly on refuge lands, but near them. If new nesting islands are created from dredged material, they would function as part of the natural environment within two to three years, although they may appear different in shape from natural islands. Naturalness of refuge lands would not be impacted, and the biological productivity of the surrounding area would be maintained if dredged material could be used to replace lost habitat.

Marine mammals and seabirds spend most of their lives at sea. The Chukchi Sea populations winter primarily in the Bering Sea so human activities even far from the nesting colonies and haul out areas could effect these animals. Cumulative impacts pose the most serious threat. Possible overfishing of prey species, such as pollock, combined with mortality from oil spills, etc. could cause populations to decline (See discussion of "Off-Refuge Environment"), but only minor increases in commercial fishing effort are anticipated (10 percent increase).

There is an 80 percent chance that oil development will not occur in the Chukchi Sea. However, oil spills of 1,000 barrels or greater are almost certain if oil development occurs. Depending on many factors (time of year, location, weather, etc.) few to several thousand seabirds could die. Cape Thompson and Cape Lisburne, with 120,000 and 130,000 seabirds respectively have the largest colonies in the Chukchi Sea. An oil spill at one of these sites during the summer breeding season could kill tens of thousands of murres and black-legged kittiwakes. Oil spills in the winter would cause little direct mortality to seabirds because few winter in the area. Some murres and black guillemots which occupy open ice leads could be killed by winter spills. Other than the worst case scenario of spills at colonies during the breeding season, oil pollution should not cause long term population declines. The Chicago Creek coal mining operation barge traffic would heighten the chance of an oil spill in southern Kotzebue Sound. There is little likelihood of any significant mortality unless the spill were near Chamisso or Puffin islands during the summer breeding season. In that situation, losses could be between zero and 15,000 seabirds, primarily murres and horned puffins. There would be negligible to major impacts on the seabirds and marine mammals using refuge lands as a result of actions proposed under this alternative.

Waterfowl and shorebirds - The barrier islands of the Chukchi Sea support nesting eiders (Sowls et al. 1978) and large numbers of migrating shorebirds and waterfowl (Gill, Handel and Connors 1985). Spills along the Chukchi coast from early June through mid-September could kill tens of thousands to hundred of thousands of birds. Incorporation of refuge barrier islands into a regional shorebird reserve status would heighten the awareness of the importance of these islands.

If an oil spill occurred near the coastal barrier islands, several hundred to a few thousand waterfowl could be directly killed. If the spill entered the lagoon waters and salt marshes, greater numbers of birds--including shorebirds--could be killed or indirectly affected through the contamination and loss of invertebrate food sources. Likelihood of spills entering the lagoon areas is considered low.

Terrestrial birds and mammals - Terrestrial mammals (particularly caribou) spend most of their time off refuge lands. The Alaska Maritime Refuge protects just a small part of their habitat. Although hunting pressure is expected to increase up to 30 percent, the populations of favored game species are large enough to absorb this increase with no substantial impact to the populations.

The level of recreational use anticipated (250 visitor use days) is not great enough to cause any significant disturbance to wildlife. Human-bear interactions are possible at Cape Lisburne and Cape Thompson. Tourists should be aware of standard precautions in bear country.

Water quality and quantity - The Service does not manage any offshore waters in this unit. Therefore, the main effects on water quality and quantity would be associated with natural streambank erosion and shoreline degradation associated with normal stream and river dynamics. Impacts would be negligible.

Socioeconomic Impacts of Alternative A - Chukchi Sea Unit

Cultural resources - These resources are among those targeted for protection under all alternatives. The discussion of common management directions indicates that recreational use and access to islands in this unit would be managed to minimize adverse impacts to cultural resources. People using refuge lands for a variety of purposes may cause some damage to sites, intentionally or unintentionally, and some sites may be lost to natural forces. However, these are both low-level risks and the overall impact on cultural resources under this alternative would be negligible.

Population - Since this alternative emphasizes existing types and levels of refuge use, the proposed management actions would not cause local population changes.

Economy - The proposed management actions would have a negligible impact on the regional economy or on the economy of any community in the unit. No refuge jobs would be created in this unit. Some economic stimulation can be expected from the oil developments anticipated by the scenario for this alternative, but this would be independent of Service action.

Recreation - Alternative A would not contribute to increased visitation because no additional facilities or programs are planned which would improve access or otherwise make recreational use easier or more popular. Recreational use levels by nonlocal people would remain low.

In the less than one percent of the unit that is designated wilderness it is illegal for recreational users to use motorized equipment, although the Alaska Lands Act exempts motorboats, snowmachines and airplanes. Subsistence users may also use chainsaws, but this is of little practical benefit as most refuge areas are treeless.

Impacts of the Wilderness Proposal for Alternative A - Chukchi Sea Unit

There are 92,506 acres (45 percent) of refuge lands in the Chukchi Sea Unit which are suitable for wilderness designation. In Alternative A none of the unit would be proposed for wilderness designation. Suitable areas would be managed as they are currently, essentially minimal management. The suitable areas include the Seahorse Islands, the Peard Bay Islets, Icy Cape, 48,320 acres of Ann Stevens/Cape Lisburne, 38,756 acres of Cape Thompson, and the barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons. See Wilderness Review for the Chukchi Sea Unit in Chapter II, Affected Environment for the determination of suitable areas. Less than one percent of the unit is already designated wilderness. The impacts of existing wilderness are not considered in this analysis. The impacts of nondesignation are only evaluated for the suitable areas of the unit. The impacts are evaluated for the two significant wilderness issues; impacts on wilderness values and impacts on wildlife populations. See Table 39 for a summary of the wilderness proposal by alternative for the Chukchi Sea Unit.

Wilderness values - Chukchi Sea Unit

Naturalness - The Service is proposing to conduct population monitoring studies on the Seahorse Islands, Cape Lisburne, and Cape Thompson. In addition, a reconnaissance survey would be done on the barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons. The Service is proposing no additional management actions which would impact naturalness on areas suitable for wilderness in this unit. Other actions and situations occurring on suitable areas which may impact naturalness are recreation and subsistence activities. Situations occurring outside of refuge jurisdiction which may impact suitable areas include oil spills resulting from offshore oil production or shipping accidents, commercial fishing, and dredging in Peard Bay.

Increases in recreational use of the unit are likely to result in a total of only 500 visitor use days per year. Use of the unit would be primarily beachcombing by U.S. Air Force personnel from the Cape Lisburne installation and recreational boaters at Cape Thompson and Cape Lisburne. This level of use is very low in relation to the number of acres affected and the activities are primarily nonconsumptive. Beachcombing would be concentrated near the U.S.

Air Force station, but recreational boating would occur along the entire coastline. No permanent campsites are anticipated. No significant impacts to the naturalness of the suitable areas would be expected.

Off-refuge actions which may impact the suitable areas include oil spills from oil production and shipping. If a spill were to occur, oil could wash ashore on these lands but the most likely impact is mortality of seabirds that become oiled when diving for food at sea. The potential for such oil spills is low given the low potential (20 percent) for oil production in the vicinity of refuge lands and the low level of shipping activity anticipated (10 to 16 ships passing refuge lands each year). Impacts of an oil spill would vary depending on the time of year, type of hydrocarbons, location of the spill, currents, and weather conditions.

The level of commercial fishing anticipated for the Chukchi Sea is likely to remain approximately the same throughout the life of the plan and would not have a significant impact on fish populations and therefore would have negligible impacts on seabird populations.

The Pt. Belcher oil support development would cause loss of important lagoon habitats near refuge lands because of dredging. Important eelgrass beds and habitats for bottom-dwelling organisms could be lost. Dredging would not occur directly on refuge lands, but within three miles of them. If new nesting islands are created from dredged material, they would function as part of the natural environment within two to three years, although they may appear different in shape from natural islands. Naturalness of refuge lands would not be impacted, and the biological productivity of the surrounding area would be maintained if dredged material could be used to mitigate habitat loss.

Conclusion - During the life of the plan and over the long term, the naturalness of the suitable lands in the Chukchi Sea Unit would be impacted by potential oil spills (potential for spills is low), and dredging in Peard Bay (indirect impacts which are both positive and negative). Negligible or no impacts can be expected from recreational use or commercial fishing. The essential naturalness of the Chukchi Sea Unit would not be significantly affected.

Outstanding opportunities for solitude - The Service is proposing no management actions which would impact opportunities for solitude on areas suitable for wilderness in this unit. Other actions and situations which may impact solitude include recreation and subsistence activities.

During the life of the plan and over the long term, recreational use of the Chukchi Sea Unit is expected to increase to a total of 500 visitor use days per year. Beachcombing would be concentrated near the U.S. Air Force station, but recreational boating would occur along the entire coastline. Hunting activity is spread throughout the area.

Subsistence use of the unit, primarily egging at Cape Lisburne, occurs over a short period of time (approximately one week) and is not expected to increase over current levels.

The large size of the Cape Lisburne and Cape Thompson parcels (104,000 and 88,000 acres respectively) and the topographical screening provided by the Lisburne hills allow for outstanding opportunities for solitude. Other areas of the unit are very remote and difficult to access.

Conclusion - Over the long term, recreational use of refuge lands is likely to double to a total of 500 visitor use days per year. Most of the public use (subsistence, recreational boating, and hunting) would be distributed over the parcels. Beachcombing by Air Force personnel would be concentrated along the beach near the U.S. Air Force station. One out of 10 recreationists may encounter other people on the beach or near the quarry. Opportunities for solitude would remain outstanding during the life of the plan and the long term. There would be no impacts to solitude opportunities.

Outstanding opportunities for primitive recreation - The Service is proposing no management actions which would impact opportunities for primitive recreation on areas suitable for wilderness in this unit. Increased

Table 39. Summary of the wilderness proposal by alternative for the Chukchi Sea Unit.

Suitable Areas	Suitable Acres	Proposed Acres (Alternative)		
		A	B	C
Seahorse Islands	120	0	120	0
Islets in west Peard Bay	30	0	30	0
Icy Cape	5,130	0	5,130	0
Ann Stevens/ Cape Lisburne	70,739	0	70,739	0
Cape Thompson	38,756	0	38,756	0
Stepping Lagoon Barrier Islands	20	0	20	0
Tasikpak Lagoon Barrier Island	40	0	40	0
Pusaluk Lagoon Barrier Island	50	0	50	0
Tugik Lagoon Barrier Island	20	0	20	0
Kavorak Lagoon Barrier Island	20	0	20	0
Totals	114,925	0	114,925	0

recreational use and the risk of oil spills could impact primitive recreation opportunities.

All areas of this unit which are suitable for wilderness designation are very remote and, with the exception of Cape Lisburne, are difficult to access. Hiking, camping, birdwatching, and photography are available. There would be an estimated 500-525 visitor use days per year on the unit. Beaches near Cape Lisburne are easily accessible to the small group of Air Force personnel based at the Cape Lisburne Air Force station. One out of 10 recreationists may encounter other people on the beach. In other areas of the unit recreational use would be widely dispersed and encounters would be unlikely. If oil spills were to impact seabird populations as discussed under Naturalness above, birdwatching opportunities would be diminished. Depending on the severity of the damage, it could take from one to 15 years for populations to recover. No proposed action would impact the primitive nature of these areas. Overall opportunities for primitive recreation would remain outstanding.

Conclusion - There would be a total of approximately 500 visitor use days per year on the unit, most of which would be dispersed throughout the Cape Lisburne and Cape Thompson parcels. There would be some concentration of use along the beach near the Cape Lisburne Air Force station. There would be decreased birdwatching opportunities if oil spills were to impact seabird populations. Overall opportunities for primitive recreation would remain outstanding during the life of the plan and for the long term

Special features - The unique wildlife features of this unit would benefit by the Service's proposed management actions. Additional studies of bird populations, particularly on the barrier islands, would increase knowledge of these species and allow for more effective management. The unique wildlife values associated with Kasegaluk Lagoon shorebird habitat, seabird, caribou, and archaeological resources at Point Franklin, Cape Lisburne, and Cape Thompson would not be negatively impacted by any management action proposed in this alternative. Shorebirds and seabirds could sustain major adverse impacts if an oil spill were to occur on critical habitats during breeding season. The potential for oil spills in this area is low (20 percent).

Conclusion - Management actions proposed in this alternative are essentially studies which would enhance the knowledge and management of the special features of the areas suitable for wilderness designation in this unit. Major impacts from oil spills are possible, but not probable.

Wildlife populations - Chukchi Sea Unit

Management actions proposed by the Service are the monitoring of seabird populations throughout the unit and the consideration of barrier islands in the unit for inclusion in the Regional Shorebird Reserve Program. Dredging activities in Peard Bay and oil spills beyond Service jurisdiction may impact wildlife resources.

Management actions proposed by the Service under Alternative A would enhance the knowledge and management of wildlife resources on the Chukchi Sea Unit. Inclusion of the barrier islands in the Regional Shorebird Reserve Program would place additional emphasis on protection of those areas.

The Pt. Belcher oil support development would cause loss of important lagoon habitats near refuge lands because of dredging. Dredging would not occur directly on refuge lands, but near them. If new nesting islands are created from dredged material, they would function as part of the natural environment within two to three years, although they may appear different in shape from natural islands. Wildlife populations using refuge lands would not be impacted, and the biological productivity of the surrounding area would be maintained if dredged material could be used to mitigate habitat loss.

There is an 80 percent chance that oil development would not occur in the Chukchi Sea. However, oil spills of 1,000 barrels or greater are almost certain if oil development occurs. Depending on many factors (time of year, location, weather, etc.) few to several thousand seabirds could die. If an oil spill occurred near the coastal barrier islands, several hundred to a few thousand waterfowl could be directly killed. If the spill entered the lagoon waters and salt marshes, greater numbers of birds--including shorebirds--could be killed or indirectly affected through the contamination and loss of invertebrate food sources. Likelihood of spills entering the lagoon areas is considered low.

Conclusion - During the life of the plan and in the long term, management actions would enhance the knowledge and management of refuge resources. Dredging activities in Peard Bay would not impact refuge lands directly, but would have both positive and negative impacts to the surrounding area. Oil spills would have major impacts to wildlife populations depending on several factors. The potential for such an oil spill is low.

Subsistence/Section 810 Evaluation and Findings -Chukchi Sea Unit

Evaluation - This section examines the impacts on subsistence that would result from implementation of Alternative A. It also conforms to the guidelines recommended by the Alaska Land Use Council and the guidelines of the Department of the Interior for complying with section 810 of the Alaska Lands Act. Alternative A would have a negligible impact on subsistence users and the resources upon which they depend. No management initiatives are contemplated in Alternative A which would increase the existing levels of refuge use by nonlocal people. Increase in competition for subsistence resources with nonlocal people is unlikely to occur. A projected population increase of the permanent resident population (currently estimated at 9,248 people) in this area is estimated to be 0.6 percent per year for the next ten years. This increase would result in a minor increase in subsistence harvest and local competition.

Independent of the alternatives, cultural change would continue to occur in the region due to the infusion of revenues into the communities from onshore oil related development. The degree of local employment has meant several things for the level and intensity of subsistence activity in the community. It has altered the amount of cash available to purchase expensive items often used in conjunction with subsistence-oriented pursuits, such as the snowmachine. This available technology has caused a shift in the goals of the hunt (example there is not a pressing need for meat for dog food) and the winter hunt has shifted toward land resources, such as caribou, because snowmachines do not perform well on ice. Also, more game can be harvested in a shorter period of time at greater distances from the community. As more people have become employed in the commercial economic sector, they have proportionally less time and need to spend on subsistence pursuits.

Availability of other lands - Section 810(a) requires that the availability of other lands and other alternatives be considered in evaluating plans on subsistence uses. This plan is a refuge plan by definition and addresses the general suitability of a broad range of activities for refuge lands. Thus although there may be other lands available for the uses considered, lands outside of the refuge are not considered because they are beyond the scope of this plan.

Other Alternatives - Three alternatives were developed for the Alaska Maritime Refuge. This alternative maintains the current situation in refuge management.

Finding - This alternative would have no impact on subsistence harvest opportunities or levels. Increases in competition between local and nonlocal users and among local users would be negligible. Local perceptions of competition levels may vary.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

ALTERNATIVE B - CHUKCHI SEA UNIT

Scenario for the Life of the Plan (10-15 years)

The scenario for Alternative A applies to this alternative as well. Almost all the assumptions described in that scenario remain true for all alternatives as they concern actions over which the Service has no control. All management actions described in Alternative A would also take place in this alternative.

Under Alternative B, 240 acres of the unit would be placed in intensive management and 110,914 acres would be managed under minimal management. In addition, this alternative proposes all suitable lands (45 percent of the unit) for wilderness designation. Less than one percent of the unit is currently congressionally designated wilderness. This scenario assumes that Congress approves the recommendation and designates the refuge as wilderness. Management

Particularly in the Chukchi Sea Unit, the refuge includes many barrier islands. Like the Seahorse Islands pictured here, these islands provide important habitat for shorebirds, terns, waterfowl, and black guillemots.

of the refuge would be subject to the provisions of the Wilderness Act as amended by the Alaska Lands Act.

Although oil and gas leasing may be allowed on the 240 acres in intensive management, no leasing is anticipated due to low potential. No oil and gas leasing would be permitted on the 92,506 acres proposed for wilderness, the 440 acres of existing wilderness, or on the 110,914 acres of minimal management. Geological and geophysical studies may be permitted on the portions of the unit in intensive and minimal management. Studies which do not involve mechanized equipment may be permitted on the wilderness areas. No studies are expected due to low potential.

As in Alternative A, no mining would occur on lands in the unit, because there are no claims, and the refuge is closed to further claim activity.

As in Alternative A, no commercial fishing is anticipated on refuge lands. It is anticipated that commercial fishing in the Chukchi Sea would increase no more than 10 percent.

An interpretive display would be developed for the interagency facility in Kotzebue.

It is assumed that visitor use would not increase significantly (less than five percent) as a result of wilderness designation.

Scenario for Long Term (more than 15 years) Wilderness Impacts

All assumptions made for Alternative A apply to Alternative B as well, except that proposed wilderness areas would be assumed to be designated wilderness. As in the short term scenario, use of mechanized equipment in wilderness would be limited to airplanes, snowmobiles and motorboats; subsistence users could also use chainsaws. Visitor use would increase as described in the long term scenario for Alternative A. As in the short range scenario, wilderness designation would not appreciably affect the amount of visitor use.

Biological Impacts of Alternative B - Chukchi Sea Unit

Fish - Impacts from commercial fishing would be negligible as described for Alternative A. Commercial fishing in the Chukchi sea occurs at low levels. The fish resources of the area will very likely be affected by oil spills, etc., but considering the relatively broad distribution of fish, the overall effects are expected to be minor.

Seabirds and marine mammals - Management actions proposed by the Service under this alternative consist of monitoring studies designed to increase knowledge of these species and to enhance efforts to manage their populations and habitats. In addition, wilderness designation would further protect habitats from unforeseen development.

Impacts to seabirds and marine mammals may happen as a result of quarry activity at Cape Lisburne, increased recreational use, commercial fishing, petroleum development and oil spills. See Alternative A for an in-depth discussion of impacts to seabirds and marine mammals.

Waterfowl and shorebirds - Spills along the Chukchi coast during breeding season could kill large numbers of birds depending on the time of year, location of the spill, currents, and weather conditions. The potential for such an oil spill is low. Incorporation of refuge barrier islands into a regional shorebird reserve status would heighten the awareness of the importance of these islands. See Alternative A for an in-depth discussion of impacts to waterfowl and shorebirds. In addition, wilderness designation would further protect habitats from unforeseen development.

Terrestrial birds and mammals - Impacts on terrestrial birds and mammals on refuge lands of the Chukchi Sea Unit are from hunting and human disturbance. Disturbance to wildlife from tourists is expected to be minor. See Alternative A for an in-depth discussion of the impacts on terrestrial birds and mammals. In addition, wilderness designation would further protect lands from unforeseen development.

Water quality and quantity - The Service does not manage any off shore waters in this unit. Therefore, the main effects on water quality and quantity would be due to natural processes. Impacts would be negligible.

Socioeconomic Impacts of Alternative B - Chukchi Sea Unit

Cultural resources - The impact of this alternative on cultural resources would be negligible; see the discussion for Alternative A.

Population - This alternative would not effect the population of area communities; see the discussion for Alternative A.

Economy - The negligible impacts on the economy are identical to those described for Alternative A.

Recreation - Designation of an additional 45 percent of the unit as wilderness would have a negligible effect on recreational use because of the remoteness of the unit. Development of an interpretive display for the interagency facility in Kotzebue would have minor positive effects on interpretive opportunities, although it would not be likely to draw additional visitors to the refuge.

Impacts of the Wilderness Proposal - Chukchi Sea Unit

There are 92,506 acres of refuge lands in the Chukchi Sea Unit which are suitable for

wilderness designation. In Alternative B all of these lands would be proposed for wilderness designation. Suitable areas include the Seahorse Islands, the Peard Bay Islets, Icy Cape, 48,320 acres of Ann Stevens/Cape Lisburne, 38,756 acres of Cape Thompson, and the barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons. See the Wilderness Review for the Chukchi Sea Unit in Chapter II, Affected Environment, for the determination of suitable areas. Less than one percent of the unit is already designated wilderness. The impacts of existing wilderness are not considered in this analysis. The impacts of designation are only evaluated for the significant wilderness issues: impacts on wilderness values and impacts on wildlife populations. See Table 39 for a summary of the wilderness proposal by alternative for the Chukchi Sea Unit.

Wilderness values - Chukchi Sea Unit

Naturalness - Under Alternative B all lands in the Chukchi Sea Unit which are suitable for wilderness would be proposed for designation. Congressional designation would provide further protection of refuge lands from unforeseen development. The Service is proposing no additional management actions which would impact the naturalness of suitable areas. Situations occurring outside of refuge jurisdiction which may impact suitable areas include increased recreational use, oil spills resulting from offshore oil production or shipping accidents, commercial fishing, and dredging in Peard Bay.

Recreational use of the refuge would increase as described in Alternative A. Wilderness designation would not increase visitor use substantially (less than five percent) above that point. The remote location and difficult access limits recreational use of most of this unit. Although beachcombing is concentrated near the U.S. Air Force station at Cape Lisburne, other forms of recreation are dispersed over the parcels at Cape Lisburne (104,040 acres) and Cape Thompson (88,200 acres). No significant impacts to the naturalness of suitable areas would be expected. See Alternative A for additional discussion.

The risk of oil spills due to offshore oil production and commercial shipping activity would occur under this alternative as well. These activities are beyond the Service's control and wilderness designation and management would have no bearing on them. The severity of impacts from oil spills depends on factors such as the time of year, weather conditions, currents, and proximity to sensitive areas. Risk from oil spills would continue 20 years into the future. See Alternative A for an in-depth discussion of oil spill risks.

The low level of commercial fishing anticipated (10 percent increase) for the Chukchi Sea is not likely to have a significant impact on fish populations and therefore would have negligible impacts on seabird populations.

The Pt. Belcher oil support development (dredging) would cause impacts on lagoon habitats near refuge lands in Peard Bay. Artificial nesting islands created from dredge materials would function as part of the natural environment within two to three years. As these activities would not occur on refuge lands, they would be beyond the Service's direct control. Naturalness of refuge lands would not be impacted. See Alternative A for greater detail.

Conclusion - During the life of the plan and over the long term, the naturalness of the suitable refuge lands would be impacted by potential oil spills (potential for spills is low), and dredging in Peard Bay (indirect impacts which are both positive and negative). Negligible or no impacts can be expected from increased recreational use or commercial fishing. Overall naturalness of the Chukchi Sea Unit will be preserved.

Outstanding opportunities for solitude - The Service is proposing no management actions which would impact opportunities for solitude on suitable wilderness areas in this unit. Other actions and situations occurring on suitable areas which may impact solitude include recreation and subsistence activities.

During the life of the plan and over the long term, recreational use of refuge lands is expected to increase to a total of 500-525

visitor use days per year. Less than five percent of this use would be a result of wilderness designation. Subsistence use of the unit occurs over a short period of time (approximately one week) and is not expected to increase over current levels. Cape Lisburne (104,040 acres) and Cape Thompson (88,200 acres), which would receive nearly all of the recreational use are large areas with good topographic screening. Beachcombing would be concentrated near the U.S. Air Force station at Cape Lisburne, but other activities be would distributed throughout the area. Opportunities for solitude would remain outstanding.

Conclusion - A small increase, less that 5 percent, in recreational use would occur as a result of wilderness designation. Some activities would be concentrated, but most would be dispersed. Opportunities for solitude would remain outstanding during the life of the plan and the long term. There would be no impacts to solitude opportunities.

Outstanding opportunities for primitive recreation - The Service is proposing no management actions which would impact opportunities for primitive recreation on areas suitable for wilderness in this unit. Increased recreational use and the risk of oil spills could impact primitive recreation opportunities.

All areas of this unit which are suitable for wilderness designation are very remote and, with the exception of Cape Lisburne, are difficult to access. Hiking, camping, birdwatching, and photography are available. There would be an estimated 500-525 visitor use days per year on the unit. Less than five percent of this increase would be due to wilderness designation. Some use would be concentrated along the beaches near Cape Lisburne. In other areas of the unit recreational use would be widely dispersed and encounters would be unlikely. If oil spills were to impact seabird populations, birdwatching opportunities would be diminished. No proposed action would impact the primitive nature of these areas. Overall opportunities for primitive recreation would remain outstanding. See Alternative A for additional discussion.

Conclusion - There would be an annual total of approximately 500-525 visitor use days on the unit, most of which would be dispersed throughout the Cape Lisburne and Cape Thompson parcels. There would be some concentration of activities along the beaches near the Cape Lisburne Air Force station. There would be decreased birdwatching opportunities if oil spills were to impact seabird populations. Overall opportunities for primitive recreation would remain outstanding during the life of the plan and for the long term.

Special features - The unique wildlife and archaeological values of this unit would receive additional protection from unforeseen development due to wilderness designation. No other management action proposed in this alternative would impact the special features of the refuge. There is a small (20 percent) chance that bird populations would be impacted by oil spills. See Alternative A for additional discussion.

Conclusion - Special features of the areas suitable for wilderness designation would gain additional protection from unforeseen development due to wilderness designation. Knowledge and management capabilities for these special values would be increased by studies proposed under this alternative.

Wildlife populations - Chukchi Sea Unit

Management actions proposed by the Service are the monitoring of seabird and shorebird populations throughout the unit, and the consideration of barrier islands in the unit for inclusion in the Regional Shorebird Reserve Program. No additional management actions are anticipated because of wilderness. Dredging activities in Peard Bay and oil spills beyond Service jurisdiction may impact wildlife resources.

Management actions proposed under Alternative B would provide additional protection against unforeseen development on refuge lands and enhance the knowledge and management of wildlife resources on the Chukchi Sea Unit. Dredging activities in Peard Bay for the oil support facility at Pt. Belcher would not impact refuge lands directly. In the unlikely chance that an oil spill were to occur, bird populations could sustain a major impact. See Alternative A for more detail on dredging and oil spills.

Conclusion - During the life of the plan and over the long term, management actions would enhance the knowledge and management of refuge resources as well as providing an additional level of protection against unforeseen development on suitable lands in the unit. Designation of areas suitable for wilderness in the Chukchi Sea Unit would have no impacts on the wildlife populations of the unit.

Subsistence/Section 810 Evaluation and Findings - Chukchi Sea Unit

The minor impacts on subsistence resulting from implementing this alternative would be similar to Alternative A, except that subsistence users would not be able to use generators or other motorized tools except chain saws in wilderness areas (about 45 percent) of the unit. The section 810 evaluation and findings for Alternative A apply to Alternative B as well.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

ALTERNATIVE C (PREFERRED ALTERNATIVE)
CHUKCHI SEA UNIT

Scenario for the Life of the Plan (10-15 years)

The scenario for Alternative A applies to this alternative as well. Almost all the assumptions described in that scenario are true for all alternatives as they concern actions over which the Service has no control. All management actions described in Alternative A would also take place in this alternative.

Under Alternative C, 240 acres of the unit would be placed in intensive management and 203,420 acres would be managed under minimal management. This alternative proposes none of the suitable lands (45 percent of the unit) for wilderness designation. Less than one percent of the unit, 440 acres, is currently congressionally designated wilderness (See Table 38).

Management actions proposed by the Service under this alternative consist of monitoring studies designed to increase knowledge of these species and to enhance efforts to manage their populations and habitats. These studies would occur on the Seahorse Islands, Cape Lisburne, Cape Thompson, and Chamisso Island. The Seahorse Islands and the barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons would be proposed for inclusion in the Regional Shorebird Reserve Program. In addition, a reconnaissance survey would be done on the barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons.

As in Alternative B, an interpretive display would be developed for the interagency facility in Kotzebue.

As in Alternative A, no mining would occur on lands in the unit, because there are no claims, and the refuge is closed to further claim activity.

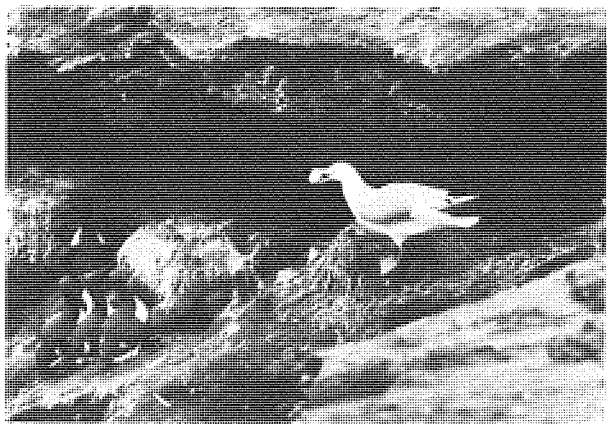
Although oil and gas leasing may be permitted on the 240 acres in intensive management, no leasing is anticipated due to low potential. No oil and gas leasing may be permitted on the areas proposed for minimal management or the 440 acres of existing wilderness. Geological and geophysical studies may be permitted on minimal management areas. Studies which do not involve mechanized equipment may be permitted on the wilderness areas. No studies are expected due to low potential.

As in Alternative A, no commercial fishing is anticipated on refuge lands. It is anticipated that commercial fishing in the Chukchi Sea would increase no more than 10 percent.

As in Alternative A, it is assumed that Canadian oil tankers would be traveling through the Chukchi Sea approximately four times per year.

Scenario for Long Term (more than 15 years)
Wilderness Impacts

All assumptions made in the long-term scenario for Alternative A apply to this alternative as well. In addition, the Service would do a reconnaissance survey of the barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons and, as in Alternative B, an interpretive display would be maintained for the interagency facility in Kotzebue.



Gulls prey on seabird eggs when disturbance causes the birds to flush from their nests. Disturbances can be caused by people, boats, or low-flying aircraft; birds at some colonies are tolerant of close viewers or outside activity while others are not.

Biological Impacts of Alternative C - Chukchi Sea Unit

Fish - Impacts from commercial fishing would be negligible as described for Alternative A. Commercial fishing in the Chukchi sea occurs at low levels. The fish resources of the area will very likely be affected by oil spills, etc., but considering the relatively broad distribution of fish, the overall effects are expected to be minor.

Seabirds and marine mammals - Management actions proposed by the Service under this alternative consist of monitoring studies designed to increase knowledge of these species and to enhance efforts to manage their populations and habitats. A reconnaissance survey would be done on the barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons.

Impacts to seabirds and marine mammals may happen as a result of quarry activity at Cape Lisburne, increased recreational use, commercial fishing, petroleum development and oil spills. See Alternative A for an in-depth discussion of impacts to seabirds and marine mammals.

Waterfowl and shorebirds - Spills along the Chukchi coast during breeding season could kill large numbers of birds depending on the time of year, location of the spill, currents, and weather conditions. The potential for such an oil spill is low. Incorporation of refuge barrier islands into a regional shorebird reserve status would heighten the awareness of the importance of these islands. See Alternative A for an in-depth discussion of impacts to waterfowl and shorebirds.

Terrestrial birds and mammals - Impacts on terrestrial birds and mammals on refuge lands of the Chukchi Sea Unit are from hunting and human disturbance. Disturbance to wildlife from tourists is expected to be minor. See Alternative A for an in-depth discussion of the impacts on terrestrial birds and mammals. In addition, wilderness designation would further protect lands from unforeseen development.

Water quality and quantity - The Service does not manage any off shore waters in this unit. Therefore, the main effects on water quality and quantity would be due to natural processes. Impacts would be negligible.

Socioeconomic Impacts of Alternative C - Chukchi Sea Unit

Cultural resources - The impact of this alternative on cultural resources would be negligible; see the discussion for Alternative A.

Population - This alternative would not effect the population of area communities; see the discussion for Alternative A.

Economy - The negligible impacts on the economy are identical to those described for Alternative A.

Recreation - Nondesignation of areas suitable for wilderness on the unit would have a negligible effect on recreational use because of the remoteness of the unit. Development of an interpretive display for the interagency facility in Kotzebue would have minor positive effects on interpretive opportunities, although it would not be likely to draw additional visitors to the refuge.

Impacts of the Wilderness Proposal - Chukchi Sea Unit

There are 92,506 acres of refuge lands in the Chukchi Sea Unit which are suitable for wilderness designation. In Alternative C none of these lands would be proposed for wilderness designation. Suitable areas include the Seahorse Islands, the Peard Bay Islets, Icy Cape, 48,320 acres of Ann Stevens/Cape Lisburne, 38,756 acres of Cape Thompson, and the barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons. See the Wilderness Review for the Chukchi Sea Unit in Chapter II, Affected Environment, for the determination of suitable areas. Less than one percent of the unit (440 acres) is already designated wilderness. The impacts of existing wilderness are not considered in this analysis. The impacts of nondesignation are only evaluated for the significant wilderness issues: impacts on wilderness values and impacts on populations. See Table 39 for a summary of the wilderness proposal by alternative for the Chukchi Sea Unit.

Wilderness values - Chukchi Sea Unit

Naturalness - Under Alternative C none of the lands in the Chukchi Sea Unit which are suitable for wilderness would be proposed for designation. As in Alternative A, the Service is proposing to conduct population monitoring studies on Seahorse Islands, Cape Lisburne, and Cape Thompson. The Seahorse Islands and the barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons would be proposed for inclusion in the Regional Shorebird Reserve Program. These actions would enhance knowledge of these resources but would not entail any physical disruption to refuge lands. In addition, a reconnaissance survey would be done on the barrier islands of Stepping, Tasikpak, Pusaluk, Tugik, and Kavorak lagoons. The Service is proposing no additional management actions which would impact the naturalness of suitable areas. Situations occurring outside of refuge jurisdiction which may impact suitable areas include increased recreational use, oil spills resulting from offshore oil production or shipping accidents, commercial fishing, and dredging in Peard Bay.

Recreational use of the refuge would increase as described in Alternative A. The remote location and difficult access limits recreational use of most on this unit. No significant impacts to the naturalness of suitable areas would be expected. See Alternative A for additional discussion.

The risk of oil spills due to offshore oil production and commercial shipping activity would occur under this alternative as well. These activities are beyond the Service's control. It is unlikely that commercial quantities of oil would be found (20 percent probability). If they were, the risk from oil spills would continue 20 years into the future. See Alternative A for in-depth discussion of oil spill risks.

As in Alternative A, the low level of commercial fishing anticipated (10 percent increase) for the Chukchi Sea is not likely to have a significant impact on fish populations and therefore would have negligible impacts on seabird populations.

The Pt. Belcher oil support development would cause impacts on lagoon habitats near refuge lands in Peard Bay. Artificial nesting islands created from dredge materials would function as part of the natural environment within two to three years. Naturalness of refuge lands would not be impacted. See Alternative A for greater detail.

Conclusion - During the life of the plan and over the long term, the naturalness of the suitable refuge lands would be impacted by potential oil spills (potential for spills is low). Dredging in Peard Bay would have indirect impacts which are both positive and negative. Negligible or no impacts can be expected from increased recreational use or commercial fishing. Overall, naturalness of the Chukchi Sea Unit would be preserved.

Outstanding opportunities for solitude - As in Alternative A, the Service is proposing no management actions which would impact opportunities for solitude on suitable wilderness areas in this unit. Other actions and situations occurring on suitable areas which may impact solitude include recreation and subsistence activities.

During the life of the plan and over the long term, recreational use of refuge lands is expected to increase to a total of 500 visitor use days per year. Nondesignation of suitable areas of the unit is not expected to increase the level of use of these areas. Cape Lisburne and Cape Thompson, which would receive nearly all of the recreational use are large areas (104,000 and 88,000 acres respectively) with good topographic screening. Beachcombing would be concentrated near the U.S. Air Force station at Cape Lisburne, but other activities would be distributed throughout the area. Subsistence use of the unit occurs over a short period of time (approximately one week) and is not expected to increase over current levels. Opportunities for solitude would remain outstanding.

Conclusion - Some recreational activities would be concentrated, but most would be dispersed over 104,000 acres at Cape Lisburne and 88,000 acres at Cape Thompson. Opportunities for solitude would remain outstanding during the life of the plan and the long term. There would be no impacts to solitude opportunities.

Outstanding opportunities for primitive recreation - The management actions proposed by the Service under Alternative C would not impact opportunities for primitive recreation on areas suitable for wilderness in this unit. Increased recreational use and the risk of oil spills could impact primitive recreation opportunities.

All areas of this unit which are suitable for wilderness designation are very remote and, with the exception of Cape Lisburne, are difficult to access. As in Alternative A, there would be an estimated 500 visitor use days per year on the area. While some use would be concentrated along the beaches near Cape Lisburne, use would be widely dispersed elsewhere. If oil spills were to impact seabird populations, birdwatching opportunities would be diminished. See Alternative A for additional discussion. No proposed action would impact the primitive nature of these areas. Overall opportunities for primitive recreation would remain outstanding. See Alternative A for further details.

Conclusion - There would be a total of approximately 500 visitor use days per year on the area, most of which would be dispersed throughout the Cape Lisburne and Cape Thompson parcels. There would be decreased birdwatching opportunities if oil spills were to impact seabird populations. Overall opportunities for primitive recreation would remain outstanding during the life of the plan and for the long term.

Special features - As in Alternative A, the unique wildlife features of this unit would benefit by the Service's proposed management actions. Additional studies of bird populations, particularly on the barrier islands, would increase knowledge of these species and allow for more effective management. No management actions are proposed in Alternative C which would have negative impacts on the special features of the refuge. There is a small (20 percent) chance that bird populations would be impacted by oil spills. See Alternative A for additional discussion.

Conclusion - Knowledge and management capabilities for these special values would be increased by studies proposed under this alternative. There is a small (20 percent) chance that bird populations would be impacted by oil spills.

Wildlife populations - Chukchi Sea Unit

Management actions proposed by the Service are the monitoring of seabird and shorebird populations throughout the unit, and the consideration of barrier islands in the unit for inclusion in the Regional Shorebird Reserve Program. Dredging activities in Peard Bay and oil spills beyond Service jurisdiction may impact wildlife resources.

As in Alternative A, management actions proposed under Alternative B would enhance the knowledge and management of wildlife resources on the Chukchi Sea Unit. Dredging activities in Peard Bay for the oil support facility at Pt. Belcher would not impact refuge lands directly. In the unlikely event of an oil spill, bird populations could sustain a major impact. See Alternative A for more detail on dredging and oil spills.

Conclusion - During the life of the plan and in the long term, management actions would enhance the knowledge and management of refuge resources. Alternative C would have no impacts on the wildlife populations of the refuge.

Subsistence/Section 810 Evaluation and Findings - Chukchi Sea Unit

As in Alternative A, subsistence users would not be able to use generators or other motorized tools except chain saws in wilderness areas (less than one percent) of the unit. This would have only a minor impact as these tools are rarely used for subsistence activities in these areas. No other impacts to subsistence resources are anticipated. The section 810 evaluation and findings for Alternative A apply to Alternative C as well.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

Table 40. Summary of management category designations by alternative for the Bering Sea Unit.

Management Category	Alternative A % of Unit	A % of Refuge	B % of Unit	B % of Refuge	C % of Unit	C % of Refuge
Intensive	1%	1%	1%	1%	1%	1%
Moderate	0%	0%	0%	0%	0%	0%
Minimal	51%	2%	12%	1%	51%	2%
Existing Wilderness	49%	2%	49%	2%	49%	2%
Proposed Wilderness	0%	0%	39%*	1%*	1%	1%

Note: These percentages are approximate and include all selected lands, tidelands, and submerged lands, and waters. Refuge wide percentages do not include Unimak Island (932,484 acres - 19% of refuge) which is proposed for transfer to Izembek Refuge.

* 100% of suitable wilderness area

ALTERNATIVE A (CURRENT SITUATION)

Scenario for the Life of the Plan (10-15 years)

In this alternative, the Bering Sea Unit would be managed as it currently is. More than half of the unit (86,147 acres) would be placed in minimal management. One acre would be placed in intensive management. The remaining 81,416 acres is existing designated wilderness. No additional wilderness would be proposed. See Table 40.

Development of petroleum resources off of refuge lands may affect refuge resources in this unit. Three Outer Continental Shelf planning areas are in the vicinity of the Bering Sea Unit. These are the Norton Basin, Navarin Basin and St. George Basin (see Aleutian Islands scenario for discussion of St. George Basin) planning areas.

Exploration in the Navarin Basin to date has been discouraging and the Minerals Management Service now estimates that there is only a three percent chance that commercial quantities of hydrocarbons will be found in the basin (Sale 107 Environmental Impact Sale, in prep.). Any finds of gas are not expected to be economic at this time. In the remote case that commercial quantities of oil are discovered the Minerals Management Service estimates that 1.16 billion barrels of oil could be produced, offshore loaded onto tankers, and transported to market through Unimak Pass. In that situation, three oil spills of 1,000 barrels or more would be likely to occur over the 20 year life of the field.

The Minerals Management Service estimates that there is only a 15 percent chance that commercial quantities of hydrocarbons are present in Norton Basin. If commercial quantities were found, production of 0.64 billion barrels of oil and 2.94 trillion cubic feet of gas could be expected. There is an 88 percent chance that two oil spills of at least 1,000 barrels would occur as a result of production and transportation of this oil. If development were to occur, drilling of the exploration and delineation wells on existing Sale 57 leases would be completed by 1989 (Minerals Management Service 1985). Oil would be produced from three platforms starting in 1993. Natural gas will be produced from one platform installed in 1994; production would start in 1995. The oil would be offshore loaded to tankers at the point of production. The loaded tankers would travel through Unimak Pass (Han-Padron Associates 1984).

Finfish species such as salmon, herring and pollock would continue to be fully exploited for commercial purposes. Shellfish species including red king crab, blue king crab and tanner crab would also remain fully exploited in the commercial fishery. Species such as sandlance and capelin would continue to be harvested for subsistence purposes only. The Service would participate more fully in the

activities of management bodies such as the North Pacific Fisheries Management Council to ensure that refuge concerns with regard to forage fish are considered when management decisions affecting the Bering Sea are made.

No mining would occur on lands in this unit because there are no claims, and the refuge is closed to further claim activity.

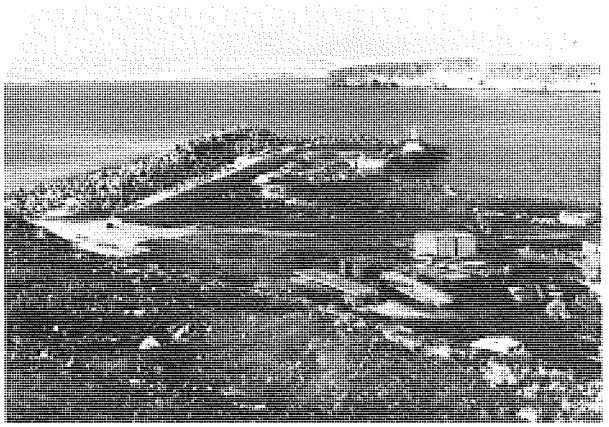
Pribilof Islands - On St. George and St. Paul islands, the Service would start an interpretive effort which would include displays and films about seabirds. Administrative sites would be developed in each town that would include sleeping quarters, work and storage space, and a small visitor contact facility. Construction and maintenance of these facilities would require the employment of several local people.

Upon appropriation of funds by Congress, a study would be done to locate and assess necessary and desirable access and transportation routes, facilities, and improvements (e.g. roads, foot trails, boardwalks, bicycle paths, and wildlife observation points) in connection with the development of cultural and natural resource interpretive programs and facilities on St. Paul and St. George (See Figure 53H).

An off-road vehicle route would be designated along the eastern portion of St. Paul Island. The route consists of an unimproved trail approximately 10 feet wide which parallels the coastline for approximately five miles. Designation of this route is intended to allow continued use of an existing trail.

Approximately one acre on St. Paul Island would be managed under intensive management. This area consists of an existing road and picnic area. Placement of this area in intensive management is intended to allow these uses to continue.

Population monitoring of selected seabird species (e.g. murres, kittiwakes, cormorants, and least and crested auklets) would continue on an annual or semi-annual basis. The National Marine Fisheries Service would continue to monitor northern fur seals and northern sea lions.



Harbor construction like this at St. Paul will help increase the use of the Pribilof Islands as a support base for Bering Sea fisheries.

No developments or studies are planned for Walrus and Otter islands, and they are expected to remain in a totally natural state.

On St. Paul and St. George islands, Natives would continue to take seabird eggs (primarily murres), seabirds (primarily kittiwakes), waterfowl, fur seals, and northern sea lions for subsistence purposes. The Service would work to amend the Canadian Migratory Bird Treaty Act as implemented under the Migratory Bird Treaty Act treaty to allow regulated taking of kittiwakes and other species for subsistence purposes. Currently, the only seabirds legal to take are auklets, guillemots, murres, and puffins.

Harbor and airport construction is occurring on both islands and both boat and aircraft traffic near refuge lands would increase. The new facilities may increase the use of the Pribilof Islands as fishing ports and could bring in several hundred visiting fishermen and cannery workers.

At this time about 1,000 tourists per year visit St. Paul (7,000 visitor use days) and 60 tourists per year visit St. George Island (420 visitor use days). Numbers of tourists would be expected to increase to 2,000 visitors per year (14,000 visitor use days) on St. Paul and 600 visitors per year (4,200 visitor use days) on St. George. These visitors make the trip almost

exclusively for the bird and marine mammal viewing opportunities on the islands.

Hagemeister Island - Hagemeister Island would continue to be used for reindeer grazing. Currently over 1000 reindeer are present. The Service, in cooperation with the Soil Conservation Service, has conducted range surveys and determined range conditions to be poor (Swanson and La Plant 1987). A cooperative Resource Management Plan is being developed with the Soil Conservation Service to guide rehabilitation of overgrazed areas. Numbers of animals allowed would be reduced to the point that overgrazing does not occur and vegetation would not be harmed. Annual censuses of the reindeer would be done to check on compliance with grazing permits. No monitoring of the small seabird colonies on Hagemeister Island is planned.

Recreational use of Hagemeister Island is primarily beachcombing, camping, and picnicking by residents of Dillingnam. Small aircraft are used to fly to the island over a six month period from May through October. Activities are centered on the beaches. Approximately two groups of two people each use the island each week. While most of this use is for day trips, approximately 20 percent camp overnight.

Local residents also use Hagemeister for subsistence activities including berrypicking. They generally travel to the island by boat and approximately half of them stay overnight. This results in approximately 216 visitor use days.

St. Matthew Group - The Service would monitor the seabird and marine mammal populations on St. Matthew, Hall, and Pinnacle islands approximately once every five years.

During the crab fishery opening in the area (two to four weeks per year) there would be approximately 300 fishing and commercial boats offshore. Illegal take of fresh water from lakes and streams from these islands may occur. As many as 300 people would come ashore to beachcomb. Small local runs of Dolly Varden on St. Matthew Island are occasionally sport-fished by these visitors. It is anticipated that these uses would constitute 600 visitor use days per year. Occasionally cruise ships visit St. Matthew Island (less than one ship per year). Approximately 75 people from these ships come ashore to explore the island (an approximate average of 37 visitor use days annually). Within the life of the plan, this use is expected to increase to one ship per year (75 visitor use days).

Bluff - At Bluff, continued seabird monitoring would occur annually or semi-annually.

Subsistence use of bird eggs is expected to continue at present levels or to lessen over time.

Alaska Gold Company's dredge Bima would continue to operate offshore between Nome and Sledge Island. Offshore dredging would also occur near Bluff, where the Alaska Department of Natural Resources has reissued a 20 year lease of 1,287 acres to Auric Offshore Mining.

Sledge Island - The Army Corps of Engineers is scheduled in 1988 or 1989 to conduct a clean-up of barrels left by the U.S. Coast Guard containing oil product residues. Some subsistence egging probably occurs here. No wildlife monitoring is planned for this site.

Sand Islands (Krekatok, Neragon), and Kikegtek, Pingurbek and Kwigluk islands - These islands would remain untouched by development and have few if any visitors. No wildlife population monitoring is planned for these areas.

Norton Sound Parcels (Safety Sound, Topkok Head, Cape Darby, Cape Stephens, Besboro, Egg, Whale and Beulah islands) - The Service has no plans to monitor these seabird sited within the next five years. Also see Sledge Island and Bluff write-ups above.

Scenario for the Long Term (more than 15 years)

The long term scenario is used only for analyzing the long term impacts of the wilderness proposal, in this case, no wilderness, on the areas suitable for wilderness. There are 65,202 acres of refuge land in this unit which are suitable for wilderness status. See the Wilderness Review for the Bering Sea Unit in Chapter II, Affected Environment, for analysis of suitable areas. The suitable areas are the Sand Islands, Kikegtek, Pingurbek, Kwigluk, Hagemeister,

Walrus and Otter islands. This scenario only includes activities which would affect those areas.

Public use on Hagemeister Island would increase from a total of 223 visitor use days per year to 300. This use is dispersed over approximately 20,000 acres, primarily beaches and occurs over a six month period. Other parcels which are suitable for wilderness are remote and difficult to access, therefore they receive essentially no public use.

The Service would monitor major seabird species at several representative sites instead of the few "indicator species" which are studied at present.

It is anticipated that the commercial fishery for currently important commercial species such as herring would remain fully exploited. Development of fisheries for species such as sandlance and capelin would probably occur in the Norton Sound area if a market for the product is identified. While oil and gas exploration and development are likely to occur somewhere in the Bering Sea, the probability of development in the vicinity of refuge lands in the Bering Sea Unit is low. No onshore facilities are anticipated. See the Scenario for the Life of the Plan for a full discussion of anticipated oil and gas activities. Grazing would continue to be allowed on Hagemeister Island subject to a special use permit and according to the provisions of a current grazing plan. The grazing plan would limit the number of animals to the level which would not cause damage to the range.

Biological Impacts of Alternative A - Bering Sea Unit

Fish - Fisheries resources which use refuge lands in the Bering Sea Unit are limited and should not be impacted under this scenario. Small local runs of Dolly Varden on St. Matthew Island are occasionally sport-fished by crews from boats that anchor nearby, but the take is small and occurs over a short period of time. This level of use should have no effect on stocks.

Offshore gold dredging activities may interfere with capelin spawning if water turbidity increases. Concentrations of heavy metals, such as mercury, may increase in the food chain.

Seabirds and marine mammals - Oil spills may occur and would cause some mortality to seabirds and marine mammals. Numbers killed would vary depending on many factors, including location, weather, time of year, etc. If, for example, a tanker were to break up on St. George Island during the breeding season an oil spill could kill a million birds and thousands of fur seals (Sowls pers. comm. 1987). The same spill occurring during the winter would probably kill only a few thousand birds and no fur seals. Most of the wildlife using the Pribilof Islands and other areas of the Bering Sea are highly migratory. Birds killed during the summer would be primarily seabirds (fulmars, cormorants, alcids, gulls); birds killed from a winter spill would be primarily sea ducks and some murres and cormorants. If the worst-case scenario of multiple oil spills were to occur, seabirds, wintering seaducks, seals, sealions, and fur seals would all be substantially reduced in numbers over many years due to their low reproductive potential.

The probability of oil spills in the area is low and it is likely that they would not be nearly as bad as the worst-case scenario. They may have a negligible effect on populations. However, if populations are already declining, any added mortality due to oil pollution could be major.

At present, populations of some seabirds, northern fur seals, and sea lions appear to be declining. Reasons are uncertain, but are likely related to competition with commercial fisheries. Sustained reductions in prey species such as herring and pollock might cause significant impacts on certain species of seabirds and marine mammals. The seabird species which appear to be reduced in numbers are black- and red-legged kittiwakes, red-faced cormorants, and common and thick-billed murres. These species are primarily fish-eating seabirds. Those species which are plankton feeders, such as least, parakeet, and crested auklets, probably would not suffer adverse impacts from over-fishing since plankton stocks should not be negatively affected (Bedard 1969).

Other factors which may make a substantial contribution to cumulative effects include mortality resulting from birds accidentally captured in salmon drift-nets (Ainley et al. 1981, DeGange et al. 1985) and the long-term effects of habitat degradation, disturbance, and possible alteration or reduction of prey-species populations.

Scientific understanding of the ecosystem of the Bering Sea is a necessary requirement to keep wildlife populations stable. More information is needed on winter distribution and foods of seabirds and dynamics of their prey fish populations.

Terrestrial birds and mammals - Some ground nesting birds (Lapland longspur, rock sandpipers) would have nests crushed by grazing reindeer on Hagemeister Island. No effects on populations are expected. Reindeer grazing on refuge land is and would continue to be subject to special use permit. Numbers would be limited to avoid overgrazing vegetation. Adverse impacts to terrestrial birds or mammals would be negligible under this alternative.

Waterfowl and shorebirds - Waterfowl and shorebirds would be affected by oil spills which occur. Spring and fall migration through the Bering Sea is the most vulnerable time for shorebirds and most waterfowl. Winter is the most vulnerable time for sea ducks (eiders, scoters, harlequin, and old squaw ducks). As with seabirds and marine mammals, impacts could range from major to negligible.

Water quality and quantity - The Service does not manage any off shore waters in this unit. Therefore, the main effects on water quality and quantity would be associated with natural streambank erosion and shoreline degradation associated with normal stream and river dynamics and impacts would be negligible. Illegal taking of water on St. Matthew Island is not likely to cause dewatering problems since it happens only over a short period of time (two to four weeks per year). Increased law enforcement activities on St. Matthew during crab season would effectively eliminate this problem.

The Pribilof Islands' famous bird cliffs, fur seals, and Asiatic migrant bird species attract tourists from many nations.

Socioeconomic Impacts of Alternative A - Bering Sea Unit

Cultural resources - These resources are among those targeted for protection under all alternatives. The discussion of common management directions indicates that recreational use and access to lands in this unit would be managed to minimize adverse impacts to cultural resources. People using refuge lands for a variety of purposes may cause some damage to sites, intentionally or unintentionally, and some sites may be lost to natural forces. However, these are both low-level risks and the overall impact on cultural resources under this alternative would be negligible.

Population - Since this alternative emphasizes existing types and levels of refuge use, the proposed management actions would not cause local population changes.

Economy - The construction and maintenance of refuge facilities at St. Paul and St. George would create a small amount of local employment. The management actions proposed for the Bering Sea Unit in this alternative would not impact the economy of any individual community. Some economic stimulation can be expected from the commercial fishing and oil

developments anticipated by the scenario for this alternative, but this would be independent of Service action.

Recreation - Under Alternative A the Service would provide interpretive materials including displays and films on the Pribilof Islands and would provide a small visitor contact facility. Although these facilities would enhance wildlife viewing for tourists, they are not expected to impact the number of visitors to the island. The number of visitors to the Pribilofs is dependent primarily on transportation costs and the availability of lodging.

Alternative A would not contribute to increased visitation of St. Matthew or Hagemeister islands because no additional facilities or programs are planned which would improve access or otherwise make recreational use easier or more popular. Recreational use levels by nonlocal people would increase in the Pribilof Islands and on St. Matthew Island but would remain negligible throughout the rest of the refuge.

Impacts of the Wilderness Proposal for Alternative A - Bering Sea Unit

In Alternative A none of the unit would be proposed for wilderness designation. Forty-nine percent of this unit is already designated wilderness. The impacts of existing wilderness are not considered in this analysis. The impacts of nondesignation are only analyzed for the 65,202 acres of suitable land in the unit. See the Wilderness Review for the Bering Sea Unit in Chapter II, the Affected Environment, for the determination of suitable areas. These areas are: the Sand Islands, Kikegtek, Pingurbek, Kwigluk, Hagemeister, Walrus, and Otter islands (Table 41). The impacts are analyzed for the two significant wilderness issues: impacts on wilderness values and impacts on fish and wildlife populations.

Wilderness values - Bering Sea Unit

Naturalness - The Service is proposing to conduct annual range surveys and to reduce the number of reindeer grazed on Hagemeister Island. No other management action is proposed which would affect naturalness on the areas suitable for wilderness designation. Other actions and situations which would affect areas suitable for wilderness are recreation, oil spills, and commercial fishing.

The reduction in numbers of reindeer allowed to graze would be undertaken in order to rehabilitate rangeland on the island. This action would have a beneficial impact since it would improve the naturalness of the island. Range and seabird studies would improve naturalness by enhancing the knowledge and management of refuge resources.

Public use on Hagemeister Island is expected to increase from 223 to 300 visitor use days per year over the life of the plan. This use is primarily beachcombing, picnicking, and day hiking. No permanent campsites or picnic facilities are anticipated. This use occurs over a six month period (May through October) and is dispersed over approximately 20,000 acres along the coast.

These activities are nonconsumptive and dispersed. No significant impacts to the naturalness of the areas suitable for wilderness would be expected.

Off-refuge actions which may impact the suitable areas include oil spills from oil production and tanker traffic. If an oil spill were to occur, oil could wash ashore on these lands but the most likely impact is the mortality of seabirds that become oiled when diving for food at sea. The potential for oil spills which would lessen the naturalness of refuge lands is low given the low potential for oil production in the vicinity of refuge lands (three percent probability for the Navarin Basin and 15 percent for the Norton Basin).

It is not known whether increased commercial fishing for pollock, a favored seabird prey species, is affecting or could affect seabird numbers. Seabirds have been affected by fishing pressure on prey species in other areas of the world (see the discussion in the Affected Environment chapter, Off-Refuge Environment). Over the long term, naturalness would likely decline on suitable areas where seabirds are a major part of the natural ecosystem. Hagemeister, Walrus, and Otter islands have the greatest numbers of seabirds and would sustain the greatest impacts, but the Sand Islands and Kikegtek, Pingurbek, and Kwigluk islands could

Table 41. Summary of the wilderness proposal by alternative for the Bering Sea Unit.

Suitable Areas	Suitable Acres	Proposed Acres (Alternative)		
		A	B	C
Krekatok Island	2,170	0	2,170	0
Neragon Island	1,700	0	1,700	0
Kikegtek Island	200	0	200	0
Pingurbek Island	930	0	930	0
Kwigluk Island	20	0	20	0
Hagemeister Island	60,000	0	60,000	0
Walrus Island	30	0	30	30
Otter Island	152	0	152	152

also be impacted if commercial fishing were to depress populations of prey fish species. The level of impact could range from negligible to major, depending on the species involved and the level of over-exploitation.

Conclusion - During the life of the plan, reduced reindeer grazing would benefit naturalness on Hagemeister Island. Recreational use on Hagemeister Island (100 visitor use days) is dispersed over 20,000 acres and occurs primarily over a six month period. No adverse impacts are anticipated from recreational use of Hagemeister Island. Oil spills are unlikely, but should they occur, they could have a negative impact on naturalness on the Sand Islands, Kikegtek, Pingurbek, Kwigluk, Hagemeister, Walrus and Otter islands.

Outstanding opportunities for solitude - The Service is proposing no management actions which would impact opportunities for solitude on areas which are suitable for wilderness. Increased recreation on Hagemeister Island would also impact solitude, but would not occur as a result of Service actions.

Visitor use on Hagemeister Island is expected to increase from 223 to 300 visitor use days over the long term. This use is primarily beachcombing, picnicking, and day hiking. This use occurs primarily over a six month period (May through October) and is dispersed over approximately 20,000 acres along the coast. Because this use is dispersed in both time and space, opportunities for solitude are expected to remain high. Other areas which are suitable for wilderness are remote, very difficult to access and have essentially no public use. Opportunities for solitude would remain outstanding on areas suitable for wilderness.

Conclusion - Visitor use on Hagemeister Island is dispersed over 20,000 acres and occurs over a six month period. Because this use is dispersed in both time and space, opportunities for solitude are expected to remain high on Hagemeister Island. Other areas which are suitable for wilderness are remote and receive essentially no public use. Opportunities for solitude would remain outstanding during the life of the plan and over the long term.

Outstanding opportunities for primitive recreation - The Service is proposing no management actions which have the potential to impact opportunities for primitive recreation on the refuge. Off-refuge actions which may impact recreation opportunities are oil spills from production facilities and tankering and commercial fishing. The principal recreational opportunities on the suitable areas are beachcombing, picnicking, hiking, birdwatching, and photography.

If an oil spill were to occur, oil could wash ashore on these lands, making beaches unsuitable for picnicking and beachcombing for one to three years. Another likely impact is the mortality of seabirds who become oiled when diving for food at sea. Decreases in seabird populations due to oil spill mortality would decrease the opportunities for birdwatching and bird photography. The potential for oil spills which would lessen recreational opportunities on refuge lands is low given the low potential for oil production in the vicinity of refuge lands (three percent probability for the Navarin Basin and 15 percent for the Norton Basin).

Increased commercial fishing for pollock may affect seabird populations by competing for important prey species. Over the long term, opportunities for birdwatching and bird photography would decline on areas where seabirds are a major feature (Hagemeister, Walrus, and Otter islands).

Conclusion - Management actions proposed by the Service in this alternative would not impact opportunities for primitive recreation. Oil spills and commercial fishing have potential for decreasing the opportunities for primitive recreation, although potential for those actions is low. Opportunities for primitive recreation would remain outstanding.

Special features - No management action proposed by the Service would impact the sand spit, hot springs or walrus on Hagemeister Island or the sea lion rookery on Walrus Island. These features could be damaged by oil spills. The potential for damaging oil spills in these areas is low (three percent probability in the Navarin Basin and 15 percent in the Norton Basin).

Conclusion - Special features of the areas suitable for wilderness designation would not be impacted by management actions in this alternative. Special features could be damaged by oil spills, although potential for spills is low (three percent probability in the Navarin Basin and 15 percent in the Norton Basin).

Wildlife populations - Bering Sea Unit

Wildlife - Management actions proposed under Alternative A for areas suitable for wilderness are seabird population monitoring, range surveys on Hagemeister Island, and decreased reindeer grazing on Hagemeister Island. Off-refuge actions which could impact wildlife populations include oil spills and commercial fishing.

The Service's proposed management actions would have positive impacts on wildlife populations because they would enhance the Service's knowledge and management of refuge resources in the Bering Sea Unit. Nondesignation of these suitable areas is not expected to have negative impacts on wildlife populations.

Oil spills from oil production and tanker traffic could cause mortality of seabirds who become oiled when diving for food at sea. The potential for oil spills which would impact wildlife populations on refuge lands is low given the low potential for oil production in the vicinity of refuge lands (three percent probability for the Navarin Basin and 15 percent for the Norton Basin).

Commercial fishing may impact seabird populations to the extent that important prey species are over-exploited (See Chapter II, Affected Environment, Off-Refuge Environment). The level of impact could range from negligible to major, depending on the species involved and the level of over-exploitation.

Conclusion - Management actions proposed under Alternative A would have a positive impact on wildlife populations because they would enhance the knowledge and management of refuge resources. Nondesignation of suitable areas suitable for wilderness in the Bering Sea Unit would have no significant negative impact on wildlife populations of the refuge. Oil spills and commercial fishing could impact wildlife populations on lands suitable for wilderness designation, but are beyond the jurisdiction of the Service and would occur regardless of wilderness status.

Subsistence/Section 810 Evaluation and Findings Bering Sea Unit

Evaluation - This section examines the impacts on subsistence that would result from implementation of Alternative A. It also conforms to the guidelines recommended by the Alaska Land Use Council and the guidelines of the Department of the Interior for complying with section 810 of the Alaska Lands Act.

Alternative A would have a negligible impact on subsistence users and the resources upon which they depend. No management initiatives are contemplated in Alternative A which would increase the existing levels of refuge use by non-local people. Little increase in competition for subsistence resources with non-local people would likely occur.

Even though the population in the Pribilof communities of St. Paul and St. George have

increased only slightly in the past five years, reliance on subsistence resources is increasing and can be expected to continue to become more important. This increase in subsistence use is mainly due to employment cutbacks and continually increasing prices.

Availability of other lands - Section 810(a) requires that the availability of other lands and other alternatives be considered in evaluating plans on subsistence uses. This plan is a refuge plan by definition and addresses the general suitability of a broad range of activities for refuge lands. Thus although there may be other lands available for the uses considered, lands outside of the refuge are not considered because they are beyond the scope of this plan.

Other Alternatives - Three alternatives were developed for the Alaska Maritime Refuge. This alternative maintains the current situation in refuge management.

Finding - The net effect of this alternative would be a minor increase in subsistence harvest levels due to local population increases. Increases in competition between local and non-local users and among local users would be negligible. Local perceptions of competition levels may vary.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

ALTERNATIVE B - BERING SEA UNIT

Scenario for the Life of the Plan (10-15 years)

Under this alternative all refuge lands suitable for wilderness designation would be proposed for designation. Alternative B proposes 65,202 acres (39 percent of the unit) for wilderness designation. Forty-nine percent of the unit is currently Congressionally designated wilderness. The remaining 12 percent of the unit would be managed under minimal management. This scenario assumes Congress approves the recommendation and designates these proposed areas as wilderness. Management of the refuge would be subject to the provisions of the Wilderness Act as amended by the Alaska Lands Act.

The scenario for Alternative A also applies to this alternative, except where noted below. Almost all of the assumptions described in that scenario are true for all alternatives as they concern actions over which the Service has no control.

Fishery management activities would center on more active participation in management bodies responsible for marine forage fish management. In addition, baseline fishery surveys would be conducted on St. Matthew and Hagemeister islands.

Management actions described for fish and wildlife management and air and water quality monitoring would also take place in this alternative.

Scenario for Long Term (more than 15 years) Wilderness Impacts

The long term scenario is used only for analyzing the long term impacts of the wilderness proposal on areas suitable for wilderness designation. This scenario is similar to the long term scenario for Alternative A except that all suitable areas would be managed as designated wilderness. In addition, baseline studies would be conducted on St. Matthew and Hagemeister islands and the Service would be more actively involved in management bodies responsible for marine forage fish management. Most actions which would impact refuge resources would occur beyond Service jurisdiction and would occur regardless of wilderness designation.

As in existing designated wilderness, use of mechanized equipment in wilderness would be limited to airplanes, snowmobiles and motorboats; subsistence users could also use chainsaws, although their use is unlikely since this unit is not wooded.

Visitor use would increase as described in the long term scenario for Alternative A.

Biological Impacts of Alternative B - Bering Sea Unit

Fish - Use of fishery resources would not change on St. Matthew Island because the island is designated wilderness and will continue to be managed as such. Impacts from offshore gold dredging would occur beyond the Service's jurisdiction and associated impacts would occur regardless of the refuge management strategy. See Alternative A for greater detail.

Seabirds and marine mammals - Oil spills, commercial fisheries, and their associated impacts occur beyond the jurisdiction of the Service and will not change in response to this alternative. See Alternative A for a discussion of impacts of oil spills and commercial fisheries.

Terrestrial birds and mammals - Reindeer grazing would continue to be allowed on Hagemeister Island under this alternative subject to special use permit and a current grazing plan. Herd size would be limited to a level which would not harm vegetation. See Alternative A for a discussion of impacts of reindeer grazing.

Waterfowl and shorebirds - Impacts from oil spills could occur because they are beyond the jurisdiction of the Service. Wilderness designation would not affect the risk of oil spills. See Alternative A for a discussion of impacts of oil spills on waterfowl and seabirds.

Water quality and quantity - The impacts of this alternative on water quality and quantity would be the same as described for Alternative A. Increased law enforcement would effectively eliminate the illegal taking of water from St. Matthew Island. Negligible impacts are anticipated.

Socioeconomic Impacts of Alternative B - Bering Sea Unit

Cultural resources - The risk of damage to cultural resources from Service management actions or from increased recreational use of refuge lands is low and the overall impacts would be negligible. See Alternative A for greater discussion.

Population - As in Alternative A, this alternative would not affect the population of area communities because the proposed management actions would not cause local population changes.

Economy - As in Alternative A, a small amount of local employment would be created in St. Paul and St. George due to the construction and maintenance of refuge facilities in those communities. Commercial fishing and oil development may provide some economic stimulation to local communities, but this would be independent of Service action. Impacts to local economies from implementation of Alternative B would be negligible.

Recreation - Management actions proposed under Alternative B would have negligible effects on recreational use of the Bering Sea Unit. Interpretive facilities in the Pribilofs would enhance wildlife viewing for tourists, but are not expected to impact the level of use. Increased use of St. Matthew, Hagemeister, and the Pribilof islands would not be a result of Service action. Designation of an additional 39 percent of the unit as wilderness would have a negligible effect on recreational use because of the difficult access and the remote nature of the lands suitable for wilderness.

Impacts of the Wilderness Proposal for Alternative B - Bering Sea Unit

In Alternative B, an additional 39 percent of the Bering Sea Unit would be proposed for wilderness designation. Forty-nine percent of the unit is currently designated wilderness. The remaining 12 percent of the unit would be managed under minimal management. The impacts on existing wilderness are not considered in this analysis. The impacts of designation and nondesignation are only evaluated for the 65,202 suitable acres. These areas are: the Sand Islands, Kikegtek, Pingurbek, Kwigluk, Hagemeister, Walrus, and Otter islands. The impacts are evaluated for the two significant wilderness issues: impacts on wilderness values and impacts on wildlife populations. See Table 41 for a summary of the wilderness proposal by alternative for the Bering Sea Unit.

Wilderness values - Bering Sea Unit

Naturalness - Under Alternative B all

lands in the Bering Sea Unit which are suitable for wilderness would be proposed for designation. Congressional designation would provide further protection of refuge lands from unforeseen development. The Service is also proposing annual range surveys and a reduction in the number of reindeer grazed on Hagemeister Island to eliminate overgrazing, and additional monitoring studies of seabird populations. Situations occurring outside of refuge jurisdiction which may impact suitable areas include increased recreational use, oil spills resulting from offshore oil production of shipping accidents, and commercial fishing.

Under Alternative B, reindeer would continue to be grazed on Hagemeister Island subject to special use permit and a current grazing plan which would limit the number of animals to the level which would not cause damage to the range. Wilderness status would not impact the opportunity to graze reindeer. Naturalness would increase because range conditions would improve with reduced numbers of animals allowed. Range and seabird studies would improve naturalness by enhancing the knowledge and management of refuge resources. See Alternative A for more detail.

Increased public use of Hagemeister Island is dispersed over approximately 20,000 acres and occurs over a six month period. No significant impacts to the naturalness of the areas suitable for wilderness would be expected. See Alternative A for greater detail.

Oil spills and commercial fishing could impact naturalness, but would occur beyond the Service's jurisdiction. See Alternative A for further discussion.

Conclusion - During the life of the plan, reduced reindeer grazing and proposed studies would benefit naturalness on Hagemeister Island. No significant impacts would be expected from increased recreation since it would be dispersed over 20,000 acres and occurs over a six month period. Oil spills are unlikely, but should they occur, they could have a negative impact on naturalness on the Sand Islands, Kikegtek, Pingurbek, Kwigluk, Hagemeister, Walrus and Otter islands.

Outstanding opportunities for solitude - The Service is proposing no management actions which would impact opportunities for solitude on suitable wilderness areas in this unit. Increased public use has the potential for impacting opportunities for solitude, but is not a result of Service action.

Public use on Hagemeister Island is expected to increase from 223 to 300 visitor use days. This use occurs over a six month period (May through October) and is dispersed over approximately 20,000 acres along the coast. This increase would be a result of increased populations in the area, not due to wilderness designation. No significant impacts to solitude are anticipated. See Alternative A for further discussion of visitor use.

Conclusion - An increase in visitor use days from 223 to 300 would not be the result of wilderness designation. Activities would occur over a six month period and would be dispersed over approximately 20,000 acres. There would be no significant impacts to solitude.

Outstanding opportunities for primitive recreation - The Service is proposing no management actions which have the potential to impact opportunities for primitive recreation on the refuge. Off-refuge actions which may impact recreation opportunities are oil spills from production facilities and tankering and commercial fishing.

If an oil spill were to occur, oil could wash ashore on these lands, making beaches unsuitable for picnicking and beachcombing for one to three years. Mortality of seabirds who become oiled would decrease the opportunities for birdwatching and bird photography. The potential for oil spills which would lessen recreational opportunities on refuge lands is low. See Alternative A for in-depth discussion of oil spill impacts.

Increased commercial fishing for pollock may impact opportunities for birdwatching and bird photography. See Alternative A for more detail.

Conclusion - Management actions proposed by the Service in this alternative would not impact opportunities for primitive recreation. Oil spills and commercial fishing have potential for

decreasing the opportunities for primitive recreation, although potential for those actions is low. Opportunities for primitive recreation would remain outstanding.

Special features - As in Alternative A, no management action proposed by the Service would impact the sand spit, the hot springs or walrus on Hagemeister Island or the sea lion rookery on Walrus Island. These features could be damaged by oil spills. The potential for damaging oil spills in these areas is low (three percent probability in the Navarin Basin and 15 percent in the Norton Basin).

Conclusion - Special features of the areas suitable for wilderness designation would not be impacted by management actions in this alternative. Special features could be damaged by oil spills, although potential for spills is low given the low potential for oil production in the vicinity of refuge lands (three percent probability in the Navarin Basin and 15 percent in the Norton Basin).

Wildlife populations - Bering Sea Unit

Wildlife - Management actions proposed under Alternative A for areas suitable for wilderness are seabird population monitoring, range surveys on Hagemeister Island, and decreased reindeer grazing on Hagemeister Island. No additional management actions are foreseen as a result of wilderness designation. Off-refuge actions which could impact wildlife populations include oil spills and commercial fishing.

The Service's proposed management actions would have positive impacts on wildlife populations because they would enhance the Service's knowledge and management of refuge resources in the Bering Sea Unit. Refuge habitats would receive the highest level of protection from future developments.

Oil spills from oil production and tanker traffic could impact wildlife populations on refuge lands but the potential for such spills is low given the low potential for oil production in the vicinity of refuge lands (three percent probability for the Navarin Basin and 15 percent for the Norton Basin). See Alternative A for greater detail.

Commercial fishing may impact seabird populations to the extent that important prey species are over-exploited (See Chapter II Affected Environment, Off-Refuge Environment). The level of impact could range from negligible to major, depending on the species involved and the level of over-exploitation.

Conclusion - Management actions proposed under Alternative B would have a positive impact on wildlife populations because they would enhance the knowledge and management of refuge resources. Refuge habitats would receive the highest level of protection from future developments. Oil spills and commercial fishing could impact wildlife populations on lands suitable for wilderness designation, but are beyond the jurisdiction of the Service and would occur regardless of wilderness status.

Subsistence/Section 810 Evaluation and Findings

Evaluation - The minor impacts on subsistence resulting from implementing this alternative could be identical to Alternative A, except that subsistence users would not be able to use generators or other motorized tools except chainsaws in wilderness areas (88 percent of the unit). The section 810 evaluation and findings for Alternative A apply to Alternative B as well.

ALTERNATIVE C (PREFERRED ALTERNATIVE)
BERING SEA UNIT

Scenario for the Life of the Plan (10-15 years)

Under this alternative Walrus and Otter islands would be proposed for wilderness designation. All other lands suitable for wilderness in the unit would be managed under minimal management. Alternative C proposes 182 acres (less that one percent of the unit) for wilderness designation. Forty-nine percent of the unit is currently wilderness. The remaining 51 percent would be managed under minimal management.

The scenario for Alternative A applies to this alternative as well. Almost all of the assumptions described in that scenario are true for all alternatives as they concern actions over which the Service has no control. Management actions described for fish and wildlife management and air and water quality

monitoring would also take place in this alternative.

Under this alternative there would be a much more thorough biological monitoring program. Data on several more seabird species would be collected and sites in Norton Sound that receive irregular visits from refuge staff would get greater attention. There would be better coordination and communication between the refuge staff and the Alaska Department of Fish and Game, Native organizations, and other interested people and organizations.

Baseline surveys on freshwater fish populations and habitats would be conducted on St. Matthew and Hagemeister islands, and on forage fish/seabird interactions.

Scenario for Long Term (more than 15 years) Wilderness Impacts

The long term scenario is used only for analyzing the long term impacts of the wilderness proposal on areas suitable for wilderness designation. In this case, Walrus and Otter islands would be proposed for wilderness designation while other areas suitable for wilderness designation would be managed under minimal management.

All other assumptions made in Alternative A apply to this alternative as well, except that refuge lands on Walrus and Otter islands would receive an additional degree of protection from unforeseen developments. As in existing designated wilderness, use of mechanized equipment in wilderness would be limited to airplanes, snowmobiles and motorboats; subsistence users could also use chainsaws, although their use is unlikely since this unit is not wooded. Visitor use would increase as described in the long term scenario for Alternative A.

Biological Impacts of Alternative C - Bering Sea Unit

Fish - Management actions proposed by the Service are essentially studies and coordination efforts which would enhance the knowledge and management of refuge resources. Impacts from offshore gold dredging would occur beyond the Service's jurisdiction and associated impacts would occur regardless of the refuge management strategy. See Alternative A for greater detail.

Seabirds and marine mammals - Important seabird and marine mammal habitats on Walrus and Otter islands would benefit from a higher degree of protection from unforeseen developments. In addition, a more thorough biological studies program would enhance the knowledge and management of seabirds and marine mammals. Oil spills, commercial fisheries, and their associated impacts occur beyond the jurisdiction of the Service and would not change in response to this alternative. See Alternative A for a discussion of impacts of oil spills and commercial fisheries.

Terrestrial birds and mammals - Reindeer grazing would continue to be allowed on Hagemeister Island under this alternative. See Alternative A for a discussion of the impacts of reindeer grazing.

Waterfowl and shorebirds - A more thorough biological studies program would enhance the knowledge and management of waterfowl and shorebirds. Impacts from oil spills could occur because they are beyond the jurisdiction of the Service. Wilderness designation would not affect the risk of oil spills. See Alternative A for a discussion of impacts of oil spills on waterfowl and seabirds.

Water quality and quantity - Baseline studies on aquatic environments on St. Matthew and Hagemeister islands would enhance knowledge and management of water resources on the Bering Sea Unit. The impacts of actions and situations beyond Service control would be the same as those described for Alternative A. Negligible impacts are anticipated from implementation of this alternative.

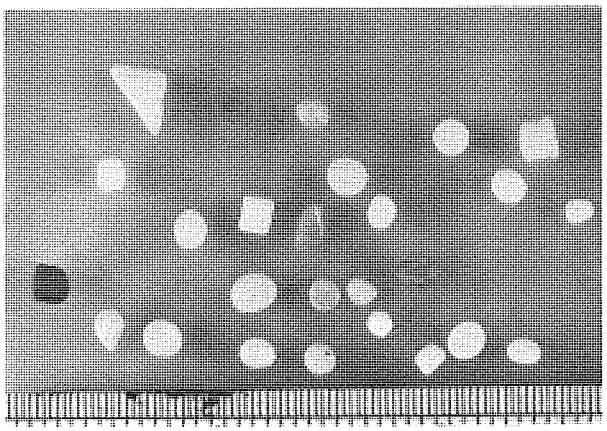
Socioeconomic Impacts of Alternative C - Bering Sea Unit

Cultural resources - The risk of damage to cultural resources from Service management actions or from increased recreational use of refuge lands is low and the overall impacts would be negligible. See Alternative A for more discussion.

Population - As in Alternative A, this alternative would not affect the population of area communities because the proposed management actions would not cause local population changes.

Economy - As in Alternative A, a small amount of local employment would be created in St. Paul and St. George due to the construction and maintenance of refuge facilities in those communities. Commercial fishing and oil development may provide some economic stimulation to local communities, but this would be independent of Service action. Impacts to local economies from implementation of Alternative C would be negligible.

Recreation - Management actions proposed under Alternative C would have negligible effects on recreational use of the Bering Sea Unit. Interpretive facilities in the Pribilofs would enhance wildlife viewing for tourists, but are not expected to impact the level of use. Increased use of St. Matthew, Hagemeister, and the Pribilof islands would not be a result of Service action. Designation of additional wilderness on Walrus and Otter islands (182 acres) would have a negligible effect on recreational use because of the difficult access and the remote nature of the lands proposed for wilderness.



Seabirds and marine mammals eat floating plastic debris, apparently mistaking it for food. As plastic is not digestible, it can accumulate in their stomachs; these plastic particles were found in a seabird stomach.

Impacts of the Wilderness Proposal for Alternative C - Bering Sea Unit

There are 65,202 acres of refuge lands in the Bering Sea Unit which are suitable for wilderness designation. In Alternative C, 182 of these acres would be proposed for wilderness designation. Proposed areas are Walrus and Otter islands in the Pribilof islands. Other suitable areas which are not proposed are the Sand Islands, Kikegtek, Pingurbek, Kwigluk, and Hagemeister islands. See the Wilderness Review for the Bering Sea Unit in Chapter II, Affected Environment, for the determination of suitable areas. Forty-nine percent of the unit is currently Congressionally designated wilderness. The impacts of existing wilderness are not considered in this analysis. The impacts of designation and nondesignation are only evaluated for the significant wilderness issues: impacts on wilderness values and impacts on wildlife populations. See Table 37 for a summary of the wilderness proposal by alternative for the Bering Sea Unit.

Suitable Area Proposed for Wilderness

Wilderness values - Bering Sea Unit

Naturalness - Under Alternative C, 65,020 acres of the Bering Sea Unit which are suitable for wilderness would not be proposed for designation. These lands would be managed under minimal management. Congressional designation would provide long term protection of refuge lands from unforeseen development. The Service would also propose additional monitoring of seabird populations. Activities occurring outside of refuge jurisdiction which may impact suitable areas not proposed for wilderness include oil spills resulting from offshore oil production or shipping accidents, and commercial fishing; these activities could impact naturalness, but would occur beyond the Service's jurisdiction. See Alternative A for further discussion.

Conclusion - During the life of the plan, proposed studies would benefit naturalness on Walrus and Otter islands by enhancing knowledge and management of seabird species. Wilderness status would provide long term protection from unforeseen developments. Oil spills are unlikely, but should they occur, they could have

a negative impact on naturalness on Walrus and Otter islands.

Outstanding opportunities for solitude - The Service is proposing no management actions which would impact opportunities for solitude on proposed wilderness areas in this unit. There is essentially no public use of the islands and no substantial increases are anticipated due to their remote location and difficult access. No other actions or situations are anticipated which would impact solitude on Walrus and Otter islands.

Conclusion - No management actions are proposed which would impact solitude on proposed wilderness areas. No other actions or situations are anticipated which would impact solitude on these areas. There would be no significant impacts to solitude.

Outstanding opportunities for primitive recreation - The Service is proposing no management actions which have the potential to impact opportunities for primitive recreation on proposed wilderness areas. Off-refuge actions which may impact recreational opportunities are oil spills from production facilities and tankering, and commercial fishing.

Mortality of seabirds which become oiled would decrease the opportunities for birdwatching and bird photography. The potential for oil spills which would lessen recreational opportunities on refuge lands is low. See Alternative A for an in-depth discussion of oil spill impacts.

Increased commercial fishing for pollock may impact opportunities for birdwatching and bird photography. See Alternative A for more detail.

Conclusion - Management actions proposed by the Service in this alternative would not impact opportunities for primitive recreation. Oil spills and commercial fishing have potential for decreasing the opportunities for primitive recreation, although potential for those actions is low. There would be no significant impacts to opportunities for primitive recreation.

Special features - As in Alternative A, no management action proposed by the Service would impact the sea lion rookery on Walrus Island. This feature could be damaged by oil spills. The potential for damaging oil spills in these areas is low given the low potential for oil production in the vicinity of refuge lands (three percent probability in the Navarin Basin and 15 percent in the Norton Basin).

Conclusion - Special features of the areas proposed for wilderness designation would not be impacted by management actions in this alternative. Special features could be damaged by oil spills, although potential for spills is low given the low potential for oil production in the vicinity of refuge lands (three percent probability in the Navarin Basin and 15 percent in the Norton Basin).

Wildlife populations - Bering Sea Unit

Wildlife - Management actions proposed under Alternative C for areas proposed for wilderness are seabird population monitoring and baseline fisheries and aquatic habitat studies. No additional management actions are foreseen as a result of wilderness designation. Off-refuge actions which could impact wildlife populations include oil spills and commercial fishing. As in Alternative A, the Service's proposed management actions would have positive impacts on wildlife populations because they would enhance the Service's knowledge and management of refuge resources in the Bering Sea Unit. Seabird and marine mammal habitats on Walrus and Otter islands would be given long term protection from unforeseen development through wilderness designation.

The probability that oil spills from oil production and tanker traffic would impact wildlife populations on refuge lands is low given the low potential for oil production in the vicinity of refuge lands (three percent probability for the Navarin Basin and 15 percent for the Norton Basin). See Alternative A for greater detail.

Commercial fishing may impact seabird populations to the extent that important prey species are over-exploited (See Chapter II, Affected Environment, Off-Refuge Environment). The level of impact could range from negligible to major, depending on the species involved and the level of over-exploitation.

Conclusion - Management actions proposed under Alternative C are essentially studies which would have a positive impact on wildlife populations because they would enhance the knowledge and management of refuge resources. Habitats on proposed lands would have long term protection from development. Oil spills and commercial fishing could impact wildlife populations on lands proposed for wilderness designation, but are beyond the jurisdiction of the Service and would occur regardless of wilderness status.

Suitable Areas Not Proposed for Wilderness

Wilderness values - Bering Sea Unit

Naturalness - Under Alternative C, 65,020 acres of the 65,202 acres which are suitable for wilderness would be managed under minimal management. The suitable areas which are not proposed are the Sand Islands, Kikegtek, Pingurbek, Kwigluk, and Hagemeister islands. The Service would also propose annual range surveys and a reduction in the number of reindeer grazed on Hagemeister Island, baseline fishery and aquatic habitat studies on Hagemeister and St. Matthew islands and additional monitoring of seabird populations. Situations occurring outside of refuge jurisdiction which may impact suitable areas include increased recreational use, oil spills resulting from offshore oil production of shipping accidents, and commercial fishing

Under Alternative C, reindeer would continue to be grazed on Hagemeister Island subject to the conditions of a special use permit and a current grazing plan. Numbers of animals would be limited to avoid damage to the range. Reduced numbers of animals would allow the range to revert to a more natural state. Range and seabird studies would improve naturalness by enhancing knowledge and management of refuge resources. See Alternative A for more detail.

Increased public use of Hagemeister Island is dispersed over approximately 20,000 acres and occurs over a six month period. No significant impacts to naturalness would be expected. See Alternative A for greater detail.

Oil spills and commercial fishing could impact naturalness, but would occur beyond the Service's jurisdiction. See Alternative A for further discussion.

Conclusion - During the life of the plan, reduced reindeer grazing and proposed studies would benefit naturalness on Hagemeister Island. Reduced numbers of animals would allow the range to revert to a more natural state. No significant impacts would be expected from increased recreation since it would be dispersed over 20,000 acres and occurs over a six month period. Oil spills are unlikely, but should they occur, they could have a negative impact on naturalness on the Sand Islands, Kikegtek, Pingurbek, Kwigluk, and Hagemeister islands.

Outstanding opportunities for solitude - The Service is proposing no management actions which would impact opportunities for solitude on suitable wilderness areas not proposed for wilderness designation under this alternative. Increased public use has the potential for impacting opportunities for solitude, but is not a result of Service action.

Public use on Hagemeister Island is expected to increase from 223 to 300 visitor use days. This use occurs over a six month period (May through October) and is dispersed over approximately 20,000 acres along the coast. This increase would be a result of increased populations in the area, not due to wilderness designation. No significant impacts to solitude are anticipated. See Alternative A for further discussion of visitor use.

Conclusion - An increase in visitor use days from 223 to 300 would not be the result of nondesignation. Activities would occur over a six month period and would be dispersed over approximately 20,000 acres. There would be no significant impacts to solitude.

Outstanding opportunities for primitive recreation - As in Alternative A, the Service is proposing no management actions which have the potential to impact opportunities for primitive recreation on the refuge. Off-refuge actions which may impact recreational opportunities are oil spills from production facilities and tankering, and commercial fishing.

If an oil spill were to occur, oil could wash ashore on these lands, making beaches unsuitable for picnicking and beachcombing for one to three years. Mortality of seabirds which become oiled would decrease the opportunities for birdwatching and bird photography. The potential for oil spills which would lessen recreational opportunities on refuge lands is low. See Alternative A for an in-depth discussion of oil spill impacts.

Increased commercial fishing for pollock may impact opportunities for birdwatching and bird photography. See Alternative A for more detail.

Conclusion - Management actions proposed by the Service in this alternative would not impact opportunities for primitive recreation. Oil spills and commercial fishing have potential for decreasing the opportunities for primitive recreation, although potential for those actions is low. Opportunities for primitive recreation would remain outstanding.

Special features - As in Alternative A, no management action proposed by the Service would impact the sand spit, hot springs or walrus on Hagemeister Island. These features could be damaged by oil spills. The potential for damaging oil spills in these areas is low given the low potential for oil production in the vicinity of refuge lands (three percent probability in the Navarin Basin and 15 percent in the Norton Basin).

Conclusion - Special features of the areas suitable for wilderness designation would not be impacted by management actions in this alternative. Special features could be damaged by oil spills, although potential for spills is low given the low potential for oil production in the vicinity of refuge lands (three percent probability in the Navarin Basin and 15 percent in the Norton Basin).

Wildlife populations - Bering Sea Unit

Wildlife - Management actions proposed under Alternative C for areas suitable for wilderness would be increased seabird population monitoring, range surveys on Hagemeister Island, and decreased reindeer grazing on Hagemeister Island. Off-refuge actions which could impact wildlife populations include oil spills and commercial fishing.

The Service's proposed management actions are studies which would have positive impacts on wildlife populations because they would enhance the Service's knowledge and management of refuge resources in the Bering Sea Unit. Reduced numbers of grazing animals would allow Hagemeister Island to be restored to a more natural state. Lack of wilderness designation would not cause an increase in the use of wildlife resources due to the remoteness of the unit. Impacts to wildlife as a result of nondesignation are not expected.

The chance of oil spills from oil production and tanker traffic which could impact wildlife populations on refuge lands is low given the low potential for oil production in the vicinity of refuge lands (three percent probability for the Navarin Basin and 15 percent for the Norton Basin). See Alternative A for further detail.

Commercial fishing may impact seabird populations to the extent that important prey species are over-exploited (See Chapter II, Affected Environment, Off-Refuge Environment). The level of impact could range from negligible to major, depending on the species involved and the level of over-exploitation.

Conclusion - Management actions proposed under Alternative C would have a positive impact on wildlife populations because they would enhance the knowledge and management of refuge resources. Reduced numbers of grazing animals would allow Hagemeister Islands to be restored to a more natural state. Oil spills and commercial fishing could impact wildlife populations on suitable lands not proposed for wilderness designation, but are beyond the jurisdiction of the Service and would occur regardless of wilderness status.

Subsistence/Section 810 Evaluation and Findings - Bering Sea Unit

Evaluation - The minor impacts on subsistence resulting from implementing this alternative would be identical to Alternative A, except that subsistence users would not be able to use generators or other motorized tools except chainsaws in wilderness areas

(approximately 50 percent of the unit). This would have a negligible impact because lands in the Bering Sea Unit are not wooded. The section 810 evaluation and findings for Alternative A apply to Alternative C as well.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

Table 42. Summary of management category designations by alternative for the Aleutian Islands Unit.

Management Category	Alternative A % of Unit	A % of Refuge	B % of Unit	B % of Refuge	C % of Unit	C % of Refuge
Intensive	1%	1%	2%	1%	2%	1%
Moderate	2%	1%	2%	1%	2%	1%
Minimal	40%	19%	34%	16%	35%	17%
Existing Wilderness	57%	28%	57%	28%	57%	28%
Proposed Wilderness	0%	0%	5%*	2%*	4%	2%

Note: These percentages are approximate and include all selected lands, tidelands, and submerged lands, and waters. Refuge wide percentages do not include Unimak Island (932,484 acres - 19% of refuge) which is proposed for transfer to Izembek Refuge.

* 100% of suitable wilderness area

ALTERNATIVE A (CURRENT SITUATION)

Scenario for the Life of the Plan (10-15 years)

In this alternative all lands would be managed as they currently are, one percent of the unit in intensive management, two percent in moderate, 40 percent in minimal, and 57 percent as designated wilderness (Table 42). None of the unit would be proposed for wilderness designation.

Although oil and gas leasing may be permitted on the three percent of the unit in intensive and moderate management, none is expected due to low potential. Also, all of these areas are on military bases, and national defense needs would take precedence. Geological and geophysical studies may be permitted on the nonwilderness portion of the unit and studies which do not involve mechanized equipment on the wilderness portion, but none are expected due to low potential. This scenario assumes off-shore oil exploration and leasing would take place only in the St. George Basin, affecting primarily the eastern Aleutians. Bowers Basin and the Aleutian Arc are thought to have negligible oil and gas reserves.

There is only a 22 percent chance that commercial quantities of hydrocarbons are present in the St. George Basin. The Minerals Management Service estimates mean resources of 1,690 million barrels of oil. For this amount of oil, four oil spills of 1,000 barrels or greater are projected statistically over the life of the field, approximately 25 years (Minerals Management Service 1985).

The most recent development scenarios have assumed that the St. George Basin Planning Area would be divided into a northern and a southern subunit (Minerals Management Service 1985). Drilling would be carried out by heavy-duty semi-submersibles; drillships are a possibility. Oil and gas produced in the northern subunit would be offshore loaded onto tankers and shipped through Unimak Pass. Oil from the southern subunit would be piped to and across the Alaska Peninsula to a terminal on the south side of the peninsula.

The oil industry has indicated interest in an additional shipping and storage shore-based facility in the Unalaska/Dutch Harbor area. This scenario assumes a pipeline from offshore wells would come onshore at Iliuluk or Summer bays on Unalaska Island and cross over to Ugadaga Bay on Beaver Inlet where oil would be stored and tankers would load. Alternatively, pipelines could run ashore at Akun Bay and proceed to one of three potential terminal sites on the southwest side of Akun Island (Gene Sands, Exxon, pers. comm. 1987). This shipping facility would not be developed until the last few years of the planning period, since oil has not yet been found, and the normal lapse between discovery and production is 10 years. Under this scenario, one of the four projected St. George spills of at least 1,000 barrels would

occur in the port, Beaver Inlet, or south of the port in the North Pacific.

Oil exploration in the St. George Basin has been discouraging. Ten exploration wells have been drilled and abandoned, no discoveries announced, and no further drilling is imminent. Fifty-eight of 96 leases have been relinquished. One additional sale, No. 101, is planned for 1990, but Sale 89 was canceled due to lack of industry interest.

No mining would occur on lands in the unit, because there are no claims, and the refuge is closed to further claim activity.

Commercial fishing for important finfish species such as herring, halibut, and sablefish would remain at current intense levels as long as commercial quantities of fish are available. Fishing for less important commercial species such as sandlance and capelin would remain at current low levels. Commercial fishing for important shellfish species such as red king crab, tanner crab, and shrimp would remain intense in years when these species occur in commercial quantities. Fishing for other species such as octopus, sea urchins, and razor clams would double. Commercial fishing for species such as hair crab, scallops, dungeness crab, and brown king crab would remain at current low levels. Fishing for pink salmon would increase to landings of about 1,000-5,000 pounds per year. These expanded fisheries would employ less than 100 people and increase the current fleet by less than 25 boats. Processing would occur at currently available facilities. Fishery management activities would emphasize active participation in management bodies responsible for marine forage fish management.

The offshore drift net salmon fishery would continue operating in the North Pacific and Bering Sea between 46 and 59 degrees north latitude and concentrated south of the Aleutian Islands. This fishery comes close to seabird breeding colonies primarily on the south side of the western Aleutians, specifically near Buldir and Agattu islands. The Service would continue to collect population data on the colonies most at risk.

This scenario assumes that the Environmental Protection Agency would approve the use of chemical toxicants for fox eradication.

Currently one adventure cruise ship carrying about 150 people visits the Aleutian chain for about 12 days every summer. Passengers come ashore on Attu, Kiska, Atka, Unalaska, Akutan, and Akun. This use is projected to double during the life of the plan.

Near Islands - Seabird monitoring would occur every three to five years on Agattu Island; reintroduced Aleutian Canada geese would be monitored at the same time. Reconnaissance surveys would be done on Attu, Alaid, and Nizki islands once every five to ten years in conjunction with other projects. Foxes on Attu Island would be eradicated with chemical toxicants within the life of the plan. Agattu, Alaid, and Nizki islands are fox-free.

The military presence in this island group would remain at current levels. The U.S. Coast Guard LORAN-C station with its 625 foot tower would be maintained on Attu Island, as would the U.S. Air Force seismic facility. Aircraft overflights would continue to be restricted to approaches to the north-south runway. The U.S. Air Force 60 foot tall COBRA DANE test tower would be maintained on Alaid Island. All of Shemya Island would remain an Air Force Base, with multiple communication/radio towers or antennas, runway lights, and frequent overflights. U.S. Army World War II debris and toxic waste clean-up would occur on Attu and Agattu islands within five years. Water quality would be evaluated on Agattu and Attu in association with debris removal.

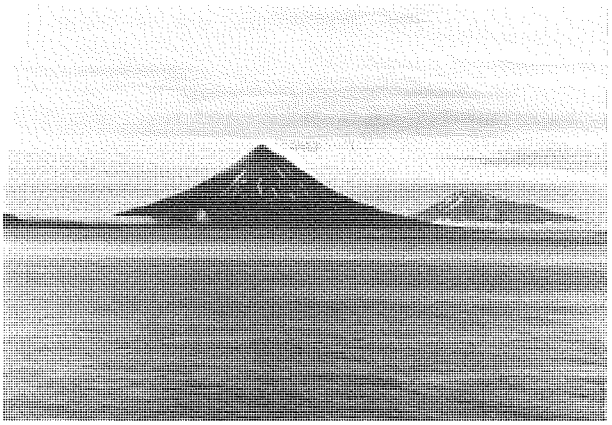
Public use would remain at approximately its present level. Most use comes from military personnel stationed on Attu Island. Sport hunting for waterfowl is done by fewer than 25 Coast Guard personnel, amounting to approximately 30 use days per year. Approximately the same number of Coast Guard personnel and 100 Air Force personnel sport fish for salmon and Dolly Varden on Attu, accounting for approximately 1,350 use days per year.

In addition, Attu Island would continue to be visited annually in spring for a three week

period by bird watching tour groups of approximately 65 people. These tours would continue to use Service facilities at Casco Cove. Periodic visits, no more than 40 people per year, by American and Japanese veterans, spouses, and their descendants would be made to the World War II battle site and memorial on Attu Island.

Rat Islands - Seabird monitoring would occur every three to five years on Buldir and Kiska islands. On Kiska Island, the monitoring would also record Aleutian Canada goose and other avian recolonization. Foxes on Tanadak, Segula, Little Sitkin, and Semisopochnoi islands would be eradicated with chemical toxicants within the life of the plan. Rat (Agudak) Island would be the site of an experimental program to eradicate introduced Norway rats; avian recolonization would be monitored in conjunction with this study. The Aleutian Canada goose reintroduction program on Amchitka Island would continue as described in the common management directions.

The military presence in this island group would remain at current levels. The U.S. Navy is currently constructing an Over-the-Horizon Radar site on Amchitka Island. Development includes multiple antennas under 20 feet tall at the transmitter and receiver sites, and a road from the major installation at the east end of the island to the fuel storage area associated with the transmitter site at the west end. Fuel is pumped from boats at the west end mooring buoy by pipeline to the storage area; fuel is also transferred from ships at Constantine Harbor. Approximately 225 military personnel would be stationed on the island. A refuge staff person is stationed on Amchitka Island for two years to monitor military construction activities, establish a biological monitoring program for seabirds, raptors, waterfowl, shorebirds, and ptarmigan, and to develop a public use program for Navy personnel. The island is closed to public access per 50 CFR 36.42. A permanent Service facility including office, storage, and housing would be provided on Amchitka to support Service programs on the island. World War II debris and toxic waste cleanup would occur on Kiska Island within five years. Water quality would be evaluated on Kiska, Little Kiska, and Semisopochnoi islands.



Chuginadak Island in the Islands of the Four Mountains is one of the islands scheduled for eradication of introduced fox during the life of the plan.

On Amchitka, recreational use would increase to 2,250 use days after the base in completed and fully staffed. Principal activities would be beachcombing, fishing, and sightseeing. Most use would occur close to base housing and the road system. Only about 225 of these use days would occur on the 16,322 acres of Amchitka which are suitable for wilderness designation. Also, periodic visits by Japanese and American veterans, spouses, and their descendants, no more than 40 people per year, would be made to the Japanese occupation site on Kiska Island.

Delarof Islands - Foxes on Amatignak and Ulak islands would be eradicated using chemical toxicants during the life of the plan. Foxes on Gareloi would be eradicated during the second half of the planning period. No recreational use is known to occur in this island group.

Islands of the Four Mountains - Introduced foxes would be eradicated using chemical toxicants on Yunaska, Herbert, Carlisle, Chuginadak, and Kagamil islands during the life of the plan. The experimental program to eradicate arctic foxes on Uliaga Island using sterilized red foxes would be completed. The remnant population of Aleutian Canada goose on Chagulak would be monitored every ten years. Amukta would be monitored at least once every

ten years to document bird recolonization. There is no known recreational use of these islands.

Andreanof Islands - Introduced foxes would be eradicated on many islands using chemical toxicants during the second half of the planning period. Status of fox would be verified on Adak islets. Foxes would be eradicated from Tanaga, Bobrof, Kanaga, Adak islets, Kagalaska, Little Tanaga, Umak, Great Sitkin, Igitkin, Chagul, Tagalak, Ikiginak, Kasatochi, Agligadak, Sagagik and Seguam. Seabird monitoring would take place every three years on Kasatochi, and every one to five years on Adak. Waterfowl would be monitored monthly on Adak. Management of introduced caribou on Adak would maintain the herd at a post-season population level of 200-250 animals. Feral reindeer on Atka would be managed to reduce overgrazing of the wilderness area.

Military use of Adak would remain at approximately the same level. Facilities currently include one 800 foot antenna, three 300 foot antennas and over 20 80-120 foot antennas. Aircraft overflights are currently restricted to the approaches to the two runways. U.S. Navy World War II debris cleanup is in progress. World War II debris cleanup on Tanaga and Great Sitkin would occur during the first five years of the planning period. Water quality would be evaluated on Tanaga and Great Sitkin islands.

The refuge unit headquarters on Adak would be maintained; see discussion of facilities in the management alternatives chapter.

Public use on Adak would remain at approximately its present level. In 1986, there were 18,411 visits for hiking, wildlife observation, photography, fishing, and caribou, ptarmigan, and waterfowl hunting. Fifteen people trapped arctic fox on Adak and five trapped on Kagalaska. Thirty people contributed 240 sport fishing use days for salmon and Dolly Varden on Kagalaska.

Subsistence use of Atka and Amlia islands is expected to remain at current levels. The amount of subsistence use occurring on refuge lands on Atka is not known, but for the purposes of this scenario is estimated at 1,000 use days. Subsistence use for the area on Atka, 97,144 acres, which is under consideration for wilderness is estimated at 500 use days per year. Most subsistence activities take place closer to the village on private land, on selected land near Korovin Bay, reindeer hunting in the wilderness area, or along beaches. Several off road vehicle routes would be designated near the village of Atka (See Figure 79 in the Management Alternatives Chapter). Less than 50 recreational visitor use days per year are estimated for Atka, since most villagers' activities on refuge lands are for subsistence use. There is almost no use by nonlocals. About 20 of these use days take place on the area of Atka which is suitable for wilderness designation. Recreational use is not expected to increase.

On the two other areas suitable for wilderness designation, Tanaga, 765 acres, and Great Sitkin, 700 acres, no use is thought to occur on Tanaga but about 150 use days occurs on Great Sitkin. Great Sitkin is close to Adak, and the Fox Creek area in the suitable portion is utilized by Adak Boy Scouts most summers. Use of Great Sitkin is expected to increase to 200 days by the end of the planning period. No other recreational use is known to occur in this island group.

Fox Islands and Bogoslof Island - The experimental program to eradicate foxes on Adugak Island using sterilized red foxes would be completed. If the experiment fails, foxes would be eradicated here and on Sedanka Island using chemical toxicants at the same time as the Islands of the Four Mountains group. Seabirds, fur seals, and sea lions would be monitored every three to five years on Bogoslof, the Baby, or Egg islands. Existing grazing permits would be maintained. Currently, approximately 600 sheep and 300 cattle graze on Umnak; 425 sheep, 425 cattle, and 300 horses graze on Unalaska; and 300 cattle graze on Akun. Feral reindeer on Umnak would be managed to prevent range damage.

Recreational use of refuge lands on Unalaska and Umnak is limited because most use takes place on private lands surrounding the villages. Most activities on refuge lands are for subsistence. However, some fishing crews come ashore to fish or beachcomb, some hiking occurs on Unalaska, and some adventure travelers visit Unalaska and

the surrounding islands. This use is thought to be no more than 400 use days per year. About 15 of these use days are estimated to occur on the 453 acres of islands and islets surrounding Unalaska which are under consideration for wilderness designation. Recreational use of Unalaska and surrounding islets is expected to double during the life of the plan.

Krenitzin Islands - Seabirds would be monitored on Aiktak Island every three to five years. Foxes on Ugamak Island would be eradicated using chemical toxicants. Subsistence activities on Akutan are not expected to increase. There is virtually no recreational use occurring in this island group. Most of Akutan is in private ownership and refuge lands are not near the village. No recreational or subsistence use is known to occur on the three islands suitable for wilderness designation, Aiktak, Ugamak, and Round islands. Historically, Akutan Natives hunted sea lions on Ugamak.

Unimak Island - Bear, caribou, tundra swans in winter, and waterfowl in fall would be censused. Recreational visitor use, which is currently estimated at about 120 visitor use days per year, is expected to increase to 200 use days by the end of the planning period. The majority of current use, 100 use days, is by bear hunters, and bear hunting permits, 15 per year, are not expected to increase. The increase is expected to be in backpackers and climbers. Less than five use days per year are occurring on the 8,000 acres under consideration for addition to the existing wilderness. This use is also expected to double. Subsistence use would not increase since False Pass is not expected to grow. Current use of refuge lands on Unimak is unknown but, for the purposes of analysis, is estimated at 400 use days. Less than five of these days would occur on the 8,000 acres under consideration for addition to the wilderness area. Most use takes place on private lands closer to the village and along the beaches.

Scenario for Long Term (more that 15 years) Wilderness Impacts

The long term scenario is used only for analyzing the long term impacts of the wilderness proposal, in this case, no wilderness, on the areas suitable for wilderness. There are 126,102 suitable acres in this unit (Table 43). This scenario only includes activities which would affect those areas.

Oil and gas leasing and studies would not occur on these areas because the potential is too low (see the Affected Environment). Production from the St. George basin, use of the shore based shipping facility at Unalaska or Akun, and shipping through Unimak Pass would continue for another 20 years as described in the short range scenario. A commercial fishery for forage fish would be established and fully exploited. Other fishery resources would be fully exploited with little room for additional expansion.

Subsistence use of suitable areas would remain as discussed in the short range scenario since the only village which is expected to grow is Unalaska. It is unlikely that the new people moving to Unalaska to work in the fishing or oil support industries would egg on the islets under consideration. Expected subsistence use figures are 500 use days on Atka, 20 on the islets surrounding Unalaska, less than 10 on the suitable portion of Unimak, and none on the remaining islands.

Recreational use of the suitable areas would be expected to increase to 800 use days per year in the long term from the 500 use days predicted for the end of the planning period. Use would remain constant on Amchitka, 225 use days, because base staffing would remain constant or decline with improved technology. Use would increase on suitable areas on other islands because of improved access and increased interest in adventure travel and bird watching. Use would increase on the islets near Unalaska because Unalaska would continue to grow, perhaps doubling in population. Also, a road along the oil pipeline, discussed in the short range scenario, would connect Unalaska to Beaver Inlet. A boat harbor and homes would develop on private land in Beaver Inlet. Tour ships would increase from the two per year predicted for the end of the planning period to five per year in the long run. Approximately 700 people per year would visit the Aleutians on tour ships. These visitors are not included in the 800 use days given above, because they would not come ashore on any of the suitable areas. They would

Table 43. Summary of the areas suitable for wilderness designation in the Aleutian Islands Unit.

Wilderness Review Unit	ACRES Suitable	Existing Wilderness	Non Suitable	Private
Rat Islands				
Amchitka	16,322	22,152	36,738	0
Delarof Islands				
Ogliuga	389	2,000	0	0
Andreanof Islands				
Tanaga	765	127,226	9	0
Great Sitkin	700	38,519	0	0
Atka	97,144	81,988	12,300	59,365
Egg	102	0	0	0
Fox Islands				
Baby	250	0	0	0
Wislow	5	0	0	0
Round	20	0	0	0
Tanaskan Bay Islets	5	0	0	0
Dushkot	30	0	0	0
Erskine Bay Islets	5	0	0	0
Kisselen Bay Islets	10	0	0	0
Peter	128	0	0	0
Krenitzin Islands				
Aiktak	307	0	0	0
Ugamak	1,900	1,300	0	0
Round	20	0	0	0
Unimak	8,000	910,000	14,484	45,855
Totals	126,102	1,183,185	63,531	105,420

sightsee around some of the suitable areas particularly the Baby Islands, Atka, and Great Sitkin.

Biological Impacts of Alternative A - Aleutian Islands Unit

Fish - Impacts from commercial fishing under this alternative could vary from minor to severe, especially for certain localized areas where pollock might be over-fished. There is no evidence that this is happening. However, the classic example of the sardine fishery's collapse in California shows what can happen with intensive fishing such as the pollock have experienced at times (Clark and Marr 1955; Frey 1971).

Seabirds - The eradication of introduced fox from selected islands scattered throughout the Aleutian Islands would greatly benefit both numbers of birds and diversity of breeding species of fossorial seabirds like puffins, auklets, and storm-petrels. Surveys in the eastern Aleutians (Nysewander et al. 1982) showed that 1.7 million burrowing and ground-nesting seabirds reoccupied 68 small islands or islets after introduced foxes died off. On Alaid and Nizki islands where foxes were eliminated by 1976, many species that had survived only as small scattered populations had increased five to fifteen fold by 1984 (Zeillemaker and Trapp 1986).

Sustained reductions in prey species such as pollock could cause either lowered or increased productivity of seabirds on colonies in certain localized areas where commercial fishing is heavy (Furness 1982). If the larger fish are caught, then smaller or "forage" fish proliferate making food resources available for seabirds. However, few other small forage fish species are available in some parts of the North Pacific and Bering Sea (Hunt et al. 1981, Schneider and Hunt 1984). If forage fish on which birds depend decrease due to commercial fishing, then seabird productivity and numbers decrease as seen in California (Ainley and Lewis 1974), Peru (Schaeffer 1970, Furness 1982, Furness 1984), and Newfoundland (Brown and Nettleship 1984, Carscadden 1984). Studies on seabirds (Baird and Gould 1983) between 1976 and 1978 under the Offshore Continental Shelf Environmental Assessment Program in Alaska

illustrated that the absence of certain forage fish correlated with decreased breeding success even when other forage fish species were used. Small size pollock (age class zero and one) were the primary forage fish utilized certain years by tufted puffins in the eastern Aleutians (Sanger and Hatch 1987).

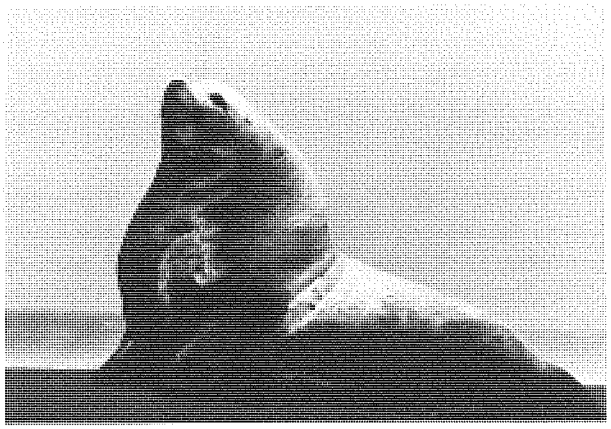
The intensive pollock fishery in the Bering Sea/eastern Aleutian Islands has the potential to drastically alter food chains so that seabirds would have to utilize other species. Seabirds in the Aleutians utilize Atka mackerel, capelin, and sandlance, but it is not known if any of these would support productivity similar to that of pollock. This phenomenon is used to explain why tufted puffin numbers in California have never recovered from the sardine fishery collapse in that area (Ainley and Lewis 1974).

Shore-based facilities such as pipelines and terminals would be developed in the Fox and Krenitzin islands. At least three spills are projected in the nearby St. George Basin and one at the terminal or at sea south of the terminal. At least one would contact land. There is a history of oil spills associated with military bases such as at Amchitka and Adak islands and a potential for future spills. Commercial fishing boats periodically go aground or sink in the Aleutians, creating spills also. The impact of oil spills would be minor on a region wide basis, but severe on a local basis for diving marine birds such as puffins, murres, and auklets. Certain species like whiskered auklets would be especially susceptible to severe impact since sizeable proportions of the world's population concentrate during all seasons in tide rips in passes (Byrd and Gibson 1980, Nysewander pers. comm. 1987). Up to 14,000 whiskered auklets (25-53 percent of the known world population) have been documented to use Akutan Pass and Avatanak Straits in the Fox and Krenitzin islands (Nysewander et al. 1982; Byrd and Gibson 1980). Up to 36 million shearwaters migrate through the Aleutian Islands and many may go through Unimak Pass at some time of the year (Gould et al. 1982). Impact of an oil spill on either of these species could be moderate to major on the basis of the world population. Very few observations are available at present for fall, winter, or spring use of the eastern Aleutians, but millions of seabirds utilize this region all through the year (Gould et al. 1982). The Unimak Pass/Fox Islands area is certainly one of the most important areas for seabird numbers and diversity, but it is also one of the prime areas for oil spill occurrence.

The offshore drift net fishery for salmon comes close to seabird breeding colonies in the western Aleutians. Direct mortality of seabirds entangled in gill nets has ranged annually from 96,000 to 251,000 birds, mainly shearwaters and tufted puffins (DeGange et al. 1985). Tufted puffin breeding colonies near Buldir and Agattu islands could be severely impacted since between 7.2 and 8.7 percent of the local breeding population in the western Aleutians were lost annually in 1981-84 (DeGange et al. 1985). Fishing effort in this fishery decreased by half between 1984 and 1987 (L.L. Jones, National Marine Fisheries Service, pers. comm. 1987), but the adverse effect locally is still significant.

Seabird population monitoring of a sample of colonies throughout the refuge would enhance the ability of the Service to manage these resources. Natural population trends can be established, interactions of seabirds and prey be determined, and the effects of human activity be assessed. This is especially important for species with low productivity potential, long life spans, and highly variable population parameters.

Marine mammals - The world population of northern sea lion has decreased over a ten year period more than 50 percent from the 230,000 once present (Braham et al. 1980). This decrease is forcing the National Marine Fisheries Service to consider giving this species a "depleted" status (Tom Loughlin, National Marine Fisheries Service, pers. comm. 1987). The proposed "depleted" status would require a change in gear and fishing practices as mandated by law, treaty, enforcement, or negotiation. On certain rookeries in the eastern Aleutian Islands, the sea lion population is only 20 percent or less of its original numbers (Nysewander et al. 1982, Braham et al. 1980). On the three rookeries surveyed in 1988 in the western Aleutians, the sea lion population is only 40 percent of what it was in 1978 (V. Byrd, U.S. Fish and Wildlife Service, pers. comm. 1988). The greatest decreases such



The world population of northern sea lions has declined 50 percent in the last 10 years.

as in the Krenitzin and Fox islands have correlated with the most intensive commercial fishing activity. There is known direct mortality associated with the netting of pollock and other finfishes in the eastern Aleutian Islands. The National Marine Fisheries Service has not drawn any firm conclusions about which causes are most important. The moderate to severe impact on sea lions, whatever the exact causes, may be also applicable to the northern fur seal population. This world population has also decreased by close to half from about 1.5 million to 750,000. Most of these animals are associated with the Pribilof Islands in the Bering Sea unit, but one rookery is found on Bogoslof Island in the eastern Aleutians.

The northern sea lion and fur seal populations would receive minor adverse impact from oil spills except on a very localized and infrequent basis. Sea otter concentrations in the Krenitzin and Fox islands and at Amak Island could be severely impacted by oil spills. Impacts on these populations would not significantly affect the world population of sea otters.

Minor to severe adverse impacts would result from tourists from cruise ships going ashore in the Bogoslof Island fur seal rookery, unless special use permits are enforced or checked on a frequent basis.

Waterfowl - The emperor goose utilizes various portions of the Aleutian Islands for winter habitat. This species is of Service concern because of depressed populations as indicated by declining fall migration numbers from 150,000 in 1971 to 42,000 in 1986 and 65,000 in 1987 (B. Butler, U.S. Fish and Wildlife Service, pers. comm. 1987). Increased surveys and monitoring would greatly facilitate management decisions for this species.

Waterfowl, including numerous sea ducks such as eiders, oldsquaw, and harlequins, are abundant throughout the Aleutian Islands in winter and during migration. The impact of oil spills would be minor on a region wide basis, but severe on a local basis depending upon the time of year and locality. Impacts would be more severe from spills in the Unimak Pass/Fox Islands area since so many species pass through the area.

The eradication of introduced foxes from selected islands throughout the Aleutians would greatly benefit both the numbers and diversity of species breeding on these islands. See the seabird and endangered species categories in this unit for benefits to the Aleutian Canada goose.

Shorebirds - Impacts on most species would be negligible and adverse. Because they swim on the water surface, red and red-necked phalaropes could be severely impacted locally if an oil spill coincided with migration through the area.

Fox eradication would benefit local breeding populations of species like rock sandpipers and black oystercatchers.

Terrestrial birds and mammals - Minor local adverse impacts would derive from hunting, poaching, and human disturbance. Fox eradication would have a major benefit, because nesting would increase for passerines and ptarmigan on islands where fox were removed. Impacts from grazing by introduced reindeer on Umnak, Atka, and Adak islands should be negligible; however, the range conditions on Atka Island are unknown and need to be evaluated. Wildlife disturbance by tourists is expected to be minor.

Endangered species - The Aleutian Canada goose would greatly benefit from eradication of introduced fox and from transplants of breeding geese and goslings near fledging to traditional breeding sites now free of fox. Impacts of management actions on the Aleutian shield fern (Polystichum aleuticum) should be negligible due to its remote mountaintop habitat requirements.

Water quality and quantity - The Service does not manage any offshore waters in this unit. The main effects on water quality and quantity would be associated with natural streambank erosion and shoreline degradation associated with normal stream and river dynamics. Impacts would be negligible.

Socioeconomic Impacts of Alternative A - Aleutian Islands Unit

Cultural resources - These resources are among those targeted for protection under all alternatives. The discussion of common management directions indicates that recreational use and access to islands in this unit would be managed to minimize adverse impacts to cultural resources. People using refuge lands for a variety of purposes may cause some damage to sites, intentionally or unintentionally, and some sites may be lost to natural forces. However, these are both low-level risks and the overall impact on cultural resources under this alternative would be negligible.

Population - Since this alternative emphasizes existing types and levels of refuge use, the proposed management actions would not cause local population changes.

Economy - The proposed management actions would have a negligible impact on the regional economy or on the economy of any community in the unit. Three new positions would be added to the unit office in Adak to fully implement the management directions called for in this alternative. No other jobs would be created. Some economic stimulation can be expected from the commercial fishing and oil developments anticipated by the scenario for this alternative, but this would be independent of Service action.

Table 44. Summary of the wilderness proposal by alternative for the Aleutian Islands Unit.

Suitable Areas	Suitable Acres	Proposed Acres (Alternative)		
		A	B	C
Rat Islands				
Amchitka	16,322	0	16,322	16,322
Delarof Islands				
Ogliuga	389	0	389	389
Andreanof Islands				
Tanaga	765	0	765	765
Great Sitkin	700	0	700	700
Atka	97,144	0	97,144	66,484
Egg	102	0	102	102
Fox Islands				
Baby	250	0	250	250
Wislow	5	0	5	5
Round	20	0	20	20
Tanaskan Bay Islets	5	0	5	5
Dushkot	30	0	30	30
Erskine Bay Islets	5	0	5	5
Kisselen Bay Islets	10	0	10	10
Peter	128	0	128	128
Krenitzin Islands				
Aiktak	307	0	307	307
Ugamak	1,900	0	1,900	1,900
Round	20	0	20	20
Unimak	8,000	0	8,000	8,000
Totals	126,102	0	126,102	95,442

Recreation - Alternative A would not contribute to increased visitation because no additional facilities or programs are planned which would improve access or otherwise make recreational use easier or more popular. Recreational use levels by nonlocal people would remain low. Those people who visit the area to view wildlife generally come with commercial adventure tour groups because of the remote character of the area. Such visitors generally have little need or chance to purchase food, fuel or other services from the few local communities.

Impacts of the Wilderness Proposal for Alternative A - Aleutian Islands Unit

In Alternative A none of the suitable areas, 126,102 acres, would be proposed for wilderness designation (Table 44). Areas suitable for wilderness designation would be managed as they currently are, essentially under minimal management. Fifty-seven percent of the unit, not counting Unimak Island, is already designated wilderness, but the impacts of existing wilderness are not considered in this analysis. The impacts of nondesignation are only evaluated for the suitable areas (Table 43). The Affected Environment chapter for the Aleutian Islands Unit, Wilderness Review section, discusses how suitability for wilderness designation was determined. The impacts are evaluated for the two significant wilderness issues: impacts on wilderness values and impacts on wildlife populations.

Wilderness values - Aleutian Islands Unit

Naturalness - Management actions on the suitable areas which have the potential to affect naturalness are fox eradication, the continued reintroduction of Aleutian Canada geese on Amchitka, seabird monitoring on Aiktak, and military debris cleanup. Recreational and subsistence use, including the continued use of off road vehicle trails on Atka, may also affect naturalness. Actions occurring off the refuge which may affect naturalness include oil spills and commercial fishing.

During the life of the plan, eradication of introduced fox on Tanaga, Great Sitkin, and Ugamak would improve natural seabird and waterfowl diversity and abundance. Fox prey on the chicks and eggs of some species of seabirds and waterfowl. Introduction of fox to these islands caused the elimination of the Aleutian Canada goose which then became endangered. Once fox are eliminated, geese can be reintroduced and other ground and burrow nesting species such as puffins, auklets, and storm-petrels would reestablish themselves. Naturalness would be restored.

Aleutian Canada geese would continue to be transplanted from Buldir to Amchitka until a breeding population of 50 pairs is established. Aleutian Canada geese were native to Amchitka but were eliminated when fox were introduced to the island. Fox have since been exterminated. Naturalness would benefit by restoration of this native species. Introduction activities would not affect naturalness since the temporary holding pens for the geese and a temporary camp, if any, for the crew would not be located on the suitable area.

Seabirds would be monitored on Aiktak every three to five years. This may involve temporary camps utilizing tents, weatherports, and rubber rafts for transportation. Naturalness would not be affected.

World War II military debris cleanup by the Army Corps of Engineers on Tanaga and Great Sitkin would remove remnants of buildings, a runway, pieces of equipment, and fuel drums. These ruins substantially impair naturalness on about 100 acres of these islands. Surface disturbance from the war has healed over in the intervening 40 years. Once the debris is removed and vegetation regrows on the building sites, in approximately 10 years, the suitable areas would appear natural.

Continued use of off road vehicles on the 30 miles of trails in the suitable areas on Atka Island would impact naturalness in the immediate area. Probably only the narrow track appears unnatural now, but it may expand in places to widths of 10 feet or more with continued use. The affected area probably covers no more than 30 acres. The trails are used to access subsistence areas. Since the total subsistence use thought to be occurring on the suitable portion of Atka is 500 use days per year, and much of this is from boats, no more than one trip a month is probably made on the spur trails

and one or two a week on the main trail. Subsistence use on Atka also involves set net sites for salmon and temporary camps. Probably one or maybe two fishing sites in the suitable area are used every year, in which case an area of less than one acre may show some "wear" and damage to vegetation. Overall naturalness would not be affected.

Subsistence use on the other suitable areas would involve egg collecting on the islets near Unalaska, 20 use days per year, and possibly trapping or hunting on Unimak, less than five use days. These are dispersed uses which would not utilize camps. The amount of egging occurring on the islets near Unimak is unlikely to be affecting the bird populations. Naturalness would not be impacted. Subsistence use is not expected to increase during the life of the plan or the long term.

Recreational use of the suitable areas has never been determined but is estimated at 425 use days per year currently, 500 by the end of the planning period, and 800 over the long term. This use is dispersed over 126,102 acres. Much of this use, 225 use days, would occur on the 16,322 suitable acres of Amchitka. Amchitka use would be primarily day use for sightseeing and fishing and would not involve even temporary camps. Use of the islets in Beaver Inlet would also be day use by bird watchers or picnickers who would come by boat. Most use of Great Sitkin would be by about 12 Boy Scouts and advisors who camp most years from four to 10 days in the same general area. There is some evidence of "wear" and past camping near Fox Creek. Use of the other islands would involve camping by boaters or hikers but campsites would be dispersed over a large area, 108,627 acres, on eight different islands. This use would not involve the establishment of permanent camps, trails, or areas of concentration. Naturalness would not be affected by recreational use during the life of the plan or the long term.

There is a 22 percent chance of four oil spills from the terminal site in Beaver Inlet or Akun Harbor, from tanker traffic out of Beaver Inlet or through Unimak Pass, or from offshore loading or shipping accidents in the St. George Basin. Due to location, Aiktak, Ugamak, and Round islands at the south end of Unimak Pass and the Baby Islands and Round, Tanaskan Bay, Dushkot, Erskine Bay, and Kisselen Bay islets in Beaver Inlet are most at risk. Oil could actually wash ashore on one of these islands, but the most likely impact is mortality of seabirds or sea otters that become oiled when diving for food. Wintering waterfowl could also be affected. The magnitude of the impact cannot be determined because mortality could vary from none to hundreds of thousands of birds or hundreds of otters depending on the time of year, type of hydrocarbons involved, tanker routes used, location of accident, currents, and weather conditions. If a major oil spill in a crucial location at a vulnerable time caused the mortality of seabirds, waterfowl, or otters on one of the islands at risk, naturalness would be affected.

It is not known whether increased commercial fishing for pollock, a favored seabird prey species, is affecting or could affect seabird numbers during the life of the plan (see the discussion in the Biological Impacts for Alternative A, fish and seabird sections above). Seabirds have been affected by fishing pressure on prey species in other areas of the world (see the discussion in the Affected Environment chapter, potential and current impacts of development). Sea lions may also decline due to increased pollock fishing. The world population of northern sea lions has declined about 50 percent in the past 10 years. It is not known if this decline is related to increased commercial fishing. Over the long term, development of a forage fishing industry would likely lead to declines in seabirds and sea lions due to a shortage of prey species. As a result, naturalness would decline on suitable areas where seabirds or sea lions are a part of the natural ecosystem.

Conclusion - During the life of the plan, fox eradication on Tanaga, Great Sitkin, and Ugamak, the reintroduction of Aleutian Canada geese on Amchitka, and World War II military debris cleanup on Tanaga and Great Sitkin would benefit naturalness. Naturalness would decline on about 30 acres along the 30 miles of off road vehicle trails and at set net sites on Atka Island. Other subsistence activities, seabird monitoring, and recreational use would have no impact on naturalness. There is less than a 22 percent chance that an oil spill would have a negative but unknown impact on naturalness on

Field work in most of the refuge is complicated by difficult access. Raft landings at this auklet colony on Kasatochi can only be attempted with calm seas.

Aiktak, Ugamak, and Round islands at the south side of Unimak Pass and the Baby Islands and Round, Tanaskan Bay, Dushkot, Erskine Bay, and Kisselen Bay islets. Over the long term, the risk of an oil spill would continue for an additional 20 years, use of the off road vehicle trails and set net sites would be ongoing, and commercial fishing would have a negative impact on the natural abundance of seabirds and sea lions.

Outstanding opportunities for solitude - Activities which may impact solitude are management activities including seabird monitoring, fox eradication, and clean-up of World War II debris and recreational and subsistence use.

Seabird monitoring would involve a crew of no more than four biologists on Aiktak once every three years. They would probably spend no more than one week on the island. It is a small island, 307 acres, and anyone else on the island would be aware of their presence. Since Aiktak receives no known recreational use it is extremely unlikely that anyone else would encounter the biologists. Fox eradication would involve a crew of four to six on Great Sitkin, Tanaga, and Ugamak for two weeks during the winter. A followup visit a year later would be necessary to determine if eradication was successful. These islands receive no known recreational use in the winter so no one would encounter the crews. Clean-up of military debris on Great Sitkin and Tanaga may take several months, would probably be done in the summer, and may involve 25 people or more and heavy equipment. However, it is a one-time event, and they are both very large islands. Solitude would only be affected in the immediate area for one summer.

Recreational use of the suitable areas has never been determined but is estimated at 425 use days per year currently, 500 by the end of the planning period, and 800 over the long term. This use is dispersed over 126,102 acres. Much of the use, 225 use days, would occur on the 16,322 suitable acres of Amchitka. Amchitka use would be primarily day use for sightseeing and fishing and use of the islets in Beaver Inlet would also be day use by bird watchers or picnickers who would come by boat. Solitude would be impacted at the Fox Creek campsite on Great Sitkin during the two weeks of the Scout encampment. However, only about 10 Scouts and advisors are involved. Although the suitable area of Great Sitkin is only 700 acres, the remainder of the island, 38,519 acres, is already designated wilderness. Overall opportunities for solitude would not be affected. Use of the other islands would involve camping by boaters or hikers but campsites would be dispersed over a large area, 108,627 acres, on eight different islands. This level of use would not affect opportunities for solitude.

Subsistence use is not expected to increase above the 530 use days per year occurring now on the 105,468 acres where such use is believed to be occurring. Use is dispersed over this area and occurs at various times of year for fishing, hunting, berry collecting, trapping, and egg collecting. No use is known to occur on the remaining 20,634 acres. Solitude would not be affected.

Conclusion - World War II debris clean-up on Tanaga and Great Sitkin would impact solitude during the summer that it occurs. Recreational use of 800 days per year in the long term and subsistence use of 530 days per year would not impact solitude on the 126,102 acres. Solitude would remain outstanding during the life of the plan and the long term.

Outstanding opportunities for primitive recreation - Management actions which have the potential to affect opportunities for primitive recreation are fox eradication, reintroduction of Aleutian Canada geese, and World War II debris cleanup. Actions which may occur off the refuge with the potential to affect opportunities for primitive recreation are oil spills, commercial fishing, the road and oil terminal on Beaver Inlet, and increased availability of charter boats and cruise ships.

Fox eradication and the reintroduction of Aleutian Canada geese would lead to increases in geese and seabirds as described under naturalness. Bird watching is one of the principal recreational opportunities on the suitable areas. These opportunities would improve on Tanaga, Great Sitkin, and Ugamak after fox eradication, and on Amchitka after successful reintroduction of geese.

Cleanup of World War II debris would increase the primitive opportunities available on Great Sitkin and Tanaga. Pieces of equipment, fuel drums, and remnants of buildings would be removed restoring the primitive nature of the 200 acres which are affected.

Should an oil spill or over fishing cause declines in seabird, sea otter, or sea lion populations as discussed above under naturalness, recreational opportunities would decline. Bird watching, marine mammal observation, and wildlife photography are some of the best opportunities for recreation on the suitable areas. These opportunities would be affected by loss of birds or sea lions.

Opportunities for primitive recreation would increase if a road is built along the projected oil pipeline from Unalaska to Beaver Inlet. Unalaska residents would have ready access to Beaver Inlet, and small boats and kayaks could be launched in the relatively protected waters of the inlet. Use would increase for sea kayaking, sightseeing, bird watching and picnicking on Round, Tanaskan Bay, Dushkot, Erskine Bay and Kisselen Bay islets in Beaver Inlet. The suitable areas would be out of sight of the projected oil terminal so recreational opportunities would not be affected by the terminal.

Tour ship activity in the Aleutians is projected to increase from one boat per year at present, to two during the life of the plan, and five over the long term. Although the 700 people who would be on these boats would not actually land on the suitable islands, they would sightsee, bird watch, and photograph some of the suitable areas from their ships. Atka, Great Sitkin, and the Baby Islands are the most likely places to be visited. In addition, a charter may occasionally take bird watchers out to the Baby Islands from Unalaska.

Conclusion - Opportunities for bird watching would increase on Amchitka as a result of reintroduction of Aleutian Canada geese and on Ugamak, Great Sitkin, and Tanaga as a result of fox eradication. There is less than a 22 percent chance that an oil spill at a vulnerable time of year would kill seabirds resulting in a loss of bird watching opportunities. Over the long term, increased fishing would lead to a decline in seabirds and sea lions and consequently a decline in bird watching, marine mammal observation, and wildlife photography opportunities. Opportunities would improve on the islets in Beaver Inlet if a road is built from Unalaska to the inlet. Opportunities for sightseeing, bird watching, and photography would increase as a result of increased tour and charter boat activity.

Special features - The special features of the suitable areas are the endangered Aleutian Canada goose, large populations of rock sandpiper, rock ptarmigan, and avian predators, archaeological sites, brown bear on Unimak, glaciers, active volcanic sites, sea lion rookeries, the historic site of Korovinski, large seabird colonies of more than 150,000 birds, and unique seabird species such as whiskered auklets and ancient murrelets.

Management actions which have a potential to affect these features are fox eradication and reintroduction of Aleutian Canada goose. Actions which would occur off the refuge with the potential to affect these features are oil spills and increased commercial fishing.

Elimination of fox on Tanaga, Ugamak, and Great Sitkin would benefit Aleutian Canada geese and seabirds as discussed under naturalness.

Reintroduction of Aleutian Canada geese to Amchitka would benefit the geese as discussed under naturalness. A major oil spill in a crucial location at a vulnerable time could cause seabird or waterfowl mortality as discussed under naturalness. Seabird colonies on the south side of Unimak Pass, such as Aiktak Island (150,000 birds), and near Unalaska, such as the Baby Islands (200,000 birds), are the most at risk.

Over the long term, the threat of oil spills would last another 20 years. Seabirds and sea lions would also decline because of establishment of a forage fishery. See the discussion under naturalness.

No management actions or off-refuge actions during the life of the plan or the long term would impact the archaeological sites, the historic site, the brown bear of Unimak, the glaciers and active volcanic sites of Atka, or the sandpipers, rock ptarmigan, and avian predators of Amchitka.

Conclusion - During the life of the plan, fox eradication would benefit the Aleutian Canada goose and ground and burrow nesting seabirds on Tanaga, Ugamak, and Great Sitkin islands. Reintroduction of Aleutian Canada geese to Amchitka would benefit the geese. There is less than a 22 percent chance that an oil spill would have a negative but unknown impact on seabirds on Aiktak, Ugamak, and Round islands at the south side of Unimak Pass and the Baby Islands and Round, Tanaskan Bay, Dushkot, Erskine Bay, and Kisselen Bay islets. Over the long term, the risk of an oil spill would continue for an additional 20 years, and commercial fishing would have a negative impact on the natural abundance of seabirds and sea lions.

Wildlife populations - Aleutian Islands Unit

Under Alternative A, the Service would continue to eradicate fox, reintroduce Aleutian Canada geese, and monitor seabirds. These activities would not be affected by the lack of a wilderness designation. Oil spills and increased commercial fishing would still occur off the refuge as these are actions over which the Service has no control. No other activities would impact wildlife populations.

Fox eradication would result in the complete elimination of arctic fox from Tanaga, Ugamak, and Great Sitkin. They are, however, an introduced species, and native species, including the endangered Aleutian Canada goose, could recolonize the islands once fox are eliminated. Aleutian Canada geese reintroductions on Amchitka would increase the population of this endangered species. Seabird monitoring on Aiktak would have no effect on seabird populations, but would increase knowledge of seabird population dynamics.

Impacts of oil spills on seabirds, sea otters, and waterfowl would be as discussed above under naturalness. Mortality could vary from zero to hundreds of thousands of birds and hundreds of otters depending on the time of year, type of hydrocarbons involved, tanker routes used, location of accident, currents, and weather conditions. There is about a 22 percent chance of an oil spill.

Over the long term, oil spills would continue to be a threat for an additional 20 years. Increased commercial fishing and the establishment of a forage fishery would impact the seabird, seal, and sea lion populations. Seabirds and sea lions would decline as a result of decreased prey species, as discussed at greater length under naturalness.

Conclusion - During the life of the plan, fox eradication would increase the endangered Aleutian Canada goose and seabird populations on Great Sitkin, Ugamak, and Tanaga Islands. Aleutian Canada goose reintroductions on Amchitka would benefit geese populations. There is a 22 percent chance that oil spills would have a negative but unknown impact on seabird, waterfowl, and sea otter populations particularly in the Unalaska and Unimak Pass areas. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing for forage species would have a negative impact on seabird and sea lion populations.

Subsistence/Section 810 Evaluation and Findings -Aleutian Islands Unit

Evaluation - This section examines the impacts on subsistence that would result from implementation of Alternative A. It also

conforms to the guidelines recommended by the Alaska Land Use Council and the guidelines of the Department of the Interior for complying with section 810 of the Alaska Lands Act.

Alternative A would have a negligible impact on subsistence users and the resources upon which they depend. No management initiatives are contemplated in Alternative A which would increase the existing levels of refuge use by nonlocal people. Little increase in competition for subsistence resources with nonlocal people would likely occur.

Atka and Nikolski are the communities which rely the most on subsistence and their populations have remained relatively constant. No increase in subsistence activities is expected on those islands. Unalaska and Akutan also utilize subsistence resources, and Unalaska is projected to grow. However, the growth in Unalaska would be made up of people with jobs in the commercial fishing industry. This would not lead to a substantial increase in subsistence.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

Availability of other lands - Section 810(a) requires that the availability of other lands and other alternatives be considered in evaluating the effects of all management actions including comprehensive conservation plans on subsistence uses. This plan is a refuge plan by definition and addresses the general suitability of a broad range of activities for refuge lands. Thus although there may be other lands available for the uses considered, lands outside of the refuge are not considered because they are beyond the scope of this plan.

Other alternatives - Three alternatives were developed for the Alaska Maritime Refuge. This alternative maintains the current situation in refuge management.

Finding - The net effect of this alternative would be a negligible increase in subsistence harvest levels due to local population increases. There would be no increases in competition between local and nonlocal users and among local users.

ALTERNATIVE B - ALEUTIAN ISLANDS UNIT

Scenario for the Life of the Plan (10-15 years)

In this alternative, two percent of the unit would be in intensive management, two percent in moderate management, 34 percent in minimal management, 57 percent as existing wilderness, and five percent, 126,102 acres, would be proposed for addition to the existing Aleutian Islands Wilderness and Unimak Island Wilderness (Table 42).

This scenario assumes Congress approves the recommendation and designates these proposed areas as wilderness. Management of the wilderness areas would be subject to the provisions of the Wilderness Act as amended by the Alaska Lands Act. Wilderness management policy prohibits oil and gas leasing and oil and gas studies that utilize mechanized equipment unless performed by an Interior Department agency. It also prohibits the use of mechanized equipment in wilderness areas except for snowmachines, motorboats, and airplanes. Subsistence users may also use chainsaws. Commercial activities, except as they relate to providing a service to recreational users, are generally prohibited in wilderness.

As in Alternative A, this scenario assumes there would be no mining, no oil and gas studies or leasing on refuge lands on the unit, a 22 percent chance of oil and gas development offshore in the St. George basin, oil tanker traffic through Unimak Pass, and an on-shore loading facility at either Beaver Inlet on Unalaska or Akun Bay on Akun. Should oil be found, four spills would occur either during off-shore loading, shipping, or on-shore loading. Assumptions regarding increases in commercial fishing apply here as well.

Management actions described for fish and wildlife management and air and water quality monitoring would also take place in this alternative. Seabird monitoring would be more intensive on at least three of the sites proposed for monitoring in Alternative A. Studies of seabird/prey interactions would receive slightly more emphasis than in

Alternative A, particularly baseline studies of yearly food habits.

Fishery management activities would emphasize active participation in management bodies responsible for marine forage fish management. In addition, baseline studies to determine ways to provide sport fishing on Attu, Shemya, and Amchitka Islands would be conducted.

An additional 26,266 acres on Amchitka would be designated for intensive management to allow for development of another radar site. Twenty-five employees would be added to run the extra radar site. The total number of people stationed at Amchitka under this alternative would be 250. The new people would contribute an additional 250 recreational use days to the island as a whole and 25 days to the area proposed for wilderness designation. Total recreational use would be 2,500 days per year on the island as a whole and 250 on the proposed area.

An interpretive display would be developed for the airport in Unalaska/Dutch Harbor. The display may lead to increased visits to the Baby Islands and Egg Island, perhaps an additional 50 use days per year. Total recreational use for the islands and islets proposed for wilderness around Unalaska would be 80 per year during the life of the plan. Designation of an additional 126,102 acres as wilderness would not lead to an increase in visitor use. All the areas proposed for designation are within the existing Aleutian Island or Unimak Island wildernesses.

Scenario for Long Term (more that 15 years) Wilderness Impacts

In Alternative B, proposed additions to the existing wilderness areas would be designated wilderness. As in the short term scenario, oil and gas leasing and studies, commercial uses other than recreation related, and the use of mechanized equipment would be limited on the proposed and existing wilderness areas.

As in the scenario for the life of the plan, the interpretive display in Unalaska, would increase recreational use of the Baby Islands an additional 50 use days per year. As a result of the increased staff on Amchitka, recreational use of the proposed area would increase an additional 25 use days per year. Total long term recreational use of all the proposed areas would be 875 days per year. As in the short range scenario, wilderness designation would not affect the amount of visitor use. Tour boat use would increase to five per year as in Alternative A.

This scenario is similar to the long term scenario for Alternative A in that oil and gas leasing and studies and mining would not occur on the proposed areas, and a forage fishery would be established and fully exploited. Also as in A, a 22 percent chance of oil production from the St. George basin, of use of the shore-based shipping facility at Unalaska or Akun, and of shipping through Unimak Pass would continue for another 20 years. Subsistence use is estimated at 530 use days for the proposed areas as discussed for Alternative A.

Biological Impacts for Alternative B - Aleutian Islands Unit

Fish - The impacts on fisheries resources would be as described under Alternative A.

Seabirds - Impacts would be as described in Alternative A except that additional seabird monitoring would increase benefits to seabird management as would the slight increase in studies of seabird-prey interactions focusing on yearly food habits.

Marine mammals - Impacts would be the same as in Alternative A.

Waterfowl - The impacts are the same as for Alternative A.

Shorebirds - The impacts are the same as for Alternative A.

Terrestrial birds and mammals - Impacts would be the same as in Alternative A.

Endangered species - The impacts are the same as for Alternative A.

Water quality and quantity - The impacts of this alternative on water quality and quantity would be the same as described for Alternative A.

Socioeconomic Impacts of Alternative B - Aleutian Islands Unit

Cultural resources - The impact of this alternative on cultural resources would be negligible; see the discussion for Alternative A.

Population - This alternative would not affect the population of area communities; see the discussion for Alternative A.

Economy - The negligible impacts on the economy are identical to those described for Alternative A. Wilderness designation would not affect the ability of Atka residents to develop the geothermal field on the north end of the island. Geothermal leases cannot be granted on a refuge. Should development of the field prove feasible and desireable, a land trade or purchase would have to be arranged under all alternatives. The Service can trade wilderness as well as nonwilderness lands.

Recreation - The interpretive display would stimulate interest in seabirds and refuge lands among Unalaska residents and visiting fishermen. This may lead to increased visits to the refuge, particularly the Baby Islands and Egg Island which are the most spectacular bird colonies near Unalaska.

Impacts of the Wilderness Proposal for Alternative B - Aleutian Islands Unit

In Alternative B, all of the suitable areas, five percent of the unit or 126,102 acres, would be proposed as additions and boundary adjustments to the existing Aleutian Islands Wilderness and Unimak Island Wilderness (Table 43). Designation would require the approval of Congress. If Congress designated the areas as wilderness, they would be managed like the existing wilderness according to the provisions of the Wilderness Act of 1964 as amended by the Alaska Lands Act.

The impacts of the designation are evaluated only for the proposed areas: portions of Amchitka, Tanaga, Great Sitkin, Ogliuga, Atka, Ugamak, and Unimak islands. All of these islands contain existing wilderness. The suitable areas would be a boundary adjustment of the existing wilderness. The entirety of Egg (near Atka), the Babies, Wislow, Round, Tanaskan Bay, Dushkot, Erskine Bay, Kisselen Bay, Peter, Aiktak, and Round (near Ugamak) islands are also proposed. These areas would be an addition to the existing Aleutian Islands Wilderness. See Table 44 for a summary of suitable, nonsuitable, and existing wilderness acres on these islands. The impacts are evaluated for the two significant wilderness issues: impacts on wilderness values and impacts on wildlife populations.

Wilderness values - Aleutian Islands Unit

Naturalness - Management actions on the suitable areas which have the potential to impact naturalness are fox eradication, the continued reintroduction of Aleutian Canada geese on Amchitka, seabird monitoring on Aiktak, and military debris cleanup. Recreational and subsistence use, including the continued use of off road vehicle trails on Atka, may also affect naturalness. Actions occurring off the refuge which may affect naturalness include oil spills and commercial fishing.

Eradication of fox for the benefit of Aleutian Canada geese and seabird diversity and populations would occur on Tanaga, Ugamak, and Great Sitkin islands under this alternative as well. Wilderness designation does not affect the Service's ability to eradicate introduced species. Reintroduction of Aleutian Canada geese would also occur as wilderness designation does not affect the Service's ability to reintroduce native species. Naturalness would benefit (see Alternative A for supporting analysis).

Seabird monitoring would occur after wilderness designation. The use of temporary camps in the support of monitoring would have no impact on naturalness as discussed for Alternative A. World War II military debris cleanup on Tanaga and Great Sitkin would occur in this alternative as well. Wilderness designation would not prevent cleanups of this type. Naturalness would benefit as described for Alternative A.

Subsistence use would be 530 days per year. Off road vehicles could continue to be used even in the wilderness area if they were determined to be a "...means of surface transportation traditionally employed for such purposes by local residents..." (Alaska Lands Act

section 811). Due to the remoteness of the area, it is likely that they would continue to be used regardless of the outcome of the determination. Impacts on naturalness from subsistence would be as discussed for Alternative A.

The increase in recreational use for this alternative is 75 days beyond the 800 projected for Alternative A. These additional days would be for dispersed day use activities such as fishing and hiking on Amchitka and sightseeing, photography, and bird watching mainly from boats at the Baby Islands. This increase in use spread over the 16,572 acres of Amchitka and the Baby Islands would have no impact on naturalness. Impacts would be as discussed for Alternative A.

The 22 percent chance of oil spills and the establishment of a forage fishery would occur under this alternative as well, as these are actions over which the Service has no control. These impacts are described under Alternative A.

Conclusion - During the life of the plan, fox eradication on Tanaga, Great Sitkin, and Ugamak, the reintroduction of Aleutian Canada geese on Amchitka, and World War II military debris cleanup on Tanaga and Great Sitkin would benefit naturalness. Naturalness would decline on about 30 acres along the 30 miles of off road vehicle trails and at fishing sites on Atka Island. Other subsistence activities, seabird monitoring, and recreational use would have no impact on naturalness. There is less than a 22 percent chance that an oil spill would have a negative but unknown impact on naturalness on Aiktak, Ugamak, and Round islands at the south side of Unimak Pass and the Baby Islands and Round, Tanaskan Bay, Dushkot, Erskine Bay, and Kisselen Bay islets. Over the long term, the risk of an oil spill would continue for an additional 20 years, use of the off road vehicle trails and set net sites would be ongoing, and commercial fishing would have a negative impact on the natural abundance of seabirds and sea lions.

Outstanding opportunities for solitude - Activities which may impact solitude are management activities including seabird monitoring, fox eradication, and cleanup of World War II debris and recreational and subsistence use.

Seabird monitoring and fox eradication would utilize small crews for a short period of time and would not impact solitude as discussed under Alternative A. World War II debris cleanup on Tanaga and Great Sitkin would involve large crews and heavy equipment and would impact solitude for a summer as discussed in Alternative A.

Recreational use of the suitable areas would be 75 more use days than the 800 projected for the long term in Alternative A. This increase would be for day use on Amchitka and the Baby Islands. Total use on Amchitka would be 250 use days per year dispersed over 16,322 acres. Total use on the Baby Islands would be about 65 use days per year on about 250 acres. Assuming four people per boat this represents 16 parties which would probably be dispersed over the three month nesting season. It is extremely unlikely more than one boat of bird watchers would be in the area at the same time. Opportunities for solitude would remain outstanding. See Alternative A for additional analysis.

Subsistence use is not expected to increase above the 530 use days per year occurring now on the 105,468 acres where such use is believed to be occurring. Use is dispersed over this area and occurs at various times of year for fishing, hunting, berry collecting, trapping, and egg collecting. No use is known to occur on the remaining 20,634 acres. Solitude would remain outstanding on all suitable acres.

Conclusion - World War II debris cleanup on Tanaga and Great Sitkin would impact solitude during the summer that it occurs. Recreational use of 675 days per year in the long term and subsistence use of 530 days per year would not impact solitude on the 126,102 acres. Solitude would remain outstanding during the life of the plan and the long term.

Outstanding opportunities for primitive recreation - Management actions which have the potential to affect opportunities for primitive recreation are fox eradication, reintroduction of Aleutian Canada geese, an interpretive display in Unalaska, additional personnel

stationed on Amchitka, and World War II debris cleanup. Actions which may occur off the refuge with the potential to affect opportunities for primitive recreation are oil spills, commercial fishing, the road and oil terminal on Beaver Inlet, and increased availability of charter boats and cruise ships.

Fox eradication and the reintroduction of Aleutian Canada geese would lead to increases in geese and seabirds and thus bird watching opportunities as described in Alternative A. Cleanup of World War II debris would increase the primitive opportunities available on Great Sitkin and Tanaga. Pieces of equipment, fuel drums, and remnants of buildings would be removed restoring the primitive nature of the 200 acres which are affected.

Allowing construction of another radar site on the nonsuitable portion of Amchitka, would lead to 25 more people stationed on the island and would increase the number of people who could engage in recreational activities. Since Amchitka is closed to public access, recreational opportunities of the suitable areas can only be experienced by personnel on the island. The radar site itself would not affect recreational opportunities on the proposed area since it would not be located in or visible from the suitable area.

The interpretive display proposed for Unalaska would increase awareness of seabirds and the Baby Islands in particular. This would increase use of the Baby Islands for bird watching, photography, and sightseeing by 50 use days over the long term.

Should an oil spill or over fishing cause declines in seabird, sea otter, or sea lion populations as discussed for Alternative A, recreational opportunities would decline. Bird watching, marine mammal observation, and wildlife photography are some of the best opportunities for recreation on the suitable areas. These opportunities would be affected by loss of birds or sea lions.

Opportunities for primitive recreation would increase if a road is built along the projected oil pipeline from Unalaska to Beaver Inlet as discussed for Alternative A. Unalaska residents would have ready access to Beaver Inlet, and small boats and kayaks could be launched in the relatively protected waters of the inlet.

Increased tour ship and charter boat activity in the Aleutians would create additional bird watching, marine mammal observation, and photography opportunities. See the supporting analysis for Alternative A.

Conclusion - Opportunities for bird watching would increase on Amchitka as a result of reintroduction of Aleutian Canada geese and on Ugamak, Great Sitkin, and Tanaga as a result of fox eradication. Opportunities for recreational activities would increase on Amchitka as a result of additional military presence and on the Baby Islands as a result of increased publicity. There is less than a 22 percent chance that an oil spill at a vulnerable time of year would kill seabirds resulting in a loss of bird watching opportunities. Over the long term, increased fishing would lead to a decline in seabirds and sea lions and consequently a decline in bird watching, marine mammal observation, and wildlife photography opportunities. Opportunities would improve on the islets in Beaver Inlet if a road is built from Unalaska to the inlet. Opportunities for sightseeing, bird watching, and photography would increase as a result of increased tour and charter boat activity.

Special features - The special features of the suitable areas are the endangered Aleutian Canada goose, large populations of rock sandpiper, rock ptarmigan, and avian predators, archaeological sites, glaciers, active volcanic sites, sea lion rookeries, the historic site of Korovinski, large seabird colonies of more than 150,000 birds, unique seabird species such as whiskered auklets and ancient murrelets, and brown bear on Unimak.

Management actions which have a potential to affect these features are fox eradication and reintroduction of Aleutian Canada goose. Actions which would occur off the refuge with the potential to affect these features are oil spills and increased commercial fishing.

Elimination of fox on Tanaga, Ugamak, and Great Sitkin would benefit Aleutian Canada geese and seabirds, and goose reintroduction on Amchitka would benefit geese as discussed under

Alternative A. Impacts on seabirds from the forage fishery and the 22 percent chance of oil spills, and the impacts on sea lions from development of the forage fishery would be as discussed for Alternative A.

No management actions or off-refuge actions during the life of the plan or the long term would impact the archaeological sites, the historic site, the brown bear of Unimak, the glaciers and active volcanic sites of Atka, or the sandpipers, rock ptarmigan, and avian predators of Amchitka.

Conclusion - During the life of the plan, fox eradication would benefit the Aleutian Canada goose and ground and burrow nesting seabirds on Tanaga, Ugamak, and Great Sitkin islands. Reintroduction of Aleutian Canada geese to Amchitka would benefit the geese. There is less than a 22 percent chance that an oil spill would have a negative but unknown impact on seabirds on Aiktak, Ugamak, and Round islands at the south side of Unimak Pass and the Baby Islands and Round, Tanaskan Bay, Dushkot, Erskine Bay, and Kisselen Bay islets. Over the long term, the risk of an oil spill would continue for an additional 20 years, and commercial fishing would have a negative impact on the natural abundance of seabirds and sea lions.

Wildlife populations - Aleutian Islands Unit

Management actions would be to manage all the proposed areas as wilderness, eradicate fox, reintroduce Aleutian Canada geese, and monitor seabirds. These activities would not be affected by a wilderness designation. Oil spills and increased commercial fishing would still occur off the refuge as these are actions over which the Service has no control. No other activities would impact wildlife populations.

Wilderness management would protect the proposed areas against unforeseen development activities which may impact wildlife populations. No specific wilderness management actions are anticipated in the near future. Fox eradication would result in the complete elimination of arctic fox from Tanaga, Ugamak, and Great Sitkin. They are, however, an introduced species, and native species, including the endangered Aleutian Canada goose, could recolonize the islands once fox are eliminated. Aleutian Canada geese reintroductions on Amchitka would increase the population of this endangered species. Seabird monitoring on Aiktak would have no effect on seabird populations, but would increase knowledge of seabird population dynamics.

Impacts of oil spills on seabirds, sea otter, and waterfowl would be as discussed in Alternative A. Mortality could vary from zero to hundreds of thousands of birds and hundreds of otters depending on the time of year, type of hydrocarbons involved, tanker routes used, location of accident, currents, and weather conditions. There is about a 22 percent chance of an oil spill.

Over the long term, oil spills would continue to be a threat for an additional 20 years. Increased commercial fishing and the establishment of a forage fishery would impact the seabird, seal, and sea lion populations. They would decline as a result of decreased prey species, as discussed at greater length under naturalness.

Conclusion - During the life of the plan, fox eradication would increase the endangered Aleutian Canada goose and seabird populations on Great Sitkin, Ugamak, and Tanaga islands. Aleutian Canada goose reintroductions on Amchitka would benefit geese populations. Over the long term, wilderness management would protect against unforeseen development pressures which would impact wildlife. There is a 22 percent chance that oil spills would have a negative but unknown impact on seabird, waterfowl, and sea otter populations particularly in the Unalaska and Unimak Pass areas. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing for forage species would have a negative impact on seabird, seal, and sea lion populations.

Subsistence/Section 810 Evaluation and Findings - Aleutian Islands Unit

Evaluation - The minor impacts on subsistence resulting from implementing this alternative would be identical to Alternative A, except that subsistence users would not be able to use generators or other motorized tools

except chainsaws in the proposed wilderness areas (five percent of the unit). However, there is no known use of generators or motorized tools on any of the areas under consideration. Off road vehicles are also prohibited in wilderness areas although planes, boats, and snowmobiles are allowed. Off road vehicles are used in Atka on some of the area under consideration for wilderness. Most areas of off road vehicle use on Atka are Native lands or selected lands, unsuitable for wilderness designation. However, an area in the center of the island is used to access the west shore and loss of this opportunity would be a minor negative impact. The section 810 evaluation and findings for Alternative A apply to Alternative B as well.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

ALTERNATIVE C (PREFERRED ALTERNATIVE)
ALEUTIAN ISLANDS UNIT

Scenario for the Life of the Plan (10-15 years)

In this alternative, two percent of the unit would be in intensive management, two percent in moderate management, 35 percent would be in minimal management, 57 percent is existing designated wilderness, and four percent, 95,442 acres, would be proposed as additions to the existing Aleutian Islands Wilderness and Unimak Island Wilderness (Table 42).

This scenario assumes Congress approves the recommendation and designates these proposed areas as wilderness. Management of the wilderness areas would be subject to the provisions of the Wilderness Act as amended by the Alaska Lands Act. Wilderness management policy prohibits oil and gas leasing and oil and gas studies that utilize mechanized equipment unless performed by an Interior Department agency. It also prohibits the use of mechanized equipment in wilderness areas except for snowmachines, motorboats, and airplanes. Subsistence users may also use chainsaws. Commercial activities, except as they relate to providing a service to recreational users, are generally prohibited in wilderness.

As in Alternative A, this scenario assumes there would be no mining, no oil and gas studies or leasing on refuge lands in the unit, a 22 percent chance of oil and gas development offshore in the St. George basin, oil tanker traffic through Unimak Pass, and an on-shore loading facility at either Beaver Inlet on Unalaska or Akun Bay on Akun. Should oil be found, four spills are projected to occur either during off-shore loading, shipping, or on-shore loading. Assumptions regarding increases in commercial fishing apply here as well. Management actions described for fish and wildlife management and air and water quality monitoring would also take place in this alternative. The scenario for Alternative A applies to this alternative as well. As in Alternative B, more intensive seabird monitoring would occur on three of the sites specified in Alternative A. Fishery management activities would emphasize active participation in management bodies responsible for marine forage fish management. As in Alternative B, baseline studies to determine ways to provide improved sport fishing on Attu, Shemya, and Amchitka islands would be explored. The Service would also initiate studies to monitor fishery/seabird interactions.

Interpretive displays would be developed for military installations on Attu and Shemya islands in addition to the display developed for Unalaska as in Alternative B. The refuge outdoor recreation planner would visit Attu, Shemya, and Unalaska periodically to present programs on refuge resources.

The displays and visits by the recreation planner would stimulate interest in the refuge and lead to increased recreational use on Attu, Shemya, and Unalaska. Total recreational use on the suitable islands surrounding Unalaska would be 105 use days by the end of the planning period. Designation of an additional 95,442 acres as wilderness would not lead to an increase in visitor use. All the areas proposed for designation are within the existing Aleutian Island or Unimak Island wildernesses.

Additional radar facilities would be developed on Adak. As in Alternative B, an additional 26,266 acres on Amchitka would be designated for intensive management to allow for development of an additional radar site. Twenty-five employees would be added on Amchitka to operate the extra radar site. The total stationed at Amchitka under this alternative would be 250. The new people would contribute an additional 250 recreational use days to the island as a whole and 25 days to the area proposed for wilderness designation. Total recreational use would be 2,500 on the island as a whole and 250 on the proposed area.

Scenario for Long Term (more that 15 years) Wilderness Impacts

In Alternative C, proposed additions to the existing wilderness areas would be designated wilderness. As in the short term scenario, oil and gas leasing and studies, commercial uses other than recreation related, and the use of mechanized equipment would be limited on the proposed and existing wilderness areas.

As in the scenario for the life of the plan, the interpretive display and visits by the recreational planner to Unalaska, would increase recreational use of the islands around Unalaska an additional 75 use days per year. As a result of the increased staff on Amchitka, recreational use of the proposed area would increase an additional 25 use days per year. Total long term recreational use of all the proposed areas would be 900 days per year. As in the short range scenario, wilderness designation would not affect the amount of visitor use. Tour boat use would increase to five per year as in Alternative A.

This scenario is similar to the long term scenario for Alternative A in that oil and gas leasing and studies and mining would not occur on the proposed areas, and a forage fishery would be established and fully exploited. Also as in A, a 22 percent chance of oil production from the St. George basin, of use of the shore-based shipping facility at Unalaska or Akun, and of shipping through Unimak Pass would continue for another 20 years. Subsistence use is estimated at 530 use days for the proposed areas as discussed for Alternative A.

Biological Impacts for Alternative C - Aleutian Islands Unit

Fish - Impacts of commercial fishing on refuge resources would remain minor as described in Alternative A.

Seabirds - Seabird management would receive a moderate to major benefit from additional monitoring work and the expanded studies of seabird/prey interactions. This alternative calls for both additional staffing and funding for these purposes. The discussion in Alternative A further explains the value of these types of studies.

Marine mammals - Because they also depend on certain species of forage fish, management of marine mammals would be benefited by increased information about the prey base. Other impacts would be as described in Alternative A.

Waterfowl - The impacts would be the same as Alternative A.

Shorebirds - The impacts would be the same as Alternative A.

Terrestrial birds and mammals - The impacts on terrestrial birds and mammals are identical to those described for Alternative A.

Endangered species - The impacts would be the same as Alternative A.

Water quality and quantity - The impacts of this alternative on water quality and quantity would be the same as described for Alternative A.

Socioeconomic Impacts of Alternative C - Aleutian Islands Unit

Cultural resources - The impact of this alternative on cultural resources would be negligible; see the discussion for Alternative A.

Population - This alternative would not affect the population of area communities; see the discussion for Alternative A.

Economy - The negligible impacts on the economy are similar to those described for Alternative A with the addition of two biological technicians to the Adak refuge

Beaver Bay on Atka Island is already in designated wilderness. The north end of Atka is proposed for wilderness designation in Alternative C.

staff. This would have a negligible effect on the Adak economy. Wilderness designation would not affect the ability of Atka residents to develop the geothermal field as discussed in Alternative B.

Recreation - The interpretive displays and recreation planner presentations would have a major benefit on interpretive opportunities. Interest would be stimulated in seabirds and refuge lands among military personnel, Unalaska residents, and visiting commercial fishers. This may lead to increased visits to the refuge on Attu, Shemya, and the Baby Islands and Egg Island which are the most spectacular bird colonies near Unalaska.

Impacts of the Wilderness Proposal for Alternative C - Aleutian Islands Unit

In Alternative C, four percent of the unit, 95,442 acres, would be proposed as additions or boundary adjustments to the existing Aleutian Islands Wilderness and Unimak Island Wilderness (Table 43). Designation would require the approval of Congress. If Congress designated the areas as wilderness, they would be managed like the existing wilderness according to the provisions of the Wilderness Act of 1964 as amended by the Alaska Lands Act.

Suitable Areas Proposed for Wilderness

The impacts of the designation are evaluated for the proposed areas: portions of Amchitka, Tanaga, Great Sitkin, Ogliuga, Atka, Ugamak, and Unimak islands. All of these islands contain existing wilderness. The suitable areas would be a boundary adjustment to the existing wilderness. See Table 44 for a summary of nonsuitable, suitable, and wilderness acres on these islands. The entirety of Egg (near Atka), the Babies, Wislow, Round, Tanaskan Bay, Dushkot, Erskine Bay, Kisselen Bay, Peter, Aiktak, and Round (near Ugamak) islands are also proposed. These areas would be an addition to the existing Aleutian Islands Wilderness. The impacts are evaluated for the two significant wilderness issues: impacts on wilderness values and impacts on wildlife populations.

Wilderness values - Aleutian Islands Unit

Naturalness - Management actions on the proposed areas which have the potential to impact naturalness are fox eradication, the continued reintroduction of Aleutian Canada geese on Amchitka, seabird monitoring on Aiktak, and military debris cleanup. Recreational and subsistence use, including the continued use of off road vehicle trails on Atka, may also affect naturalness. Actions occurring off the refuge which may affect naturalness include oil spills and commercial fishing.

Eradication of fox for the benefit of Aleutian Canada geese and seabird diversity and populations would occur on Tanaga, Ugamak, and Great Sitkin islands under this alternative as well. Wilderness designation does not affect the Service's ability to eradicate introduced species. Reintroduction of Aleutian Canada geese would also occur as wilderness designation does not affect the Service's ability to reintroduce native species. Naturalness would benefit (see Alternative A for supporting analysis).

Seabird monitoring would occur after wilderness designation. The use of temporary camps in the support of monitoring would have no impact on naturalness as discussed for Alternative A. World War II military debris cleanup on Tanaga and Great Sitkin would occur in this alternative

as well. Wilderness designation would not prevent cleanups of this type. Naturalness would benefit as described for Alternative A. Subsistence use would be 230 days per year. Most of the use on Atka would take place on the area which is not proposed for wilderness. No off road vehicle trails would be included within the proposed areas. Nothing is known about the location or condition of salmon set net or temporary camp sites on Atka. Probably one or maybe two fishing sites in the proposed area are used every year, in which case an area of less than one acre may show some "wear" and damage to vegetation. Subsistence use on the other suitable areas would total 30 use days and impacts would be the same as described in Alternative A.

The increase in recreational use for this alternative is 75 days beyond the 800 per year projected for Alternative A. This includes a 25 day decrease on Atka Island because not all of it is proposed. The 100 additional days would be for dispersed day use activities such as fishing and hiking on Amchitka and sightseeing, photography, and bird watching, mainly from boats, on the proposed islands surrounding Unalaska, principally the Baby Islands. This increase in use spread over the 16,775 acres of Amchitka and the Unalaska islets would have no impact on naturalness. Impacts would be as discussed for Alternative A.

The 22 percent chance of oil spills and the establishment of a forage fishery would occur under this alternative as well, as these are actions over which the Service has no control. These impacts are described under Alternative A.

Conclusion - During the life of the plan, fox eradication on Tanaga, Great Sitkin, and Ugamak, the reintroduction of Aleutian Canada geese on Amchitka, and World War II military debris cleanup on Tanaga and Great Sitkin would benefit naturalness. Naturalness would decline on less than one acre at set net sites on Atka Island. Other subsistence activities, seabird monitoring, and recreational use would have no impact on naturalness. There is less than a 22 percent chance that an oil spill would have a negative but unknown impact on naturalness on Aiktak, Ugamak, and Round islands at the south side of Unimak Pass and the Baby Islands and Round, Tanaskan Bay, Dushkot, Erskine Bay, and Kisselen Bay islets. Over the long term, the risk of an oil spill would continue for an additional 20 years, use of the off road vehicle trails and set net sites would be ongoing, and commercial fishing would have a negative impact on the natural abundance of seabirds and sea lions.

Outstanding opportunities for solitude - Activities which may impact solitude are management activities including seabird monitoring, fox eradication, and cleanup of World War II debris and recreational and subsistence use.

Seabird monitoring and fox eradication would utilize small crews for a short period of time and would not impact solitude as discussed under Alternative A. World War II debris cleanup on Tanaga and Great Sitkin would involve large crews and heavy equipment and would impact solitude for a summer as discussed in Alternative A.

Recreational use of the suitable areas would be 75 more use days than the 800 projected for the long term in Alternative A. This represents an increase of 25 on Amchitka, 75 on the islets around Unalaska, and a decrease of 25 on Atka since not all of the Atka suitable area is proposed. The increase would be for day use on Amchitka and the islets surrounding Unalaska. Total use on Amchitka would be 250 use days per year dispersed over 16,322 acres. Total use on the islets would be about 105 use days per year. This would take place on about 453 acres on more than 15 islets in four different locations. Assuming four people per boat this represents 26 parties which would probably be distributed over the three month nesting season. It is extremely unlikely more than one boat would be in the same area at the same time. Opportunities for solitude would remain outstanding. See Alternative A for additional analysis.

Subsistence use is not expected to increase above the 230 use days per year occurring now on the 75,039 proposed acres where such use is believed to be occurring. Use is dispersed over this area and occurs at various times of year for fishing, hunting, berry collecting, trapping, and egg collecting. No use is known to occur on the remaining 20,403 acres.

Solitude would remain outstanding on all suitable acres.

Conclusion - World War II debris cleanup on Tanaga and Great Sitkin would impact solitude during the summer that it occurs. Recreational use of 980 days per year in the long term and subsistence use of 230 days per year would not impact solitude on the 95,442 acres. Solitude would remain outstanding during the life of the plan and the long term.

Outstanding opportunities for primitive recreation - Management actions which have the potential to affect opportunities for primitive recreation are fox eradication, reintroduction of Aleutian Canada geese, an interpretive display and outdoor recreation planner visits in Unalaska, additional personnel stationed on Amchitka, and World War II debris cleanup. Actions which may occur off the refuge with the potential to affect opportunities for primitive recreation are oil spills, commercial fishing, the road and oil terminal on Beaver Inlet, and increased availability of charter boats and cruise ships.

Fox eradication and the reintroduction of Aleutian Canada geese would lead to increases in geese and seabirds and thus bird watching opportunities as described in Alternative A. Cleanup of World War II debris would increase the primitive opportunities available on Great Sitkin and Tanaga. Pieces of equipment, fuel drums, and remnants of buildings would be removed restoring the primitive nature of the 200 acres which are affected.

Allowing construction of another radar site which would lead to 25 more people stationed on Amchitka would increase the number of people who could engage in recreational activities. Since Amchitka is closed to public access, recreational opportunities of the suitable areas can only be experienced by personnel on the island. The radar site itself would not affect recreational opportunities on the proposed area since it would not be located in, or visible from, the suitable area.

The interpretive display and recreation planner programs proposed for Unalaska would increase awareness of seabirds and islets surrounding Unalaska, the Baby Islands in particular. This would increase use of the islets for bird watching, photography, and sightseeing by 75 use days over the long term.

Should an oil spill or over-fishing cause declines in seabird, sea otter, or sea lion populations as discussed for Alternative A, recreational opportunities would decline. Bird watching, marine mammal observation, and wildlife photography are some of the best opportunities for recreation on the suitable areas. These opportunities would be affected by the loss of birds or marine mammals.

Opportunities for primitive recreation would increase if a road is built along the projected oil pipeline from Unalaska to Beaver Inlet as discussed for Alternative A. Unalaska residents would have ready access to Beaver Inlet, and small boats and kayaks could be launched in the relatively protected waters of the inlet.

Increased tour ship and charter boat activity in the Aleutians would create additional bird watching, marine mammal observation, and photography opportunities. See the supporting analysis for Alternative A.

Conclusion - Opportunities for bird watching would increase on Amchitka as a result of reintroduction of Aleutian Canada geese and on Ugamak, Great Sitkin, and Tanaga as a result of fox eradication. Opportunities for recreational activities would increase on Amchitka as a result of additional military presence and on the Baby Islands as a result of increased publicity. There is less than a 22 percent chance that an oil spill at a vulnerable time of year would kill seabirds resulting in a loss of bird watching opportunities. Over the long term, increased fishing would lead to a decline in seabirds and sea lions and consequently a decline in bird watching, marine mammal observation, and wildlife photography opportunities. Opportunities would improve on the islets in Beaver Inlet if a road is built from Unalaska to the inlet. Opportunities for sightseeing, bird watching, and photography would increase as a result of increased tour and charter boat activity.

Special features - The special features of the suitable areas are the endangered Aleutian Canada goose, large populations of rock

sandpiper, rock ptarmigan, and avian predators, archaeological sites, glaciers, active volcanic sites, sea lion rookeries, large seabird colonies of more than 150,000 birds, unique seabird species such as whiskered auklets and ancient murrelets, and brown bear on Unimak.

Management actions which have a potential to affect these features are fox eradication and reintroduction of the Aleutian Canada goose. Actions which would occur off the refuge with the potential to affect these features are oil spills and increased commercial fishing.

Elimination of fox on Tanaga, Ugamak, and Great Sitkin would benefit Aleutian Canada geese and seabirds, and goose reintroduction on Amchitka would benefit geese as discussed under Alternative A. Impacts on seabirds from the forage fishery and the 22 percent chance of oil spills, and the impacts on sea lions from development of the forage fishery would be as discussed for Alternative A.

No management actions or off-refuge actions during the life of the plan or the long term would impact the archaeological sites, the brown bear of Unimak, the glaciers and active volcanic sites of Atka, or the sandpipers, rock ptarmigan, and avian predators of Amchitka.

Conclusion - During the life of the plan, fox eradication would benefit the Aleutian Canada goose and ground and burrow nesting seabirds on Tanaga, Ugamak, and Great Sitkin islands. Reintroduction of Aleutian Canada geese to Amchitka would benefit the geese. There is less than a 22 percent chance that an oil spill would have a negative but unknown impact on seabirds on Aiktak, Ugamak, and Round islands at the south side of Unimak Pass and the Baby Islands and Round, Tanaskan Bay, Dushkot, Erskine Bay, and Kisselen Bay islets. Over the long term, the risk of an oil spill would continue for an additional 20 years, and commercial fishing would have a negative impact on the natural abundance of seabirds and sea lions.

Wildlife populations - Aleutian Islands Unit

Management actions would be to manage all the proposed areas as wilderness, eradicate fox, reintroduce Aleutian Canada geese, and monitor seabirds. These activities would not be affected by a wilderness designation. Oil spills and increased commercial fishing would still occur off the refuge as these are actions over which the Service has no control. No other activities would impact wildlife populations.

Wilderness management would protect the proposed areas against unforeseen development activities which may impact wildlife populations. No specific wilderness management actions are anticipated in the near future. Fox eradication would result in the complete elimination of arctic fox from Tanaga, Ugamak, and Great Sitkin. They are, however, an introduced species, and native species, including the endangered Aleutian Canada goose, could recolonize the islands once fox are eliminated. Aleutian Canada geese reintroductions on Amchitka would increase the population of this endangered species. Seabird monitoring on Aiktak would have no effect on seabird populations, but would increase knowledge of seabird population dynamics.

Impacts of oil spills on seabirds, waterfowl, and sea otters would be as discussed in Alternative A. Mortality could vary from zero to hundreds of thousands of birds and hundreds of sea otters depending on the time of year, type of hydrocarbons involved, tanker routes used, location of accident, currents, and weather conditions. There is about a 22 percent chance of an oil spill.

Over the long term, oil spills would continue to be a threat for an additional 20 years. Increased commercial fishing and the establishment of a forage fishery would impact the seabird and sea lion populations. Seabirds and sea lions would decline as a result of decreased prey species, as discussed at greater length under naturalness.

Conclusion - During the life of the plan, fox eradication would increase the endangered Aleutian Canada goose and seabird populations on Great Sitkin, Ugamak, and Tanaga Islands. Aleutian Canada goose reintroductions on Amchitka would benefit geese populations. Over the long term, wilderness designation would protect against unforeseen development pressures which would impact wildlife. There is a 22 percent chance that oil spills would have a

negative but unknown impact on seabird, waterfowl, and sea otter populations particularly in the Unalaska and Unimak Pass areas. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing for forage species would have a negative impact on seabird and sea lion populations.

Suitable Areas Not Proposed for Wilderness

Impacts of nondesignation are evaluated for the one suitable area which would not be proposed: 30,660 acres on Atka Island.

Wilderness values - Aleutian Islands Unit

Naturalness - There are no management actions on the Atka parcel which have the potential to impact naturalness. Recreational and subsistence use, including the continued use of off road vehicle trails, may also affect naturalness. Actions occurring off the refuge which may affect naturalness include oil spills and commercial fishing.

Continued use of off road vehicles on the 30 miles of trails in the suitable areas on Atka Island would impact naturalness in the immediate area. Probably only the narrow track appears unnatural now, but it may expand in places to widths of 10 feet or more with continued use. The affected area probably covers no more than 30 acres. The trails are used for access to subsistence areas. Since the total subsistence use thought to be occurring on this parcel is 300 use days per year, and some of this is from boats, no more than one trip a month is probably made on the spur trails and one or two a week on the main trail. Subsistence use on Atka may also involve fishing sites for salmon and possibly temporary camps. Nothing is known about the location or condition of these sites. Probably one or maybe two fishing sites in the nonwilderness parcel are used every year, in which case an area of less than one acre may show some "wear" and damage to vegetation. Overall naturalness would not be affected.

Recreational use of the parcel has never been determined but is estimated at 25 use days per year and is not expected to increase. This use is dispersed over 30,660 acres. This use would not involve the establishment of permanent camps, trails, or areas of concentration. Naturalness would not be affected by recreational use during the life of the plan or the long term.

Oil spills and forage fisheries do not have an impact on the nonwilderness portions of Atka. Atka is not located in a high risk area for oil spills. The nonwilderness area also does not have sea lion rookeries or significant bird colonies.

Conclusion - Naturalness would continue to deteriorate on about 30 miles of off road vehicle trails. The total affected area would never be more than 50 acres.

Outstanding opportunities for solitude - Activities which may impact solitude are recreational and subsistence use. No management actions are proposed for the parcel.

Recreational use of the suitable areas would be 25 use days per year dispersed over 30,660 acres. Subsistence use would be 300 use days. Subsistence use is not expected to increase although recreational use would increase by 10 percent. This level of use would not impact opportunities for solitude.

Conclusion - No management actions would impact opportunities for solitude on the Atka parcel. Recreational use of 25 days per year in the long term and subsistence use of 300 days per year would not impact solitude on the 30,660 acres. Solitude would remain outstanding during the life of the plan and the long term.

Outstanding opportunities for primitive recreation - Principal recreation opportunities on the nonwilderness parcels are hunting, fishing, hiking, camping, and beachcombing. Nothing in the short or long range scenario would impact those opportunities. Opportunities remain outstanding.

Conclusion - Opportunities for primitive recreation would remain outstanding during the life of the plan and the long term.

Special features - The only special feature on this area is the historic site of Korovinski; no management actions or other activities would be anticipated to affect it.

Conclusion - No management activities are proposed which would affect Korovinski, the only special feature.

Wildlife populations - Aleutian Islands Unit

There are no management activities or expected actions which would affect wildlife populations on the Atka parcel. Fifty-two bird species have been identified on Atka, but there are no large seabird colonies in the nonwilderness parcels. Shorebirds, wintering waterfowl, bald eagle, and song sparrows occur in this area. Introduced fox are not scheduled for eradication on this island.

Conclusion - There are no management activities or expected actions which would affect wildlife populations on this parcel. The lack of a wilderness designation would have no effect.

Subsistence/Section 810 Evaluation and Findings - Aleutian Islands Unit

Evaluation - The minor impacts on subsistence resulting from implementing this alternative would be identical to Alternative A, except that subsistence users would not be able to use generators or other motorized tools except chainsaws in proposed wilderness areas (four percent of the unit). However, there is no known use of motorized tools in the areas under consideration. The off road vehicle trails on Atka have been deleted from the proposed wilderness area. The section 810 evaluation and findings for Alternative A apply to Alternative C as well.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

Table 45. Summary of management category designations by alternative for the Alaska Peninsula Unit.

Management Category	Alternative A % of Unit	A % of Refuge	B % of Unit	B % of Refuge	C % of Unit	C % of Refuge
Intensive	0%	0%	0%	0%	1%	1%
Moderate	0%	0%	0%	0%	0%	0%
Minimal	45%	7%	44%	6%	44%	6%
Existing	55%	8%	55%	8%	55%	8%
Proposed	0%	0%	1%*	1%*	1%	1%

Note: These percentages are approximate and include all selected lands, tidelands, and submerged lands, and waters. Refuge wide percentages do not include Unimak Island (932,484 acres - 19% of refuge) which is proposed for transfer to Izembek Refuge.

* 100% of suitable wilderness area

ALTERNATIVE A (CURRENT SITUATION)

Scenario for the Life of the Plan (10-15 years)

In this alternative, the unit would be managed as it currently is. Forty-five percent of the unit is in minimal management, and 55 percent is already designated wilderness - seven percent islands and 48 percent Service managed waters and tidelands surrounding Simeonof Island and submerged lands surrounding the Semidi Islands. No additional wilderness is proposed in this alternative (Table 45).

Oil and gas leasing would not be permitted on refuge lands in this unit. This scenario also assumes that no oil and gas leasing would take place on adjacent land or water. The Outer Continental Shelf Shumagin Planning Area is estimated to have undiscovered recoverable oil reserves of just 0.05 billion barrels, and gas reserves of 1.42 trillion cubic feet. Sale 86 was canceled in February 1986 due to lack of industry interest. Sale 129 is scheduled for February 1991, but this scenario assumes that, too, would be canceled. Although various types of geological and geophysical studies may be permitted on the nonwilderness portion of the refuge and nonmechanized studies on the wilderness portion, none are expected due to the low potential.

This scenario assumes that sufficient quantities of oil or gas are discovered in the North Aleutian Basin, Bristol Bay and the north side of the Alaska Peninsula, to warrant construction of a pipeline across the peninsula between Herendeen Bay and Balboa Bay, and an oil shipping facility in Balboa Bay. This would result in tanker traffic among islands south of the Alaska Peninsula. The chance of finding oil in commercial quantities in the North Aleutian Basin is 20 percent. Should oil be discovered, the probability of one or more spills of at least 1,000 barrels in port or the Gulf of Alaska is about 23 percent. The combined probability of first finding oil and then having a spill is about five percent. This pipeline would not be built until the last few years of the planning period, because oil has not yet been discovered and the average time from discovery to production is usually 10 years. Presently only small tankers occasionally ply these waters bringing fuel to Sand Point, King Cove, and Cold Bay.

No mining would occur on the refuge since there are no claims, and the refuge is closed to further claim activity.

Commercial fishing for salmon and other important finfish, such as herring, sablefish, and halibut, would continue at high levels as long as commercial quantities are available. Harvest of lesser important species such as Pacific Ocean perch, sandlance, and capelin would remain near current low levels. Major commercial shellfish fisheries for tanner, dungeness, and king crab, scallops, and shrimp would continue at current high levels as long as commercial quantities are available. Fishing

for species of lesser commercial importance such as octopus, sea urchins, razor clams, and hard-shell clams would be expected to double as new markets develop. These expanded fisheries would employ less than 25 people and increase the current fleet by less than 10 boats. Processing would occur at currently available facilities. Fishery management activities would emphasize active participation in management bodies responsible for marine forage fish management.

The two percent annual rate of increase of Peninsula area communities during the 1970s would not be maintained. However, the communities would continue to grow, particularly Sand Point. Sand Point's population, which was 870 in 1984, would probably increase to over 1,000 by the end of the planning period. Subsistence use would increase about 10 to 15 percent as the population grows. No studies have been done concerning how much subsistence use occurs on refuge lands. For the purposes of analysis, subsistence use of refuge lands is assumed to be less than 200 use days per year because of the remote nature of the islands. Subsistence use of the 16 areas under consideration for wilderness (Table 46) is probably less than 10 days per year.

No studies have been done of recreational use in the unit, but it is thought to be very minor, perhaps 200 visitor use days per year. This may double during the life of the plan to about 400 use days. Most use would occur in the Shumagin Islands near Sand Point and would be by local residents and commercial fishers. However, by the end of the planning period, adventure cruise ships and guided bird watching trips would visit the Semidis and Shumagins at least once a year. A few groups of sea kayakers and backpackers would also visit every year. Recreational use of the 16 areas suitable for wilderness designation (Table 46) is estimated at less than 10 use days per year and is expected to increase to 25 by the end of the planning period. Most of these areas are small islands which are difficult to land on.

Sanak Islands and Sandman Reefs - Introduced foxes would be eradicated from Inikla and Elma islands. An experimental study involving removal of introduced voles on Inikla, Gunboat, Ulma, Elma, and Mary islands would be conducted. Seabird monitoring and puffin food habits studies would be done every three to five years on Midun Island. An aerial survey of sea otters would be conducted every three to five years in the Sandman Reefs, unless done by another agency or contract.

U.S. Army World War II debris on Caton Island would be cleaned up within the first five years of the planning period.

Pavlof Islands - Introduced foxes would be eradicated from Ukolnoi, Poperechnoi, and Outer Iliasik islands.

Shumagin Islands - The current fox removal program on Big Koniuji would be completed. Introduced foxes would also be eradicated from Little Koniuji, Chernabura, and Simeonof islands. Introduced voles would be eradicated on Henderson Island. Seabird monitoring and puffin food habits studies would be conducted every three to five years on Egg Island. On Big Koniuji Island population plots for crested auklets at Yukon Harbor would be monitored every two to three years. Kittiwakes and gulls would be censused on nearby Hall Island when work is done on Big Koniuji. A reconnaissance survey of Nagai Island would be conducted during the first five years of the planning period. Adult and pup sea lions would be censused every two to three years in conjunction with other Service monitoring in the vicinity of Atkins Island.

Islands and capes associated with the Alaska Peninsula - Seal Cape would be proposed for transfer to the Alaska Peninsula Refuge. Ground squirrels would be eradicated from Kak Island in the Chignik area.

Semidi Islands - Puffins, fulmars, and other species would be monitored every two to three years on Chowiet Island and its surrounding islets. Adult and pup sea lions would be censused at the same time. An aerial survey of sea otters would be conducted every three to five years in the waters around the Semidi Islands.

Scenario for Long Term (more that 15 years) Wilderness Impacts

The long term scenario is used only for analyzing the long term impacts of the

wilderness proposal, in this case, no wilderness, on the 16 areas suitable for wilderness. This scenario only includes activities which would affect the 9,549 suitable acres (Table 46).

Oil and gas development would not occur in the Shumagin Basin because the potential is too low (see the affected environment). The oil terminal at Balboa Bay would continue to operate for another 20 years before the resource would be exhausted. Oil and gas leasing and studies would not occur on the refuge since the potential is too low. Fishery resources would be fully exploited with little room for additional expansion.

Sand Point is expected to increase 48 percent to 1,294 residents, King Cove by 41 percent to 965 residents, and Perryville by 19 percent to 132 residents by the year 2000 (see the affected environment). These figures were based on growth rates from the boom years of the 1970's and are probably too optimistic. However, under any scenario Sand Point and King Cove would grow substantially. The Chigniks would also grow but at a lesser rate. Numerous cabins and several lodges would be built on private lands along the south side of the peninsula and on private islands. Subsistence use of the islands and capes under consideration would increase about 50 percent to 15 use days per year. Recreational use of the suitable areas would increase to about 50 use days per year. More adventure cruise ships, at least a few a year carrying a total of 300 people, would visit the Shumagin Islands. Some of these ships would cruise by Karpa Island but none would land on the island.

Biological Impacts for Alternative A - Alaska Peninsula Unit

Fish - The forage fish prey base would be affected to an unknown extent by the anticipated marked expansion of breeding seabirds following elimination of fox on refuge islands in the Shumagin, Pavlof, and Sanak island groups. In 1986 research on puffin diets commenced in the Semidi Islands, Egg Island (Shumagins), Midun (Sandman Reefs), and at Aiktak Island in the eastern Aleutians. Primary utilization of fish varied considerably between these sites. Pollock were mainly used at Aiktak and Midun. Capelin and sandlance were the chief prey for puffins in the Shumagins and Semidis respectively (Hatch 1987). These investigations are continuing, and when results are integrated with commercial harvest data, a better understanding of the population dynamics of these birds with regard to prey availability should emerge.

Seabirds - Tanker traffic from a pipeline terminal at Balboa Bay, north of Unga Island, could affect marine birds and mammals in the Shumagin and Pavlof islands, and possibly even in the Sandman Reefs. Shipping would cause inevitable small oil spills and possibly a catastrophic accident at the worst possible time, the summer breeding period. Local impacts would depend greatly on factors such as timing of pollution incidents, type of hydrocarbons involved, tanker routes used, location of accident, currents, and weather conditions. Depending on whether possible future tankers proceed east or west once in Unga Strait, several important colonies are in jeopardy. The 20,000 puffins, kittiwakes, and other birds at Round Island south of Balboa Bay would face the most immediate threat. The largest black-legged kittiwake colony (55,000 birds) in the Shumagins occurs along cliffs near Delarof Harbor on the east side of Unga, and an additional 13,000 kittiwakes plus thousands of murres and cormorants nest at Bay Point on the west side of Unga (Sowls et al. 1978). The most vulnerable and important colony possibly threatened by a tanker accident would be Karpa Island, site of the largest murre (220,000 birds) colony in the region (Bailey 1978). When unknown but large numbers of nocturnal ancient murrelets are included along with thousands of puffins and gulls, over 300,000 seabirds may nest on 600 acre Karpa Island, making it one of the two most vital seabird islands in the Shumagins. If loaded tankers travel eastward from Unga Strait, they would also pass north of Castle Rock, the largest and most diverse seabird colony south of the Alaska Peninsula and west of the Semidis. The easternmost nesting population of crested auklets in North America at Big Koniuji Island and the Shumagin Islands' largest sea lion rookery at Atkins Island, would be endangered by a major spill, depending primarily on wind direction.

Northwest winds at the time of a major accident, a frequent meteorological pattern during the breeding season, could devastate colonies from Unga to Atkins islands. Castle Rock alone has an estimated 271,000 nesting seabirds comprised of 15 species. If an accident occurred off the Kupreanof Peninsula during a period of southwest winds, oil would move into the Chiachi Islands and to Spitz Island, the nesting location for some 230,000 murres, kittiwakes, and puffins (Sowls et al. 1978) plus numerous nocturnal ancient murrelets and storm-petrels (Bailey and Faust 1981). If laden tankers sailed westward through Unga Strait, the Sandman Reefs with well over a million seabirds, primarily nocturnals, and thousands of sea otters could be affected by a major accident. Impacts from a major oil spill could be moderate to major for numerous species of seabirds. Minor impacts could result from small spills from fishing boats and freighters.

It is not known whether human competition for forage fish is having deleterious effects on any species of seabirds since no long-term population data exist for marine birds south of the Alaska Peninsula. However, some inexplicable severe population declines have been observed during the past decade. For example, horned puffins at Big Koniuji Island have plummeted from an estimated 30,000 in 1976 (Moe and Day 1977) to less than 5,000, 10 years later (Bailey 1985). Similarly, tufted puffins have declined at Bird Island (Bailey and McCargo 1984). Although these decreases may partially be attributed to heavy predation by introduced red fox, arctic fox on Bird Island, and food depletion due to meteorological and/or oceanographic factors, competition with commercial fisheries may also be involved. Major changes in fish stocks occurred 50 years ago in the Shumagins when a major herring fishery collapsed; impacts on seabirds of that event are unknown, but declines of bird populations in similar cases elsewhere suggest they were probably severe. Fishing pressure on walleye pollock is very heavy, and a future fishery for capelin or sandlance is possible. For a discussion of the interrelationships between seabirds and commercial fishing see the Off-Refuge Environment section of the Affected Environment chapter.

Eliminating introduced fox from Ukolnoi, Poperechnoi, and Outer Iliasik islands in the Pavlof Islands; Little Koniuji, Chernabura, and Simeonof in the Shumagins; and Inikla and Elma islands in the Sanak Islands would result in major increases in numbers of fossorial, crevice-nesting, and surface-nesting seabirds on these islands.

No records or descriptions are known regarding the numbers and species of seabirds, waterfowl, shorebirds and other avifauna nesting in the Pavlofs prior to the onset of fur farming. However, since huge concentrations of colonial nesting seabirds occur on fox-free islands in the Shumagins to the east and in the Sandman Reefs to the south, the outer Pavlofs probably can support large colonies also. Poperechnoi, with its lush slopes rising abruptly to 1,800 feet, appears to constitute superb habitat for tufted puffins, storm-petrels, ancient murrelets, glaucous-winged gulls, and perhaps other seabirds. Elimination of alien red fox from this island should result in recolonization. Because of this island's physiographic similarity with nearby Amagat, where over 100,000 puffins nest, Poperechnoi has the potential to become one of the better seabird islands in this region. On Nizki and Alaid Islands in the western Aleutians a dozen species of seabirds increased in abundance over 500 percent in only seven years after the removal of fox (Zeillemaker and Trapp 1986). On some islands in the eastern Aleutians, such as Kaligagan where Murie (1959) recorded a severe decline of puffins because of fox in the 1930's, nearly 100,000 are again present since the disappearance of fox (Nysewander et al. 1982). Many similar recoveries following the extirpation of introduced fox on islands have been recorded, though quantification is difficult because early population accounts were not quantitative.

Some increases in puffins, gulls, oystercatchers, and other seabirds and shorebirds can be expected to follow the elimination of fox on Ukolnoi and Outer Iliasik islands, but much of the uplands of Ukolnoi Island are covered with alders and are not suitable nesting habitat for seabirds. Since the soil and vegetation on Outer Iliasik Island

appear somewhat impoverished, the island probably would not support many burrowing seabirds. Removal of fox there would most benefit oystercatchers and gulls.

Formerly the Sanak Islands were utilized by enormous colonies of nocturnal seabirds, primarily Leach's storm-petrels, Cassin's auklets, and ancient murrelets, but they were virtually eliminated after practically all the islands were stocked with arctic fox in the 1920s (Murie 1959). Fox persist on seven of these islands, but because of partial ownership by Natives and trespass cattle on five of the islands, the refuge would eradicate fox on only Inikla and Elma islands. These low, relatively flat areas would almost certainly witness rapid recolonization by gulls from surrounding islands devoid of fox, followed by a probable slow reoccupation by storm-petrels and ancient murrelets.

Gulls are already recolonizing both Bird and Big Koniuji islands, only a year or two after the apparent elimination of fox, and crested auklet numbers seem higher on Big Koniuji Island. Simeonof and Little Koniuji islands also should experience recolonization by mew and glaucous-winged gulls and terns. A relict arctic tern colony is present on the tiny adjoining Murie Islets, and they can be expected to spread to Simeonof and Little Koniuji as soon as they are free of fox.

Experimental attempts would be made to eliminate all introduced voles on Inikla, Gunboat, Umla, Elma, and Mary islands in the Sanak Islands in order to restore insular vegetation and nesting habitat for fossorial seabirds. All of these small islands are completely in federal ownership and free of cattle. Voles, ground squirrels, and other small rodents prey directly on the eggs and chicks of some species of seabirds besides denuding portions of islands and causing erosion. For example, 20 percent of parakeet auklet chicks in plots studied on St. Lawrence Island were killed by voles (Sealy 1982), and 44 percent of Xantus murrelets' eggs and chicks on Santa Barbara Island off California were preyed on by deer mice (Murray et al. 1983).

Following successful elimination of voles from the Sanak Islands and Henderson Island and squirrels from Kak Island, umbellifer and grass habitat preferred by several seabird species for nesting would recover, resulting in recolonization of such islands chiefly by nocturnal seabirds. Nesting storm-petrels and nocturnal alcids, such as Cassin's auklets, would receive moderate to major benefits. Of the nocturnal nesters, only ancient murrelets readily coexist with introduced voles and squirrels on most islands south of the Alaska Peninsula (Bailey and Faust 1981).

Selected seabird colonies in the Semidi, Shumagin, and other island groups would be monitored to detect significant fluctuations in long-term population trends since marine birds and mammals serve as indicators of the productivity of the overall oceanic food web. Sharp seabird population declines caused by overfishing, pollution, or other careless human activities are indicators of a likely collapse in a commercial fishery. The Service can not regulate commercial fishing. However, monitoring should provide essential information needed for Alaska Department of Fish and Game, National Marine Fisheries Service, and the North Pacific Fisheries Management Council to ensure, when formulating quotas for human consumption, that adequate stocks of pollock and other small schooling fish are available for seabirds.

Marine mammals - It is not known whether human competition for fisheries is having any effects on sea otters, seals, or sea lions. The drop in numbers of sea lions at Atkins Island, site of the biggest sea lion rookery in the Shumagins, suggests a connection between commercial fisheries and the welfare of fish-eating species. Counts in 1979 by Alaska Department of Fish and Game totalled about 5,000 individuals (Caulkins and Pitcher 1982), yet only approximately 900 adults and 262 pups were counted in July 1987 (Bailey and Norvell 1987). Though there is no certainty that overfishing is causing the general decline in abundance of sea lions in most parts of the state, circumstantial evidence suggests it.

Expanded shellfisheries would necessitate regular aerial censusing of sea otters in the Shumagins, Pavlofs, and Sandman Reefs. The same conflicts between seabirds and certain fisheries may occur with competition between sea otters and people over clams, sea urchins, crabs, and

other shellfish. The rationale and benefits of increased censusing and food habits investigations of sea otters and more careful scrutiny of escalating consumption by humans are the same as for increased surveillance of seabird populations and their relations to fisheries.

The Shumagin Islands' largest sea lion rookery at Atkins Island would be endangered by a major oil spill, depending primarily on wind direction. Barring a major accident, tanker traffic would have minimal impacts on sea otters.

Waterfowl and Shorebirds - A winter tanker accident could have a moderate negative impact on marine waterfowl. During winter numerous emperor geese, brant, eiders, scoters, mergansers, scaup, mallard, and other waterfowl congregate in bays south of the Alaska Peninsula and around the Shumagins, Sandman Reefs, Pavlofs, and other island groups. Not until spring do they disperse back across the Alaska Peninsula into the Bering Sea.

Following fox removal, common eider, mallard, gadwall, green-winged teal, and other ducks should begin nesting in the Sanak Islands as they do at high densities on the nearby Trinity Islands (Bailey and Faust 1980). Sanak Island has numerous ponds and marshes, but introduced fox and cattle forced waterfowl breeding in the area to use the few undisturbed islands.

On Little Koniuji, Simeonof, and Chernabura islands in the Shumagin group, the chief beneficiaries of fox eradication would be nesting tundra swans, mallards, gadwalls, common eiders, mergansers, teal and white-winged scoters. Because of the prime marsh habitat present, especially on Simeonof, red-throated loons and least sandpipers should increase. Considerable increases in breeding populations of American black oystercatchers and semipalmated plovers also would follow fox removal on these three islands, all of which have extensive sand beaches.

Some increases in shorebirds can be expected to follow the elimination of fox on Ukolnoi and Outer Iliasik islands. On Outer Iliasik Island, with its extensive intertidal areas, removal of fox would most benefit oystercatchers and gulls.

Eradication of fox on Inikla and Elma may increase the introduced vole population. However, experimental attempts would be made to eliminate introduced voles on Inikla, Gunboat, Umla, Elma, and Mary islands in the Sanak group, and on Henderson Island in the Shumagin group, and introduced ground squirrels on Kak Island. Ground squirrels are known predators on ground nesting birds, particularly on eggs of waterfowl (Sowls 1948, Horn 1938, Cade 1951, Stanton 1944, and Geist 1932). Both voles and ground squirrels have caused extensive damage to vegetation on Bird, Andronica, Henderson, and other islands in the Shumagins, but only Henderson is small enough to permit eradication efforts. All of the five above mentioned islets in the Sanak Islands are small enough to facilitate experimental removal. In the South Pacific rats have been extirpated on a few small islands using poison grain (Moors 1985).

Following eradication of introduced rodents, regeneration of beach rye (Elymus areuarius mollis) on the fringes of low, flat islands is apt to result in renewed nesting by common eiders, mergansers, mallards, and other waterfowl.

Terrestrial birds and mammals - Ptarmigan populations on Ukolnoi, Little Koniuji, Simeonof, and Chernabura should expand considerably after fox are removed. Numbers of resident passerines such as song sparrows and winter wrens would also be expected to greatly expand after fox are gone.

Higher nesting success of certain passerines, such as song sparrows and winter wrens which depend on strand vegetation, would be expected after eradication of introduced rodents.

Short-eared owls, rough-legged hawks, and golden eagles, which all prey upon rodents, infrequently occur on these islands. These raptors should generally be unaffected by rodent eradication, provided toxicants are used only after fall migration.

Endangered species - Since Aleutian Canada geese breed both east and west of the Shumagin Islands, it is likely that they also once nested in the outer Shumagins prior to the release of fox. Hence, this endangered species could be

reintroduced to one of the outer Shumagins, preferably Little Koniuji, after fox are gone. A reestablished population in the outer Shumagins or on Poperechnoi in the Pavlofs would greatly augment the relict population of these geese still nesting in the Semidi Islands off the Alaska Peninsula.

Water quality and quantity - No management actions are proposed for the only offshore waters managed by the Service in this unit, the waters surrounding Simeonof Island. There is less than a five percent chance that an oil spill from tanker traffic to Balboa Bay would affect these waters. Impacts on water quality could be minor to major depending on the location of the spill, weather, currents, and type of hydrocarbons. No management actions are proposed which would affect on-shore water quality or quantity. The main effects would be caused by natural streambank erosion and shoreline degradation associated with normal stream and river dynamics. Impacts would be negligible. The Service also manages the submerged lands surrounding the Semidi Islands.

Socioeconomic Impacts of Alternative A - Alaska Peninsula Unit

Cultural resources - These resources are among those targeted for protection under all alternatives. The discussion of common management directions indicates that recreational use and access to islands in this unit would be managed to minimize adverse impacts to cultural resources. People using refuge lands for a variety of purposes may cause some damage to sites, intentionally or unintentionally, and some sites may be lost to natural forces. However, these are both low-level risks and the overall impact on cultural resources under this alternative would be negligible.

Population - Since this alternative emphasizes existing types and levels of refuge use, the proposed management actions would not cause local population changes.

Economy - The proposed management actions would have a negligible impact on the regional economy or on the economy of any community in the unit. No new jobs would be created in this unit as a result of refuge activities. Some economic stimulation can be expected from commercial fishing and the oil developments anticipated by the scenario for this alternative, but this would be independent of Service action.

Recreation - Alternative A would not contribute to increased visitation, because no additional facilities or programs are planned which would improve access or otherwise make recreational use easier or more popular. Independent of the alternative selected, recreational use of refuge lands and waters would grow as described in the scenario. However, recreational use levels by nonlocal people would remain low.

Impacts of the Wilderness Proposal for Alternative A - Alaska Peninsula Unit

In Alternative A, none of the unit would be proposed for wilderness designation. Fifty-five percent of this unit, 390,870 acres, is already designated wilderness - seven percent islands and 48 percent Service managed waters, tidelands, or submerged lands surrounding the Semidi Islands and Simeonof Island. The impacts of existing wilderness are not considered in this analysis. The impacts of nondesignation are only evaluated for the 9,549 acres of suitable land in the unit (Table 46). The Wilderness Review section of the Affected Environment chapter for the Alaska Peninsula Unit discusses how suitability for wilderness designation was determined. The impacts are evaluated for the two significant wilderness issues: impacts on wilderness values and impacts on wildlife populations.

Wilderness values - Alaska Peninsula Unit

Naturalness - Management actions on the suitable areas which have the potential to impact naturalness are ground squirrel eradication and seabird and sea otter studies. Other actions which may impact naturalness are increased recreational and subsistence use. Actions occurring off the refuge which may impact naturalness include oil spills, commercial fishing, and development of lodges and cabins on private land.

Ground squirrel eradication is proposed for Kak Island. Ground squirrels, which are not

indigenous to Kak, prey directly on the eggs and chicks of some species of seabirds and denude portions of the island causing erosion. Once squirrels are eliminated, nocturnal seabirds such as fork-tailed storm-petrels and Leach's storm-petrels would recolonize the island. The natural diversity and abundance of seabird species on the island would be restored. Umbellifer and grass habitat would recover from squirrel damage. Naturalness would benefit.

Seabird monitoring and puffin food habits studies on Midun Island in the Sandman Reefs would involve a crew of four or less at a temporary camp of tents and weatherports for a period of a few weeks, once every three or five years. Vegetation would quickly recover from any trampling that would occur. Sea otter surveys would be done from the air every three to five years. These studies would have no impact on the naturalness of the areas.

Subsistence use of the suitable areas is projected to increase from an estimated 10 use days per year to 15 over the long term. This use is thought to be for egging and possibly marine mammal hunting. This level of use would not affect the populations of seabirds or marine mammals. No camps would be established on any of the islands. Naturalness would not be affected.

Recreational use is projected to increase from 10 use days per year to 50 over the long term. This use would be dispersed over 9,549 acres on 16 different island groups. Most use would be day use for beachcombing, bird watching, and marine mammal observation. Sea kayaking use would involve some camping, but established campsites would not develop. Although adventure cruise ships may circle Karpa on their way to the larger islands in the Shumagins, no one would come ashore on the suitable areas. Naturalness would not be affected.

There is a five percent chance of oil spills from tankers coming from the proposed Balboa Bay port which could impact the Sandman Reefs, the Pinnacle, Egg, Omega, Kennoys, Jude, and Karpa islands. Oil could actually wash ashore on these islands, but the most likely impact is mortality of seabirds or otters which become oiled when diving for food at sea. Waterfowl which winter in the Sandman Reefs are also at risk. The magnitude of the impact cannot be determined because mortality could vary from none to hundreds of thousands of birds depending on the time of year (seabirds are vulnerable in summer, waterfowl in winter), type of hydrocarbons involved, tanker routes used, location of accident, currents, and weather conditions. If tankers proceed east from Unga Strait, the most vulnerable and important colony threatened by a tanker accident would be Karpa Island, site of the largest murre (220,000 birds) colony in the region (Bailey 1978). Over 300,000 seabirds may nest on Karpa making it one of the two most vital seabird islands in the Shumagins. If tankers sailed westward through Unga Strait, the Sandman Reefs with well over a million seabirds, primarily nocturnals, and thousands of sea otters could be affected by a major accident. Since sea otters depend on clean fur for insulation against cold sea water, they are particularly vulnerable to oiling. If a major oil spill in a crucial location at a vulnerable time caused the mortality of seabirds or otters on one of the islands at risk, naturalness would be affected.

It is not known whether increased commercial fishing for pollock, a favored seabird prey species, is affecting or would affect seabird numbers during the life of the plan (see the discussion in the Biological Impacts for Alternative A, fish section above). Seabirds have been affected by fishing pressure on prey species in other areas of the world (see the discussion in the Affected Environment chapter, Off-Refuge Environment section). Sea lions, which have already declined about 50 percent on the south side of the Alaska Peninsula, may also be affected by increased pollock fishing. It is not known if this decline is related to increased commercial fishing. Sea otters may also be impacted by the doubling of fishing effort for favored prey species such as sea urchins and clams. Over the long term, seabirds, sea otters, and sea lions would likely decline on the islands due to decreased prey species. As a result, naturalness would be impacted on suitable areas where they are a major part of the natural ecosystem, Egg, Kennoys, Jude, Karpa, Leader, Kak, Kekernoi, and Atkulik islands, Sandman Reefs, the Pinnacle, and Nagai Rocks.

Table 46. Summary of the wilderness proposal by alternative for the Alaska Peninsula Unit.

Suitable Areas	Suitable Acres	Proposed Acres (Alternative) A	B	C
Egg Island	15	0	15	15
Sandman Reefs	270	0	270	270
The Pinnacle	10	0	10	0
Omega Island	3	0	3	0
Kennoys Island	15	0	15	0
Jude Island	20	0	20	0
Karpa Island	610	0	610	610
Leader Island	10	0	10	0
Seal Cape	8,200	0	8,200	8,200
Kak Island	50	0	50	0
Atkulik Island	300	0	300	0
Aiugnak Columns	1	0	1	0
Jute Island	35	0	35	35
Kekernoi Islets	6	0	6	6
Alinchak Bay Islets	3	0	3	3
Nagai Rocks	1	0	1	0
Totals	9,549	0	9,549	9,139

Cabins and lodges on private land would not impact naturalness on the suitable areas, because the suitable areas are remote islands or capes and are not adjacent to private land.

Conclusion - During the life of the plan, ground squirrel eradication would benefit naturalness on Kak Island. Seabird and sea otter monitoring, subsistence use, and recreational use would have no effect. There is less than a five percent chance that an oil spill would have a negative but unknown impact on naturalness on Egg, the Sandman Reefs, Omega, Kennoys, Jude, Karpa, and the Pinnacle. Over the long term, the risk of an oil spill would continue for an additional 20 years, and commercial fishing may have a negative impact on naturalness on important seabird, sea otter, and sea lion islands.

Outstanding opportunities for solitude - Seabird monitoring and ground squirrel eradication are the only management activities which have the potential to impact solitude. Other activities which could affect solitude are subsistence and recreational use.

Seabird monitoring and puffin food habits studies on Midun would involve a crew of four biologists based on Midun for several weeks, once every three to five years. Midun is a small island and anyone who was there at the same time would be aware of their presence. However, there is no known recreational use of Midun, so there is very little chance that anyone would be affected.

Eradication of ground squirrels on Kak would involve a crew of two people for a week in the fall. A return trip the next fall would be necessary to check success. Kak is a small island, 50 acres, and anyone on the island would be aware of the work crew. Visitors would probably be asked to leave to avoid accidents with the toxicants the crew would be using. However, there is no known recreational use of Kak, particularly in the fall, so it is extremely unlikely that anyone would be affected. There would be no impact on solitude.

Recreational use of the suitable areas has never been determined but is estimated at 10 use days per year now, 25 by the end of the planning period, and 50 over the long term. This use is dispersed over 9,549 acres on 16 different island groups. Bird watching groups may visit Karpa, some use out of Cold Bay or King Cove may occur in the Sandman Reefs, and sea kayakers may visit Seal Cape. It is unlikely that anyone

would encounter someone else on these areas. In addition to the above numbers, several tour boats carrying about 100 people each may visit the general area on their way to the larger islands in the Shumagins. These boats would probably not pass very close to any of the areas except Seal Cape and Karpa. No one would come ashore. Solitude opportunities would remain outstanding.

Subsistence use is currently estimated at 10 use days per year increasing to 15 in the long term. Most of this use is for egging which might occur on about a dozen different islands. Solitude opportunities would not be affected.

Conclusion - No management actions would impact opportunities for solitude on the suitable acres. Recreational use of 50 days per year and subsistence use of 15 days per year dispersed over 9,549 acres would not impact solitude. Solitude would remain outstanding during the life of the plan and the long term.

Outstanding opportunities for primitive recreation - The only management action with a potential to affect primitive recreation opportunities is ground squirrel eradication. Off-refuge actions which may impact recreation opportunities are oil spills, commercial fishing, and increased availability of charter boats and cruise ships. The principal recreational opportunities on the suitable areas are bird watching and bird photography. A few areas also have marine mammal observation, beachcombing, sea kayaking, and camping.

Squirrel eradication would lead to an increase in nocturnal seabirds on Kak as described under naturalness. Bird watching opportunities would improve.

Should an oil spill or over-fishing cause declines in seabirds or otters as discussed under naturalness, recreational opportunities would decline. Bird watching, marine mammal observation, and wildlife photography opportunities would be affected by a loss of birds or otters.

Access to these opportunities would improve slightly in the short and long term if guides and tour boats started operating in the area. However, this activity would mainly take place on and around the larger Shumagin Islands. Some tour boats would visit Karpa Island increasing the opportunities for people to view the largest murre colony in the Shumagins, a quarter million birds.

Conclusion - Opportunities for bird watching would increase on Kak Island as a result of ground squirrel eradication and on Karpa and possibly other locations due to increased access provided by tour boats and cruise ships. There is less than a five percent chance that an oil spill at a vulnerable time of year would kill seabirds or sea otters resulting in a loss of bird watching and marine mammal observation opportunities. Over-fishing over the long term would also lead to a decline in seabird and sea lion viewing opportunities.

Special features - The special features of the suitable areas are sea lion rookeries, a large sea otter population, wintering waterfowl, large and diverse seabird colonies including the largest murre colony in the Shumagins, several species of nocturnal seabirds, the columnar basalt of the Aiugnak Columns, the hot spring on Egg Island, and the outstanding scenery of Seal Cape.

The only management action which has the potential to affect these features is ground squirrel eradication. Other actions which could affect the special features are oil spills and increased commercial fishing.

Elimination of ground squirrels on Kak Island would benefit seabirds particularly nocturnal nesting species as discussed under naturalness. A major oil spill in a crucial location at a vulnerable time could cause seabird, sea otter, or waterfowl mortality as discussed under naturalness. Seabird colonies on Egg, Karpa, and the Sandman Reefs, sea otters in the Sandman Reefs, and wintering waterfowl in the Sandman Reefs would be the most at risk.

Seabirds and sea lions may decline due to increased commercial fishing as discussed in the section on naturalness. Sea lions have already declined about 50 percent on the south side of the Alaska Peninsula. It is not known if this decline is related to increased commercial fishing.

No management actions or other activities would impact the hot spring, the columnar basalt, or the scenery of Seal Cape.

Conclusion - During the life of the plan, ground squirrel eradication would allow an increase in nocturnal seabirds on Kak Island. There is less than a five percent chance that oil spills would have a negative but unknown impact on seabirds, sea otters, and wintering waterfowl. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabirds and sea lions.

Wildlife populations - Alaska Peninsula Unit

Under Alternative A, the Service would continue to eradicate ground squirrels and monitor seabirds and sea otters. These activities would not be affected by the lack of a wilderness designation. Oil spills and increased commercial fishing would still occur off the refuge as these are actions over which the Service has no control. No other activities would impact wildlife populations.

Ground squirrel eradication would result in the complete elimination of ground squirrels on Kak Island, but they are an introduced species. Several species of seabirds could recolonize the island after the squirrels were removed. Seabird monitoring and studies on Midun and aerial sea otter surveys would have no effect on seabird or sea otter populations but would increase knowledge of population dynamics and behavior.

Impacts of oil spills on seabirds, otters, and waterfowl would be as discussed above under naturalness. Mortality could vary from zero to hundreds of thousands of birds or hundreds of otters depending on the time of year, type of hydrocarbons involved, tanker routes used, location of accident, currents, and weather conditions. There is about a five percent chance of an oil spill. Over the long term, oil spills would continue to be a threat for an additional 20 years.

Increased commercial fishing would impact the seabird, sea otter, seal, and sea lion populations. Seabirds and sea lions would decline as a result of decreased prey species, particularly pollock. Sea otters would be affected by the doubling in fishing effort for urchins and clams. This is discussed at greater length under naturalness.

Conclusion - During the life of the plan, ground squirrel eradication would lead to increased populations seabirds on Kak Island. There is a five percent chance that oil spills would have a negative but unknown impact on seabirds, sea otters, and waterfowl on Egg, the Sandman Reefs, Omega, Kennoys, Jude, Karpa, and the Pinnacle. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabirds, sea otters, seals, and sea lions.

Subsistence/Section 810 Evaluation and Findings - Alaska Peninsula Unit

Evaluation - This section examines the impacts on subsistence that would result from implementation of Alternative A. It also conforms to the guidelines recommended by the Alaska Land Use Council and the guidelines of the Department of the Interior for complying with section 810 of the Alaska Lands Act.

Alternative A would have a negligible impact on subsistence users and the resources upon which they depend. Very little subsistence use occurs on refuge lands. No management initiatives are contemplated in Alternative A which would increase the existing levels of refuge use by nonlocal people. Little increase in competition for subsistence resources with nonlocal people would likely occur.

Because of increased economic opportunities associated with the commercial fishing industry, the populations of Perryville, Sand Point, and King Cove have increased significantly. Subsistence in these communities has been replaced to a large degree by the commercial salmon fishery and the increased contact with the larger Euro-American sociocultural system. However, subsistence remains an important basis for social relations, ethnic identity, community values and world views.

Availability of other lands - Section 810(a) requires that the availability of other lands and other alternatives be considered in

evaluating the effects of all management actions including comprehensive conservation plans on subsistence uses. This plan is a refuge plan by definition and addresses the general suitability of a broad range of activities for refuge lands. Thus although there maybe other lands available for the uses considered, lands outside of the refuge are not considered because they are beyond the scope of this plan.

Other alternatives - Three alternatives were developed for the Alaska Maritime Plan. This alternative maintains the current situation in refuge management.

Finding - The net effect of this alternative would be a negligible increase in subsistence harvest levels due to local population increases. Increases in competition between local and nonlocal users would be negligible since there would be minimal use of refuge lands by either group.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

ALTERNATIVE B - ALASKA PENINSULA UNIT

Scenario for the Life of the Plan (10-15 years)

In this alternative, all the suitable areas, 9,549 acres, less than one percent of the unit, would be proposed for wilderness designation. Fifty-five percent of the unit is already Congressionally designated wilderness, and the remainder, about 45 percent, would be in minimal management (Table 45). This scenario assumes Congress approves the recommendation and designates these proposed areas as wilderness. Management of the wilderness areas would be subject to the provisions of the Wilderness Act as amended by the Alaska Lands Act. Wilderness management policy prohibits oil and gas leasing and oil and gas studies that utilize mechanized equipment unless performed by an Interior Department agency. It also prohibits the use of mechanized equipment in wilderness areas except for snowmachines, motorboats, and airplanes. Subsistence users may also use chainsaws.

As in Alternative A, this scenario assumes there would be no mining, or oil and gas studies or leasing anywhere on the refuge, and there would be development of an oil loading terminal at Balboa Bay (see the scenario for Alternative A). Assumptions regarding increases in commercial fishing apply here as well.

Management actions described for fish and wildlife management and air and water quality monitoring would also take place in this alternative. Fishery management activities would emphasize active participation in management bodies responsible for marine forage fish management. Seabird monitoring would be as described in Alternative A, with the addition of four new monitoring sites in this unit.

The assumptions given in Alternative A regarding growth of local communities, subsistence use levels, and an increase of 10 to 15 percent in subsistence, apply here as well.

An interpretive display would be developed for Sand Point. Recreational use of the refuge believed to be about 200 use days now, would increase to 400 to 500 use days by the end of the planning period. Wilderness designation of 9,549 acres would increase recreational use of the proposed areas an additional 10 visitor days beyond the 25 visitor days projected in Alternative A. This increase would occur on Seal Cape which would be designated wilderness along with the contiguous Castle Cape area of Alaska Peninsula Refuge. This is a spectacular but unknown area, and the additional publicity would attract a few more visitors. The other proposed areas are small, remote islands, and designation would have no effect on their popularity.

Scenario for Long Term (more that 15 years)

Wilderness Impacts

In Alternative B, proposed wilderness areas would be designated wilderness. As in the short term scenario, oil and gas leasing and studies, commercial uses other than recreation related, and the use of mechanized equipment would be limited on the proposed wilderness areas.

As in the scenario for the life of the plan, wilderness designation would lead to an increase

in visitor use of the proposed areas of 10 days per year. Total recreational use of the proposed areas would be 60 use days per year. This increase would occur in the Seal Cape area as in the short range scenario. Tour boat use would increase to at least a few a year as in Alternative A. The interpretive display in Sand Point would have no effect on recreational use of the proposed areas because they are all too distant from Sand Point.

This scenario is similar to the long term scenario for Alternative A in that oil and gas studies and leasing and mining would not occur on the proposed areas, an oil terminal would be constructed at Balboa Bay and continue to operate for another 20 years, and fishery resources would be fully exploited with little room for additional expansion. Growth of the communities and developments on private lands would be as discussed for Alternative A. Subsistence use of the proposed areas would increase by 50 percent to 15 use days as in Alternative A.

Biological Impacts for Alternative B - Alaska Peninsula Unit

Fish - Impacts of commercial fishing on refuge resources would remain minor, as in Alternative A.

Seabirds - Impacts would be the same as in Alternative A, except monitoring of four new sites would benefit management capabilities.

Marine mammals - Impacts would be the same as in Alternative A.

Waterfowl and Shorebirds - Impacts would be the same as in Alternative A.

Terrestrial birds and mammals - Impacts would be the same as in Alternative A.

Endangered species - Impacts would be the same as in Alternative A.

Water quality and quantity - Impacts would be the same as in Alternative A.

Socioeconomic Impacts of Alternative B - Alaska Peninsula Unit

Cultural resources - The impact of this alternative on cultural resources would be negligible; see the discussion for Alternative A.

Population - This alternative would not affect the population of area communities; see the discussion for Alternative A.

Economy - The negligible impacts on the economy are identical to those described for Alternative A.

Recreation - Construction of an interpretive display in Sand Point would increase local residents' and visiting fishers knowledge and enjoyment of refuge resources. It would probably not lead to an appreciable increase in refuge use, because Sand Point is surrounded by private land both on Popof Island and neighboring Unga Island. Designation of less than one percent of the unit as wilderness would have a negligible effect on recreational use, because the proposed areas are small, remote islands. It is impossible to land on many of these islands. Visitor use would increase an additional 10 use days per year on Seal Cape as it, and the adjacent proposed Castle Cape wilderness, became better known.

Impacts of the Wilderness Proposal for Alternative B - Alaska Peninsula Unit

In Alternative B, all the suitable areas, 9,549 acres, less than one percent of the unit, would be proposed for wilderness designation (Table 46). This would require the approval of Congress. If Congress designated the proposed areas as wilderness, they would be managed according to the provisions of the Wilderness Act of 1964 as amended by the Alaska Lands Act.

Fifty-five percent of this unit is already designated wilderness - seven percent islands and 48 percent Service managed waters and tidelands surrounding Simeonof Island and submerged lands surrounding the Semidis. The impacts of existing wilderness are not considered in this analysis. The impacts of designation are only evaluated for the proposed areas. The impacts are evaluated for the two significant wilderness issues: impacts on

wilderness values and impacts on wildlife populations.

Wilderness values - Alaska Peninsula Unit

Naturalness - Management actions on the suitable areas which have the potential to impact naturalness are ground squirrel eradication and seabird and sea otter studies. Other actions which may impact naturalness are increased recreational and subsistence use. Actions occurring off the refuge which may impact naturalness include oil spills, commercial fishing, and development of lodges and cabins on private land.

Eradication of ground squirrels for the benefit of seabird diversity and populations would occur on Kak Island under this alternative as well. Wilderness designation does not affect the Service's ability to eradicate introduced species. Naturalness would benefit (see Alternative A for supporting analysis). Seabird and sea otter monitoring would occur after wilderness designation. Monitoring and studies are permissible activities in wilderness. The use of temporary camps in support of monitoring and studies would have no impact on monitoring as in Alternative A.

The only management action in addition to those discussed under Alternative A is the addition of four more monitoring sites, and these would not be on the proposed areas.

Subsistence use of 15 days per year for egging and possibly marine mammal hunting would have no impact on naturalness as discussed in Alternative A. The increase in recreational use for this alternative is 10 visitor use days per year in addition to the 50 days projected in Alternative A. These additional days would be for sea kayaking and camping on Seal Cape. This area is 8,000 acres and has several beaches and areas where camping could occur. This negligible amount of use would have no impact on the naturalness of Seal Cape. Impacts from recreational use would be as discussed in Alternative A.

The five percent chance of oil spills and the increase in commercial fishing would occur under this alternative as well as these are actions over which the Service has no control. These impacts are described under Alternative A.

Conclusion - During the life of the plan, ground squirrel eradication would benefit naturalness on Kak Island. Seabird and sea otter monitoring, subsistence use, and recreational use would have no effect. There is less than a five percent chance that an oil spill would have a negative but unknown impact on naturalness on Egg, the Sandman Reefs, Omega, Kennoys, Jude, Karpa, and the Pinnacle. Over the long term, the risk of an oil spill would continue for an additional 20 years, and commercial fishing may have a negative impact on naturalness on important seabird, sea otter, and sea lion islands.

Outstanding opportunities for solitude - Seabird monitoring and ground squirrel eradication are the only management activities which have the potential to impact solitude. Other activities which could affect solitude are subsistence and recreational use.

Seabird monitoring and puffin food habits studies on Midun and ground squirrel eradication on Kak would involve small crews for a short period of time and would not impact solitude as described in Alternative A.

Recreational use of the suitable areas would be 10 more use days per year than the 50 use days projected in Alternative A. This increase would occur on Seal Cape and would probably represent only one additional party of boaters. This 8,200 acre area has an extremely rugged coastline and mountainous interior. In the unlikely event that more than one party was in the area at the same time, they would probably not be aware of each other. Subsistence use would be as in Alternative A, 15 use days per year. Solitude would remain outstanding.

Conclusion - No management actions would impact opportunities for solitude on the suitable acres. Recreational use of 60 days per year and subsistence use of 15 days per year dispersed over 9,549 acres would not impact solitude. Solitude would remain outstanding during the life of the plan and the long term.

Outstanding opportunities for primitive recreation - The only management action with a potential to affect primitive recreation opportunities is ground squirrel eradication. Off-refuge actions which may impact recreation opportunities are oil spills, commercial fishing, and increased availability of charter boats and cruise ships. The principal recreational opportunities on the suitable areas are bird watching and bird photography. A few areas also have marine mammal observation, beachcombing, sea kayaking, and camping.

Ground squirrel eradication would lead to increases in seabirds and thus bird watching opportunities as discussed in Alternative A.

Should an oil spill or over-fishing cause declines in seabirds or marine mammals as discussed for Alternative A, recreational opportunities would decline. Bird watching, marine mammal observation, and wildlife photography are some of the best opportunities for recreation on the suitable areas. These opportunities would be affected by loss of birds or mammals.

Increased tour ship and charter boat activity along the south side of the Alaska Peninsula would increase wildlife viewing and photography opportunities as in Alternative A. This would mainly affect Karpa Island.

Conclusion - Opportunities for bird watching would increase on Kak Island, as a result of ground squirrel eradication, and on Karpa and possibly other locations, due to increased access provided by tour boats and cruise ships. There is less than a five percent chance that an oil spill at a vulnerable time of year would kill seabirds or sea otters resulting in a loss of bird watching and marine mammal observation opportunities. Over-fishing over the long term would also lead to a decrease in seabird and marine mammal viewing opportunities.

Special features - The special features of the suitable areas are sea lion rookeries, a large sea otter population, wintering waterfowl, large and diverse seabird colonies including the largest murre colony in the Shumagins and several species of nocturnal seabirds, the columnar basalt of the Aiugnak Columns, the hot spring on Egg Island, and the outstanding scenery of Seal Cape.

The only management action which has the potential to affect these features is ground squirrel eradication. Other actions which could affect the special features are oil spills and increased commercial fishing.

Elimination of ground squirrels on Kak would benefit seabirds as discussed under Alternative A. Impacts on seabirds and sea otters from the five percent chance of an oil spill and on seabirds and sea lions from increased commercial fishing would be as discussed for Alternative A.

No management actions or off-refuge actions would impact the hot spring, the columnar basalt, or the scenery of Seal Cape. See the discussion for Alternative A.

Conclusion - During the life of the plan, ground squirrel eradication would allow the recolonization of Kak Island by nocturnal seabirds. There is less than a five percent chance that oil spills would have a negative but unknown impact on seabirds, sea otters, and wintering waterfowl. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabirds and sea lions.

Wildlife populations - Alaska Peninsula Unit

Management actions would be to manage all the proposed areas as wilderness, eradicate squirrels, and monitor and study seabirds and sea otters. These activities would not be affected by a wilderness designation. Oil spills and increased commercial fishing would still occur off the refuge as these are actions over which the Service has no control. No other activities would impact wildlife populations.

Wilderness management would protect the proposed areas against unforeseen development activities which may impact wildlife populations. No specific wilderness management actions are anticipated in the near future. Squirrel eradication would result in the complete elimination of ground squirrels from Kak Island. They are, however, an introduced species, and native seabird species could

recolonize the island once squirrels are gone. Seabird monitoring and studies on Midun and aerial sea otter surveys would have no effect on seabird or sea otter populations but would increase knowledge of population dynamics and behavior.

Impacts of oil spills on seabirds, otters, and waterfowl would be as discussed above under naturalness. Mortality could vary from zero to thousands of birds and hundreds of otters depending on the time of year, type of hydrocarbons involved, tanker routes used, location of accident, currents, and weather conditions. There is about a five percent chance of spills.

Increased commercial fishing would impact the seabird, sea otter, and sea lion populations. They would decline as a result of decreased prey availability. This is discussed at greater length under naturalness.

Conclusion - During the life of the plan, ground squirrel eradication would be a detriment to introduced ground squirrels and a benefit to seabirds on Kak Island. There is a five percent chance that oil spills would have a negative but unknown impact on seabirds, otters, and waterfowl on Egg, the Sandman Reefs, Omega, Kennoys, Jude, Karpa, and the Pinnacle. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabirds, sea otters, and sea lions. Wilderness designation would protect the proposed areas from unforeseen development activities.

Subsistence/Section 810 Evaluation and Findings - Alaska Peninsula Unit

Evaluation - The negligible impacts on subsistence resulting from implementing this alternative would be identical to Alternative A, except that subsistence users would not be able to use motorized tools other than chainsaws in areas proposed for wilderness under this alternative, less than one percent of the unit. It is unlikely that any subsistence activities occur on the 9,549 acres under consideration, so this would have no impact. The section 810 evaluation and findings for Alternative A apply to Alternative B as well.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

ALTERNATIVE C (PREFERRED ALTERNATIVE) ALASKA PENINSULA UNIT

Scenario for the Life of the Plan (10-15 years)

This alternative proposes 9,139 acres, less than one percent of the unit, for wilderness designation. Fifty-five percent of the unit is already Congressionally designated wilderness. About 44 percent of the unit would be in minimal management and less than one percent, 640 acres, in intensive management (Table 45). This scenario assumes Congress approves the recommendation and designates these proposed areas as wilderness. Management of the wilderness areas would be subject to the provisions of the Wilderness Act as amended by the Alaska Lands Act. Wilderness management policy prohibits oil and gas leasing and prohibits studies that utilize mechanized equipment unless performed by an Interior Department agency. It also prohibits the use of mechanized equipment in wilderness areas except for snowmachines, motorboats, and airplanes. Subsistence users may also use chainsaws.

As in Alternative A, this scenario assumes there would be no mining or oil and gas studies or leasing anywhere on the refuge, and there would be development of an oil loading terminal at Balboa Bay (see the scenario for Alternative A). Assumptions regarding increases in commercial fishing apply here as well.

Management actions described for fish and wildlife management and air and water quality monitoring would also take place in this alternative. In addition, another reconnaissance survey of the Chiachi islands would be conducted during the last half of the planning period. Fishery management activities would emphasize active participation in management bodies responsible for marine forage fish management.

Seabird population monitoring would increase with new study sites on Ugaiushak, Amagat, Goose, Near, Sanak Reefs, and Poperechnoi (after fox removal). In addition, the Service would initiate studies to monitor fishery/seabird interactions. Besides the current analysis of the diets of puffins, food utilization by puffins and other fish-eating seabirds would be investigated at Chowiet (Semidis), Egg (Shumagins), and Midun (Sandmans) islands. In addition to projects at colony sites, pelagic studies involving assessments of prey biomass using the M/V Tiglax would occur. Harvest data of commercial fishing affecting subject colonies would be closely correlated with egg-laying, chick weight gain and growth rates, incubation bouts, and other factors determining ultimate breeding success. Winter pelagic studies to ascertain whether excessive mortality is occurring away from colonies due to a scarcity of food would also be conducted.

On Popof Island, 640 acres would be zoned for intensive management so that Shumagin corporation could build a road connecting the community of Sand Point with East Side Harbor. For the purposes of analysis it is assumed this road would be built. Recreational use on refuge lands adjacent to this road would add an additional 100 visitor use days to the 400 use days projected under Alternative A for all refuge lands in the unit. Wilderness designation of 9,139 acres would increase recreational use an additional 10 visitor days. This use would occur on Seal Cape which would be designated along with the contiguous Castle Cape area of Alaska Peninsula Refuge. This is a spectacular but unknown area and the additional publicity would attract a few more visitors. The islands involved are so small and remote that designation would have no effect on their popularity.

An interpretive display would be developed for Sand Point as in Alternative B. The assumptions given in Alternative A regarding growth of local communities, subsistence use levels, and an increase of 10 to 15 percent in subsistence, apply here as well.

Scenario for Long Term (more that 15 years)
Wilderness Impacts

In Alternative C, proposed wilderness areas would be designated wilderness. As in the short term scenario, oil and gas leasing and studies, commercial uses other than recreation related, and the use of mechanized equipment would be limited on the proposed wilderness areas.

As in the scenario for the life of the plan, wilderness designation would lead to an increase in visitor use of the proposed areas of 10 days per year. Total recreational use of the proposed areas would be 60 use days per year. This increase would occur in the Seal Cape area as in the short range scenario. Tour boat use would increase to at least a few a year as in Alternative A. The interpretive display and new road in Sand Point would have no effect on recreational use of the proposed areas, because these areas are too distant from Sand Point.

This scenario is similar to the long term scenario for Alternative A in that oil and gas studies and leasing and mining would not occur on the proposed areas, an oil terminal would be constructed at Balboa Bay and continue to operate for another 20 years, and fishery resources would be fully exploited with little room for additional expansion. Growth of the communities and developments on private lands would be as discussed for Alternative A. Subsistence use of the proposed areas would increase by 50 percent to 15 use days as in Alternative A.

Biological Impacts of Alternative C -
Alaska Peninsula Unit

Fish - Impacts would be the same as those described in Alternative A.

Seabirds - Impacts on seabirds would be the same as in Alternatives A and B, except that monitoring of seabird fishery interactions would produce more data useful to regulatory agencies in avoiding overharvest and concomitant declines in some species of marine birds and mammals. Management would be benefited a minor to moderate extent.

Marine mammals - Additional forage fish studies would result in minor benefits to marine mammal management.

Waterfowl and shorebirds - Impacts would be the same as Alternative A.

Terrestrial birds and mammals - Impacts would be the same as in Alternative A. Road construction on Popof Island would have negligible local effects.

Endangered species - Impacts would be the same as Alternative A.

Water quality and quantify - Impacts would be the same as Alternative A.

Socioeconomic Impacts of Alternative C - Alaska Peninsula Unit

Cultural resources - The impact of this alternative on cultural resources would be negligible; see the discussion for Alternative A.

Population - This alternative would not affect the population of area communities; see the discussion for Alternative A.

Economy - The negligible impacts on the economy are identical to those described for Alternative A.

Recreation - Construction of an interpretive display in Sand Point would increase local residents' and visiting fishers' knowledge and enjoyment of refuge resources. It would probably not lead to an appreciable increase in refuge use because Sand Point is surrounded by private land both on Popof Island and neighboring Unga Island. If the Shumagin Corporation builds a road across the refuge lands to the east side of the island, recreational use would increase on refuge lands for ptarmigan hunting, photography, sightseeing, and hiking. This may contribute an additional 100 visitor use days per year during the life of the plan. Designation of less than one percent of the unit as wilderness would have a negligible effect on recreational use because the proposed areas are small, remote islands. It is impossible to land on many of these islands. Visitor use would increase an additional 10 use days per year on Seal Cape as it and the adjacent proposed Castle Cape Wilderness, became better known.

Impacts of the Wilderness Proposal for Alternative C - Alaska Peninsula Unit

In Alternative C, 9,139 acres, less than one percent of the unit, would be proposed for wilderness designation which would require the approval of Congress (Table 46). This proposal is 410 acres less than the proposal in Alternative B. If Congress designated the proposed areas as wilderness, they would be managed according to the provisions of the Wilderness Act of 1964 as amended by the Alaska Lands Act.

Suitable Areas Proposed for Wilderness

The impacts of designation are evaluated for the proposed areas: Egg, Karpa, Jute, Kekernoi, and Alinchak Bay islands, Sandman Reefs, and Seal Cape (Table 46). The impacts are evaluated for the two significant wilderness issues: impacts on wilderness values and impacts on wildlife populations.

Wilderness values - Alaska Peninsula Unit

Naturalness - Management actions on the suitable areas which have the potential to impact naturalness are seabird and sea otter studies. Other actions which may impact naturalness are increased recreational and subsistence use. Actions occurring off the refuge which may impact naturalness include oil spills, commercial fishing, and development of lodges and cabins on private land.

Seabird and sea otter monitoring would occur after wilderness designation. Monitoring and studies are permissible activities in wilderness. Monitoring on Goose Island in the Sandman Reefs and additional seabird food utilization studies at Midun also in the Sandman Reefs would be done in addition to the studies discussed in Alternative A. The use of temporary camps in support of monitoring and studies would have no impact on monitoring as in Alternative A.

Perhaps 10 of the 15 subsistence use days thought to be occurring on the suitable areas occurs on these proposed areas. Subsistence use

of 10 days per year for egging and possibly marine mammal hunting would have no impact on naturalness as discussed in Alternative A.

Most of the recreational use occurring on the suitable areas occurs on the proposed islands, about 40 of the 50 use days. Ten additional days would occur as a result of wilderness designation and the resulting publicity for sea kayaking and camping on Seal Cape. This area is 8,200 acres and has several beaches and areas where camping could occur. This negligible amount of use would have no impact on the naturalness of Seal Cape. Impacts from recreational use would be as discussed in Alternative A.

The five percent chance of oil spills and the increase in commercial fishing would occur under this alternative as well as these are actions over which the Service has no control. The suitable areas most at risk from both actions are within the proposed area, Karpa and Egg islands and the Sandman Reefs. As in Alternative A, developments on private lands would not impact these remote islands. These impacts are described under Alternative A.

Conclusion - Seabird and sea otter monitoring, subsistence use, and recreational use would have no effect on naturalness. There is less than a five percent chance that an oil spill would have a negative but unknown impact on naturalness on Egg, the Sandman Reefs, and Karpa. Over the long term, the risk of an oil spill would continue for an additional 20 years, and commercial fishing may have a negative impact on naturalness on important seabird, sea otter, and sea lion islands.

Outstanding opportunities for solitude - Seabird monitoring is the only management activity which has the potential to impact solitude. Other activities which could affect solitude are subsistence and recreational use.

Seabird monitoring and puffin food habits and food utilization studies on Midun and seabird monitoring on Goose Island would involve small crews for a short period of time and would not impact solitude as described in Alternative A.

Recreational use of the suitable areas would be 10 more use days per year than in Alternative A. This increase would occur on Seal Cape and would probably represent only one additional party of boaters. This 8,200 acre area has an extremely rugged coastline and mountainous interior. In the unlikely event that more than one party was in the area at the same time, they would probably not be aware of each other. Subsistence use would be as in Alternative A, 10 use days per year on these areas. Solitude would remain outstanding.

Conclusion - No management actions would impact opportunities for solitude on the suitable acres. Recreational use of 50 days per year and subsistence use of 10 days per year dispersed over 9,139 acres would not impact solitude. Solitude would remain outstanding during the life of the plan and the long term.

Outstanding opportunities for primitive recreation - There are no management actions with potential to affect primitive recreation opportunities. Off-refuge actions which may impact recreation opportunities are oil spills, commercial fishing, and increased availability of charter boats and cruise ships.

Should an oil spill or over-fishing cause declines in seabirds or marine mammals as discussed for Alternative A, recreational opportunities would decline. Bird watching, marine mammal observation, and wildlife photography are some of the best opportunities for recreation on the proposed areas. These opportunities would be affected by loss of birds or mammals.

Increased tour ship and charter boat activity along the south side of the Alaska Peninsula would increase wildlife viewing and photography opportunities as in Alternative A. This would mainly affect Karpa Island.

Conclusion - Opportunities for bird watching would increase on Karpa and possibly other locations due to increased access provided by tour boats and cruise ships. There is less than a five percent chance that an oil spill at a vulnerable time of year would kill seabirds, waterfowl, or sea otters resulting in a loss of bird watching and marine mammal observation opportunities. Over-fishing over the long term would also lead to a decrease in seabird and marine mammal viewing opportunities.

Special features - The special features of the proposed areas are sea lion rookeries, a large sea otter population, wintering waterfowl, large and diverse seabird colonies including the largest murre colony in the Shumagins and several species of nocturnal seabirds, the hot spring on Egg Island and the outstanding scenery of Seal Cape.

There are no management actions which have the potential to affect these features. Other actions which could affect the special features are oil spills and increased commercial fishing.

Impacts on seabirds and sea otters from the five percent chance of an oil spill and on seabirds, sea otters, and sea lions from increased commercial fishing would be as discussed for Alternative A.

No management actions or off-refuge actions would impact the hot spring or the scenery of Seal Cape. See the discussion for Alternative A.

Conclusion - During the life of the plan, there is less than a five percent chance that oil spills would have a negative but unknown impact on seabirds, sea otters, and wintering waterfowl. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabirds, sea otters, and sea lions.

Wildlife populations - Alaska Peninsula Unit

Management actions would be to manage all the proposed areas as wilderness and monitor and study seabirds and sea otters. These activities would not be affected by a wilderness designation. Oil spills and increased commercial fishing would still occur off the refuge as these are actions over which the Service has no control. No other activities would impact wildlife populations.

Wilderness management would protect the proposed areas against unforeseen development activities which may impact wildlife populations. No specific wilderness management actions are anticipated in the near future. Seabird monitoring and studies on Midun and Goose islands and aerial sea otter surveys would have no effect on seabird or sea otter populations but would increase knowledge of population dynamics and behavior.

Impacts of oil spills on seabirds, otters, and waterfowl would be as discussed in Alternative A. Mortality could vary from zero to thousands of birds and hundreds of otters depending on the time of year, type of hydrocarbons involved, tanker routes used, location of accident, currents, and weather conditions. The suitable areas most at risk, Karpa, Egg, and the Sandman Reefs, are proposed for wilderness designation in this alternative. There is about a five percent chance of spills.

Increased commercial fishing would impact the seabird, sea otter, and sea lion populations. They would decline as a result of decreased prey species. This is discussed at greater length in Alternative A.

Conclusion - There is a five percent chance that oil spills would have a negative but unknown impact on seabirds, otters, and waterfowl on Egg, the Sandman Reefs, and Karpa. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabirds, sea otters, and sea lions. Wilderness designation would protect the proposed areas from unforeseen development activities.

Suitable Areas not Proposed for Wilderness

The impacts of nondesignation are evaluated for the suitable areas which are not proposed, 410 acres: the Pinnacle, Omega, Kennoys, Jude, Leader, Kak, and Atkulik islands, Aiugnak Columns, and Nagai Rocks (Table 46).

Wilderness values - Alaska Peninsula Unit

Naturalness - The only management action on these areas which has the potential to impact naturalness is ground squirrel eradication. Other actions which may impact naturalness are increased recreational and subsistence use. Actions occurring off the refuge which may impact naturalness include oil spills, commercial fishing, and development of lodges and cabins on private land.

Eradication of ground squirrels for the benefit of seabird diversity and populations would occur

on Kak Island under this alternative as well. Naturalness would benefit (see Alternative A for supporting analysis).

Subsistence use of five days per year for egging and possibly marine mammal hunting would have no impact on naturalness as discussed in Alternative A. Less recreational use is thought to occur on these parcels than the proposed areas, perhaps 10 use days per year. This is the same as what was projected for these islands in Alternative A. As in A, there would be no impact on naturalness from this negligible amount of use.

The five percent chance of oil spills and the increase in commercial fishing would occur under this alternative as well as these are actions over which the Service has no control. The Pinnacle, Omega, Kennoys, and Jude islands could be affected by oil spills. Seabird, sea otter, and sea lion populations on Kennoys, Jude, Leader, Kak, Atkulik, the Pinnacle, and Nagai Rocks would be at risk from decreased prey species from overfishing. As in A, development on private land would have no impact on these remote islands. These impacts are described under Alternative A.

Conclusion - During the life of the plan, ground squirrel eradication would benefit naturalness on Kak Island. There is less than a five percent chance that an oil spill would have a negative but unknown impact on naturalness on Omega, Kennoys, Jude, and the Pinnacle. Over the long term, the risk of an oil spill would continue for an additional 20 years, and commercial fishing may have a negative impact on naturalness on important seabird, sea otter, and sea lion islands.

Outstanding opportunities for solitude - Ground squirrel eradication is the only management activity which has the potential to impact solitude. Other activities which could affect solitude are subsistence and recreational use.

Ground squirrel eradication on Kak would involve small crews for a short period of time and would not impact solitude as described in Alternative A.

Subsistence use of five days per year and recreational use of 10 days distributed over 410 acres would not impact opportunities for solitude as described in Alternative A.

Conclusion - No management actions would impact opportunities for solitude on the suitable acres. Recreational use of 10 days per year and subsistence use of five days per year dispersed over 410 acres would not impact solitude. Solitude would remain outstanding during the life of the plan and the long term.

Outstanding opportunities for primitive recreation - The only management action with a potential to affect primitive recreation opportunities is ground squirrel eradication. Off-refuge actions which may impact recreation opportunities are oil spills, commercial fishing, and increased availability of charter boats and cruise ships. Only one of these islands, Atkulik, has outstanding opportunities for recreation. The other islands all have bird watching and photographic opportunities, but they are less than outstanding.

Ground squirrel eradication would lead to increases in seabirds and thus bird watching opportunities as discussed in Alternative A.

Should an oil spill or over-fishing cause declines in seabirds or marine mammals as discussed for Alternative A, recreational opportunities would decline. Bird watching, marine mammal observation, and wildlife photography are some of the best opportunities for recreation on these areas. These opportunities would be affected by loss of birds or mammals.

Increased tour ship and charter boat activity along the south side of the Alaska Peninsula would increase wildlife viewing and photography opportunities as in Alternative A. It is not very likely that these islands would be affected however, since their resources are not that outstanding.

Conclusion - Opportunities for bird watching would increase on Kak Island as a result of ground squirrel eradication and possibly other locations due to increased access provided by

tour boats and cruise ships. There is less than a five percent chance that an oil spill at a vulnerable time of year would kill seabirds or sea otters resulting in a loss of bird watching and marine mammal observation opportunities. Over-fishing over the long term would also lead to a decrease in seabird and marine mammal viewing opportunities.

Special features - The special features of the nonwilderness suitable areas are sea lion rookeries, a large sea otter population, large and diverse seabird colonies including several species of nocturnal seabirds, and the columnar basalt of the Aiugnak Columns.

Impacts, on seabirds from ground squirrel eradication, the five percent chance of major oil spills, and overfishing, and on sea lions from overfishing, would be the same as those discussed for Alternative A. Nothing during the life of the plan or the long term would impact the columnar basalt. See the discussion for Alternative A.

The only management action which has the potential to affect these features is ground squirrel eradication. Other actions which could affect the special features are oil spills and increased commercial fishing.

Elimination of ground squirrels on Kak would benefit seabirds as discussed under Alternative A. Impacts on seabirds and sea otters from the five percent chance of an oil spill and on seabirds and sea lions from increased commercial fishing would be as discussed for Alternative A.

No management actions or off-refuge actions would impact the columnar basalt. See the discussion for Alternative A.

Conclusion - During the life of the plan, ground squirrel eradication would allow the recolonization of Kak Island by nocturnal seabirds. There is less than a five percent chance that oil spills would have a negative but unknown impact on seabirds, sea otters, and wintering waterfowl. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabirds, sea otters, and sea lions.

Wildlife populations - Alaska Peninsula Unit

The only management action which would impact wildlife population would be eradicating ground squirrels. This activity would not be affected by the lack of a wilderness designation. Off-refuge actions which have the potential to impact wildlife populations are oil spills and increased commercial fishing.

Squirrel eradication would result in the complete elimination of ground squirrels from Kak Island. They are, however, an introduced species, and native seabird species would increase once squirrels are gone.

Impacts of oil spills on seabirds, otters, and waterfowl would be as discussed in Alternative A. Mortality could vary from zero to thousands of birds and hundreds of otters depending on the time of year, type of hydrocarbons involved, tanker routes used, location of accident, currents, and weather conditions. There is about a five percent chance of spills.

Increased commercial fishing would impact the seabird, sea otter, and sea lion populations. They would decline as a result of decreased prey species. This is discussed at greater length under Alternative A.

Conclusion - During the life of the plan, ground squirrel eradication would be a detriment to introduced ground squirrels and a benefit to seabirds on Kak Island. There is a five percent chance that oil spills would have a negative but unknown impact on seabirds, otters, and waterfowl on Omega, Kennoys, Jude, and the Pinnacle. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabirds, sea otters, seals, and sea lions.

Subsistence/Section 810 Evaluation and Findings - Alaska Peninsula Unit

Evaluation - The negligible impacts on subsistence resulting from implementing this alternative could be similar to Alternative A, except that subsistence users would not be able to use motorized tools other than chainsaws in the areas proposed for wilderness under this

alternative, less than one percent of the unit. It is unlikely that any subsistence activities involving mechanized equipment occur on the 9,139 acres under consideration, so this would have no impact. Should the Shumagin Corporation build a road across Popof Island, subsistence opportunities for Sand Point residents would increase for fishing, hunting, and trapping. This would be a minor benefit overall. The section 810 evaluation and findings for Alternative A apply to Alternative C as well.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

GULF OF ALASKA UNIT

Table 47. Summary of management category designations by alternative for the Gulf of Alaska Unit.

Management Category	Alternative A % of Unit	A % of Refuge	B % of Unit	B % of Refuge	C % of Unit	C % of Refuge
Intensive	3%	1%	3%	1%	72%	8%
Moderate	1%	1%	4%	1%	1%	1
Minimal	95%	9%	89%	9%	25%	2%
Existing Wilderness	2	1%	2%	1%	2%	1%
Proposed Wilderness	0%	0%	2%*	1%*	1%	1%

Note: These percentages are approximate and include all selected lands, tidelands, and submerged lands, and waters. Refuge wide percentages do not include Unimak Island (932,484 acres - 19% of refuge) which is proposed for transfer to Izembek Refuge.

* 100% of suitable wilderness area

ALTERNATIVE A (CURRENT SITUATION)

Scenario for the Life of the Plan (10-15 Years)

In this alternative, all lands would be managed as they currently are, and the existing mix of undeveloped and developed uses would be maintained. Two percent of the unit is already designated wilderness and no additional wilderness is proposed. Three percent of the unit would be in intensive management, less than one percent in moderate management, and 95 percent in minimal management (Table 47). The intensive management areas include Bear and Harvester islands, bays around Afognak Island with log transfer facilities or fish hatcheries, and the developed shoreline in Womens Bay on Kodiak Island. Moderate management areas include part of Chisik Island and the existing experimental mariculture site in Raspberry Strait.

Although oil and gas leasing may be permitted on 13,034 acres of the unit in the moderate and intensive management category, none is expected due to low potential. Geological and geophysical studies may be permitted on the nonwilderness portion of the unit and nonmechanized studies on the wilderness portion, but none are expected due to low potential. This scenario also assumes that no offshore oil and gas exploration or development activities would take place. This unit includes three planning areas for the Outer Continental Shelf program: the Kodiak, Cook Inlet, and Gulf of Alaska planning areas. All lease sales scheduled for the Kodiak planning area and the last Cook Inlet sale have been canceled due to lack of industry interest and/or concerns from Kodiak residents. One sale is scheduled for 1990 but this scenario assumes it too would be canceled. All 100 tracts leased in previous sales have expired or been relinquished; the 13 wells that were drilled have been plugged and abandoned. None of the 112 tracts leased during three sales in the Gulf of Alaska planning area are still active; the 12 wells that were drilled have been plugged and abandoned.

Oil shipping would continue from the pipeline terminal at Valdez to Puget Sound. Some of this oil would also be shipped from Valdez to Cook Inlet refineries. In addition, state royalty oil (1.8 million barrels per year) would be shipped from Cook Inlet to Taiwan. In 1987, two major spills occurred in the Gulf of Alaska and one in Cook Inlet. The probability of a major spill en route from Valdez to Cook Inlet, en route out of Cook Inlet, or when loading or unloading in Cook Inlet is about 25 percent for the life of the fields, about 35 years. Small spills from fishing boats and freighter traffic may also occur.

No mining would occur on refuge lands or waters because there are no claims, and the refuge is closed to further claim activity.

Commercial fishing for salmon and other important finfish such as herring, rock fish,

sablefish, walleye pollock, cod, and halibut would remain intense with little room for expansion in most instances. Harvest of less important commercial species such as Pacific Ocean perch, sandlance, and capelin would remain at current low levels. Commercial shellfish harvest of species such as crab, scallops, and shrimp would remain intense with little room for expansion expected. Fishing for less important species of shellfish such as octopus, sea urchins, and razor clams would develop to take advantage of new markets. It is further assumed that these expanded fisheries would use less than 10 boats and employ less than 25 people. Processing would occur at currently available facilities. Fishery management activities would emphasize active participation with management bodies responsible for marine fish management.

Afognak area - Many of the selected islands are expected to be conveyed to private ownership. With the exception of Delphin and Discoverer islands, the remaining refuge islands would remain in their natural state.

The timber rights to Delphin and Discoverer islands would be exercised in accordance with a cooperative harvest plan to be developed by the Afognak Joint Venture and the Service per the Alaska Lands Act section 1427(m). There is an estimated 1.1 million board feet of timber on Delphin Island and 2.8 million board feet on Discoverer Island. To economically log these islands, nearly all timber would be harvested in one year. Logs would be transferred by ground skidding.

The existing barge type log transfer facility in Discoverer Bay would remain in operation for the next 20 years. Service divers or their consultants would systematically monitor bark accumulation and subtidal habitat at the site. Mitigative measures would be required in accordance with the Service's mitigation policy.

At Kazakof Bay (Danger Bay), a second inclined slide log transfer facility would be constructed near East Arm (Arctic Environmental Information and Data Center 1987). The project would require construction of artificial reefs and eelgrass transplants to comply with Service mitigation policy. As with the northern facility, monitoring of project impacts as well as the mitigative measures would be required by a right-of-way permit.

An additional inclined slide log transfer facility has also been planned for an unknown site at the north side of the island (J. Sturgeon, Koncor Forest Products, pers. comm. 1987). Monitoring and mitigation of this project would be similar to that described above. As with all projects occupying Service lands, a right-of-way permit and either an environmental assessment or environmental impact statement would be required.

Service research staff would continue diving work to establish a baseline for sea otter prey species (A. DeGange, U.S. Fish and Wildlife Service, pers. comm. 1987). Long term study plots would be developed to assess changes in prey populations, concurrent with surveys of sea otter prey in the entire Kodiak Archipelago. A study of sea otter demographics and movement is planned for northern Kodiak Island and a growth study of otters is planned for the northern Kodiak and Shuyak island areas. Sea urchin populations would be monitored in Chiniak Bay and southern Kodiak Island.

Experiments by permittees assessing the feasibility of mariculture for weathervane scallops would continue for the first few years of the planning period. Experimental culture of blue mussels is currently permitted at one site in Raspberry Strait. This alternative limits the area where mariculture could be practiced around Afognak Island to the 11,544 acres of intensive management in Kazakof, Kitoi, and Discoverer bays and the 640 acres of moderate management at the existing experimental site at Raspberry Strait. Log transfer facilities would also be located in Kazakof and Discoverer bays and a fish hatchery is in Kitoi Bay. For the purpose of analysis, it is assumed that no further mariculture sites are developed in this alternative.

Construction of an inclined slide log transfer facility has been approved for this site in Kazakof (Danger) Bay.

The existing Kitoi Bay hatchery would continue to produce pink salmon. Some expansion to allow for production of chum salmon would be expected. No new state operated hatcheries are expected. Commercial fishing effort in the Kitoi Bay area varies from year to year depending on projections made by the Alaska Department of Fish and Game. Currently harvest is maximized and no significant expansion is expected.

This scenario assumes no fish processors would locate in the intensive or moderate management areas since extensive fish processing facilities with air access are located in nearby Kodiak.

Womens Bay - This area currently accommodates a wide variety of industrial, military, commercial, recreational, and subsistence uses, while providing important fish and wildlife habitat. Existing use types and levels would be accommodated, while fish and wildlife management would focus on maintenance of existing populations and habitats and determining if past use areas require restoration. Existing areas of shoreline development would be in intensive management and the head of the bay would be in minimal management.

For the last ten years, seabird monitoring has occurred almost every year on 22 sites in Womens Bay (Nysewander and Barbour 1979; D. Nysewander, U.S. Fish and Wildlife Service, pers. comm. 1987). Monitoring would continue on an annual basis for the life of the plan. A reconnaissance survey of subtidal habitats would also take place within the next five years to collect baseline data from disturbed and undisturbed areas.

Special use permit sites would be subject to annual monitoring. Kodiak Reduction, Inc., a seafood by-products plant in nearby Gibson Cove, would continue to discharge a maximum 10,000 gallons of effluent per day. This effluent results from reduction of seafood processing wastes to fish meal, oil, and protein by-products. Currently operated by the city of Kodiak, the plant would be turned over to management by a cooperative of area canneries. Subtidal monitoring would be done for three years, and providing impacts are found to be minimal, future monitoring would be conducted at three year intervals. In the event that adverse impacts are found, more frequent monitoring would be needed.

In addition to the numerous seafood processing plants collectively discharging up to nearly 6,000,000 gallons of effluent daily, the waters of Womens Bay are the site of a deep water military dumping ground and are also affected by leachates from an active Coast Guard landfill. In 1987 the Service initiated sediment and benthic biota studies to determine contaminant sources, provide baseline contaminant levels, and assess the impacts on resources in Womens Bay.

Lash Corporation currently has a pier for offloading/onloading barges north of Shannon Point. Two permits for several (one to three) mooring buoys each are in effect. It is

projected that three additional permits would be granted for Lash expansion during the life of the plan.

The U.S. Coast Guard occupies virtually all of Nyman Peninsula. Base facilities include housing, airstrips, and piers. These are used for large (278-foot) cutters. The Coast Guard also has a boat ramp at the base of Nyman Peninsula. A private boat ramp is also located along the peninsula. The Coast Guard does not allow industrial development that would create electromagnetic interference with their communications receiver at Holiday Beach.

Small oil spills would occur as at any industrial terminal. The offloading of ship and aircraft fuels poses an unavoidable risk of a major spill such as occurred in the area in March of 1970.

The head of the bay would be proposed for minimal management to protect wetlands and tide flats that serve as staging areas for waterfowl and shorebirds.

Subsistence use of the area consists mostly of bottom fishing, salmon fishing, crabbing, and some clamming. Current use is estimated at about 400-500 use days per year. This use is projected to increase by 10 to 20 percent during the life of the plan.

Commercial fishing in the area is primarily for herring, crab, and salmon. These resources are fully exploited with little room for expansion. Use levels would remain at the current 300-400 days per year.

No studies have been done of recreational use of the area. Bird watching, picnicking and pleasure boating are the principal activities. This use is expected to increase as the city of Kodiak experiences low to moderate growth.

Karluk - No habitat or population management actions would be undertaken within this 3,000 foot wide strip of tidelands, submerged lands, and water column. The beach would be designated an off road vehicle area. Current subsistence use of the tidelands and water column is estimated at less than 10 days per season. This is projected to increase less than 10 percent during the life of the plan.

Commercial fishing operations in these waters account for about 200-1,100 use days per year depending on the magnitude of the pink and sockeye salmon runs. This use is projected to remain in this range as the fishery is currently fully exploited.

Islands associated with Kodiak Island - Periodic reconnaissance surveys would be performed incidental to other duties. The current uses of Bear and Harvester Islands for support of commercial fishing and grazing cattle and sheep would be continued. Harvester Island below the 200 foot contour would be designated an off road vehicle use area. Seasonal and year round living would increase on private lands adjacent to these islands. Subsistence use which is minimal now would increase an additional 10 percent during the life of the plan. Recreational use is also minimal on these islands, probably no more than 50 use days per year. This is projected to increase to about 100 use days by the end of the planning period.

Barren Islands - Fork-tailed storm-petrels, tufted puffins, and glaucous-winged gulls would be monitored annually on East Amatuli Island. Seabirds on the other Barren Islands would be surveyed every five years except as described below for Ushagat Island. Foxes would be eliminated on Ushagat Island. Seabirds and waterfowl would benefit, and both groups of birds would be monitored before and after fox have been removed from the island. Alaska Department of Fish and Game would continue to periodically monitor the northern sea lion rookery at Sugarloaf Island.

Most current public use is incidental to other activities. About 7,500 passengers per year pass near these islands on the state ferry. Halibut fishing charters utilize the waters near the islands on calm days most frequently early or late in the season. Some sightseeing may be done by these boats as well. An expedition charter boat occasionally visits the Barren Islands. A helicopter flightseeing company in Homer currently has a special use permit to land tourists on Ushagat Island. No use data have been collected on the Barren Islands, but use is believed to be very low due to the limiting factors of bad weather, rough water, and strong tide rips. Probably no more than 25 use days per year actually occur on the islands or

immediately adjacent waters with another 5,000 incidental use days of sightseeing from the ferries and halibut charters. Direct use would double to 50 use days during the life of the plan mainly for bird watching and marine mammal watching charters.

Mushroom Islets - No management activities would occur. Periodic reconnaissance surveys would be performed incidental to other duties.

Tuxedni Subunit - The 160 acres of nonwilderness, moderate management area at the north end of Chisik Island would be heavily developed with cabins in support of commercial fishing activities. In addition to the ten cabins located there now, up to seven new cabins would be permitted to accommodate set net permit holders displaced from within the Wilderness area. The Columbia-Ward cannery at the southern end of Chisik Island would continue to support the set net fishery at its current level; while the cannery itself is not operating, setnetters continue to buy gas and use the docks there. Black-legged kittiwakes, murres, puffins, and cormorants would be monitored on an annual basis. Service law enforcement staff would visit the area each year during fishing season to monitor cabin use. A baseline study of the flora of Chisik Island would be conducted to determine species sensitivity to air pollution. An air quality monitoring site would be installed within the next five years.

Homer, Kachemak Bay and adjacent waters (including Sixty-foot Rock) - Seabirds at Gull Island and Sixty-foot Rock would be monitored annually. Transects of birds and marine mammals in the bay would be conducted incidental to other projects. This scenario assumes Gull Island would be reacquired by the refuge through purchase or land trade. Visitor use data have never been collected for Gull Island and Sixty-foot Rock. However, at least two or three tour boats carrying 20 people visit Gull Island daily in summer. In addition, numerous private boats visit the island daily as it is only one mile from Homer boat harbor. Sixty-foot Rock is visited by one charter company daily and the twice weekly ferry to Seldovia. Sightseeing use of these rocks is projected to increase by 300 percent during the life of the plan.

A visitor center and refuge headquarters building would be constructed in Homer by the end of the planning period. Information collected in surveys described above would supplement wildlife displays. An outdoor recreation planner and seasonal technicians would be added to the staff to run the visitor center and public use program. Presentations would be given to schools and local organizations. Visitor center use is expected to increase from the 1,000 visits recorded at the small center in the current refuge office to 30,000 per year. Total visitor use of the Homer area was 200,000 visitors in 1986 (Becky Paul, Chamber of Commerce, pers. comm. 1987).

Pye Islands - Wildlife management would consist of monitoring black-legged kittiwakes, murres, cormorants, gulls, and puffins every ten years. The Alaska Department of Fish and Game would periodically census sea lions at the Outer Island rookery.

Many visitors combine cruising in Kenai Fjords National Park with viewing of the refuge. Private recreational boat use is estimated at 120 use days per year. Charter boat service to the area began in 1984, with a Seward company offering three overnight excursions per summer to Nuka Bay (Kenai Fjords Park), totalling an estimated 80 use days. This use is expected to double within the life of the plan.

Chugach Islands - No management activities would occur. Periodic reconnaissance surveys would be performed incidental to other duties.

Chiswell Islands - Wildlife management would consist of monitoring black-legged kittiwakes, cormorants, puffins, murres, storm-petrels, parakeet auklets, rhinoceros auklets, and pigeon guillemots at least every three years. Difficult sea conditions make more frequent monitoring unlikely.

Public use is expected to double during the planning period, due to the island group's location at the mouth of Resurrection Bay, adjacent to Kenai Fjords National Park, and approximately 35 miles from Seward. Current use of the area is estimated at 24,000 incidental use days per year from approximately 90 boats per week during the tourist season. This use

consists of approximately 25 sightseeing charters per week, approximately 35 sport fishing charters per week, eight cruise ships a summer, and approximately 30 private boats per week (U.S. Dept. of the Interior 1988). Only about ten people per year actually land on the islands due to their rugged character. Visitation during the months of June, July, and August has increased 20 fold since this area was added to the refuge in 1980. Scheduled tours of the Chiswells began in 1982.

Middleton Island - This island is in private ownership, but the Service has an easement to most of the seabird areas with stipulations that they be treated like other refuge lands. Management would consist of annually monitoring black-legged kittiwakes, murres, cormorants, puffins, and glaucous-winged gulls and an annual beached bird and marine mammal survey. One or two tour groups visit the island each year, an estimated 60 use days per year. This use is projected to increase to 100 use days per year by the end of the planning period. Rabbit hunters also visit the island, an estimated 20 use days per year.

St. Lazaria Island - Wildlife management would consist of monitoring every three years storm-petrels, puffins, murres, rhinoceros auklets, eagles, and glaucous-winged gulls.

A 225 percent increase in public use would occur. The existing level of use by charter boat clients is estimated at 2,000 use days per year during a 12 week season. This use is projected to increase to 4,500 use days per year by the end of the planning period. The increased use would be largely due to visits from several charter vessels having a 150 person capacity. The Service would work with the local charter boat operators association to protect seabirds from disturbance.

Hazy Islands - Wildlife management would consist of seabird surveys conducted incidental to other duties or at least at 10 year intervals.

Forrester Island - Wildlife management would consist of monitoring seabird populations and productivity every five years. Alaska Department of Fish and Game would monitor sea lions periodically. Occasional special use permits would be issued for tourism, geological work, or professional photography.

Past Canadian exploration for oil in Dixon Entrance appears encouraging and would be anticipated to continue. There is currently a moratorium on exploratory drilling, but consideration is being given to lifting this ban. Tanker traffic off the coast of southeast Alaska would continue to pose a threat to seabirds nesting on refuge lands in this region.

Scenario for Long Term (more than 15 years) Wilderness Impacts

The long term scenario is used only for analyzing the long term impacts of the wilderness proposal, in this case, no wilderness, on the 7,905 suitable acres in this unit (Table 48). The suitable areas are the Uganik Bay islands of Kodiak; the Afognak islets except for Delphin and Discoverer; Carl, Sugarloaf, Sud, and Nord islands in the Barren Island group; all of the Pye Islands except for Ragged; and all of the Chiswell Islands except for Rugged and Pilot Rock. This scenario only includes activities which would affect those areas.

Oil and gas leasing and studies would not occur on these areas, because the potential is too low. Additional oil development would not occur in the Cook Inlet or Kodiak basins, because the potential is too low. Tanker traffic described in the short range scenario would continue for at least another 20 years. Commercially important fisheries would be fully exploited with little room for expansion.

The only subsistence use which is known to occur on the suitable islands now is on the Uganik Bay islets off of Kodiak. This use, which is probably less than 30 use days per year now, would double to 60 use days. Cabins and lodges would increase on private land near the refuge islands in the Uganik Bay group, the Afognak group, and the Pye Islands.

Recreational use would increase to five times the current level for the Barren and Pye island groups and three times the current level for the Uganik Bay, Chiswell, and Afognak island groups. Current recreational use of the suitable portion of these island groups has

never been determined but for the purposes of analysis is estimated at 50 use days per year for the Kodiak Island group, less than 25 for the Afognak, 25 for the Barrens, 40 for the suitable islands in the Pyes, and 24,000 for the Chiswells. Over the long term this use would increase to: 150 use days for the Kodiak Island group, 75 for Afognak, 125 for the Barrens, 200 for the Pyes, and 72,000 for the Chiswells.

Biological Impacts of Alternative A - Gulf of Alaska Unit

Marine flora and fauna - Impacts on these organisms are included for Service managed waters in the Karluk, Womens Bay and Afognak areas. Log transfer facilities around Afognak Island would continue to deposit bark within the waters and submerged lands of the refuge covering two to six acres of submerged lands per facility, affecting three different bays. Bark accumulation could profoundly reduce local benthic productivity through smothering of infauna or alteration of substrate. The degree and extent of these effects at each site would depend on water currents and flushing action. Grounding of log bundles during low tides could also produce negative effects on benthic substrate and infauna. New log transfer facilities would require land fills of about 0.5 acre each. These structures would displace habitat currently supporting kelp, eelgrass beds, and a variety of crabs, shrimps, clams, snails, starfish, marine worms, sea otter foraging areas, and fishes. Building of docks, slides, and staging areas will result in discharge of sediments into the intertidal zone. In addition, operation of the facilities may result in discharge of sediments and hydrocarbons in nearshore waters, affecting perhaps three to five additional acres. Permit stipulations would require that bark be contained and then removed from refuge waters. Some impacts would be mitigated by constructing artificial reefs and transplanting eelgrass. These measures have never been tried in Alaska and their potential for success is unknown. The impacts of alternative log transfer facilities at Afognak were evaluated in 1987 (Arctic Environmental Information and Data Center 1987).

Development of mariculture structures in Raspberry Strait would obscure light penetration and create small localized reductions in primary production. Support structures such as docks would result in losses of about 0.5 acres per project of nearshore habitat. Furthermore, if non-native shellfish spat are used, inadvertent introductions of predatory invertebrates may occur that could prove harmful to native shellfish populations. Importation of exotic diseases and potential dissemination of indigenous aquatic animal diseases by movement of mariculture species would be adequately controlled by existing state regulation. Environmental contamination may be caused by therapeutic drugs or chemicals used in mariculture practices. Escape of cultured organisms could lead to interbreeding with wild stocks, causing genetic problems.

In the Womens Bay area, localized adverse impacts to benthic communities would continue from periodic oil spills. Loss of an unknown acreage of bottom habitat may also occur from build-up of organic material off the Kodiak Reduction, Inc., plant at Gibson Cove. As the population of Kodiak increases, there would be greater pressure to create land fills along the nearshore waters that would result in primary impacts to lower food chain organisms. Similarly, greater human demands on shellfish such as crabs and clams would be anticipated.

Fish - Within waters of this unit, impacts from commercial fishing would generally be minor. The primary finfish harvests are anticipated to continue at existing levels. Loss of less than five percent of the herring spawning habitat at Afognak Island would occur with construction of three log transfer facilities on the island. Additional industrial/urban developments around Womens Bay are expected to encroach upon fish rearing habitat in that area. Consumptive pressures on fish and shellfish resources would also be greater as the population of Kodiak Island expands.

Impacts of fishery resources adjacent to refuge waters are difficult to assess with the available information. Although there may have been decreases in some bottomfish, only preliminary analyses are available.

Waterfowl and shorebirds - As the population of Kodiak Island continues to expand, industrial and urban development pressures would likely

result in loss of perhaps several acre- subtidal habitat at Womens Bay. These activities would probably have little impact on the several hundred to a thousand waterfowl that use areas proposed for minimal management (Nishimoto et al. 1985). Most of the tidal flats used by semipalmated plover, American golden plover, black-bellied plover, surfbird, black turnstone, least sandpiper, rock sandpiper, dunlin, and short-billed dowitcher would be similarly protected. However, chronic, low level oil discharges associated with industrial terminals and fuel docks at Womens Bay would affect several species of diving ducks, particularly during the winter. Such spills could adversely affect oldsquaw, Steller's eider, greater scaup, common goldeneye, bufflehead, and scoters.

Seabirds - There is insufficient information to determine the impacts of commercial fishing on seabird forage species in Alaska, but studies have been done elsewhere such as California (Ainley and Lewis 1974), Peru (Schaeffer 1979, Furness 1982, Furness 1984), and Newfoundland (Brown and Nettleship 1984, Carscadden 1984). A seabird species generally prefers only a few types of food items. If its preferred food item is unavailable due to over-exploitation, a particular species may not be able to efficiently switch to other unexploited forage fish. Juvenile walleye pollock can be important in the diets of murres and puffins. Sanger and Hatch (1987) suggest that pollock are not an important prey item among tufted puffins in the Gulf of Alaska Unit although they are important elsewhere. No food habit data involving commercial fishes exist for other seabird species within the unit at this time.

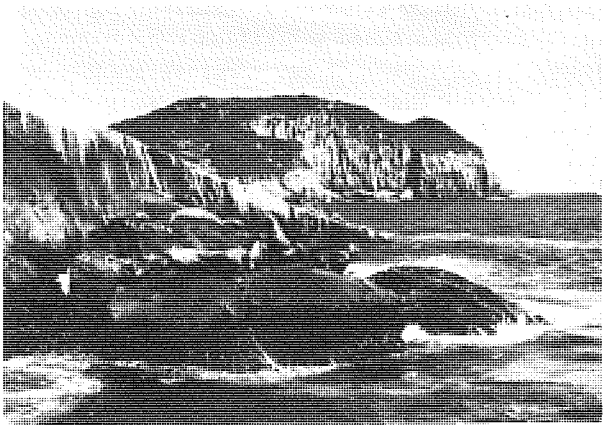
Timber harvest in the Afognak area would have little effect on most seabirds. However, marbled murrelets nest primarily in old growth forests and would lose breeding habitat to clearing. Since these birds are solitary nesters, the size of the affected population on Afognak Island is unknown, although it is commonly observed in bays around the island. The loss of old growth forests and subsequent decline of these species on the west coast of North America was of sufficient magnitude to raise concerns about the health of this population among seabird biologists (Pacific Seabird Group Workshop, Annual Meeting 1986).

Incidental impacts on other seabirds may occur with increased human activities near logging camps as well as boat and aircraft traffic near the transfer facilities at the north and south side of the island.

In Womens Bay, minor losses of birds due to oiling from occasional oil spills would decline as measures are taken to correct existing defects; other development activities occur away from seabird habitat and would have negligible impacts. Elsewhere in the Kodiak Archipelago and the Barren Islands, impacts may result from oil spills from tanker traffic. The greatest threat to the Tuxedni seabirds relate to potential oil spills resulting from tankers transporting north slope oil to refineries on the Kenai Peninsula. The 125,000 gallon oil spill from the tanker Glacier Bay on July 2, 1987, clearly demonstrated this problem. Furthermore, clean-up efforts in the tidal rips of Cook Inlet suggest that containment of oil in these waters is difficult, if not impossible. Under a worse case scenario, a spill during summer would have major adverse impacts on the seabird colonies in Cook Inlet and Kachemak Bay.

In the Pye Islands, seabird populations could be affected by oil spills caused by tankers transporting Prudhoe Bay crude oil from Valdez to Nikiski. A spill during the breeding season could be lethal to the entire colony under the worst case scenario. Tanker traffic from Valdez would create the potential for oil spills resulting in oiled birds and mortalities to prey species at Middleton Island. A spill near the island during the summer would be fatal to the entire colony under a worst case scenario. Even a spill in the open Gulf can kill many seabirds, as observed on Middleton Island in 1987 (V. Mendenhall, U.S. Fish and Wildlife Service, pers. comm. 1987), near Ketchikan in December 1979 (U.S. Fish and Wildlife Service files) and on the coast near Homer in November 1967 (U.S. Fish and Wildlife Service files).

Eradication of arctic foxes at Ushagat Island in the Barrens should be particularly beneficial to burrow nesting seabirds such as puffins and storm-petrels. Glaucous-winged gull populations should also be expected to increase. Cliffs that are currently accessible to foxes should show an increase in black-legged kittiwakes, murres, and cormorants.



Although northern sea lions appear plentiful to visitors to the Chiswell Islands, the world population of this species has declined by 50 percent in the past 10 years.

In the Tuxedni subunit, Chisik and Duck islands, set nets would continue to entangle common murres. Human activities would attract gulls, increasing their population and thus their predation on kittiwakes, cormorants, and murres.

In the Chiswell Islands, increased visitation by charter boats may result in a decline of cormorants since they sometimes abandon nests when frequently disturbed. Occasional landings on these islands would disturb nesting birds and quite likely result in crushed storm-petrel burrows. The rhinoceros auklets at Matushka Island, one of the northernmost colonies of this species, would be similarly impacted by human visits on the island. Increased human use of islands in Womens Bay may also impact sensitive species such as cormorants and Aleutian terns.

At St. Lazaria increased boat visits around the island could cause cormorants to decline as they abandon nests due to disturbances. Increased incidence of crushed storm-petrel, rhinoceros auklet, and tufted puffin burrows are expected if landings on the island increase. With uncontrolled visitor use, up to 15 percent of the burrow nesting habitat could be lost.

At Middleton Island some decline in cliff nesting habitat is anticipated as the island continues to naturally erode.

Marine mammals - As sea otter populations continue to increase in the Afognak area and near refuge areas off Kodiak Island, conflicts between otters and commercial fishing could escalate which could result in increased illegal killing or harassing of otters in localized areas. Pressure to control sea otter predation at the experimental mariculture site can be anticipated, if sea otters successfully prey on the species (scallops and mussels) being cultured. Mariculture special use permits would require effective exclosures that would not harm wildlife. Increased fishing effort for sea urchins and razor clams could affect sea otter populations through their food source. If bark is not removed from the waters around log transfer facilities, it could impact sea otter food sources in localized areas.

Sea lion populations in the Barren Islands would continue to decline until the cause of this decline is identified and corrective actions can be taken. In the Chiswell Islands, some disturbance to sea lions can also be expected from tour and recreational boating traffic; however, occasional disturbance would have negligible impacts on the refuge sea lion population.

Terrestrial birds and mammals - At Tuxedni subunit, bears that occasionally use Chisik Island would be harassed or killed, if they become a nuisance or threaten the lives of temporary residents of the island. About one or two animals per year would be involved. Since Discoverer and Delphin islands would be clearcut, Sitka black-tailed deer winter range would be lost and deer numbers could decline on these islands. Bear mortalities would probably occur during the logging operation due to conflicts with loggers. Furthermore, isolated bald eagle nest trees left after the timber harvest would likely be destroyed by blowdowns. Forest birds associated with old growth timber would also be lost.

Water quality and quantity - The Service has jurisdiction over the tidelands, submerged lands, and water column from Wolcott Reef to Sturgeon Lagoon in the Karluk area of Kodiak Island, the submerged lands and water column surrounding Afognak Island and the tidelands, submerged lands, and water column in Womens

Bay. There is some potential for a minor oil spill in Womens Bay, given the existing docks, fueling facilities, and Coast Guard traffic; this possibility exists regardless of which Alternative is implemented. There is also some potential for water quality degradation from leachates and runoff from past and present military dumps, both onshore and inwater.

Service divers or their consultants would systematically monitor bark accumulation and subtidal habitat at the log transfer facility at Discoverer Bay and the proposed site at the north side of the island. To maintain water quality at log transfer facilities, bark would be contained by gabions and then removed. Any runoff from upland portions of these facilities would be required to meet state water quality standards. The Service would also conduct a reconnaissance survey of subtidal habitats in Womens Bay within the next five years to collect baseline data among disturbed and undisturbed areas. The purpose of this monitoring is to detect unacceptable impacts and develop corrective measures.

The existing Raspberry Strait experimental mariculture project and the fish hatchery at Kitoi Bay are expected to have negligible impacts on refuge water quality.

Socioeconomic Impacts of Alternative A - Gulf of Alaska Unit

Cultural resources - These resources are among those targeted for protection under all alternatives. The discussion of common management directions indicates that recreational use and access to islands in this unit would be managed to minimize adverse impacts to cultural resources. People using refuge lands for a variety of purposes may cause some damage to sites, intentionally or unintentionally, and some sites may be lost to natural forces. However, these are both low-level risks and the overall impact on cultural resources under this alternative would be negligible.

Population - Since this alternative emphasizes existing types and levels of refuge use, the proposed management actions would not cause local population changes.

Economy - Eight new refuge jobs would be created in Homer. The visitor center would attract more visitors and stimulate interest in seabirds and nearby seabird colonies which would benefit charter companies and other tourist oriented businesses. Construction of the visitor center would also create jobs. This alternative would have a minor benefit to the Homer economy. Some economic stimulation can be expected from commercial fishing anticipated by the scenario for this alternative, but this would be independent of Service action. The proposed management actions would have a negligible impact on the regional economy or on the economy of most communities in the unit.

Recreation - Interpretive opportunities would increase dramatically with construction of the new visitor center and office complex in Homer. The visitor center would become a major attraction of regional significance as it would be the only such facility devoted to the Alaska marine ecosystem. Initially, visitor use days would be 30,000 per year. Addition of an outdoor recreation planner to the staff would also allow for more interpretive work in the other communities of the unit.

Charter boat visits to Gull Island and Sixty-foot Rock would increase by at least 300 percent as interest was stimulated in these areas by the visitor center. Other areas reachable from Homer such as the Barren Islands, Chisik Island, and the Pye Islands would also receive increased use as the refuge became better known and the Homer charter industry develops. Visitation would at least double in all parts of the refuge as a result of the growth of the tourist industry in Alaska.

Impacts of the Wilderness Proposal for Alternative A - Gulf of Alaska Unit

In Alternative A none of the suitable areas, 7,905 acres, would be proposed for wilderness designation. Areas suitable for wilderness designation would be managed as they are now, essentially under minimal management. Two percent of this unit is already designated wilderness, but the impacts of existing wilderness are not considered in this analysis. The impacts of nondesignation are only evaluated for the suitable areas (Table 48). The Affected

Environment chapter for the Gulf of Alaska Unit, Wilderness Review section, discusses how suitability for wilderness designation was determined. The impacts are evaluated for the two significant wilderness issues: impacts on wilderness values and impacts on wildlife populations.

Wilderness values - Gulf of Alaska Unit

Naturalness - The only management action on the suitable areas which has the potential to affect naturalness is seabird, sea otter, and sea lion monitoring. Other actions which may impact naturalness are subsistence and recreational use. Off-refuge actions which may affect naturalness are oil spills, increased commercial fishing, and cabin and lodge development on private lands.

Sea otter monitoring would be done from boats in the area of the Afognak Island group. Seabird monitoring in the Pye, Barren, and Chiswell islands would take place every three to 10 years with a crew of less than four biologists, utilizing small rafts and occasionally temporary camps. Sea lion monitoring on Outer and Sugarloaf islands would be done from boats and for pup monitoring from shore but would probably not involve temporary camps. Naturalness would not be affected. Current estimated subsistence use of less than 30 days per year is expected to increase to 60 days per year over the long term on the 1,830 acres in the Uganik island group. This use would be for deer hunting, berry picking, and trapping. These are dispersed uses which would not utilize camps except possibly for deer hunting on Sheep Island. Naturalness would not be affected. Subsistence use is not known to occur on any of the other island groups.

On 4,425 acres, all islands except the Chiswells, recreational use is projected to increase from a current level of 140 use days per year to 550 use days over the long term. Use which would occur in the Barren Island group, 125 use days, would nearly all be offshore bird watching, marine mammal observation, and photography from charter boats. Naturalness would not be affected. Use of the other island groups would be for sea kayaking, bird watching, beachcombing, sightseeing, and in some cases camping. Use would be dispersed over more than 20 islands and islets and would not lead to the development of permanent campsites or other facilities. Naturalness would not be affected.

Use of the Chiswells would increase from 24,000 use days to 72,000 over the long term. About 90 percent of this use would be from cruise ships and charter boats. The remainder would be from smaller private boats. Only about 100 use days would actually involve landing on the 3,480 acres of over 20 islands and islets in the group. Some camping would occur, but it would not lead to the development of permanent campsites. The cormorant population may decline up to 10 percent on the six islands visited most frequently by tour boats. Cormorants sometimes abandon nests when frequently disturbed. This would be a negative impact on naturalness.

There is a 25 percent chance of oil spills from tanker traffic into and out of Cook Inlet. Due to location near the shipping routes, the Barren, Pye, and Chiswell islands are most at risk from a spill. The suitable islands of the Barren and Chiswell island groups both have large numbers of seabirds (70,000) and sea lions, and the Chiswells are extremely important as one of the most visited bird colonies in the state. Sea otters in the Barrens and around the Afognak islets are also at risk. Otters depend on clean fur to maintain their body temperatures. Oil could wash ashore on these islands, but the most likely impact is mortality of seabirds or otters that become oiled when diving for food. The magnitude of the impact cannot be determined because mortality could vary from none to thousands of birds or hundreds of otters depending on the time of year (seabirds are present primarily in summer), type of hydrocarbons involved, location of accident, currents, and weather conditions. If a major oil spill in a crucial location at a vulnerable time caused the mortality of seabirds or otters on one of the islands at risk, naturalness would be affected.

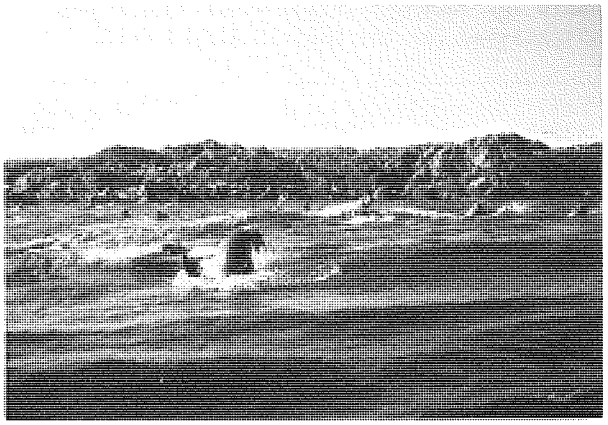
It is not known whether increased commercial fishing for pollock, a favored seabird prey species, is affecting or could affect seabird numbers during the life of the plan (see the discussion in the Biological Impacts for Alternative A, Seabirds, section above). Seabirds have been affected by fishing pressure on prey species in other areas of the world (see

Table 48. Summary of the wilderness proposal by alternative for the Gulf of Alaska Unit.

Suitable Areas	Suitable Acres	Proposed acres (Alternative) A	B	C
Uganik Bay Islets				
Noisy Island	40	0	40	0
Unnamed island adj. to Noisy I.	40	0	40	0
Islets at head of Northeast Arm	15	0	40	0
Sally Island	1,560	0	1,560	0
Sheep Island	80	0	80	0
Green Island and islets	95	0	95	0
Afognak Island group				
Grassy Island	10	0	10	0
Alligator Island	20	0	20	0
Rocky Island	5	0	5	0
Sealion Rocks	5	0	5	0
Sea Otter Island	45	0	45	0
Latax Rocks	20	0	20	20
Dark Island	200	0	200	0
Carl Island	20	0	20	20
Barren Islands				
Sugarloaf Island	180	0	180	180

Table 48. Summary of the wilderness proposal by alternative for the Gulf of Alaska Unit, cont.

Suitable Areas	Suitable Acres	Proposed acres (Alternative) A	B	C
Sud Island	300	0	300	300
Nord Island	85	0	85	85
Pye Islands				
Pye Reef	5	0	5	0
Outer Island	800	0	800	800
Rabbit Island	900	0	900	0
Chiswell Islands				
Granite Island	1,560	0	1,560	1,560
Twin Islands	185	0	185	185
Dora Island	50	0	50	50
Harbor Island	670	0	670	670
Natoa Island	270	0	270	270
Beehive Islands	20	0	20	20
Matushka Island	200	0	200	200
Chiswell Islands	15	0	15	15
Lone Rock	5	0	5	5
Seal Rocks	15	0	15	15
Chat Island	100	0	100	100
Cheval Island	190	0	190	190
Unnamed Islands	200	0	200	200
Totals	7,905	0	7,905	4,885



Harbor seals, sea otters, and sea lions haul out on the Latax Rocks located a few miles north of Shuyak Island.

the discussion in the Affected Environment chapter, Off-Refuge Environment). Sea lions may also decline due to increased pollock fishing. Sea lions have already declined about 50 percent in the Gulf of Alaska Unit and particularly on Sugarloaf Island. It is not known if this decline is related to increased commercial fishing. Sea otters may also decline due to increased fishing for their prey species, urchins and clams. Over the long term, seabirds, sea otters, and sea lions may decline on the islands due to decreased prey species. As a result, naturalness would decline on suitable areas where seabirds or marine mammals are a major part of the natural ecosystem: the Barrens, Latax Rocks, the Pye Islands, and the Chiswell Islands.

Cabins and lodges on private land would impact naturalness only on the Uganik Bay islands which are close to the areas likely to be developed. Structures and increased boat traffic would be visible from the islands under consideration. The other suitable islands are too remote to be affected.

Conclusion - Seabird, sea otter, and sea lion monitoring and subsistence use would have no impact on naturalness. There is less than a 25 percent chance that an oil spill would have a negative but unknown impact on naturalness on the Barrens, Pye, and Chiswell islands. Over the long term, the risk of an oil spill would continue for an additional 20 years; commercial fishing may have a negative impact on naturalness on important seabird, sea otter, and sea lion islands; cormorants, and thus naturalness, would decline on about six islands in the Chiswells group due to increased tour boat visits; and nearby private development would affect naturalness on the Uganik Bay islands.

Outstanding opportunities for solitude - The only management activity which may impact solitude is seabird, sea otter, and sea lion monitoring. Recreational and subsistence use and recreational developments on private land may also impact solitude.

Sea otter monitoring and studies would be done from boats with small crews near the Afognak island group. The crews may be in the area for several months and more than one season. However, it is unlikely that they would land on any of the islands very often. Seabird monitoring would be done by crews of two to four people every three to 10 years in the Barren, Chiswell, and Pye islands. They would probably spend no more than one week in each island group. Anyone visiting in those islands during that time would probably be aware of their presence. Solitude would be affected for that short time. Sea lion monitoring of Outer and Sugarloaf islands would probably require only one reconnaissance trip by boat per year that would last a few hours. Solitude would not be affected.

On 4,425 acres, all islands except the Chiswells, recreational use is projected to increase from a current level of 140 use days per year to 550 use days over the long term. Use which would occur in the Barren Island group, 125 use days, would nearly all be offshore day use from charter boats. Solitude would not be affected. Use of the other island groups would be for sea kayaking, bird watching, beachcombing, sightseeing, and in some cases camping. Use would be dispersed over more than 20 islands and islets. Solitude would not be affected.

Use of the Chiswells would increase from 24,000 use days to 72,000 over the long term. About 90 percent of this use would be from cruise ships and large charter boats with the remainder from

smaller private boats. Use occurs almost exclusively in June, July, and August, is concentrated from late morning through mid-afternoon, and is generally only around the closest islands: the Chiswells, the Beehives, Cheval, and Natoa. During that time period, on those affected islands, solitude is not outstanding now and opportunities would continue to erode with increased use. Solitude opportunities would not be affected on the remainder of the islands. Only about 100 use days would involve landing on the 3,480 acres of over 20 islands and islets in the group. This increase from the current level of 10 use days is not enough to affect opportunities for solitude. Rough seas and lack of suitable landing sites would remain a limiting factor.

Boat traffic from nearby cabins, lodges, and set net sites as well as commercial fishing boat traffic, subsistence use of 60 days per year, and recreational use of 150 days per year would lead to a loss of solitude opportunities during the summer on the smaller islands in the Uganik Bay group. Although lodges, cabins, and recreational development would occur on Afognak Island and in Nuka Bay near the Pye Islands, the suitable islands are difficult to reach and too remote from the areas of most probable development to be affected. Solitude opportunities would not be affected.

Conclusion - Solitude opportunities would be lost during the summer months on the most accessible of the Chiswell Islands due to increased tour boat use. Opportunities would also be lost over the long term on the Uganik Bay islands during the summer months due to increasing boat traffic, developments on nearby private lands, and recreational and subsistence use. Solitude opportunities would be affected for about a week every three to 10 years in the Chiswells, Barrens, and Pye island groups while seabird monitoring studies are being conducted.

Outstanding opportunities for primitive recreation - The only management action which has the potential to affect primitive recreation opportunities is establishment of a visitor center in Homer. Actions which may occur off the refuge with the potential to affect opportunities for primitive recreation are oil spills, commercial fishing, and the growth of the tourist industry in Homer, Seward, and Kodiak.

The development of a Service visitor center at Homer with a projected yearly attendance of 30,000 visitors, would increase awareness of and interest in refuge lands and resources. This would lead to increased use of the Pye and Barren islands and would also stimulate the charter industry in Homer. Recreational use of the suitable areas in the Pye and Barren island groups would increase from 65 days per year now to 325 over the long run. Opportunities for bird watching, marine mammal observation, and photography would increase in the Barren and Pye islands. Opportunities for sea kayaking, boating, and camping would increase in the Pye islands.

The well developed charter boat industry as well as the cruise ship industry would continue to grow in Seward. Cruise ship use of Seward is expected to increase from 20 ships in 1987 to 30 in 1988. Charter boat, private boat, and cruise ship use of the Chiswell Islands has grown from its beginnings in 1982 to 24,000 use days in 1987. Use is projected to increase to 72,000 use days per year over the long term. This would be a major increase in opportunities for bird watching, marine mammal observation, sightseeing, and photography in the Chiswell Islands. Growth of the recreation industry including lodges, charters, and guides, around Kodiak and Afognak would have less impact on the suitable areas because of their remote locations. However, recreational use of the Uganik Bay islets and the Afognak Island group would increase from an estimated 75 use days per year now to 225 over the long term. Opportunities would increase for bird watching, sea kayaking, camping, boating, marine mammal observation, and sightseeing.

Should an oil spill or overfishing cause seabird, sea lion, or sea otter populations to decline as discussed under naturalness, opportunities for primitive recreation would decline. Bird watching, marine mammal observation, and wildlife photography are some of the best opportunities on the suitable areas, and these would be affected by declines in wildlife populations.

Conclusion - Recreational opportunities on all the island groups, particularly the Chiswells, would increase as a result of growth in the tourist industry. Use of the Barren and Pye island groups would increase as a result of the increased knowledge of and interest in these areas stimulated by the new visitor center in Homer. There is less than a 25 percent chance that an oil spill would impact seabird and marine mammal populations and thus decrease opportunities for bird watching, marine mammal observation, and wildlife photography. Over the long term, increased fishing would lead to a decline in seabirds and mammals which would impact recreational opportunities.

Special features - The special features of the suitable areas are sea lion rookeries, large or unique seabird colonies including 30,000 black-legged kittiwakes on Nord Island and rhinoceros auklet and fulmar colonies on the Chiswells, and Taz Basin in the Chiswells.

There are no management actions which would impact the special features. Actions which would occur off the refuge with the potential to affect these features are oil spills and increased commercial fishing.

A major oil spill in a crucial location at a critical time could cause seabird mortality as discussed above under naturalness. Seabird colonies on the Barren, Pye, and Chiswell island groups are most at risk. Impacts from oil spills on sea lions would be negligible. Increased commercial fishing for forage fish could lead to declines in seabird and sea lion populations as discussed above under naturalness.

No management actions or off-refuge actions during the life of the plan or the long term would impact Taz Basin in the Chiswells.

Conclusion - During the life of the plan there is less than a 25 percent chance that an oil spill would have a negative but unknown impact on seabirds. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabirds and sea lions.

Wildlife populations - Gulf of Alaska Unit

Under Alternative A, the Service would monitor seabirds and sea otters, and the Alaska Department of Fish and Game would monitor sea lions. These activities would not be affected by the lack of a wilderness designation. Another action which may impact wildlife populations is increased recreational use. Oil spills and increased commercial fishing would still occur off the refuge as these are actions over which the Service has no control. No other activities would impact wildlife populations.

Seabird, sea otter, and sea lion monitoring would have no effect on populations but would increase knowledge of population dynamics. Increased recreational use of the Chiswell Islands to 72,000 visitor use days over the long term, could cause a decrease in cormorant populations of up to 10 percent. Cormorants sometimes abandon their nests when frequently disturbed. This is discussed in greater detail under naturalness.

Seabird and otter mortality from oil spills could vary from zero to thousands of birds or hundreds of otters depending on the time of year, type of hydrocarbons involved, location of accident, currents, and weather conditions. There is about a 25 percent chance of a spill. Increased fishing for prey species would impact seabird, sea otter, and sea lion populations as discussed under naturalness.

Conclusion - During the life of the plan, there is less than a 25 percent chance that oil spills would have a negative but unknown impact on seabirds and sea otters. Cormorants would decline during the life of the plan and in the long term on the Chiswell Islands due to increased visitor use. Also over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabird, sea otter, and sea lion populations.

Subsistence/Section 810 Evaluation and Findings - Gulf of Alaska Unit

Evaluation - This section examines the impacts on subsistence that would result from

implementation of Alternative A. It also conforms to the guidelines recommended by the Alaska Land Use Council and the guidelines of the Department of the Interior for complying with section 810 of the Alaska Lands Act.

Overall within this unit, Alternative A would have negligible impacts on subsistence users and the resources upon which they depend. Very little subsistence use occurs on refuge lands in this unit. Homer and Seward by law are not subsistence communities. However, subsistence activities are common among Kodiak Island villagers. Placement of log transfer facilities in three Afognak bays that were traditionally used for fishing may displace a few potential subsistence users from those waters. Although Alternative A would permit no additional development in Womens Bay, existing dock facilities, boat traffic, and onshore fueling facilities could result in a minor oil spill, which would degrade water quality and render that area less suitable for subsistence clamming and fishing. Nothing in this alternative would increase competition with nonlocal people in the areas where subsistence activities do occur, Womens Bay and the Afognak waters.

Availability of other lands - Section 810(a) requires that the availability of other lands and other alternatives be considered in evaluating the effects of all management actions including comprehensive conservation plans on subsistence uses. This plan is a refuge plan by definition and addresses the general suitability of a broad range of activities for refuge lands. Thus, although there may be other lands available for the uses considered, lands outside of the refuge are not considered because they are beyond the scope of this plan.

Other Alternatives - Three alternatives were developed for the Alaska Maritime Refuge. This alternative maintains the current situation in refuge management.

Finding - The net effect of this alternative would be minor increases in subsistence harvest levels due to local population increases. Log transfer sites could displace subsistence users from highly localized areas within three bays around Afognak Island. Increases in competition between local and nonlocal users and among local users would be negligible.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

ALTERNATIVE B - GULF OF ALASKA UNIT

Scenario for the Life of the Plan (10-15 Years)

Three percent of the unit would be in intensive management, four percent in moderate management, and 89 percent in minimal management. This alternative proposes 7,905 acres, two percent of the unit, for wilderness designation. An additional two percent of the unit is already Congressionally designated wilderness (Table 47).

This scenario assumes Congress approves the recommendation and designates these proposed areas as wilderness. Management of the wilderness areas would be subject to the provisions of the Wilderness Act as amended by the Alaska Lands Act. Wilderness management policy prohibits oil and gas leasing and oil and gas studies that utilize mechanized equipment unless performed by an Interior Department agency. It also prohibits the use of mechanized equipment in wilderness areas except for snowmachines, motorboats, and airplanes. Subsistence users may also use chainsaws. Commercial activities, except as they relate to providing a service to recreational users such as guiding, are generally prohibited in wilderness.

As in Alternative A, this scenario assumes there would be no mining on the refuge, no oil and gas studies or leasing anywhere on the refuge, no oil and gas development offshore of the refuge, and continued shipped of oil into and out of Cook Inlet (see the scenario for Alternative A). Assumptions regarding increases in commercial fishing apply here as well.

Management actions described for fish and wildlife management and air and water quality monitoring would also take place in this alternative. In addition, fishery management activities would emphasize active participation in management bodies responsible for marine forage fish management.

Interpretive displays would be developed for Juneau, Sitka, and the marine highway system. These displays would increase interest in the refuge and lead to increased use of St. Lazaria and increase sightseeing from the ferry when passing the Barren and Chiswell islands. As in Alternative A, the increase in tourists, the growth of the charter industry, and the greater visibility of the refuge after construction of the visitor center are the major factors affecting increases in recreational use. Wilderness designation of an additional 7,905 acres would not increase visitor use.

Afognak area - Assumptions discussed in Alternative A of three log transfer facilities, timber harvest on Delphin and Discoverer islands, maintenance and some expansion of the Kitoi Bay hatchery, and the absence of seafood processors apply to this alternative as well.

Experiments assessing the feasibility of mariculture for weathervane scallops would continue for the first few years of the planning period. Shellfish mariculture is now legal in Alaska; this scenario assumes that finfish mariculture is legalized by the end of the planning period, and that experimental mariculture projects in Raspberry Strait are successful. Under this scenario all of Raspberry Strait would be in moderate management (20,768 acres). Based on draft state of Alaska aquatic farming projections, this scenario assumes that five percent of the mariculture development projected for the five years after legislative action would take place in the Afognak area. The draft state aquatic farming projections portray two sets of criteria for state approval of aquatic farms, a more liberal and a more conservative set. For the purposes of analysis, this alternative assumes the state would apply the more conservative criteria in approving mariculture projects. These projections assume 1) good screening of applicants, 2) a good "prove up" period, 3) good site review criteria, and 4) most applications will be for medium and large projects. Using these projections and assumptions, 25 permit applications would be expected during this five year period. Two to five of these projects would be expected to become operating aquatic farms, with a 10-20 percent success rate. It is assumed that the number of finfish farm proposals would be low because of compatibility requirements for this type of project. For analysis purposes it is assumed that two permit applications would be for finfish projects. Neither of these would be expected to become operating aquatic farms.

All mariculture projects would require a special use permit which would determine the compatibility of the project with refuge purposes including the conservation of "fish and wildlife populations and habitats in their natural diversity including, but not limited to marine mammals, . . ." [Alaska Lands Act section 303(1)(b)(i)]. For the purposes of analysis it is assumed that the technology would be developed to effectively exclude sea otters from mariculture projects without inflicting harm on the animals, which would be considered illegal "taking" or harassment under the terms of the Marine Mammals Protection Act.

Womens Bay - The scenario for the bay would be similar to Alternative A.

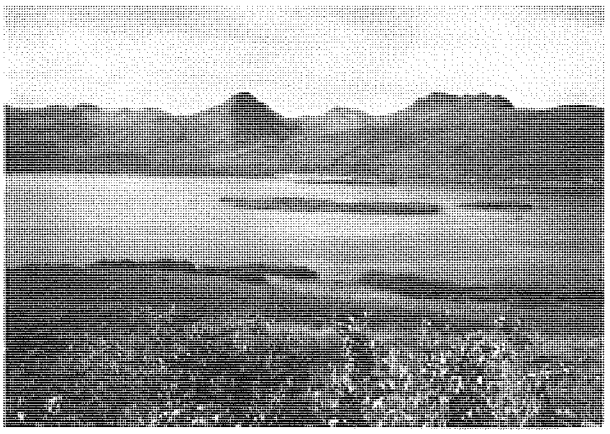
Pye Islands - The scenario for the Pye Islands would be similar to Alternative A except that Outer and Rabbit islands would be designated wilderness.

Chiswell Islands - There would be little change from Alternative A except that most islands would be designated wilderness.

Scenario for Long Term (more that 15 years) Wilderness Impacts

In Alternative B, proposed wilderness areas would be designated wilderness. As in the short term scenario, oil and gas leasing and studies, commercial uses other than recreation-related, and the use of mechanized equipment would be limited on the proposed wilderness areas.

This scenario is similar to the long term scenario for Alternative A in that oil and gas leasing and studies and mining would not occur on the proposed areas, additional oil development would not occur in Cook Inlet or Kodiak basins, oil shipping into and out of Cook Inlet would continue for at least another 20 years, and commercially important fisheries would be fully exploited with little room for expansion.



Although Womens Bay accommodates a wide variety of industrial, military, and commercial uses, the head of the bay remains an important habitat area easily accessible to residents of Kodiak.

Visitor use would increase as described in the long term scenario for Alternative A except that incidental sightseeing use of the Barren and Chiswell island groups would increase from the ferry as a result of the interpretive display. As in the short range scenario, wilderness designation would not affect the amount of visitor use. Cabins and lodges would increase on private land near the refuge islands in the Uganik Bay group, the Afognak group, and the Pye Islands as in Alternative A. Subsistence use would be as described for Alternative A, 60 use days per year in the long run for the Uganik Island group.

Biological Impacts of Alternative B - Gulf of Alaska Unit

Marine flora and fauna - Except for mariculture projects, impacts associated with this alternative would be the same as Alternative A.

The two to five aquatic farming projects that would be developed in Raspberry Strait would obscure light penetration and create small localized reductions in primary production. Support structures such as docks would result in approximately 0.5 acre losses of biota per project at start up; an average of 2 acres could ultimately be lost. If nonnative shellfish spat are used, inadvertent introduction of predatory invertebrates may occur that could prove harmful to native shellfish populations.

Importation of exotic diseases and potential dissemination of indigenous aquatic animal diseases by movement of mariculture species would be adequately controlled by existing state regulations. Environmental contamination may be caused by therapeutic drugs or chemicals used in mariculture practices. Escape of cultured organisms could lead to interbreeding with wild stocks, causing genetic problems.

Increased numbers of finfish and shellfish mariculture projects would increase the number of sites and localized benthic, nearshore, and upland habitats that would be altered. Increased habitat areas affected would result in additional impacts on local flora and fauna.

Fish - Impacts from commercial fishing would be as described for Alternative A.

Waterfowl and shorebirds - No change from Alternative A is anticipated.

Seabirds - Impacts would be essentially identical to Alternative A.

Marine mammals - Mariculture special use permits would require effective exclosures that would not harm wildlife. If the exclosures are not successful in preventing otters from preying on the species being cultured, particularly mussels and scallops, at the projected two to five successful mariculture projects in Raspberry Strait, increased pressures to control this species can be expected. As many as 400 otters inhabit Raspberry Strait at different times of the year. Otters move to and from Raspberry Strait on a regular basis. The Strait may be important as a migration corridor as the large population found in adjacent Marmot Bay, 750 otters in 1985, is believed to have migrated through Raspberry Strait. If mariculture projects are located in the Strait, otters may be displaced. The effects on the population of this displacement are unknown. All other impacts would be similar to those described under Alternative A.

Terrestrial birds and mammals - Impacts would be similar to Alternative A.

Water quality and quantity - The impacts of this alternative on water quality and quantity would be the same as described for Alternative A, with additional minor effects from possible mariculture efforts in Raspberry Strait. Two to five mariculture projects in the Raspberry Strait coves or bays could alter water quality in each immediate project area. However, this alternative assumes that mariculture projects are for shellfish, which would have only minor effects on water quality. No changes in water quantity would result from shellfish projects.

Socioeconomic Impacts of Alternative B - Gulf of Alaska Unit

Cultural resources - The impact of this alternative on cultural resources would be negligible; see the discussion for Alternative A.

Population - The impact of this alternative on population would be negligible; see the discussion for Alternative A.

Economy - Depending on the success of mariculture projects in Raspberry Strait, Alternative B could cause minor benefits to the economy. Other impacts of this alternative on the economy would be similar to those described for Alternative A.

Recreation - Interpretive opportunities would increase dramatically with the construction of the new visitor center and office complex in Homer and interpretive displays in Juneau and Sitka. Minor negative effects on recreation may result due to commercial mariculture development in the Afognak area. Sheltered bays most suited for mariculture are also favored spots for recreational activities. Other impacts of this alternative would be similar to those described for Alternative A.

Impacts of the Wilderness Proposal for Alternative B - Gulf of Alaska Unit

In Alternative B, all the suitable areas, 7,905 acres or two percent of the unit, would be proposed for wilderness designation which would require the approval of Congress. If Congress designated these islands as wilderness, they would be managed according to the provisions of the Wilderness Act of 1964 as amended by the Alaska Lands Act.

The two percent of this unit that is already designated wilderness, will not be included in this analysis. The impacts of designation are only evaluated for the proposed islands (Table 48). The impacts are evaluated for the two significant wilderness issues: impacts on wilderness values and impacts on wildlife populations.

Wilderness values - Gulf of Alaska Unit

Naturalness - The only management action on the suitable areas which has the potential to affect naturalness is seabird, sea otter, and sea lion monitoring. Other actions which may impact naturalness are subsistence and recreational use. Off-refuge actions which may affect naturalness are oil spills, increased commercial fishing, and cabin and lodge development on private lands.

Seabird, sea otter, and sea lion monitoring would occur under this alternative as well. Wilderness designation does not affect the ability of the Service to monitor populations and do studies. The use of temporary camps in the support of monitoring would have no impact on naturalness as discussed for Alternative A.

On all areas except the Chiswells, there would be no impacts on naturalness from subsistence use of 60 days per year and recreational use of 550 days as discussed under Alternative A. Recreational use of the Chiswells, primarily tour boat activity, is expected to increase from 24,000 visitor days per year to 72,000 over the long term. This could lead to a decline in cormorant populations of up to 10 percent on the most visited islands. Cormorants sometimes abandon nests when frequently disturbed. This is discussed under Alternative A.

The 25 percent chance of oil spills, the increase in commercial fishing, and the increase in cabins and lodges on adjacent private lands would occur under this alternative as well as Alternative A, because these are actions over which the Service has no control. These impacts are described under Alternative A.

Conclusion - Seabird, sea otter, and sea lion monitoring and subsistence use would have no impact on naturalness. There is less than a 25 percent chance that an oil spill would have a negative but unknown impact on naturalness on the Barrens, Pye, and Chiswell islands. Over the long term, the risk of an oil spill would continue for an additional 20 years; commercial fishing may have a negative impact on naturalness on important seabird, sea otter, and sea lion islands; cormorants, and thus naturalness, would decline on about six islands in the Chiswell group due to increased tour boat visits; and nearby private development would affect naturalness on the Uganik Bay islands.

Outstanding opportunities for solitude - The only management activity which may impact solitude is seabird, sea otter, and sea lion monitoring. Recreational and subsistence use and recreational developments on private land may also impact solitude.

Monitoring would utilize small crews for a short period of time as described in Alternative A. Solitude opportunities would be lost for a week every three to ten years while seabird monitoring was being conducted in the Barren, Pye, and Chiswell island groups.

Impacts from subsistence and recreational use would be as described for Alternative A. Solitude is not outstanding now and opportunities for it would continue to decline during the summer months on the most accessible of the Chiswell Islands. Visitor use of the Chiswells, mainly by tour boats and cruise ships, is expected to increase to 72,000 visitor use days from the 24,000 occurring now. This is discussed in Alternative A. In addition to the recreational use detailed in Alternative A, some additional incidental sightseeing would occur from the state ferry passing the Barren and Chiswell islands resulting from the interpretive displays on the ferry. However, there would be no impacts on solitude from this increase, because the ferry is already traveling this route. There would be no increase in recreational use as a result of wilderness designation.

Development of adjacent private lands and the resulting boat traffic, as well as subsistence use of 60 use days per year and recreational use of 150 days would lead to a loss of solitude opportunities during the summer on the smaller islands in the Uganik Bay group as described for Alternative A.

Conclusion - Solitude opportunities would be lost during the summer months on the most accessible of the Chiswell Islands due to increased tour boat use. Opportunities would also be lost over the long term on the Uganik Bay islands during the summer months due to increased boat traffic, developments on nearby private lands, and recreational and subsistence use. Solitude opportunities would be affected for about a week every three to 10 years in the Chiswells, Barrens, and Pye island groups while seabird monitoring studies are being conducted.

Outstanding opportunities for primitive recreation - The only management action which has the potential to affect primitive recreation opportunities is establishment of a visitor center in Homer. Actions which may occur off the refuge with the potential to affect opportunities for primitive recreation are oil spills, commercial fishing, and the growth of the tourist industry in Homer, Seward, and Kodiak.

As in Alternative A, access to recreational opportunities would improve as charter operators, cruise ships, guides, and lodges continue to proliferate and the new visitor center in Homer increases visitor awareness of and interest in refuge resources. As a result, opportunities would increase in all island groups but particularly the Chiswells, Barrens, and Pye islands. In addition, the new display on the marine highway system would also increase awareness of the Chiswell and Barren islands. This would increase incidental sightseeing use from the ferry.

Should an oil spill or overfishing cause declines in seabird, sea otter, or sea lion populations as discussed for Alternative A, recreational opportunities would decline. Bird watching, marine mammal observation, and wildlife photography are some of the best opportunities on the suitable areas, and these would be affected by declines in bird and mammal populations.

Conclusion - Recreational opportunities on all the island groups, particularly the Chiswells, would increase as a result of growth in the tourist industry. Use of the Barren and Pye island groups would increase as a result of the increased knowledge of and interest in these areas stimulated by the new visitor center in Homer. There is less than a 25 percent chance that an oil spill would impact seabird and marine mammal populations and thus decrease opportunities for bird watching, marine mammal observation, and wildlife photography. Over the long term, increased fishing would lead to a decline in seabirds and mammals which would subsequently impact recreational opportunities.

Special features - The special features of the suitable areas are sea lion rookeries, large or unique seabird colonies including 30,000 black-legged kittiwakes on Nord Island and rhinoceros auklet and fulmar colonies on the Chiswells, and Taz Basin in the Chiswells.

There are no management actions which would impact the special features. Actions which would occur off the refuge with the potential to affect these features are oil spills and increased commercial fishing.

A major oil spill in a crucial location at a critical time could cause seabird mortality as discussed in Alternative A. Seabird colonies on the Barren, Pye, and Chiswell island groups are most at risk. Impacts from oil spills on sea lions would be negligible. Increased commercial fishing for forage fish could lead to declines in seabird and sea lion populations as discussed under Alternative A.

No management actions or off-refuge actions during the life of the plan or the long term would impact Taz Basin in the Chiswells.

Conclusion - During the life of the plan there is less than a 25 percent chance that an oil spill would have a negative but unknown impact on seabirds. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabirds and sea lions.

Wildlife populations - Gulf of Alaska Unit

Management actions would be to administer all the proposed areas as wilderness and monitor seabirds, sea otters, and sea lions. These activities would not be affected by a wilderness designation. Another action which may impact wildlife populations is increased recreational use. Oil spills and increased commercial fishing would still occur off the refuge as these are actions over which the Service has no control. No other activities would impact wildlife populations.

Wilderness management would protect the proposed areas against unforeseen development activities which may impact wildlife populations. No specific actions are expected at this time. Seabird, sea otter, and sea lion monitoring would have no effect on populations but would increase knowledge of population dynamics. Increased recreational use of the Chiswell Islands to 72,000 visitor use days over the long term, could cause a decrease in cormorant populations of up to 10 percent. Cormorants sometimes abandon their nests when frequently disturbed. This is discussed in greater detail in Alternative A.

Seabird and sea otter mortality from oil spills could vary from zero to thousands depending on the time of year, type of hydrocarbons involved, location of accident, currents, and weather conditions. There is about a 25 percent chance of a spill. Increased fishing for prey species would impact seabird, sea otter, and sea lion populations as discussed under naturalness.

Conclusion - During the life of the plan, there is less than a 25 percent chance that oil spills would have a negative but unknown impact on seabirds in the Barren, Chiswell, and Pye island groups. Cormorants could decline during the life of the plan and the long term on the Chiswell Islands due to increased visitor use. Also over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabird, sea otter, and sea lion populations.

Subsistence/Section 810 Evaluation and Findings - Gulf of Alaska Unit

Evaluation - The minor impacts on subsistence resulting from implementing this alternative could be similar to Alternative A, except that subsistence users would not be able to use generators or other motorized tools except chain saws in areas proposed for wilderness (two percent of the unit). However, there is no known use of motorized tools, other than chainsaws, on any of the proposed areas. The section 810 evaluation and findings for Alternative A relative to log transfer facilities around Afognak Island and marine development in Womens Bay would apply to Alternative B as well. In addition to those possible effects, two to five shellfish mariculture projects in Raspberry Strait could displace a few subsistence users from sheltered bay areas that may have been traditionally used for fishing or shellfish gathering. This effect would be very localized and limited to the actual project area occupied.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations for future uses or proposals.

ALTERNATIVE C (PREFERRED ALTERNATIVE) GULF OF ALASKA UNIT

Scenario for the Life of the Plan (10-15 Years)

Seventy-two percent of the unit would be in intensive management, less than one percent would be in moderate management, and 25 percent would be in minimal management. This alternative proposes 4,885 acres, less than one percent of the unit, for wilderness designation. Two percent of the unit is already designated wilderness (Table 47).

This scenario assumes Congress approves the recommendation and designates these proposed areas as wilderness. Management of the wilderness areas would be subject to the provisions of the Wilderness Act as amended by the Alaska Lands Act. Wilderness management policy prohibits oil and gas leasing and oil and gas studies that utilize mechanized equipment unless performed by an Interior Department agency. It also prohibits the use of mechanized equipment in wilderness areas except for snowmachines, motorboats, and airplanes. Subsistence users may also use chainsaws. Commercial activities, except as they relate to providing a service to recreational users such as guiding, are generally prohibited in wilderness.

As in Alternative A, this scenario assumes there would be no mining on the refuge, no oil and gas studies or leasing anywhere on the refuge, no oil and gas development offshore of the refuge, and continued shipping of oil into and out of Cook Inlet (see the scenario for Alternative A). Assumptions regarding increases in commercial fishing apply here as well.

Management actions described for fish and wildlife management and air and water quality monitoring would also take place in this alternative. Fishery management activities would emphasize active participation in management bodies responsible for marine forage fish management. Fish and wildlife management would focus on seabird monitoring, seabird-prey species interactions, causes of seabird population fluctuations, effects of development activities on submerged lands, sea otter/fishery (including mariculture) conflicts, subtidal ecology, and eradication of introduced predators.

Interpretive displays would be developed for Juneau, Sitka, and the marine highway system as in Alternative B. These displays would increase interest in the refuge and lead to increased use of St. Lazaria and increased sightseeing from the ferry of the Chiswell and Barren islands. As in Alternative A, the increase in tourists, the growth of the charter industry, and the greater visibility of the refuge after construction of the visitor center are the major factors affecting increases in recreational use. Wilderness designation of an additional 4,885 acres would not increase visitor use.

Commercial use opportunities would increase in the Kodiak and Afognak islands area.

Afognak area - Assumptions discussed in Alternative A of three log transfer facilities, timber harvest on Delphin and Discoverer islands, maintenance and some expansion of the Kitoi Bay hatchery, and the absence of seafood processors apply to this alternative as well.

Latax Rocks would be proposed for wilderness designation.

Shellfish mariculture is now legal in Alaska; this scenario assumes that the legislature would also permit finfish mariculture projects by the end of the planning period. It is further assumed that five percent of the mariculture development projected for the state in the five years following legislative action would take place in the Afognak area. A large area of Afognak waters, 335,984 acres, would be zoned for intensive management. Draft state aquatic farming projections portray two sets of criteria for state approval of aquatic farms, a more liberal and a more conservative set. For the purposes of analysis, this alternative assumes the state would apply the more liberal criteria in approving mariculture projects. These projections assume: 1) no applicant screening, 2) minimal prove-up requirements, 3) minimum site review criteria, and 4) most applications would be for small projects. It is assumed that the number of finfish proposals would be low because of compatibility requirements for this type of project. For analysis purposes it is assumed that 10 percent of the applicants would be for finfish projects and one project would become operational.

Using these assumptions, 135 permit applications would be expected during the five years following legislative action. Seven to fourteen of the projects would be expected to become operating aquatic farms, a five to ten percent success rate.

All mariculture projects would require a special use permit which would determine the compatibility of the project with refuge purposes including the conservation of "fish and wildlife populations and habitats in their natural diversity including, but not limited to marine mammals, . . ." [Alaska Lands Act section 303(1)(b)(i)]. For the purposes of analysis, it is assumed that the technology would be developed to effectively exclude sea otters from mariculture projects without inflicting harm on the animals which would be considered illegal "taking" or harassment under the terms of the Marine Mammals Protection Act.

Due to anticipated impacts to water quality and submerged lands, as well as interactions with marine mammals, special surveys would be required to locate the most suitable sites for these activities. Furthermore, an environmental assessment would be required to evaluate the individual and cumulative impacts of mariculture projects and develop mitigative measures and monitoring requirements. Depending on the level of impacts, an environmental impact statement may be required.

Womens Bay - As in Alternatives A and B, existing areas of shoreline development would be in intensive management, and the head of the bay would be in minimal management. In addition, the area from Blodgett Island to the mouth of the bay would also be in intensive management. Under this scenario, it is assumed that up to two additional marine dependent commercial docks would be constructed in the bay. Several additional government docks may be expected to be constructed or existing ones expanded on Nyman Peninsula. The seafood reduction plant at Gibson Cove would continue to operate and pollutant levels would be minimized with improved technology. Oil discharges would decline as discussed under Alternative A.

Seabird monitoring for black-legged kittiwakes, cormorants, and perhaps puffins and gulls, would be regularly scheduled on an annual basis rather than nearly every year as in Alternative A. In addition, seasonal nearshore transects along selected habitats along the bay would be conducted at least once every five years. Similarly, subtidal surveys would be conducted periodically between April and October at least once every five years. Special emphasis would be given to delineating Pacific herring and capelin spawning sites. The bay would also be evaluated as a potential site to study the relationship between available forage fish and seabird reproductive success.

Arrangements would be made with the Kodiak Refuge to include seabird displays at the visitor center. Presentations would be made to the Kodiak Refuge staff, the National Audubon

Society, and local schools on information collected on the previously described studies.

Barren Islands - The Service would monitor seabirds at East Amatuli Island annually as described under Alternative A. In addition, all other islands would be surveyed every five years.

Refuge staff would provide wildlife ecology data about the Barrens to charter boat operators in Homer and to expedition tour boats. Public use levels would be documented.

Mushroom Islets - The scenario for these islets would be similar to Alternative A except that seabird surveys would be conducted at least once every 10 years.

Tuxedni Subunit - The scenario for this subunit would be similar to Alternative A.

Kachemak Bay and adjacent waters including Sixty-foot Rock - The scenario for this area would be similar to Alternative A. However, seabird transects along selected portions of the bay and shoreline surveys near Homer would be conducted at least once per month every five years. This data would be used for interpretive purposes and to assess potential impacts of oil spills. In addition, the bay as well as Cook Inlet would be considered along with Womens Bay and Chiswell Islands as a site to study the relationship between forage fish abundance and seabird reproductive success. Environmental education activities would be provided to local schools, the Pratt Museum, conservation organizations, the community college, and on the marine highway system as described for the Chiswell Islands.

Chugach Islands - The scenario for these islands would be similar to Alternative A.

Pye Islands - The scenario for these islands would be similar to Alternative A except at Outer Island which would be proposed for wilderness designation. Public use would be as described in the scenario for Alternative A. Black-legged kittiwakes, puffins, cormorants, and gulls would be surveyed at least once every five years.

Chiswell Islands - All but Rugged Island and Pilot Rock would be proposed for wilderness designation. Black-legged kittiwakes and cormorants at Chiswell Island, unnamed Chiswell Island, Beehive Island, unnamed Beehive Island, and Matushka Island would be monitored annually with more intensive surveys conducted at least once every three years. Barwall Island and Cape Resurrection would be surveyed incidentally to this work. Incidental surveys would also be made of sea lions to assist in evaluating the nearly statewide decline of this species. Other islands in the group would be surveyed at least once every five years. The Service would enter into a cooperative agreement with the state marine highway system to provide interpretive programs during the summer months which would include volunteer naturalists and videotaped programs on seabirds, marine mammals, and the refuge system in Alaska. This would increase sightseeing use from the state ferry. A similar arrangement would be made with Kenai Fjords National Park.

Middleton Island - The scenario for this island would be similar to Alternative A except that the Service would arrange for long-term use of a privately owned building by biologists.

St. Lazaria Island - The monitoring activities described for Alternative A would be expanded to include two visits during each breeding season to determine storm-petrel reproductive success. Furthermore, banding of storm-petrel chicks would be initiated to collect survivorship data. This information should help interpret census data and complement data collected at East Amatuli Island.

The refuge recreation planner would visit Sitka once a year to inform the charter boat operators association about the seabird studies and measures that could be taken to minimize visitor impacts on the island. In addition, presentations about St. Lazaria would be made to local schools, the chamber of commerce, and local conservation groups. Public use levels would be documented and the impacts of landings on the island evaluated. An interpretive display would be prepared for Sitka's Centennial Hall within three years.

Hazy Islands - The scenario for this island would be similar to Alternative A.

Forrester Island - The scenario for this island would be similar to Alternative A except that during years that seabirds are monitored at least two trips would be made to determine reproductive success.

Scenario for Long Term (more that 15 years) Wilderness Impacts

In Alternative C, proposed wilderness areas would be designated wilderness. As in the short term scenario, oil and gas leasing and studies, commercial uses other than recreation related, and the use of mechanized equipment would be limited on the proposed wilderness areas.

This scenario is similar to the long term scenario for Alternative A in that oil and gas leasing and studies and mining would not occur on the proposed areas; additional oil development would not occur in the Cook Inlet or Kodiak basins; oil shipping into and out of Cook Inlet would continue for at least another 20 years; and commercially important fisheries would be fully exploited with little room for expansion.

Visitor use would increase as described in the long term scenario for Alternative A. In addition, incidental sightseeing use of the Barren, Pye, and Chiswell island groups would increase from the ferries as a result of the interpretive display and volunteer naturalist stationed on the ferries. Use of the Barren Islands would increase an additional 25 use days as a result of providing information to charter operators. As in the short range scenario, wilderness designation of 4,885 acres would not affect the amount of visitor use. Cabins and lodges would increase on private land near the refuge islands in the Uganik Bay group, the Afognak group, and the Pye Islands as in Alternative A. Subsistence use would be as described for Alternative A, 60 use days per year in the long term for the Uganik Island group.

Biological Impacts of Alternative C - Gulf of Alaska Unit

Marine flora and fauna (including nearshore fishes) - A moderate increase in potential impacts can be anticipated under this alternative over Alternatives A or B. Designation of 335,984 acres of intensive management around Afognak Island would increase mariculture impacts previously described. The magnitude of this effect would depend upon the success of pilot projects in the area.

Impacts for the three log transfer facilities would be as described for Alternative A.

Mariculture structures at the projected seven to fourteen successful projects would obscure light penetration and create small localized reductions in primary production. Support structures such as docks would result in losses of approximately 0.5 acres of nearshore biota per project at start up; an average of two acres of habitat per project could ultimately be lost. If nonnative spat are used, inadvertent introduction of predatory invertebrates may occur that could prove harmful to native shellfish populations.

Importation of exotic diseases and potential dissemination of indigenous aquatic animal diseases by movement of mariculture species would be adequately controlled by existing state regulations. Environmental contamination may be caused by therapeutic drugs or chemicals used in mariculture practices. Escape of cultured organisms could lead to interbreeding with wild stocks, causing genetic problems.

The projected successful finfish project would be expected to produce fairly large quantities of unutilized feed and feces, which would settle to the bottom. This sedimentation could result in major localized changes to the ocean floor.

Fish - Impacts of commercial fishing would be similar to those described in Alternative A. However, some Pacific herring spawning habitat could be displaced by designating areas of Womens Bay moderate management.

Waterfowl and shorebirds - Impacts would be similar to those previously described under Alternative A.

Seabirds - Impacts to seabirds would be similar to those described under Alternative A. Monitoring would increase in the Pye Islands. Although this is a relatively small colony, these seabirds are strategically located between larger or more accessible colonies such as the

Chiswells, Middleton Island, Barren Islands, and Chisik Island. Monitoring data here could provide a more comprehensive picture of the health of seabirds and the Gulf of Alaska ecosystem particularly when some colonies fail, but others do not. By expanding the monitoring effort in the Barren Islands, correlations of reproductive success could be made between East Amatuli Island and areas elsewhere in the Barrens. It would also provide information on one of the northernmost colonies of rhinoceros auklets on Sud Island. Surveys on Ushagat Island would further document the changes following removal of arctic foxes. Additional monitoring would also occur at Womens Bay, the Mushroom Islets, the Chiswells, St. Lazaria, and Forrester Island. Natural population trends could be established, and the effects of human activity assessed.

Marine mammals - Mariculture special use permits would require effective exclosures that would not harm wildlife. If the exclosures are not successful in preventing otters from preying on the species being cultured, particularly mussels and scallops, at the projected seven to fourteen successful mariculture projects in the waters around Afognak Island, increased pressures to control this species can be expected. About 3,000 otters live in the waters around Afognak. Raspberry Strait and Afognak Bay, both within the intensive management area, are high concentration areas for the animals. Pupping, weaning, and wintering areas are located within the moderate management areas around Afognak. If mariculture projects are located in these sensitive areas, otters could be displaced. The effects on the population of this displacement are unknown. Additional monitoring would be necessary to determine the impacts of the projects on otters. Other impacts to marine mammals would be as discussed for Alternative A.

Terrestrial birds and mammals - Impacts to these groups should be similar to those described under Alternative A.

Water quality and quantity - The impacts of this alternative on water quality and quantity at log transfer facilities would be the same as described for Alternative A. Additional impacts would be expected from the projected successful finfish mariculture operations and more shellfish operations located around Afognak Island; these projects would be carefully monitored and permit stipulations would be developed to maintain refuge water quality. Also, up to two additional commercial docks would be constructed in Womens Bay and several additional government docks may be expected to be constructed or existing ones expanded on the Nyman Peninsula. Monitoring and mitigation of these projects would be similar to that proposed under Alternative A.

Socioeconomic Impacts of Alternative C - Gulf of Alaska Unit

Cultural resources - The impacts of this alternative on cultural resources would be the same as described for Alternative A

Population - The impacts of this alternative on population would be the same as described for Alternative A.

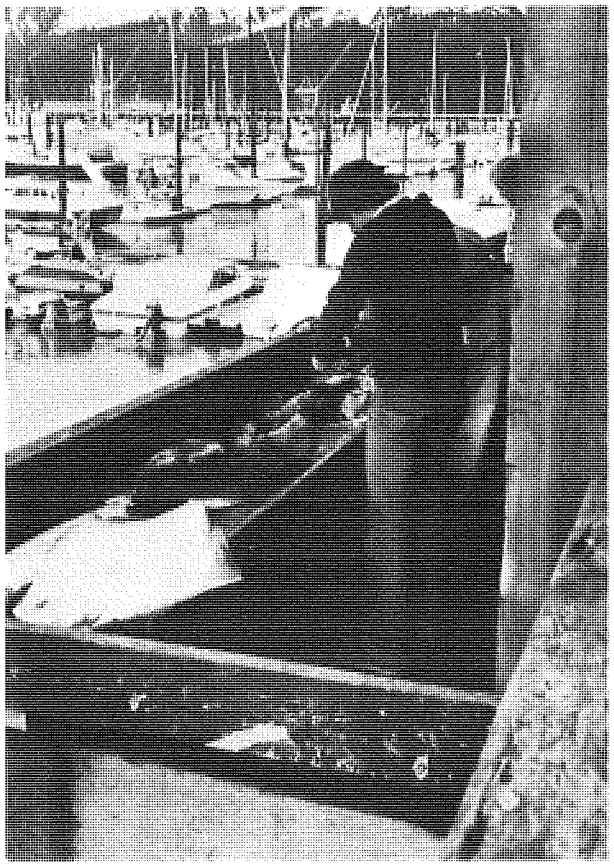
Economy - Depending on the success of mariculture projects in the waters around Afognak Island, Alternative C could cause moderate to major benefits to the local economy. Also, eight refuge jobs in addition to those discussed for Alternative A, would be created in Homer. Other impacts of this alternative on the economy would be the same as those described for Alternative A.

Recreation - The impacts of this alternative on recreation would be the same as described for Alternative B.

Impacts of the Wilderness Proposal for Alternative C - Gulf of Alaska Unit

In Alternative C, 4,885 acres, less than one percent of the unit, would be proposed for wilderness designation which would require the approval of Congress. If Congress designated the islands as wilderness, they would be managed according to the provisions of the Wilderness Act of 1964 as amended by the Alaska Lands Act.

Impacts of existing wilderness, two percent of the refuge, are not considered in this analysis. The impacts of designation are only evaluated for the proposed islands and the suitable areas which are not proposed (Table 48). The impacts are evaluated for the



Seward is a popular tourist destination, offering a variety of recreational activities; both fishing and sightseeing charter boats are available.

two significant wilderness issues: impacts on wilderness values and impacts on wildlife populations.

Suitable Areas Proposed for Wilderness

The impacts of designation are evaluated for the proposed islands: Carl, Sud, Nord, and Sugarloaf in the Barren Islands; Outer Island in the Pyes; all of the Chiswell Islands except Ragged Island and Pilot Rock; and Latax Rocks.

Wilderness values - Gulf of Alaska Unit

Naturalness - The only management action on the suitable areas which has the potential to affect naturalness is seabird and sea lion monitoring. Recreational use may also impact naturalness. Off-refuge actions which may affect naturalness are oil spills, increased commercial fishing, and cabin and lodge development on private lands.

Seabird and sea lion monitoring would occur under this alternative as well. Sea otter monitoring is not proposed for these areas. Wilderness designation does not affect the ability of the Service to monitor populations and do studies. The use of temporary camps in the support of monitoring would have no impact on naturalness as discussed for Alternative A.

On all areas except the Chiswells, there would be no impacts on naturalness from recreational use of 575 days per year as discussed under Alternative A. The additional 25 use days for the Barren Islands which would result from increased information distributed to charter operators would not affect naturalness. This use would be for bird watching, sightseeing, and photography from charter boats and would probably not involve landing on the islands. Recreational use of the Chiswells, primarily tour boat activity, is expected to increase from 24,000 visitor days per year to 72,000 over the long term. This could lead to a decline in cormorant populations of up to 10 percent on the most visited islands. Cormorants sometimes abandon nests when frequently disturbed. This is discussed under Alternative A.

No subsistence use is known to occur on these areas, so there would be no impacts.

The 25 percent chance of oil spills and the increase in commercial fishing would occur under this alternative as well as Alternative A, because these are actions over which the Service has no control. These impacts are described under Alternative A. Development of cabins and lodges on private land would not impact these areas as they are too remote from areas of most probable development.

Conclusion - Seabird and sea lion monitoring would have no impact on naturalness. There is less than a 25 percent chance that an oil spill would have a negative but unknown impact on naturalness on the Barrens, Pye, and Chiswell islands. Over the long term, the risk of an oil spill would continue for an additional 20 years, commercial fishing may have a negative impact on

naturalness on important seabird and sea lion islands, and cormorants, and thus naturalness, would decline on about six islands in the Chiswell group due to increased tour boat visits.

Outstanding opportunities for solitude - The only management activity which may impact solitude is seabird and sea lion monitoring. Recreational use may also impact solitude.

Monitoring would utilize small crews for a short period of time as described in Alternative A. Monitoring would occur more frequently than in Alternative A. Solitude opportunities would be lost for a week every year in the Chiswells and every three to five years while seabird monitoring was being conducted in the Barren and Pye island groups.

Impacts from recreational use would be as described for Alternative A. Solitude is not outstanding now and opportunities for it would continue to decline during the summer months on the most accessible of the Chiswell Islands. Visitor use of the Chiswells, mainly by tour boats and cruise ships, is expected to increase to 72,000 visitor use days from the 24,000 occurring now. This is discussed in Alternative A.

In addition to the recreational use detailed in Alternative A, additional incidental sightseeing from the state ferries in the Barren, Pye, and Chiswell islands would result from the interpretive displays and volunteer naturalist on the ferries. However, there would be no impacts on solitude from this increase, because the ferry is already traveling this route. In this alternative, recreational use of the Barren Islands would increase an additional 25 use days to 150 days per year. Use occurring on the Barrens would be primarily day use sightseeing trips from boats. Few people would land on the islands. This level of use would be the equivalent of about 40 boat trips, four people per boat, over the course of the summer. Solitude would not be impacted. There would be no increase in recreational use as a result of wilderness designation.

Conclusion - Solitude opportunities would be lost during the summer months on the most accessible of the Chiswell Islands due to increased tour boat use. Solitude opportunities would be affected for about a week annually on the Chiswells and every three to five years in the Barrens and Pye island groups while seabird monitoring studies are being conducted.

Outstanding opportunities for primitive recreation - The only management action which has the potential to affect primitive recreation opportunities is establishment of a visitor center in Homer. Actions which may occur off the refuge with the potential to affect opportunities for primitive recreation are oil spills, commercial fishing, and the growth of the tourist industry in Homer and Seward.

As in Alternative A, access to recreational opportunities would improve as charter operators, cruise ships, guides, and lodges continue to proliferate and the new visitor center in Homer increases visitor awareness of and interest in refuge resources. As a result, opportunities would increase in the Chiswells, Barrens, and Pye islands. In addition, the display and volunteer naturalist on the marine highway system would also increase awareness of the Chiswell, Pye, and Barren islands. This would increase incidental sightseeing use from the ferries.

Should an oil spill or overfishing cause declines in seabird, sea otter, or sea lion populations as discussed for Alternative A, recreational opportunities would decline. Bird watching, marine mammal observation, and wildlife photography are some of the best opportunities on the suitable areas, and these would be affected by declines in bird and mammal populations.

Conclusion - Recreational opportunities on all the island groups, particularly the Chiswells, would increase as a result of growth in the tourist industry. Use of the Barren and Pye island groups would increase as a result of the increased knowledge of and interest in these areas stimulated by the new visitor center in Homer. There is less than a 25 percent chance that an oil spill would impact seabird and marine mammal populations and thus decrease opportunities for bird watching, marine mammal observation, and wildlife photography. Over the long term, increased fishing would lead to a decline in seabirds and mammals which would impact recreational opportunities.

Special features - The special features of the suitable areas are sea lion rookeries; large or unique seabird colonies including 30,000 black-legged kittiwakes on Nord Island and rhinoceros auklet and fulmar colonies on the Chiswells; and Taz Basin in the Chiswells.

There are no management actions which would impact the special features. Actions which would occur off the refuge with the potential to affect these features are oil spills and increased commercial fishing.

A major oil spill in a crucial location at a critical time could cause seabird mortality as discussed in Alternative A. Seabird colonies on the Barren, Pye, and Chiswell island groups are at risk. Impact from oil spills on sea lions would be negligible. Increased commercial fishing for forage fish could lead to declines in seabird and sea lion populations as discussed under Alternative A.

No management actions or off-refuge actions during the life of the plan or the long term would impact Taz Basin in the Chiswells.

Conclusion - During the life of the plan there is less than a 25 percent chance that an oil spill would have a negative but unknown impact on seabirds. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabirds and sea lions.

Wildlife populations - Gulf of Alaska Unit

Management actions would be to manage all the proposed areas as wilderness and monitor seabirds and sea lions. These activities would not be affected by a wilderness designation. Another action which may impact wildlife populations is increased recreational use. Oil spills and increased commercial fishing would still occur off the refuge as these are actions over which the Service has no control. No other activities would impact wildlife populations.

Wilderness management would protect the proposed areas against unforeseen development activities which may impact wildlife populations. No specific actions are expected at this time. Seabird and sea lion monitoring would have no effect on populations but would increase knowledge of population dynamics. Increased recreational use of the Chiswell Islands to 72,000 visitor use days over the long term, could cause a decrease in cormorant populations of up to 10 percent. Cormorants sometimes abandon their nests when frequently disturbed. This is discussed in greater detail in Alternative A. The additional 25 use days which would occur in the Barren Islands would have no impact on wildlife populatations. This increase would result from sightseeing from boats. The additional six boat trips, four people per boat, that would occur under this alternative would not affect cormorants or other species.

Seabird mortality from oil spills could vary from zero to thousands of birds depending on the time of year, type of hydrocarbons involved, location of accident, currents, and weather conditions. There is about a 25 percent chance of a spill. Increased fishing for prey species would impact seabird and sea lion populations as discussed under Alternative A.

Conclusion - During the life of the plan, there is less than a 25 percent chance that oil spills would have a negative but unknown impact on seabirds in the Barren, Chiswell, and Pye island groups. Cormorants would decline during the life of the plan and the long term on the Chiswell Islands due to increased visitor use. Also over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabird and sea lion populations.

Suitable Areas not Proposed for Wilderness

The impacts of nondesignation are evaluated for the suitable areas which are not proposed for wilderness, 3,020 acres: the Uganik Bay islands off Kodiak, the Afognak island group except for Latax Rocks which is proposed, and Pye Reef and Rabbit Island in the Pye Islands (Table 48).

Wilderness Values - Gulf of Alaska Unit

Naturalness - The only management action on the suitable areas which has the potential to affect naturalness is sea otter studies. Other actions which may impact naturalness are subsistence and recreational use. Off-refuge actions which may affect naturalness are oil

spills, increased commercial fishing, and cabin and lodge development on private lands.

Sea otter studies would occur under this alternative as well. Wilderness designation does not affect the ability of the Service to monitor populations and do studies. This would have no impact as discussed for Alternative A. No seabird studies are proposed for these areas.

There would be no impacts on naturalness from subsistence use of 60 days per year and recreational use of 325 days per year dispersed over 3,020 acres on over 20 islands and islets. This is discussed for Alternative A.

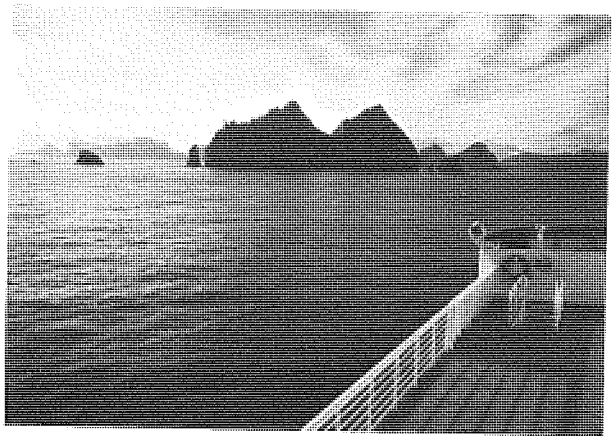
The 25 percent chance of oil spills, the increase in commercial fishing, and the increase in cabins and lodges on adjacent private lands would occur under this alternative as well as Alternative A, because these are actions over which the Service has no control. These islands, due to location and lesser wildlife values, have a lower risk for an oil spill than the proposed areas. However, they could still be affected by a spill. These impacts are described under Alternative A.

Conclusion - Sea otter studies and subsistence and recreational use would have no impact on naturalness. There is less than a 25 percent chance that an oil spill would have a negative but unknown impact on naturalness on these islands. Over the long term, the risk of an oil spill would continue for an additional 20 years, commercial fishing may have a negative impact on naturalness on seabirds and sea lions, and nearby private development would affect naturalness on the Uganik Bay islands.

Outstanding opportunities for solitude - The only management activity which may impact solitude is sea otter studies. Recreational and subsistence use and recreational developments on private land may also impact solitude.

Sea otter studies would utilize small crews in boats who would rarely come ashore as described in Alternative A. Solitude would not be affected.

Development of adjacent private lands and the resulting boat traffic, as well as subsistence use of 60 use days per year, and recreational use of 150 days per year would lead to a loss of solitude opportunities during the summer on the smaller islands in the Uganik Bay group as described for Alternative A. Recreational use of the other island groups would not impact solitude as described in Alternative A.



The rugged Chiswell Islands, easily accessible by charter from Seward and to passengers on the Alaska Marine Highway, are home to roughly 60 percent of all the nesting seabirds on the south side of the Kenai Peninsula.

Conclusion - Solitude opportunities would be lost over the long term on the Uganik Bay islands during the summer months due to increasing boat traffic, developments on nearby private lands, and recreational and subsistence use.

Outstanding opportunities for primitive recreation - Rabbit Island in the Pye Islands is the only island in this group that has outstanding recreational opportunities. See the Affected Environment chapter, Wilderness Review section for the determination of outstanding opportunities for primitive recreation.

The only management action which has the potential to affect primitive recreation opportunities is establishment of a visitor center in Homer. Actions which may occur off the refuge with the potential to affect opportunities for primitive recreation are oil spills and the growth of the tourist industry in Homer.

As in Alternative A, access to recreational opportunities would improve as charter operators, cruise ships, guides, and lodges continue to proliferate and the new visitor center in Homer increases visitor awareness of and interest in refuge resources. As a result, recreational opportunities would increase on Rabbit Island.

Should an oil spill wash ashore or cause declines in seabird populations as discussed for Alternative A, recreational opportunities would decline.

Conclusion - Recreational opportunities on Rabbit Island would increase as a result of growth in the tourist industry and increased knowledge of and interest in the refuge stimulated by the new visitor center in Homer. There is less than a 25 percent chance that an oil spill would impact this island and its seabird opulations and thus decrease opportunities for bird watching and wildlife photography.

Special features - There are no special features on these areas. See the Affected Environment chapter, Wilderness Review section - Gulf of Alaska Unit, for a description of how special features were determined.

Conclusion - There are no impacts on special features, because there are no special features on these islands.

Wildlife populations - Gulf of Alaska Unit

The only management action in these areas is the sea otter study. This activity would not be affected by the lack of a wilderness designation. Another action which may impact wildlife populations is increased recreational use. Oil spills and increased commercial fishing would still occur off the refuge as these are actions over which the Service has no control. No other activities would impact wildlife populations.

Sea otter studies would have no effect on populations but would increase knowledge of population dynamics. Increased recreational use of 250 use days per year would not impact wildlife populations. This is discussed in greater detail in Alternative A.

Seabird mortality from oil spills could vary from zero to hundreds of birds depending on the time of year, type of hydrocarbons involved, location of accident, currents, and weather conditions. There is about a 25 percent chance of a spill. These islands are at less risk for an oil spill than the proposed areas. Increased fishing for prey species would impact seabird and sea lion populations as discussed under naturalness.

Conclusion - During the life of the plan, there is less than a 25 percent chance that oil spills would have a negative but unknown impact on seabirds on these islands. Over the long term, oil spills would continue to be a risk for an additional 20 years, and commercial fishing may have a negative impact on seabird and sea lion populations.

Subsistence/Section 810 Evaluation and Findings - Gulf of Alaska Unit

Evaluation - The minor impacts on subsistence resulting from implementing this alternative could be similar to Alternative A, except that subsistence users would not be able to use generators or other motorized tools except chainsaws in the areas proposed for wilderness, less than one percent of the unit. However, there is no known use of motorized tools for subsistence purposes on any of the proposed areas. The section 810 evaluation and findings for Alternative A relative to log transfer facilities around Afognak Island and marine development in Womens Bay would apply to Alternative B as well. In addition to those possible effects, seven to fourteen shellfish mariculture projects in Raspberry Strait could displace a few subsistence users from sheltered bay areas that may have been traditionally used for fishing or shellfish gathering. This effect would be very localized and limited to the actual project area occupied. One finfish mariculture project would have similar displacement effects in an additional bay in Raspberry Strait.

It should be noted that there may be other proposed uses in the future that could affect subsistence use. In accordance with requirements of section 810, the Service would conduct additional evaluations on future uses or proposals.

SUMMARY OF SECTION 810 EVALUATION AND FINDINGS

Section 810(a) of the Alaska National Interest Lands Conservation Act (Alaska Lands Act) states:

> In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes.

The management alternatives in the Alaska Maritime Refuge plan do not withdraw, reserve, lease or permit any use of the public lands, as defined by section 102(3) of the Alaska Lands Act, within the refuge. However, they do recommend various land uses be allowed on the refuge. It is for this reason that section 810 evaluations and findings are included in this document.

The Alaska Maritime Refuge plan is a general land use plan and makes only recommendations for land uses on the refuge. Other Service actions on the refuge, including development of the more specific refuge management plans, and issuance of special use permits, would directly affect specific land uses on the refuge. The Service would make additional section 810 evaluations for all other activities that affect land uses on Alaska Maritime Refuge.

As one of the five major purposes of Alaska Maritime Refuge under section 303(1)(B) of the Alaska Lands Act, subsistence considerations have been addressed throughout the plan. Chapter I of the plan identifies subsistence concerns raised by local residents. Chapter II notes important subsistence species, describes subsistence use patterns, and identifies areas where local residents harvest resources in the refuge. All of the management alternatives included in this plan share a common management direction on subsistence. In its section 810(a) evaluations of the alternatives in this chapter, the Service determined that none of the alternatives would significantly restrict subsistence use.

The preferred alternative, Alternative C, provides broad direction for uses of the 4.9 million acres of federal land within the refuge boundary. A complete description of the alternative is found in Chapter III. The preferred alternative emphasizes management to maintain fish and wildlife values, natural diversity, and opportunities for recreational and subsistence uses, and restore endangered species.

The Service determined in its section 810 evaluation that the preferred alternative would have a negligible impact on subsistence use of the Alaska Maritime Refuge. The Service would work with the local villages, the Alaska Department of Fish and Game, and the State Boards of Fisheries and Game to ensure that subsistence activities are not adversely affected by this alternative.

MITIGATION

Adverse impacts resulting from implementing the Alaska Maritime Refuge plan would be mitigated whenever and wherever possible, relative to the goals and objectives of the plan. As noted in the common management directions, the Alaska Department of Fish and Game would regulate fish and wildlife harvests in the refuge. The Service would publicize regulations, develop stipulations, and issue permits to mitigate other impacts. These regulations, stipulations, and permits would mitigate impacts by: avoiding the impact altogether; minimizing the impact by limiting the degree or magnitude of the action; rehabilitating or restoring the affected environment; or, compensating for the impact by replacing or providing substitute resources or environments. Mitigation may consist of standard stipulations imposed on common refuge activities or be attached to special use permits. Site-specific, project-specific mitigation identified through detailed "step-down" management plans or the National Environmental Policy Act process would also entail stipulations attached tc permits. The degree, type, and extent of mitigation undertaken would depend on site-specific

conditions at the time of the impact and management goals and objectives of the actions being implemented.

SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

In all alternatives the primary short-term use of the refuge would be for conserving fish and wildlife populations and habitats. Monitoring would ensure the long-term productivity of fish and wildlife populations.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

As two alternatives propose commercial development for the Alaska Maritime Refuge, there could be an irreversible commitment of resources. Any ground-breaking activity would be preceded by a survey for historical and cultural resources and would not be allowed to proceed until such means are found to preserve the resources. The moderate level of public use is not expected to affect cultural resources; however, supervision and other protective measures could curtail any detrimental activities.

EVALUATION OF THE ALTERNATIVES

This section evaluates each of the three alternatives for the Alaska Maritime Refuge against two evaluation criteria and proposes one of the alternatives as the plan for managing the refuge. Tables 49 and 50 summarize the major differences between the alternatives for each of the five refuge units. Table 51 summarizes the impacts of the wilderness proposal for each alternative. As noted previously, although the alternatives were designed to meet political, financial, technical, and legal tests of feasibility, each has a different management emphasis.

EVALUATION CRITERIA

To minimize subjectivity in the selection of the preferred alternative, the three alternatives were judged against two criteria:

- o to what extent does the alternative satisfy the purposes of the refuge and other provisions of the Alaska Lands Act?
- o to what extent does the alternative satisfy the issues and concerns of the public?

The relative costs of implementing the alternatives were also examined in the evaluation of the alternatives.

The most important criterion in evaluating the alternatives is the degree to which they achieve the five purposes of the refuge as mandated by the Alaska Lands Act (see Introduction). Biological and socioeconomic assessments indicate how well each alternative satisfies this criterion.

Table 50 summarizes the potential biological and socioeconomic impacts of each alternative. None of the alternatives would be expected to have major adverse impacts on either refuge resources or refuge users. All the alternatives would have a positive effect on fish and wildlife populations because improved surveys would allow for development of management actions to mitigate the effects of expected increases in human activities. However, the level of effort varies among the alternatives, increasing to the highest level in Alternative C. Subsistence opportunities would be unaffected by all three alternatives. None of the alternatives would significantly affect the size of the local human population. Alternative C would provide increased economic opportunity in the marine area around Afognak Island and in Womens Bay. No other significant economic effects are expected.

Of the alternatives considered, Alternative C poses few if any risks to refuge resources while maintaining most recreational and subsistence opportunities. Mariculture developments would displace some recreational and subsistence use, but effects are expected to be negligible. Fish and wildlife can be managed to protect them from possible increased pressures in the future, based on surveys proposed in this alternative.

Alternatives A and B would offer protection to resources similar to that in Alternative C. The wilderness proposals in Alternatives B and C would protect areas from possible future development, but no such development is proposed or foreseen during the life of this plan (the next 10 years).

From a refuge-wide perspective, most of the impacts resulting from Alternatives A through C would be beneficial and negligible to minor in extent. No alternative would result in a population decrease that would affect the long-term viability of the refuge's fish and wildlife populations.

The second criterion in evaluating the alternatives is the degree to which the alternatives respond to or satisfy the issues and concerns raised by the state, local residents, industry, conservation groups, and other interested parties. The Service must work closely with all of these groups to minimize conflicts if it is to effectively manage the refuge and its resources.

The major refuge issues and concerns were identified early in the planning process and provided one of the bases for development of the management alternatives. In addition, significant public comment was received on the draft plan (see the Introduction chapter, Public Involvement, Public Review of the Draft Plan section). Comment from the Kodiak area favored increased economic opportunity in the marine areas as well as protection of the head of

Womens Bay. These comments were the basis for the modification of Alternative C from the draft plan. Numerous comments favored more wilderness particularly wilderness recommendations for the selected lands. The wilderness recommendation of the draft plan was not changed in response to these comments, because it is Service policy to not make wilderness recommendations on lands to which we do not have clear title. Atka residents were opposed to the wilderness recommendation of Alternative C, because they were concerned it would affect development of the geothermal field on the north end of the island. Since geothermal development cannot occur on a refuge, the land would need to be acquired from the Service should development prove feasible and desireable. This could occur in wilderness as well as nonwilderness. No change was made to the draft recommendation.

Because of the number of different types of issues raised and the groups affected by the management of the refuge, many of which have differing ideas on how the refuge should be managed, no single alternative probably would satisfy all of the concerns. Each alternative would satisfy the concerns of some groups and cause problems for others. The Service believes Alternative C would satisfy most of the concerns of subsistence users and accommodate increases in the level of public and economic use.

RELATIVE COSTS OF THE ALTERNATIVES

Staffing needs and management costs are other factors to consider in evaluating the alternatives. Table 52 and Figure 81 compare the annual costs of the three alternatives. Staffing patterns are shown in Figures 72 and 80 in the Management Alternatives chapter. Alternative C, the preferred alternative, is the most costly and would require nine more permanent employees and eight more temporary employees than Alternative A, the least costly alternative. Most of these positions would be biological technicians or a relief crew for the refuge vessel. Some of these positions could be filled by "permanent intermittent" appointments.

Alternative C would cost $640,000 more per year than Alternative A to provide adequate funding and staffing to accomplish all of the work specified for this management alternative. In particular, critical studies of seabird-prey relationships, seabird/gill net mortality, eastern Aleutian oil terminals/seabird conflicts, population dynamics of colonies, and monitoring of mariculture and log transfer facilities would require 12 month operation of the M/V Tiglax. Both Alternatives A and B are based upon an eight month operation. The extra use would require a relief crew for the M/V Tiglax and more permanent biological technicians to provide year to year continuity. With the increased development permitted in Alternative C, more time would be needed for mitigation and reduction of potential impacts. The other alternatives severely limit economic use opportunities in the Afognak area and propose only a minimal level of monitoring. The Service feels that understanding the dynamics of the marine ecosystem will help maintain healthy seabird, marine mammal, and fish populations and ensure the future of the vast commercial fishery resource that is so important to the Alaskan economy.

SELECTION OF THE PREFERRED ALTERNATIVE

The Service has selected Alternative C as its preferred alternative for managing the Alaska Maritime Refuge on the basis that it would both satisfy the purposes of the refuge and ensure that opportunities are maintained for the widest range of users. The Service would carefully monitor and regulate all uses and activities to ensure that adverse impacts to refuge resources and users are minimized.

The proposed management alternative would maintain existing values of the refuge. By conducting intensive studies and developing mitigation in areas of moderate and intensive use, the Service can meet its mandates and public needs for controlled development. The other alternatives were not selected because they were not as responsive to public concerns or management needs.

Table 49. Summary of the alternatives by unit.

RESOURCE OR USE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
CHUKCHI SEA UNIT			
Fish and Wildlife	High level of protection	Same as A	Same as A
Scientific Research	monitoring is major management emphasis; lands considered for Regional Shoreline Reserve Program	Same as A	Same as A, except reconnaissance surveys on barrier islands
Access	Existing opportunities maintained	Same as A	Same as A
Subsistence	Existing opportunities maintained	Same as A	Same as A
Recreation	Existing opportunities maintained	Same as A	Same as A
Economic Use	Existing opportunities maintained	Same as A	Same as A
Interpretation and Environmental Education	Current level maintained	Intrepretive display in interagency facility in Kotzebue	Same as B
Proposed for Wilderness Designation	0 acres	114,925 acres	Same as A
Existing Wilderness	440 acres	Same as A	Same as A
BERING SEA UNIT			
Fish and Wildlife	High level of protection	Same as A	Same as A
Scientific Research	major management emphasis on monitoring and increased participation in groups responsible for forage fish management	Same as A	Same as A, except increased biological and environmental monitoring
Access	Existing opportunities maintained	Same as A	Same as A
Subsistence	Existing opportunities maintained	Same as A	Same as A
Recreation	Existing opportunities maintained	Same as A	Same as A
Economic Use	Existing opportunities maintained	Same as A	Same as A
Interpretation and Environmental Education	Intrepretive displays on St. Paul and St. George islands	Same as A	Same as A

Table 49. Summary of the alternatives by unit, continued.

RESOURCE OR USE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
BERING SEA UNIT, CONTINUED			
Proposed for Wilderness Designation	0 acres	65,202 acres	182 acres
Existing Wilderness	81,417 acres	Same as A	Same as A
ALEUTIAN ISLANDS UNIT			
Fish and Wildlife	High level of protection	Same as A	Same as B
Scientific Research	major management emphasis on seabird monitoring, increased participation in groups responsible for forage fish management, and eradication of introduced foxes	Same as A, plus sport fishing baseline studies would be done on three islands	Same as B plus initiate studies to monitor fishing and seabird interactions
Access	Existing opportunities maintained	Same as A	Same as A
Subsistence	Existing opportunities maintained	Same as A	Same as A
Recreation	Existing opportunities maintained	Same as A	Same as A
Economic Use	Existing opportunities maintained	Same as A	Same as A
Interpretation and Environmental Education	Current level maintained	Develop interpretive display for Unalaska/Dutch Harbor	Same as B, except also develop displays for Attu and Shemya islands
Proposed for Wilderness Designation	0 acres	126,102 acres	95,442 acres
Existing Wilderness	2,281,136 acres	Same as A	Same as A
ALASKA PENINSULA UNIT			
Fish and Wildlife	High level of protection	Same as A	Same as A
Scientific Research	major management emphasis on monitoring, continuing eradication of introduced mammals, and increased participation in groups responsible for forage fish management	Same as A, except initiate studies to monitor fishing/ seabird interactions	Same as B, plus increase surveys
Access	Existing opportunities maintained	Same as A	Same as A

Table 49. Summary of the alternatives by unit, continued.

RESOURCE OR USE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
ALASKA PENINSULA UNIT, CONTINUED			
Subsistence	Existing opportunities maintained	Same as A	Same as A
Recreation	Existing opportunities maintained	Same as A	Same as A
Economic Use	Existing opportunities maintained	Same as A	Same as A
Interpretation and Environmental Education	Current level maintained	Develop interpretive display for Sand Point	Same as B
Proposed for Wilderness Designation	0 acres	9,549 acres	9,139 acres
Existing Wilderness	390,870 acres	Same as A	Same as A
GULF OF ALASKA UNIT			
Fish and Wildlife	High level of protection	Same as A	Same as B
Scientific Research	Monitoring major emphasis	Same as A, plus increase emphasis on participation in groups responsible for marine forage fish management	Same as B, plus additional seabird monitoring in the Barren Islands
Access	Existing opportunities maintained	Same as A	Same as A
Subsistence	Existing opportunities maintained	Localized decrease in opportunity near mariculture sites in Raspberry Strait	Localized decrease in opportunity near mariculture sites around Afognak Island
Recreation	Existing opportunities maintained	Localized decrease in opportunity near mariculture sites in Raspberry Strait	Localized decrease in opportunity near mariculture sites around Afognak Island
Economic Use	Existing opportunities maintained	Increase in opportunity in Raspberry Strait area	Increase in opportunity in Afognak area and Womens Bay
Interpretation and Environmental Education	Develop visitor center in Homer	Same as A, plus develop interpretive displays for Juneau and Sitka	Same as B, plus develop interpretive program in Sitka and on marine highway system
Proposed for Wilderness Designation	0 acres	7,905 acres	4,885 acres
Existing Wilderness	8,477 acres	Same as A	Same as A

Table 50. Summary of the impacts of the alternatives by unit.

RESOURCE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
CHUKCHI SEA UNIT			
Marine fauna	Negligible negative impacts due to commercial fishing and loss of lagoon habitat in Peard Bay	Same as Alternative A	Same as Alternative A
Freshwater fish	Little or no impact on refuge populations expected	Same as Alternative A	Same as Alternative A
Seabirds	Negligible to major negative impacts due to oil development and possible oil spills; minor negative impacts from commercial fisheries; minor positive impact due to increased monitoring; negligible negative impacts due to quarry activities	Same as Alternative A	Same as Alternative A except moderate positive impacts due to increased monitoring
Waterfowl, loons and grebes	Negligible to major negative direct and indirect impacts due to possible oil spills	Same as Alternative A except minor positive impacts due to protection of critical coastal barrier island habitats	Same as Alternative B
Shorebirds	Negligible to major negative direct and indirect impacts due to possible oil spills, particularly for phalaropes during migration	Same as Alternative A except minor positive impacts due to protection of critical coastal barrier island habitats	Same as Alternative B
Raptors	Negligible impacts on raptors	Same as Alternative A	Same as Alternative A
Upland birds and songbirds	Negligible negative impacts due to human disturbance	Same as Alternative A	Same as Alternative A
Marine mammals	Negligible to minor negative impacts due to oil development and possible spills; minor negative impacts due to commercial fisheries	Same as Alternative A	Same as Alternative A
Terrestrial mammals	Negligible to minor negative impacts due to increase in hunting pressure; negligible impacts due to increased visitor use	Same as Alternative A	Same as Alternative A
Endangered species	No breeding population in this unit	Same as Alternative A	Same as Alternative A
Water quality and quantity	Negligible impacts on water quality and quantity	Same as Alternative A	Same as Alternative A
Cultural Resources	Negligible impacts on cultural resources	Same as Alternative A	Same as Alternative A

Table 50. Summary of the impacts of the alternatives by unit, continued.

RESOURCE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
CHUKCHI SEA UNIT Continued			
Population	Negligible impacts on population	Same as Alternative A	Same as Alternative A
Economy	Negligible impacts on economy	Same as Alternative A	Same as Alternative A
Recreation	Negligible impacts on recreation	Minor increase in interpretive opportunities	Same as Alternative B
Subsistence	Negligible impacts on subsistence	Same as Alternative A	Same as Alternative A
BERING SEA UNIT			
Marine fauna	Negligible negative impacts due to commercial fishing	Same as Alternative A	Same as Alternative A except management benefits due to increased studies
Freshwater fish	Little or no effect on refuge freshwater fish	Same as Alternative A except management benefits due to increased studies	Same as Alternative B
Seabirds	Negligible to major negative impacts due to oil development and possible oil spills; minor to major negative impacts due to commercial fisheries; minor negative impacts due to entanglement in drift nets	Same as Alternative A	Same as Alternative A except minor positive impacts due to higher degree of protection for Walrus and Otter islands also positive impacts due to increased monitoring
Waterfowl, loons and grebes	Negligible to major negative impacts due to possible oil spills	Same as Alternative A	Same as Alternative A except positive impacts due to increased monitoring
Shorebirds	Negligible to major negative impacts due to possible oil spills	Same as Alternative A	Same as Alternative A except positive impacts due to increased monitoring
Raptors	Negligible impacts on raptors	Same as Alternative A	Same as Alternative A
Upland birds and songbirds	Negligible negative impacts due to reindeer grazing	Same as Alternative A	Same as Alternative A
Marine mammals	Negligible to minor negative impacts due to possible oil spills; minor to major negative impacts due to commercial fisheries; minor negative impacts due to entanglement in drift nets	Same as Alternative A	Same as Alternative A except negligible benefits due to higher degree of protection of Walrus and Otter islands; also benefits to management due to increased studies
Terrestrial mammals	Negligible impacts on terrestrial mammals	Same as Alternative A	Same as Alternative A

Table 50. Summary of the impacts of the alternatives by unit, continued.

RESOURCE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
BERING SEA UNIT Continued			
Endangered species	No breeding population in this unit	Same as Alternative A	Same as Alternative A
Water quality and quantity	Negligible impacts on water quality and quantity	Same as Alternative A	Same as Alternative A except minor benefits to management due to increased studies
Cultural Resources	Negligible impacts on cultural resources	Same as Alternative A	Same as Alternative A
Population	Negligible impacts on population	Same as Alternative A	Same as Alternative A
Economy	Negligible impacts on economy	Same as Alternative A	Same as Alternative A
Recreation	Moderate increase in interpretive opportunities	Same as Alternative A	Same as Alternative A
Subsistence	Negligible impacts on subsistence	Same as Alternative A	Same as Alternative A
ALEUTIAN ISLANDS UNIT			
Marine fauna	Minor to major negative impacts due to commercial fishing	Same as Alternative A	Same as Alternative A
Freshwater fish	Minor impact from increased fishing near military bases and in eastern Aleutian Islands near Dutch Harbor	Same as Alternative A	Same as Alternative A
Seabirds	Benefit from increased monitoring, improves management; minor impact regionally from possible oil spills, but severe impact possible locally; minor to major negative impacts as well as possible benefits to seabird productivity by commercial fishery; increase in numbers and diversity of breeding seabirds as introduced predators are removed; minor negative impact due to entanglement in gill nets	Same as Alternative A except minor benefits from yearly food habits studies and additional monitoring sites	Same as Alternative B except moderate to major benefit from studies of seabird fisheries interactions; increased staffing would allow more studies benefiting management decisions
Waterfowl, loons and grebes	Minor to severe negative impacts due to possible oil spills; major local benefits from increase in numbers and diversity of breeding birds as introduced predators are removed; benefit from increased monitoring and improved management	Same as Alternative A	Same as Alternative A

Table 50. Summary of the impacts of the alternatives by unit, continued.

RESOURCE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
ALEUTIAN ISLANDS UNIT Continued			
Shorebirds	Most species would have negligible impacts from possible oil spills; phalaropes could have severe local impacts from oil spills during migration	Same as Alternative A	Same as Alternative A
Raptors	Negligible impacts on raptors	Same as Alternative A	Same as Alternative A
Upland birds and songbirds	Major local benefits due to eradication of introduced fox	Same as Alternative A	Same as Alternative A
Marine mammals	Moderate to major negative impacts due to commercial fisheries; minor negative impacts due to possible oil spills	Same as Alternative A	Same as Alternative A except benefit from increased prey base information
Terrestrial mammals	Minor local negative impacts due to hunting, poaching, and human disturbance	Same as Alternative A	Same as Alternative A
Endangered species	Major positive impacts on Aleutian Canada geese due to fox removal; negligible impacts on Aleutian shield fern	Same as Alternative A	Same as Alternative A
Water quality and quantity	Negligible impacts on water quality and quantity	Same as Alternative A	Same as Alternative A
Cultural Resources	Negligible impact on cultural resources	Same as Alternative A	Same as Alternative A
Population	Negligible impact on population	Same as Alternative A	Same as Alternative A
Economy	Negligible impact on economy	Same as Alternative A	Same as Alternative A except three additional refuge positions would be added at Adak
Recreation	Negligible impact on recreation	Minor to moderate increase in interpretive opportunities	Major increase in interpretive opportunities
Subsistence	Negligible impact on subsistence	Same as Alternative A	Same as Alternative A
ALASKA PENINSULA UNIT			
Marine fauna	Unknown impact from increase in seabird populations on forage fish species due to the removal of fox on refuge islands	Same as Alternative A	Same as Alternative A
Freshwater fish	Negligible impacts	Same as Alternative A	Same as Alternative A

Table 50. Summary of the impacts of the alternatives by unit, continued.

RESOURCE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
ALASKA PENINSULA UNIT Continued			
Seabirds	Minor to major negative impacts due to oil development and possible oil spills; minor to major negative impacts due to commercial fisheries; major positive impacts from removal of introduced species; minor positive impact due to increased monitoring	Same as Alternative A except minor benefit from improved management capabilities	Same as Alternative B except minor to major benefits to management from studies of seabird/fisheries interactions
Waterfowl, loons and grebes	Minor to major negative direct and indirect impacts due to possible oil spills; major local positive impacts from the removal of introduced species	Same as Alternative A	Same as Alternative A
Shorebirds	Minor to major negative direct and indirect impacts due to possible oil spills; major local positive impacts from the removal of introduced species	Same as Alternative A	Same as Alternative A
Raptors	Negligible negative impacts due to the removal of introduced rodents	Same as Alternative A	Same as Alternative A
Upland birds and songbirds	Major local positive impacts due to the removal of introduced species	Same as Alternative A	Same as Alternative A
Marine mammals	Minor to major negative impacts due to oil development and possible oil spills; minor to major negative impacts from commercial fisheries; minor management benefits due to increased studies	Same as Alternative A	Same as Alternative A except minor benefit to management from additional forage fish studies
Terrestrial mammals	Elimination of introduced fox may result in burgeoning ground squirrel and vole populations on some islands which could cause more erosion and localized damage to vegetation	Same as Alternative A	Same as Alternative A except negligible local effects from road construction on Popof Island
Endangered species	Major positive impacts due to the removal of introduced predators	Same as Alternative A	Same as Alternative A
Water quality and quantity	Negligible impacts on water quality and quantity	Same as Alternative A	Same as Alternative A

Table 50. Summary of the impacts of the alternatives by unit, continued.

RESOURCE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
ALASKA PENINSULA UNIT Continued			
Cultural Resources	Negligible impacts on cultural resources	Same as Alternative A	Same as Alternative A
Population	Negligible impacts on population	Same as Alternative A	Same as Alternative A
Economy	Negligible impacts on economy	Same as Alternative A	Same as Alternative A
Recreation	Negligible impacts on recreation	Minor increase in interpretive opportunities	Same as Alternative B
Subsistence	Negligible impacts on subsistence	Same as Alternative A	Same as Alternative A
GULF OF ALASKA UNIT			
Marine fauna	Major localized negative impacts due to log transfer facilities; negligible localized negative impacts due to one 0.5 acre mariculture project; minor to major localized negative impacts due to possible oil spills; minor impacts due to commercial fishery	Same as Alternative A except two to five 0.5 acre mariculture projects would be developed	Same as Alternative A except seven to fourteen 0.5 acre mariculture projects would be developed; single finfish mariculture project would cause major localized changes to the ocean floor
Freshwater fish	No impacts anticipated due to limited fish habitat	Same as Alternative A	Same as Alternative A
Seabirds	Minor to major negative impacts due to oil development and possible oil spills; minor negative impacts from commercial fisheries; negligible negative impacts due to timber harvest; major positive impacts due to the removal of introduced predators; negligible to minor negative impacts due to increased tourist use; minor negative impacts due to entanglement in set nets	Same as Alternative A	Same as Alternative A, except minor to moderate benefits to management due to increased monitoring and studies
Waterfowl, loons and grebes	Minor negative localized impacts due to increased urban development; minor to severe negative impacts due to possible oil spills; minor to moderate negative localized impacts due to industrial discharge	Same as Alternative A	Same as Alternative A
Shorebirds	Minor negative localized impacts due to an increase in urban development	Same as Alternative A	Same as Alternative A,

Table 50. Summary of the impacts of the alternatives by unit, continued.

RESOURCE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
GULF OF ALASKA UNIT Continued			
Raptors	Minor negative localized impacts due to timber harvest	Same as Alternative A	Same as Alternative A
Upland birds and songbirds	Minor negative localized impacts due to timber harvest	Same as Alternative A	Same as Alternative A
Marine mammals	Minor negative impacts on sea otters due to conflicts between otters and commercial fisheries; negligible localized negative impact due to one 0.5 acre mariculture project; minor to moderate negative impact due to increase in harvest of sea otter food source; minor to major negative impacts due to possible oil spills; negligible negative impacts due to tourist disturbance	Same as Alternative A except two to five 0.5 acre mariculture projects would be developed	Same as Alternative A except seven to fourteen 0.5 acre mariculture projects would be developed
Terrestrial mammals	Minor negative localized impacts due to timber harvest	Same as Alternative A	Same as Alternative A
Endangered species	No breeding population in this unit	Same as Alternative A	Same as Alternative A
Water quality and quantity	Negligible impacts on water quality an quantity	Same as Alternative A except minor negative impacts from two to five 0.5 to 2 acre mariculture projects	Same as Alternative A except minor negative impacts from seven to fourteen 0.5 to 2 acre mariculture projects; major localized impacts from the single finfish mariculture project, two additional commercial docks and several government docks would be developed
Cultural Resources	Negligible impacts on cultural resources	Same as Alternative A	Same as Alternative A
Population	Negligible impacts on population	Same as Alternative A	Same as Alternative A
Economy	Negligible impacts on economy	Minor positive impacts on the local economy depending on the success of mariculture projects	Moderate to major impacts on the local economy depending on the success of mariculture projects
Recreation	Major increase in interpretive opportunities and recreation	Same as A except localized negative impacts on recreation due to mariculture development	Same as Alternative B
Subsistence	Negligible impacts on subsistence	Localized minor negative impacts on subsistence due to mariculture development	Same as Alternative B

Table 51. Summary of the wilderness impacts of the alternatives by unit.

Wilderness Values	Alternative A (No Wilderness)	Alternative B (All Wilderness)	Alternative C Wilderness Area	Alternative C Nonwilderness Area
CHUKCHI SEA UNIT				
Naturalness	Life of the plan and long term - impacts from dredging in Peard Bay, possible negative impacts from potential oil spills;	Life of the plan	Same as A	Same as A
Solitude	No impacts during the life of the plan and over the long term	Same as A	Same as A	Same as A
Primitive Recreation	No impacts during the life of the plan and over the long term	Same as A	Same as A	Same as A
Special Features	Life of the plan - No impacts Long term - possible impacts from oil spills although potential is low	Same as A	Same as A	Same as A
Wildlife Populations	Life of the plan and long term - possible impacts from oil spills although the potential is low	Same as A	Same as A	Same as A
BERING SEA UNIT				
Naturalness	Life of the plan - benefits from reduced reindeer grazing, possible negative impacts from oil spills; Long term - negative impacts on seabirds from increased commercial fishing	Same as A	Life of the plan - possible negative impacts from oil spills; Long term - negative impacts on seabirds from increased commercial fishing	Same as A
Solitude	No impacts during the life of the plan and over the long term	Same as A	Same as A	Same as A
Primitive Recreation	During the life of the plan and over the long term possible negative impacts from oil spills	Same as A	Same as A	Same as A
Special Features	During the life of the plan and over the long term possible negative impacts from oil spills	Same as A	Same as A	Same as A
Wildlife Populations	During the life of the plan and over the long term positive impacts on wildlife from management actions, possible negative impacts from oil spills and commercial fishing	Same as A	Same as A	Same as A
ALEUTIAN ISLANDS UNIT				
Naturalness	Life of the plan - major benefit from fox eradication, Aleutian Canada goose reintroduction, and cleanup of WWII debris; decline in naturalness on 30 acres of ORV trail; less than 22% chance of oil spill affecting seabirds, otters; Long term - continued oil spill risk, negative impact on seabirds and sea lions from forage fishery	Major benefit from fox eradication, Aleutian Canada goose reintroduction, cleanup of WWII debris; decline in naturalness on 30 acres of ORV trail; less than 22% chance of oil spill affecting seabirds, otters negative impact from forage fishery	Same as B except ORV trail deleted from proposed area	During life of plan and long term - loss of naturalness on no more than 30 acres impacted by ORV trail
Solitude	WWII debris clean-up would impact solitude for 1 summer on Tanaga and Great Sitkin	WWII debris clean-up would impact solitude for 1 summer on Tanaga, Great Sitkin	Same as B	Opportunities would remain outstanding
Primitive Recreation	Life of the plan - benefit from fox eradication, less than 22% chance of oil spill affecting bird watching opportunities; Long term - access improves on Unalaska islets, negative impact on seabirds and sea lions from forage fishery	Same as A, except increased recreational activities on Amchitka and Unalaska islets	Same as B	During the life of the plan and long term opportunities remain outstanding

Table 51. Summary of the wilderness impacts of the alternatives by unit, continued.

Wilderness Values	Alternative A (No Wilderness)	Alternative B (All Wilderness)	Alternative C Wilderness Area	Alternative C Nonwilderness Area
ALEUTIAN ISLANDS UNIT CONTINUED				
Special Features	Life of plan - fox eradication benefits endangered Aleutian Canada goose, less than 22% chance seabirds, otters affected by oil spill; Long term - continued oil spill risk, negative impact on seabirds and sea lions from commercial fishing	Fox eradication benefits endangered Aleutian Canada goose; less than 22% chance oil spill affects seabirds, otters; forage fishery affects seabirds and sea lions	Same as B	No impact on the only special feature in this area, Korovinski
Wildlife Populations	Life of plan - less than 22% chance of oil spill affecting seabirds and geese, fox eradication and geese reintroduction benefits wildlife; Long term - continued oil spill risk, negative impact on seabirds and sea lions from commercial fishing	Fox eradication and geese reintroduction benefits wildlife, less than 22% chance of oil spill impacting wildlife; forage fishery would impact seabirds and sea lions; wilderness management would protect wildlife against unforeseen development pressures	Same as B	No impact during the life of the plan and the long term
ALASKA PENINSULA UNIT				
Naturalness	Life of the plan - benefit to seabirds from ground squirrel eradication, less than 5% chance oil spills affecting seabirds, sea otters; Long term risk from oil spills, possible negative impacts on seabirds and sea lions from commercial fishing	Life of the plan - benefit to seabirds from ground squirrel eradication. less than 5% chance oil spills affecting seabirds, sea otters; Long term risk of oil spills and increased fishing may impact seabirds and sea lions	Life of the plan - less than 5% chance of oil spill affecting seabirds; Long term - continued risk from oil spills, possible negative impacts on seabirds and sea lions from commercial fishing	Same as A
Solitude	No impacts during the life of the plan and over the long term	No impacts during the life of the plan and long term	No impacts during the life of the plan and the long term	No impacts during the life of the plan or the long term
Primitive Recreation	Life of the plan and over the long term - increase in bird watching opportunities from ground squirrel eradication and increased tour boat access, less than 5% chance of oil spills affecting seabirds, sea otters, possible impacts from overfishing on wildlife viewing opportunities	Life of plan and long term increase in bird watching opportunities from squirrel eradication and increased tour boat access, less than 5% chance of oil spills affecting seabirds, sea otters, possible impacts from overfishing on wildlife viewing opportunities	Same as B except ground squirrel eradication not in this area	Same as A
Special Features	Life of the plan - benefit to seabirds from ground squirrel eradication less than 5% chance of oil spills affecting seabirds sea otters, and waterfowl; Long term - continued risk from oil spills, possible negative impacts to seabirds and sea lions from commercial fishing	Life of the plan and long term - benefit to seabirds from squirrel eradication, less than 5% chance of oil spills affecting seabirds, sea otters, and waterfowl long term - possible impacts to seabirds and sea lions from increased fishing	Life of the plan - less than 5% chance chance of oil spills affecting seabirds, sea otters and wintering waterfowl; Long term - continued risk from oil spills, possible negative impacts to seabirds and sea lions from commercial fishing	Same as A
Wildlife Populations	Life of the plan - benefits to seabirds from ground squirrel eradication, less than 5% chance of oil spills affecting seabirds and waterfowl; Long term - possible negative impacts from oil spills, possible negative impacts to seabirds and sea lions from commercial fishing	Life of the plan - benefits to seabirds from ground squirrel eradication, less than 5% chance of oil spills affecting seabirds and waterfowl; Long term - continued risk from oil spill possible negative impacts from increased fishing on seabirds and sea lions	Life of the plan - less than 5% chance of oil spills affecting sea otters, seabirds and waterfowl; Long term - continued risk from oil spills possible negative impacts to seabirds and sea lions from commercial fishing	Same as A

Table 51. Summary of the wilderness impacts of the alternatives by unit, continued.

Wilderness Values	Alternative A (No Wilderness)	Alternative B (All Wilderness)	Alternative C Wilderness Area	Alternative C Nonwilderness Area
GULF OF ALASKA UNIT				
Naturalness	Life of the plan - less than 25% chance of oil spill affecting seabirds; Long term - continued risk from oil spills, possible negative impacts on seabirds and sea lions by commercial fishing, decline in cormorants on Chiswells due to increased recreation, decline in naturalness of Uganik Bay due to development of private land	Life of the plan - less than 25% chance of oil spill affecting seabirds; Long term - risk from oil spills, possible negative impacts on seabirds, sea lions by increased fishing, decline in cormorants on Chiswells due to increased recreation, decline in naturalness of Uganik Bay due to development of private land	Same as B except no impacts from development since Uganik islets are not in proposed area	Same as A except no impacts on cormorants since Chiswells are not in nonwilderness area
Solitude	Loss of solitude on the Chiswells in summer due to increased recreation; loss of solitude on Uganik Bay islets in summer due to use and development, loss of solitude for 1 week every few years due to bird monitoring	Loss of solitude on the Chiswells in summer due to increased recreation; loss of solitude on Uganik Bay islets in summer due to use and development loss of solitude for 1 week every few years due to bird monitoring	Loss of solitude on Chiswells in summer due to increased recreation; loss of solitude 1 week every summer due to bird monitoring	Loss of solitude in Uganik Bay due to increased recreational use and development on private land
Primitive Recreation	Life of the plan and long term - less than 25% chance of oil spills affecting seabirds, and bird watching; increased recreational opportunities due to growth of tourist industry, Homer visitor center; increased fishing could lead to decreased wildlife watching opportunities	Life of the plan and long term - less than 25% chance of oil spills affecting seabirds and bird watching increased opportunities due to growth of tourist industry Homer visitor center; increased fishing could cause decreased wildlife watching opportunities	Same as B	Only Rabbit Island has outstanding opportunities; impacts from oil and increased fishing as in A; some benefit from growth of tourist industry
Special Features	Life of the plan and long term - less than 25% chance of oil spills affecting seabirds; and long term impacts to seabirds and sea lions from commercial fishing	Life of the plan and long term - less than 25% chance of oil spills affecting seabirds and long term impacts to seabirds and sea lions from commercial fishing	Same as B	No special features in nonwilderness area
Wildlife Populations	Life of the plan and long term - less than 25% chance of oil spill affecting seabirds, sea otters; impacts on Chiswell cormorants from visitor use; possible long term impacts on seabirds and sea lions from commercial fishing	Life of the plan and long term - less than 25% chance of oil spill affecting seabirds, sea otters; impacts on Chiswell cormorants from visitor use; possible long term impacts on seabirds, sea lions from increased fishing	Same as B	Same as A except no impact on cormorants because Chiswells are not in nonwilderness area

Table 52. Staffing levels and development costs (in 1000's of dollars) of the three alternatives.

	Alternative A	Alternative B	Alternative C
Refuge Staffing:			
Permanent Full Time Equivalents	31	31	36.2
Nonpermanent Full Time Equivalents	15	20	23
Kenai Fisheries Program:			
Total Full Time Equivalents	.5	1.0	1.5
Total Costs	100	150	395
Refuge Annual Budget			
Salaries	1450	1480	1750
Wildlife Programs	300	350	400
Fisheries Programs	0	0	30
Water Quality Monitoring	150	150	170
Interpretation and Environmental Ed	50	75	100
Facility and Equipment Maintenance	300	300	400
Law Enforcement	10	20	30
Administration	80	80	100
REFUGE TOTAL	2,340	2,455	2,980
Development Costs			
Administrative Facilities			
Homer Headquarters Complex Office/Storage/Visitor Center/Bunkhouse/Lab	10,000	10,000	10,000
Adak			
Storage Building	0	500	500
Garages	0	350	350
St. George			
Office/Storage/Visitor Center/Bunkhouse	*	*	*
St. Paul			
Office/Storage/Visitor Center/Bunkhouse	*	*	*

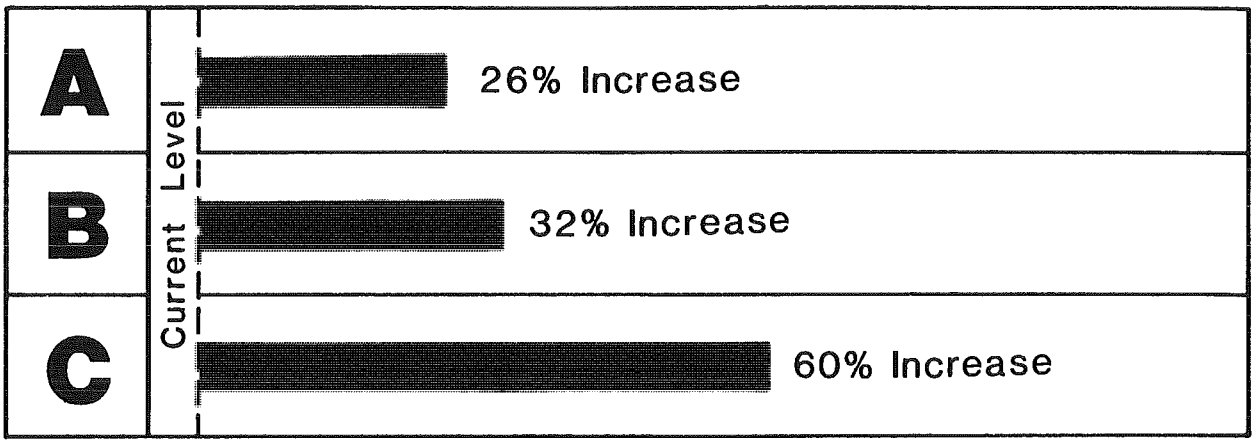
Table 52, continued.

	Alternative A	Alternative B	Alternative C
Public Use Facilities			
Juneau			
Interpretive Display	0	10	10
Sitka			
Interpretive Display	0	10	10
Homer			
Visitor Center (see admin facilities)	-	-	-
Sand Point			
Interpretive Display	0	10	10
Dutch Harbor			
Interpretive Display	0	10	10
St. George			
Interpretive Display	0	10	10
St. Paul			
Interpretive Display	0	10	10
Kotzebue**			
Interpretive Display	0	10	10
Marine Highway System			
Interpretive Display	0	10	10
DEVELOPMENT COST	10,000	10,930	10,930

*Note: See discussion of facilities on St. Paul and St. George islands in the common management directions section.

**Note: See Selawik Refuge plan for discussion of Kotzebue facilities.

Figure 81. Relative annual costs of the alternatives.



CONSULTATION AND COORDINATION

The public involvement program is described in the introduction. The Service held or participated in the following meetings to address planning on the Alaska Maritime Refuge.

10/29-30/85	Anchorage	Make presentation on refuge to state Coastal District Conference; participate in conference work sessions; consult with individual district representatives.
9/17/86	Kodiak	Discuss refuge plan with Kodiak Area Native Association Overall Economic Development Planning Committee
9/17/86	Afognak Island	Tour logging operation and proposed log transfer facility sites with Jim Carmichael, General Manager, Afognak Native Corporation.
9/23-24/86	Atka	Hold public meeting to discuss preliminary management alternatives; "visit" with residents; tour fish processing facility; meet with Axtam Corporation president.
9/25-26/86	Adak Naval Air Station	Office visits to discuss refuge planning with senior military personnel; video tape interview for base television station.
11/11/86	Anchorage	Meet with Gordon Pullar, Kodiak Area Native Association president. Discussed local concerns and public involvement needs.
1/20/87	Ouzinkie	Public meeting to discuss preliminary management alternatives.
1/20/87	Port Lions	Presentation to City Council on preliminary management alternatives.
1/21-23/87	Kodiak	Hold afternoon public meeting to discuss preliminary management alternatives. Make presentations to Kodiak Area Native Association Board of Directors. Audio conferences with Karluk and Larsen Bay. Office visits with: Linda Freed, Kodiak Island Borough; Kevin O'Sullivan, Kodiak Regional Aquaculture Association; Roger Blackett and Lonnie White, Alaska Department of Fish and Game; Bill Osborne, Kodiak Area Native Association Mariculture Project. Radio interview with Maggie Tuck, KMXT.
2/3-4/87	Shishmaref	Discuss preliminary management alternatives at joint meeting of City Council, IRA, and corporation; hold public meeting; make two presentations to high school classes.
2/5-6/87	Kotzebue	Discuss preliminary management alternatives with: Grant Hildreth, Northwest Arctic Borough; Kotzebue City Council; Pete Schaeffer

		and Walter Sampson, NANA Corporation; Chester Ballot, Kotzebue IRA Council; and Phil Truer and Kathy O'Rielly-Doyle, City Planning. Radio interview for KOTZ.
2/9-10/87	Nome	Discuss preliminary management alternatives with; Lyle Larson, Nome City Manager; Robert Fagerstrom, Sitnasaquk Corporation; Nome City Council; Caleb Pungowiyi, Kawerak; Guy Martin, Bering Straits Native Corporation; Mike Saclamana, King Island Native Corporation; Lincoln Trigg, Nome Eskimo Community. Radio interview for KNOM.
2/10/87	Stebbins	Discuss preliminary management alternatives with City Council. Make two presentations at school; discuss environmental education materials with principal Mike Settevendemie.
2/11-12/87	St. Michael	Discuss preliminary management alternatives with City Council. Make presentation at high school.
2/13/87	Golovin	Discuss preliminary management alternatives public meeting.
2/14/87	Shaktoolik	Meet with Mayor Edgar Jackson.
2/16-17/87	Unalakleet	Discuss preliminary management alternatives with: Unalakleet City Council; Sam Towarak, Bering Strait School District; June Degnan, Unalakleet Native Corporation. Discuss environmental education materials with Nita Towarak, Unalakleet High School.
2/17/87	Sitka	Hold afternoon and evening public meetings to discuss management alternatives.
2/18/87	Ketchikan	Hold public meeting to discuss management alternatives.
2/19/87	Kivalina	Discuss preliminary management alternatives with the village council.
2/19-20/87	Juneau	Discuss preliminary management alternatives with: Alaska Department of Fish and Game Southeast Regional Office, staff from several divisions; Jan Mills, Division of Governmental Coordination; Bob Clasby, Alaska Department of Fish and Game; Wendy Block, Sierra Club Legal Defense; Representative Ben Grussendorf (Sitka), Speaker of the House. Hold afternoon and evening public meetings.
2/24/87	Chignik Lake	Hold public meeting to discuss management alternatives. Meet with IRA Council president. Make presentation at the school.

2/25	Kotzebue	Discuss preliminary management alternatives with Eskimo Walrus Commission.
2/26/87	Chignik Bay	Hold public meeting. Meet with village corporation. Meet with public safety officer. Make presentation at the school.
2/26/87	Kiana	Discuss preliminary management alternatives with North West Arctic Borough Planning Commission.
3/2/87	Pt. Hope	Discuss preliminary management alternative with village council.
3/2/87	False Pass	Hold public meeting.
3/3/87	Deering	Discuss preliminary management alternatives with village council.
3/4/87	Nikolski	Hold public meeting.
3/5/87	Unalaska	Meet with City Planning Commission. Make presentation to school.
3/9/87	St. Paul	Hold public meeting. Meet with Tanaqusix Corporation. Make presentation to City Council. Make presentations at the school.
3/10/87	Buckland	Discuss preliminary management alternatives with village council.
3/10-11/87	Sand Point	Discuss preliminary management alternatives with: Dan Dunaway, Alaska Department of Fish and Game; Fish and Wildlife Protection Officer; Marilynn Dunaway, Aleutians East CRSA. Address City Council; hold evening public meeting. Make two presentations at the school.
3/12/87	King Cove	Make presentation to City Council on preliminary management alternatives. Discuss refuge with: Don McCallum, King Cove Corporation; Don Wickstrom, Aleutians East CRSA. Make presentation at the school.
3/12/87	St. George	Hold public meeting. Meet with mayor. Meet with Tanaq corporation. Meet with IRA Council.
3/16/87	Kodiak	Hold afternoon and evening meetings to discuss preliminary management alternatives.
3/17/87	Karluk	Meeting to discuss preliminary management alternatives.
3/15-16/87	Juneau	Make presentation on preliminary management alternatives to state Coastal District Conference; individual discussions with representatives of most affected coastal districts.
3/18/87	Pt. Hope	Discuss preliminary management alternatives with village council.
3/18/87	Anchorage	Hold afternoon and evening public meetings to discuss preliminary management alternatives.

3/23/87	Homer	Discuss preliminary management alternatives in evening public meeting.
4/7/87	Wales	Discuss preliminary management alternatives with village council.
3/7/88	Noorvik	Public meeting on migratory bird subsistence hunting also discussed draft plan.
3/15/88	Juneau	Public meeting on draft plan.
3/16/88	Sitka	Public meeting on draft plan.
3/17/88	Noatak	Public meeting on migratory bird subsistence hunting also discussed draft plan.
3/18/88	Kivalina	Public meeting on migratory bird subsistence hunting also discussed draft plan.
3/21/88	Atka	Public meeting on draft plan
3/23/88	Adak	Public meeting on draft plan.
3/23/88	Shishmaref	Public meeting on migratory bird subsistence hunting also discussed draft plan.
3/30/88	Point Hope	Public meeting on migratory bird subsistence hunting also discussed draft plan.
4/11/88	Unalaska	Public meeting on draft plan. Meeting with harbor master and members of the CRSA board.
4/12/88	Kodiak	Public meeting on draft plan.
4/13/88	Anchorage	Public hearing on draft plan.
4/19/88	Sand Point	Public meeting on draft plan had no attendees so a radio interview was done on KSDP
4/20/88	St. Paul	Public meeting on draft plan. Meeting with officials of Tanaqusix. Meeting with president of IRA Council.
4/21/88	St. George	Public meeting on draft plan.
4/23/88	Wales	Public meeting on migratory bird subsistence hunting also discussed draft plan.
4/24/88	Little Diomede	Meeting with city officials on migratory bird subsistence hunting and the draft plan.
4/25/88	Chignik Bay	Teleconference on draft plan.
4/26/88	Seward	Public meeting on draft plan.
4/27/88	Soldotna	Public meeting on draft plan.
4/28/88	Homer	Public meeting on draft plan.

5/3/88	Nome	Public meeting on draft plan. Interviews on KICY and KNOM. Meet with Guy Martin, Bering Straits Native Corporation.
5/4/88	Golovin	Meeting with corporation on draft plan.
5/5/88	Kotzebue	Public meeting on draft plan. Meet with Jason Jessup, Borough Planning Director, and Grant Hildreth. Meet with Bob Gale, Bureau of Land Management.

The following agencies, organizations, or individuals have received copies of this final plan of the Alaska Maritime Refuge.

U.S. CONGRESS

Senator Ted Stevens
Senator Frank H. Murkowski
Representative Don Young
House of Representatives
Subcommittee on Fish & Wildlife
Government Accounting Office

FEDERAL AGENCIES

Alaska Federal-State Land Use Council

Department of Agriculture
Soil Conservation Service
U.S. Forest Service
Department of Commerce
Economic Development Admin.
U.S. Forest Service
Department of Commerce
National Marine Fisheries Service
National Oceanic and Atmosphere Administration
North Pacific Fishery Management Council

International Trade Commission
Department of Defense
U.S. Air Force, Elmendorf AFB,
343 Tactical Fighter Wing
Environmental Engineer
OFC of Sec Pol.
U.S. Army, Corps of Engineers
U.S. Navy, COMTHIRDFLT
CINCPACFLT/U.S. Pacific Command
Defense Mapping Agency, Hydro/Topo
Department of Energy
Assistant General Council
Department of Health & Human Serv.
PHS Hospital
Department of the Interior
Bureau of Indian Affairs
Alaska Native Seattlement Claims Act Projects Office
Bureau of Land Management Serv.
National Park Service
Office of Public Use Management
U.S. Geological
National Mapping Division

Department of Transportation
Federal Aviation Administration
U.S. Coast Guard
17th Coast Guard District
General Services Adminstration
Federal Information Center
Marine Mammal Commission
U.S. Environmental Protection Agency

GOVERNMENT OF AUSTRALIA

Government of South Australia
Department of Lands

GOVERNMENT OF CANADA

Canadian Arctic Research Commission
Department of Indian Affairs
Environment Affairs Office
Northwest Territorial Government
Dept. of Renewable Resource, Yellowknife
Yukon Territorial Government
Dept. of Renewable Resource, Whitehorse

STATE OF ALASKA

Alaska Land Use Council
Alaska State Cit. Advisory Commission
Alaska State Legislature
Alaska State Office of Mineral Dev.
Office of the Governor
Office of Coastal Management
Office of Management
Department of Commerce & Economic Dev.
Alaska Power Authority
Department of Community & Regional Affairs
Department of Education
Alaska State Library
Department of Environmental Conservation
Department of Fish & Game
Board of Fisheries
Board of Game
Department of Health & Social Serv.
Department of Natural Resources
Department of Public Safety
Division of Fish & Wildlife Protection

Department of Transportation & Public Facilities
Kuskokwim Consortium Library

University:

University of Alaska, Anchorage

Library: Government Documents
Institute for Social & Economic Research

University of Alaska, Dillingham
Maps

University of Alaska, Fairbanks

Arctic Envirion. Info. Data Cent.
Elmer E. Rasmusen Library
Institute of Arctic Biology
Cross-Cultural Education Dept
University of Alaska, Juneau
Library: Government Documents

Coastal Management Districts of:

Aleutians East Borough
Aleutians West Coastal Resource Serv.
Annette Islands Indian Reserve
Bering Straits
Bristol Bay
Cenaliulriit
Kenai Peninsula Borough
Ketchikan Gateway Borough
Kodiak Island Borough
NANA Borough
North Slope Borough

City of:
Akutan,
Bethel
Cordova
Craig
Haines
Hoonah
Hydaburg
Juneau
Kake
Klawock
Nome
Pelican
Petersburg
Sitka
Skagway
St. Paul
Unalaska
Valdez
Wrangell

LOCAL GOVERNMENTS, CIVIC ORGANIZATIONS, AND GENERAL CIRULATION LIBRARIES

Local Government

Barrow, City of
Bethel, City of
Brevig Mission, Community of
Chignik, City of
Clark Point, City of
Cordova, City of
Craig, City of
Dillingham, City of
Elim, City of
Golovin, City of
Haines, City of
Homer, City of
Hoonah, City of
Hydaburg, City of
Kake, City of
Kenai, City of
Ketchikan, City of
King Cove, City of
Klawock, City of
Kodiak, City of
Kotzebue, City of
Koyuk, City of
Larsen Bay, City of
Mekoryuk, City of
Nome, City of
Old Harbor, City of
Ouzinkie, City of
Platinum, City of
Petersburg, City of
Point Hope, City of
Port Lions
St. George
St. Mary
St. Michael
St. Paul
Sand Point
Scammon Bay
Shaktoolik
Shishmaref
Seldovia
Seward
Skagway

Stebbins
Togiak
Toosook Bay
Tununak
Tyonek
Unalakleet
Unalaska
Valdez
Wainwright
Wrangell
Yakutat

Schools

Akhiok School
Akutan School
Aleutians Regional School District
Anchor Point Public Library
Anthony Andrews School
Chignik Lake School
Houghtaling Elementary School
Ketchikan High School Library
Koliganek School
Lower Kuskokwim School District
Manokotak School
Nelson Island School
North Star Borough School
Nikolski High School
Northwest School District
Nuniuaarmint Schools
Paul T. Albert Memorial High School
Peterson Elementary School
Port Graham Elementary High School
Pribilof School District
Soldotna Elementary School
Southwest Region School
Stebbins High School
Tikigaq School
Togiak School
Tustemena Elementary

Library:

Alaska Public Land Information Center
Alaska State Library, Juneau
Anchorage Public Library System
Anchor Point Public Library
Bureau of Land Management. Lib/Info
Colorado State University Library
Kenai Community College Library
Ketchikan High School Library
Kuskokwim Consortium Library, Bethel
Library/Media Service
Northwest School District
Southeast Regional Library Services

Boroughs:

Aleutians East Borough
Matanuska-Susitna Borough
Municipality of Anchorage
Northwest Alaska Borough

Civic Organization:

Inipiat Community of the Arctic
Brevig Mission Traditional Council
Greater Ketchikan Chamber of Commerce
Teller Traditional Council
Women Bay Community Council
Valdez Historical Society

Indian Reorganization Act Councils of:

Akhiok
Akutan
Atka
Buckland
Chignik
Clark's Point
Deering
Eyak
False Pass
Golovin
Homer
Hooper Bay
Ivanof Bay
Karluk
King Cove
Kivalina
Koyuk
Kotzebue
Kwigillingok
Larsen Bay
Meykoryuk
Nikolski
Old Harbor
Quinkie
Perryville
Platinum
Port Clarence
Port Graham
Port Lions
Point Hope
Point Lay

Village Council of:
- Egegik
- English Bay
- Port Clarence
- Ivanof Bay
- Solomon
- Kwigillinok

Village Council Clerk:
- Akutan
- Chignik
- Chiniak
- False Pass
- Kivalina
- Koniganak
- Moses Point
- Nikolski
- Pauloff Harbor
- Perryville
- Port Graham
- Point Lay
- Quinhagak
- Solomom
- Tin City
- Togiak
- White Mountain

City Council of:
- Afognak
- Selawik

City Council Clerk of:
- Cold Bay
- Akhiok
- Chignik
- Kodiak

NATIVE ORGANIZATION

Afognak Joint Venture
Afognak Native Corporation
Akiok-Kaguyak Corporation
Akutan Corporation
Alaska Eskimo Whaling Commission
Alaska Federation of Natives
Valdez Historical Society
Aleut Corporation
Arctic Slope Regional Corporation
Ashinuk Corporation
Bering Straits Regional Strategy
Bethel Native Corporation
Bristol Bay Native Association
Bristol Bay Native Corporation
Calista Corporation
Chignik Lagoon Native Association
Choggiung Ltd.
Cook Inlet Region, Inc.
Copper River Native Assoc.
English Bay Corporation
Elim Corporation
Eyak Corporation
Far West Corporation
Goldbelt Corporation
Golovin Native Corporation
Isanotski Corporation
Karluk Native Corporation
Kawerak, Inc.
Kawerak Regional Strategies
Kenai Natives Association, Inc.
Kikiktagrok Inupiat Corporation
King Cove Corporation
King Island Native Corporation
Kodiak Area Native Association
Koniag, Inc.
Koyuk Native Corporation
Koyukon Development Corporation
Lesnoi, Inc.
Maniilaq Association
Natives of Kodiak, Inc.
Ninilchik Native Association
Nana Regional Corporation, Inc.
Nunam Kitlutsisti
Oceanside Corporation
Old Harbor Native Corporation
Olgoonik Corporation
Ounalaska Corporation
Ouzinkie Native Corporation
Pilot Point Native Association
Salamatoff Native Association
Seaalaska Corporation
St. George Tanaq Corporation
Sanak Corporation
Seldovia Native Association
Shaan-Seet, Inc.
Shee Atika, Inc.
Shismaref Native Corp.
Shumagin Corporation
Solomon Native Corporation
Stebbins Native Corporation
Tanadqusix Corporation
Tigara Corporation
Togiak Native Ltd.
Ukpeagivk Inupiat Corporation
Unalakleet Native Corporation
Unalaska Aleut Development Corporation
Yak-tat-kwaan, Inc.

NEWS MEDIA:

ALASKA JOURNAL OF COMMERCE
ALASKA MAGAZINE
ALEUTIAN EAGLE
ALEUTIAN TIMES
ANCHORAGE DAILY NEWS
ANCHORAGE TIMES
ARCTIC SOUNDER
FAIRBANKS DAILY NEWS - MINER
HOMER NEWS
HORIZONS ALASKA
KETCHIKAN DAILY NEWS
KODIAK DAILY MIRROR
REUTERS NEWS SERVICE
THE CLARION
WRANGELL SENTINEL

Radio Stations:

Alaska Public Radio Network
KAYY-FM, Fairbanks
KASH-AM & FM, Anchorage
KATB-FM, Anchorage
KCAW-FM, Sitka
KCBF-AM, Fairbanks
KDLG-AM, Dillingham
KDSP-AM, Sand Point
KFQD-AM, Anchorage
KFAR, Fairbanks
KIAK, Fairbanks
KICY-AM, Nome
KIYU. Galena
KJNP-AM & FM, North Pole
KMXT-FM, Kodiak
KNOM-AM, Nome
KQRZ-AM, Fairbanks
KRKO-AM & FM, Fairbanks
KSKA-FM, Anchorage
KSKO-FM, McGrath
KSRM, Soldotna
KSUA-FM, College/Fairbanks
KVOK-AM, Kodiak
KYAK-AM-KGOT-FM, Anchorage
KUAC-FM(Public), Fairbanks
KXDZ, Anchorage

Television Stations:

Alaska Television Network
KAKM, Public Television, Anchorage
KATN-TV, Fairbanks
KHNS, Haines
KIMO-TV, Anchorage
KJUD, Juneau
KTVF-TV, Fairbanks
KUAC (Public), Fairbanks
KVAC-TV, Fairbanks
RATNET

ORGANIZATIONS, SPECIAL-INTEREST GROUPS, PRIVATE BUSINESS

AAA Alaskan Outfitters
A & P Tours
AIFMA COOP
AMOCO Production Company
ARCO Alaska
Afognak Wilderness Lodge
Alasak Northwest Publishing Co.
Alaska Association of Soil Conservation Subdist.
Alaska Biological Research
Alaska Center for International Business
Alaska Crab Coalition
Alaska Draggers Association
Alaska Eskimo Whaling Commission
Alaska Field Office Commission
Alaska Float Trips
Alaska Geogaphic Society
Alaska Land Management Associates
Alaska Legal Services Corporation
Alaska Mariculture Association
Alaska Oil and Gas Association
Alaska Outfitters
Alaska Pacific Univerisity
Alaska Professional Hunters Association
Alaska Programs
Alaska Research Associates
Alaska River Outfitters
Alaska Science and Technology
Alaska Sea Kayaking
Alaska Setnetters Association
Alaska State Chamber of Commerce
Alaska Travel Adventure
Alaska Treks & Voyages
Alaska Trollers Association
Alaska Wildlife Alliance
Aleatians East CRSA
Aleutian/Pribilof Islands Association
Amerada Hess Corporation
American Wilderness Alliance
Anchorage Chamber of Commerce
Aquabionbics, Inc.
Arctic Slope Consulting Engineers
Area Forester
Aristarchus Group
Arvig, Inc.
Associated General Contractors

Associated Press
BO-K Explorations
Back Alaska Operations
Bacon Productions
Becharof Lodge & Camp
Bering Sea Fishermans Association
Bristol Bay CRSA Board
Bud Dye Investment Co.
COMINCO Alaska
CONOCO, Inc.
Cablevision
California Dept of Fish & Game
Center for Northern Studies
Central Council Tlingit and Haida
Chaluka Corp
Chernofski Sheep Ranch
Cherokee Mountain Company
Chevron U.S.A., Inc.
Chinook Charters
Chirikof Cattle Co., Inc.
Chugach Alaska Corporation
Citizens Advisory Commission of Federal
Coastal Coor
Commonwealth of Massachusetts
Cooper Consultants, Inc.
Cultural Dynamics
Dalton Dalton Newport
Day Harbor Enterprises, Inc.
Dee Lane Co.
Defenders of Wildlife
Dolphin Too, Inc.
Duck Unlimited
EBASCO
Eastern Washington University
Eight Fathon Bight
Environment Management & Engineer, Inc.
Environmental Defense Fund, Inc.
Environmental Services, Ltd.
Exxon Company USA, Inc.
Fair Chase Hunts
Fairbanks Bird Club
Fairbanks Chamber of Commerce
Falls Creek Environmental Center
First Shot Gunsmithing
Fish House
Fisheries and the Environment
Foundation of Biologic Research (Mexico City)
Friends of Animals, Inc.
Friends of the Earth
Geodata Corporation
Great Water Associates
Greenpeace U.S.A
Guide Licensing and Control Board
HWW Consultants
Harbor Air
Hedland Fleischer et. al
High Country News
Hochelaga Research Institute
Homer Society of Natural History
Hooks, McCloskey & Associates, Inc.
INCOCONC
Information Resources Unlimited
International Moose Federation
International North Pacific Fish
KAK Tours
Kachemak Bay Conservation Society
Kawerak, Inc.
Kenai Fjords National Park
Kenai Fjords Tours, Inc.
Kennecott Alaska Exploration
Knik-Kaniers & Kayakers
Kodiak Arts Council
Kodiak Historical Society
Kodiak Island Setnetters Association
Kodiak Longliners Association
Kodiak Regional Aquaculture Assoc.
Koncor Forest Products
Konkel & Co.
Kotzebue Technical Center
LGL Alaska Research Associates
LNSRAA
Legal Defense Fund
Linden Spring Farm
Magic Magic Photography
Makrina Mack
Marathon Oil Company
Mariah Charters
Marine Advisory Agent/SE AK
Miner Advocacy Council
Minerals Exploration Coalition
Mujurb, Inc.
Murphy Oil Company
NSRAA
Nana CRSA
National Audubon Society
National Conservation Department
National Inholders Association
National Parks & Conservation Assoc.
National Resources Defence Council
National Rifle Association
National Wildlife Federation
Nenana Regional Corp, Inc.
Nortec
North Pacific RIM/United Fisherman's Mkt.
Northern Alaska Environmental Center
Northern Envir Dir./Terr Env. Div/Indian & North Affair
Northern Illinois University

Northern Technical Services
Nushagak Consulting Services
Oak Ridge Nat'l Lab
Oceanographic Consultants
Ott Water Engineers, Inc.
Pacific Coast Federation of Fisherman
Pennzoil Exploration & Production Co.
Petroleum Information Corporation
Phillips Petroleum
Plumbers & Pipefitters Labor Union #262
Qanirtuuq, Inc.
Quest Charters

R & D Associates
RBRP
Redwood Chapter
Reeve Aleutian Airways
Resource Analysts
Resource Development Council for Alaska
Richards Veterinary Clinic
Rose Assoc., Inc.
Santa Clara County Trans Agency
Sevy Guide Service, Inc.
Seward Charter Operators Assoc.
Shell Western E & P Inc.
Siwash Safaris, Inc.
Southeast Conservation Council
Sprucetree
St. George Tanaq Corporation
St. Mary's Mission
State University of New York
Stephen R. Braund and Associates
Sycamore Association
TAM Engineers
TCC, Inc.
Tanana Chiefs Conference
Tenneco Oil Company
Tennessee Gas Transmission Company
Texaco USA, Inc.
The Bureau of National Affairs
The Grouse Creek Corporation
The Guide
The Mapmakers
The Sierra Club
The Wilderness Society
The Wildlife Society
Timberline, Inc.
Trout Unlimited, East Jersey
Trustees for Alaska
U.S. Fisherman's Marketing Assoc.
U.S. Frontier & Conservation Asson
UNOCAL
Unga Corporation
United Press International
Univ. of California-Santa Cruz
University of Idaho/College of Forestry
University of Montana/Envir Studies
University of Waterloo/Environ Studies
University of Wisconsin
Utah International, Inc.
Valdez Historical Society, Inc.
Valdez Vanguard
Vanness, Feldman, Sutcliffe & Curt
Western Alaska Sport Fishing
Western Forestry & Conservation Asson
Western Geophysical Company of AM
Wild Country Travel Co.
Wild Management Institute
Wilderness Birding Adventures
Wildlife Refuge Program
Williams College
Woodward - Clyde Consultants

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Joseph Mazzoni	Deputy Asst. Regional Director, Wildlife Resources
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Clay Hardy	Chief of Planning

Alaska Maritime Refuge Planning Team

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Poppy Benson	Assistant Planner
Mark Bertram	Clerk/Typist
Leslie Kerr	Planning Team Leader
John Martin	Refuge Manager
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Elizabeth Sharpe	Biological Technician
Pamela Wilson	Public Involvement Specialist

Disciplinary Specialists and Support Staff

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Michelle Chivers	Cartographer
Fred Deines	Wildlife Biologist
Chuck Diters	Archeologist
Bruce Duffy	Cartographer
Tom Early	Ass't Refuge Manager
Mary Faurot	Fishery Biologist
Patti Gallagher	Visual Information Specialist
Gerard Gray	Fisheries Biologist
Evan Klett	Ass't Refuge Manager
Gary Nichols	Cartographer
Mike Nishimoto	Wildlife Biologist
Dave Nysewander	Supervisory Biologist
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Robert Platte	Biological Technician
Gerald Sanger	Wildlife Biologist
Art Sowls	Wildlife Biologist
Stephen Talbot	Vegetation Ecologist
Doug Vandergraft	Cartographer
Connie Wassink	Public Involvement Specialist
C. Fred Zeillemaker	Refuge Manager

Contracts

Michael Downs	Impact Assessment, Inc.
John Petterson	Impact Assessment, Inc.

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Alaska Maritime Refuge and Planning Staff

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APPENDIX A. International treaties.

A number of international treaties affect how the Fish and Wildlife Service manages Alaska Maritime National Wildlife Refuge. The following table identifies the major treaties and their primary purposes.

Treaty	Purpose
Convention between the Government of the United States of America and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment	To provide for the protection of species of birds which are common to both countries, or which migrate between them, by (1) enhancement of habitat, (2) exchange of research data, and (3) regulation of hunting.
Convention between the United States and Great Britain (for Canada) for the Protection of Migratory Birds	Adopted a uniform system of protection for certain species of birds which migrate between the United States and Canada, to assure the preservation of species either harmless or beneficial to man. Sets certain dates for closed seasons on migratory birds. Prohibits hunting insectivorous birds, but allows killing birds under permit when injurious to agriculture. Canada and the United States signed an agreement in 1979, to amend the treaty to allow subsistence hunting of waterfowl outside of the normal hunting season, but this provision has been ratified.
Convention between the United States of America and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and Their Environment	Provides for the protection of species of birds that migrate between the United States and the Soviet Union or that occur in either country and "have common flyways, breeding, wintering, feeding or moulting areas." Encourages actions to identify and protect important habitat and to cooperate in measures to protect migratory birds identified as being in danger of extinction.
Convention between the United States and the United Mexican States for the Protection of Migratory Birds and Game Mammals	Adopted a system for protecting certain migratory birds in the United States and Mexico. Allows, under regulation, the rational use of certain migratory birds. Provides for enactment of laws and regulations to protect birds by establishment of closed seasons and refuge zones. Prohibits killing of insectivorous birds, except under permit when harmful toagriculture. Provides for enactment of regulations on transportation of game mammals across the United States-Mexican border.

Pacific Salmon Treaty between the United States and Canada (1985)	Establishes six fishery management regions, as well as a Pacific Salmon Commission charged with managing the Pacific salmon fishery on the west coast of the United States. Major provisions of the treaty include joint management of the Pacific salmon stocks and a reduction in catch of certain stocks off southeastern Alaska and British Columbia. It also provides for United States-Canadian negotiations on Yukon River stocks of Pacific salmon with management based on escapement needs.
Treaty between the United States and Great Britain Relating to Boundary Waters between the United States and Canada	To prevent disputes regarding the use of boundary waters and settle all questions pending or that may arise in the future between the United States and Canada involving the rights, obligations, and interests of both nations along their common frontier.
Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (United States and 17 other American Republics)	To "protect and preserve in their natural habitat representatives of all species and genera of their native flora and fauna, including migratory birds" and to protect regions and natural objects of scientific value. The nations agreed to take certain actions to achieve these objectives, including the adoption of "appropriate measures for the protection of migratory birds of economic or esthetic value or to prevent the threatened extinction of any given species."
Agreement on Cooperation in the Field of Environmental Protection (United States and the Union of Soviet Socialist Republics)	To cooperate in the field of environmental protection through exchange of scientific personnel, organization of bilateral conferences, exchange of scientific and technical information, and development and implementation of projects. Emphasizes activities related to air and water pollution, enhancement of urban environments, preservation of nature, establishment of preserves, and arctic and subarctic ecological systems.

APPENDIX B. Scientific names of the fish and wildlife of Alaska Maritime Refuge (after Gabrielson and Lincoln 1959, Kessel and Gibson 1978, MacDonald 1980, Morrow 1980, Robins et al. 1980, American Ornithologist's Union 1983 with 35th and 36th Supplements).

FISH

Freshwater

Arctic Lamprey	(Lampetra japonica)
Bering Cisco	(Coregonus laurettae)
Broad Whitefish	(C. nasus)
Humpback Whitefish	(C. pidschian)
Least Cisco	(C. sardinella)
Chum Salmon	(Oncorhynchus keta)
Coho Salmon	(O. kisutch)
Chinook Salmon	(O. tshawytscha)
Sockeye salmon	(O. nerka)
Round Whitefish	(Prosopium cylindraceum)
Dolly Varden	(Salvelinus malma)
Sheefish	(Stenodus leucichthys)
Arctic Grayling	(Thymallus arcticus)
Alaska Blackfish	(Dallia pectoralis)
Northern Pike	(Esox lucius)
Lake Chub	(Couesius plumbeus)
Longnose Sucker	(Catostomus catostomus)
Burbot	(Lota lota)
Ninespine Sticleback	(Pungitius pungitius)
Slimy Sculpin	(Cottus cognatus)

Marine

Steelhead trout	(Salmo gairdeneri)
Pacific herring	(Clupea harengus pallasi)
Walleye pollock	(Theragra chalcogramma)
Pacific cod	(Gadus macrocephalus)
Sablefish	(Anaplopoma fimbria)
Atka mackerel	(Pleurogrammus monopterygius)
Pacific ocean perch	(Sebastes alutus)
Pacific halibut	(Hippoglossus stenolepis)
Arrowtooth flounder	(Atheresthes stomias)
Flathead sole	(Hippoglossoides elassodon)
Dover sole	(Microstomus pacificus)
Rex sole	(Lepidopsetta bilineata)
Rock sole	(L. bilineata)
Yellowfin sole	(Limanoa Aspera)
Capelin	(Ammodytes hexapterus)
Sandlance	(Mallotus villosus)

INVERTEBRATES

Red king crab	(Paralithodes camtschatica)
Tanner crab	(Chionoecetes bairdi)
Dungeness crab	(Cancer magister)
Pink shrimp	(Pandalus borealis)
Weathervane scallop	(Patinopecten caurinus)
Razor clam	(Siliqua patula)
Butter clam	(Saxidomus gigantea)
Cockle	(Clinocardium nutalli)
Geoduck clam	(Panope generosa)
Pinto abalone	(Haliotis kamtschatkana)
Octopus	(Octopus dolfleini)

AMPHIBIANS AND REPTILES

Wood Frog	(Rana sylvatica)

BIRDS

GAVIIFORMES

Red-throated Loon	Gavia stellata
Arctic Loon	G. arctica
Pacific Loon	G. pacifica
Common Loon	G. immer
Yellow-billed Loon	G. adamsii

PODICIPEDIFORMES

Horned Grebe	Podiceps auritus
Red-necked Grebe	P. grisegena
Western Grebe	Aechmophorus occidentalis

PROCELLARIIFORMES

Short-tailed Albatross	Diomedea albatrus
Black-footed Albatross	D. nigripes
Laysan Albatross	D. immutabilis
Northern Fulmar	Fulmarus glacialis
Mottled Petrel	Pterodroma inexpectata
Cook's Petrel	P. cookii
Pink-footed Shearwater	Puffinus creatopus
Flesh-footed Shearwater	P. carneipes
Sooty Shearwater	P. griseus
Short-tailed Shearwater	P. tenuirostris

Fork-tailed Storm-Petrel	Oceanodroma furcata
Leach's Storm-Petrel	O. leucorhoa
PELECANIFORMES	
Double-crested Cormorant	Phalacrocorax auritus
Pelagic Comorant	P. pelagicus
Brandt's Cormorant	P. penicillatus
Red-faced Cormorant	P. urile
CICONIIFORMES	
Great blue Heron	Ardea herodias
Black-crowned Night Heron	Nycticorax nycticorax
Chinese Egret	Egretta eulophotes
ANSERIFORMES	
Tundra Swan	Cygnus columbianus
Whooper Swan	C. cygnus
Greater White-fronted Goose	Anser albifrons frontalis
Bean Goose	A. fabalis
Snow Goose	Chen caerulescens
Emperor Goose	C. canagica
Brant	Branta bernicla
Canada Goose	
Green-winged Teal	Anas crecca
Baikal Teal	A. formosa
Falcated Teal	A. falcata
Mallard	A. platyrhynchos
Spot-billed Duck	A. Poecilorhyncha
Northern Pintail	A. acuta
Garganey	A. querquedula
Northern Shoveler	A. clypeata
Gadwall	A. strepera
Blue-winged Teal	A. discors
Eurasian Wigeon	A. penelope
American Wigeon	A. americana
Common Pochard	Aythya ferina
Canvasback	A. valisineria
Redhead	A. americana
Tufted Duck	A. fuligula
Ring-necked Duck	A. collaris
Greater Scaup	A. marila
Lesser Scaup	A. affinis
Common Eider	Somateria mollissima
King Eider	S. spectabilis
Spectacled Eider	S. fisheri
Steller's Eider	Polysticta stelleri
Harlequin Duck	Histrionicus histrionicus
Oldsquaw	Clangula hyemalis
Black Scoter	Melanitta nigra
Surf Scoter	M. perspicillata
White-winged Scoter	M. fusea
Common Goldeneye	Bucephala clangula
Barrow's Goldeneye	B. islandica
Bufflehead	B. albeola
Common Merganser	Mergus merganser
Red-breasted Merganser	M. serrator
Hooded Merganser	Lophodytes cucullatus
Smew	Mergellus albellus
FALCONIFORMES	
Osprey	Pandion haliaetus
Bald Eagle	Haliacetus leucocephalus
White-tailed Eagle	H. albicilla
Steller's Sea-Eagle	H. pelagicus
Northern Harrier	Circus cyaneus
Sharp-shinned Hawk	Accipter striatus
Northern Goshawk	A. gentilis
Red-tailed Hawk	B. jamicensis
Rough-legged Hawk	B. lagopus
Golden Eagle	Aquila chrysaetus
American Kestrel	Falco sparverius
Eurasian Kestrel	F. tinnunculus
Merlin	F. columbarius
Peregrine Falcon	F. peregrinus
Gyrfalcon	F. rusticolus
Northern Hobby	F. subbuteo
GALLIFORMES	
Spruce Grouse	Dendragapus canadensis
Willow Ptarmigan	Lagopus lagopus
Rock Ptarmigan	L. mutus
White-tailed Ptarmigan	L. leucurus
GRUIFORMES	
Sandhill Crane	Grus candensis
Eurasian Coot	Fulica atra
CHARADRIIFORMES	
Black-bellied Plover	Pluvilas squatarola
Lesser Golden Plover	P. dominica
Mongolian Plover	Charadrius mongolus
Common Ringed Plover	C. hiaticula
Semipalmated Plover	C. semipalmatus
Little Ringed Plover	C. dubius
Killdeer	C. vociferus
Eurasian Dotterel	C. morinellus
Black Oystercatcher	Haematopus bachmani
Black-winged Stilt	Himantopus mexicanus
Oriental Pratincole	Glareola maldivarum
Common Greenshank	Tringa nebularia
Greater Yellowlegs	T. melanoleuca
Lesser Yellowlegs	T. flavipes
Marsh Sandpiper	T. stagnatilis
Spotted Redshank	T. erythropus
Wood Sandpiper	T. glareola

Solitary Sandpiper	*T. solitaria*
Green Sandpiper	*T. ochropus*
Wandering Tattler	*Heteroscelus incanus*
Gray-tailed Tattler	*H. brevipes*
Terek Sandpiper	*Xenus cinereus*
Spotted Sandpiper	*Actitis macularia*
Common Sandpiper	*A. hypoleucos*
Upland Sandpiper	*Bartramia longicauda*
Whimbrel	*Numenius phaeopus*
Bristle-thighed Curlew	*N. tahitiensis*
Far Eastern Curlew	*N. madagascariensis*
Hudsonian Godwit	*Limosa haemastica*
Bar-tailed Godwit	*L. lapponica*
Black-tailed Godwit	*L. limosa*
Marbled Godwit	*L. fedoa*
Ruddy Turnstone	*Arenaria interpres*
Black Turnstone	*A. melanocephala*
Surfbird	*Aphriza virgata*
Red Knot	*Calidris tenuirostris*
Great Knot	*C. tenuirostris*
Sanderling	*C. alba*
Semipalmated Sandpiper	*C. pusilla*
Western Sandpiper	*C. mauri*
Rufous-necked Stint	*C. ruficollis*
Little Stint	*C. minuta*
Temminck's Stint	*C. temminkii*
Long-toed Stint	*C. subminuta*
Least Sandpiper	*C. minutilla*
Baird's Sandpiper	*C. bairdii*
Pectoral Sandpiper	*C. melanotos*
Sharp-tailed Sandpiper	*C. acuminata*
Rock Sandpiper	*C. ptilocnemis*
Dunlin	*C. alpina*
Curlew Sandpiper	*C. ferruginea*
Stilt Sandpiper	*C. himantopus*
Spoonbill Sandpiper	*Eurynorhynchus pygmeus*
Broad-billed Sandpiper	*Limicola falcinellus*
Buff-breasted Sandpiper	*Tryngites subruficollis*
Ruff	*Philomachus pugnax*
Short-billed Dowitcher	*Limnodromus griseus*
Long-billed Dowitcher	*L. scolopaceus*
Common Snipe	*Gallinago gallinago*
Jack Snipe	*Lymnocryptes minimus*
Pin-tailed Snipe	*Gallinago stenura*
Red-necked phalarope	*P. lobatus*
Red Phalarope	*P. fulicaria*
Pomarine Jaeger	*Stercorarius pomarinus*
Parasitic Jaeger	*S. parasiticus*
Long-tailed Jaeger	*S.longicaudis*
South Polar Skua	*Catharacta maccormicki*
Bonaparte's Gull	*Larus philadelphia*
Franklin's Gull	*L. pipixcan*
Common Black-headed Gull	*L. ridibundus*
Black-tailed Gull	*L. belcheri*
Mew Gull	*L. canus*
Ring-billed Gull	*L. delawarensis*
Herring Gull	*L. argentatus*
Thayer's Gull	*L. thayeri*
Slaty-backed Gull	*L. schistisagus*
Glaucous-winged Gull	*L. glaucescens*
Glaucous Gull	*L. hyperboreus*
Black-legged Kittiwake	*Rissa tridactyla*
Red-legged Kittiwake	*R. brevirostrus*
Sabine's Gull	*Xema sabini*
Ivory Gull	*Pagophila eburnea*
Ross' Gull	*Rhodostethia rosea*
Common Tern	*Sterna hirundo*
Arctic Tern	*S. paradisaea*
Aleutian Tern	*S. aleutica*
White-winged Tern	*Chlidonias leucopterus*
Dovekie	*Alle alle*
Common Murre	*Uria aalge*
Thick-billed Murre	*U. lomvia*
Black Guillemot	*Cepphus grylle*
Pigeon Guillemot	*C. columba*
Ancient Murrelet	*Synthliboramphus antiquus*
Kittlitz's Murrelet	*Brachyramphus brevirostris*
Marbled Murrelet	*B. marmoratus*
Parakeet Auklet	*Aclorrhynchus psittacula*
Cassin's Auklet	*Ptychoramphus aleuticus*
Crested Auklet	*Aethia cristatella*
Least Auklet	*Aethia pusilla*
Whiskered Auklet	*A. pygmea*
Rhinoceros Auklet	*Cerorhinca monocerata*
Tufted Puffin	*Fratercula cirrhata*
Horned Puffin	*F. corniculata*
COLUMBIFORMES	
Rock Dove	*Columba livia*
CUCULIFORMES	
Common Cuckoo	*Cuculus canorus*
Oriental Cuckoo	*C. saturatus*
STRIGIFORMES	
Oriental Scops-Owl	*Otus sunia*
Great Horned Owl	*Bubo virginianus*
Snowy Owl	*Nyctea scandiaca*
Northern Hawk-Owl	*Surnia ulula*
Northern Pygmy Owl	*Claucidium gnoma*
Great Gray Owl	*Strix nebulosa*
Short-eared Owl	*Asio flammeus*
Boreal Owl	*Aegolius funereus*
Northern Saw-whet Owl	*A. acadicus*

CAPRIMULGIFORMES	
Common Nighthawk	*Chordeiles minor*
Jungle Nightjar	*Caprimulgus indicus*
APODIFORMES	
Chimney Swift	*Chaetura peligaca*
White-throated Needletail	*Hirundapus caudacutus*
Common Swift	*Apus apus*
Fork-tailed Swift	*A. pacificus*
Rufous Hummingbird	*Selasphorus rufus*
CORACIIFORMES	
Belted Kingfisher	*Ceryle alcyon*
PICIFORMES	
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Great Spotted Woodpecker	*Dendrocopos major*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*P. villosus*
Three-toed Woodpecker	*P. tridactylus*
Northern Flicker	*Colaptes auratus*
PASSERIFORMES	
Eastern Kingbird	*Tyrannus tyrannus*
Olive-sided Flycatcher	*Contopus borealis*
Western Wood-Pewee	*C. sordidulus*
Alder Flycatcher	*Empidonax alnorum*
Hammond's Flycatcher	*E. hammondii*
Say's Phoebe	*Sayornis saya*
Eurasian Skylark	*Alauda arvensis*
Horned Lark	*Erempohila alpestris*
Purple Martin	*Progne subis*
Common House Martin	*Delichon urbica*
Tree Swallow	*Tachycineta bicolor*
Violet-green Swallow	*T. thalassina*
Bank Swallow	*Riparia riparia*
Cliff Swallow	*Hirundo pyrrhonota*
Barn Swallow	*H. rustica*
Gray Jay	*Perisoreus canadensis*
Steller's Jay	*Cyanocitta stelleri*
Black-billed Magpie	*Pica pica*
Common Raven	*Corvus corax*
Northwestern Crow	*C. caurinus*
Black-capped Chickadee	*Parus atricapillus*
Boreal Chickadee	*P. hudsonicus*
Chestnut-backed Chickadee	*P. refuscens*
Red-breasted Nuthatch	*Sitta canadensis*
Brown Creeper	*Certhia americana*
Siberian Tit	*P. cinctus*
Winter Wren	*Troglodytes troglodytes*
American Dipper	*Cinclus mexicanus*
Middendorff's Grasshopper Warbler	*Locustella ochotensis*
Lanceolated Warbler	*L. lanceolata*
Arctic Warbler	*Phylloscopus borealis*
Wood Warbler	*P. sibilatrix*
Dusky Warbler	*P. fuscatus*
Golden-crowned Kinglet	*Regulus satrapa*
Ruby-crowned Kinglet	*R. calendula*
Mugimaki Flycatcher	*Ficedula mugimaki*
Red-breased Flycatcher	*F. parva*
Siberian Flycatcher	*Muscicapa sibirica*
Gray-spotted Flycatcher	*M. griseisticta*
Gray-breasted Flycatcher	*M. dauurica*
Siberian Rubythroat	*Luscinia calliope*
Bluethroat	*L. svecica*
Siberian Blue Robin	*L. cyane*
Red-flanked Bluetail	*Tarsiger cyanurus*
Northern Wheatear	*Oenanthe oenanthe*
Mountain Bluebird	*Sialia currucoides*
Stonechat	*Saxicola torquata*
Eye-browed Thrush	*Turdus obscurus*
Swainson's Thrush	*C. ustulatus*
Hermit Thrush	*C. guttatus*
American Robin	*Turdus migratorius*
Varied Thrush	*Ixoreus naevius*
Dusky Thrush	*Turdus naumanni*
Gray-cheeked Thrush	*Catharus minimus*
Siberian Accentor	*Prunella montanella*
Yellow Wagtail	*Motacilla flava*
Gray Wagtail	*M. cinerea*
White Wagtail	*M. alba*
Black-backed Wagtail	*M. lugens*
Red-throated Pipit	*Anthus cervinus*
Water Pipit	*A. spinoletta*
Olive Tree Pipit	*A. hodgsoni*
Pechora Pipit	*A. gustavi*
Bohemian Waxwing	*Bombycilla garrulus*
Northern Shrike	*Lanius excubitor*
Brown Shrike	*L. cristatus*
Red-eyed Vireo	*Vireo olivaceus*
Orange-crowned Warbler	*Vermivora celata*
Yellow Warbler	*Dendroica petechia*
Yellow-rumped Warbler	*D. coronata*
Townsend's Warbler	*D. townsendi*
American Redstart	*Setophaga ruticilla*
Blackpoll Warbler	*D. striata*
Northern Waterthrush	*Seiurus noveboracensis*
Wilson's Warbler	*Wilsonia pusilla*
American Tree Sparrow	*Spizella arborea*
Savannah Sparrow	*Passerculus sandwichensis*
Fox Sparrow	*Passerella iliaca*
Lincoln's Sparrow	*Melospiza lincolnii*
Song Sparrow	*M. melodia*
Golden-crowned Sparrow	*Zonotrichia atricapilla*
White-crowned Sparrow	*Z. leucophrys*

Dark-eyed Junco	Junco hyemalis
Lapland Longspur	Calcarius lapponicus
Snow Bunting	Plectrophenax nivalis
McKay's Bunting	Plectrophenax hyperboreus
Little Bunting	Emberiza pusilla
Rustic Bunting	E. rustica
Gray Bunting	E. variabilis
Pallas' Reed Bunting	E. pallasi
Common Reed Bunting	E. schoeniclus
Common Grackle	Quiscalus quiscula
Rusty Blackbird	Euphagas carolinus
Brambling	Frangilla montifringilla
Rosy Finch	Leucosticte arctoa
Pine Grosbeak	Pinicola enudeator
Common Rosefinch	Carpodacus erythrinus
White-winged Crossbill	Loxia leucoptera
Red Crossbill	L. curvirostra
Common Redpoll	Carduelis flammea
Hoary Redpoll	C. hornemanni
Pine Siskin	Carduelis pinus
Oriental Greenfinch	C. sinica
Hawfinch	Coccothraustes coccothraustes
Eurasian Bullfinch	Pyrrhula pyrrhula

MAMMALS

INSECTIVORA

Masked Shrew	Sorex cinereus
Pribilof Shrew	S. pribilofensis
Dusky Shrew	S. obscurus
Northern Water Shrew	S. palustris
Arctic Shrew	S. arcticus
Pigmy Shrew	Microsorex hoyi

CHIROPTERA

Little Brown Bat	Myotis lucifugus
Keen's Myotis	M. keeni
Long-legged Myotis	M. volans
California Myotis	M. californicus
Silver-haired Bat	Lasionycteris noctivagens
Big Brown Bat	Eptesicus fuscus

LAGAMORPHA

Collared Pika	Ochotona collaris
Northern Hare	Lepus othus
Snowshoe Hare	L. americanus
European Rabbit*	Oryctolagus cuniculus

RODENTIA

Hoary Marmot	Marmota caligata
Alaska Marmot	M. broweri
Woodchuck	M. monax
Arctic Ground Squirrel	Cittellus parryi
Red Squirrel	Tamiasciurus hudsonicus
Northern Flying Squirrel	Glaucomys sabrinus
Least Chipmunk**	Eutamias minimus
Beaver	Castor canadensis
Muskrat	Ondatra zibethicus
Collared Lemming	Dicrostonyx groenlandicus
Northern Bog Lemming	Synaptomys borealis
Brown Lemming	Lemmus sibircus (including L. nigripes)
Northern Red-backed Vole	Clethrionomys rutilus
Gapper's Red-backed Vole	C. gapperi
Singing Vole	Microtus miurus
Meadow Vole	M. pennsylvanicus
Tundra Vole	M. oeconomus
Yellow-cheeked Vole	M. xanthognatus
Long-tailed Vole	M. longicaudus
Coronation Island Vole	M. coronarius
Insular Vole	M. abbreviatus
Deer Mouse	Peromyscus maniculatus
Sitka Mouse	P. sitkensis
Bushy-tailed Woodrat	Neotoma cinerea
Meadow Jumping Mouse	Zapus hudsonius
Western Jumping Mouse	Z. princeps
Norway Rat*	Rattus norvegicus
House Mouse*	Mus musculus
Porcupine	Erithizon dorsatum

CETACEA

Bowhead	Baleana mysticetus
Northern Right Whale	Eubalaena glacialis
Gray Whale	Eschrichtius robustus
Blue Whale	Balaenoptera musculus
Fin Whale	B. physalus
Sei Whale	B. borealis
Minke Whale	B. acutorostrata
Humpback	Megaptera novaeangliae
Sperm Whale	Physeter catodon
Narwal	Monodon monoceros
White Whale, Beluga	Delphinapterus leucas
Baird's Beaked Whale	Berardius bairdii
Stejneger's Beaked Whale	Mesoplodon stejnegeri
Cuvier's Beaked Whale	Ziphius cavirostris
Killer Whale	Orcinus orca
Long-finned Pilot Whale	Globicephala melaena
Pacific White-sided Dolphin	Lagenorhynchus obliquidens
Risso's Dolphin	Grampus griseus
Striped Dolphin	Stenella coeruleoalba
Northern Right Whale Dolphin	Lissodelphis borealis

Harbor Porpoise	*Phocoena phocoena*
Dall Porpoise	*Phocoenoides dalli*

CARNIVORA

Coyote	*Canis latrans*
Wolf	*C. lupus*
Arctic Fox	*Alopex lagopus*
Red Fox	*Vulpes fulva*
Black Bear	*Ursus americanus*
Grizzly or Brown Bear	*U. arctos*
Polar Bear	*U. maritumus*
Raccoon*	*Procyon lotor*
Pine Marten	*Martes americana*
Fisher**	*M. pennanti*
Short-tailed Weasel or Ermine	*Mustela erminea*
Least Weasel	*M. nivalus*
Mink	*M. vison*
Wolverine	*Gulo gulo*
River Otter	*Lutra candensis*
Sea Otter	*Enhydra lutris*
Lynx	*Felus lynx*
Northern Fur Seal	*Callorhinus ursinus*
Steller Sea Lion	*Eumelopius jubatus*
Walrus	*Odobensus rosmarus*
Harbor Seal	*Phoca vitulina*
Spotted Seal	*P. largha*
Ribbon Seal	*P. fasciata*
Ringed Seal	*P. hispida*
Bearded Seal	*Erignatus barbatus*
Hooded Seal	*Cystophora critata*
Northern Elephant Seal	*Mirounga angustirostris*

ARTIODACTYLA

Wapiti, Elk*	*Cervus elaphus*
Sitka Black-tailed Deer	*Odocoileus hemionus sitkensis*
Moose	*Alces alces*
Caribou (Reindeer*)	*Rangifer tarandus*
Muskox	*Ovibos moschatus*

*introduced
**not substantiated

APPENDIX C. Typical fish and wildlife species present on Alaska Maritime Refuge and the extent to which they use ecosystem subcomponents on the refuge.

Chukchi Sea Unit

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
Unvegetated substrates	Rocky shores and reefs	common eider, walrus
	Beaches and tidal flats	gulls, arctic terns
	Barrier islands	black brant, eiders
	Cliffs	cormorants, peregrine falcons, gyrfalcon
	Block fields	black guillemot, pigeon guillemot
	Subterranean soil	puffins, marmots, voles, foxes
	Scree, barren fellfield	Kittlitz's murrelets, marbled murrelets
Fresh or brackish water	Lacustrine	stickleback, char, loons, phalarope, oldsquaw, caribou
	Fluviatile	chum salmon, arctic char, blackfish, sheefish, brown bears, muskox, caribou
Meadows	Wet meadow	phalarope, song sparrow, lapland longspur
	Mesic meadow	none in unit
Shrubs	Dwarf shrub mat	golden plover, whimbrel, jaegers, ptarmigan, muskox, brown bears
	Low shrubs	rock ptarmigan, song sparrow, yellowlegs, fox
	Medium to tall shrubs	bluethroats, arctic warbler, redpoll
Forests	Coniferous some deciduous mixed in	none in unit
Marine	Nearshore	phalarope, oldsquaw, gulls
	Inshore	scoters, eider, kittiwake, auklets, horned puffins
	Mid-shelf	murres, kittiwakes, jaegers, bowhead whales
	Outer shelf	none in unit
	Oceanic waters	none in unit
	Sea ice edge	ivory gull
Man-made habitats		black guillemot

Bering Sea Unit

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
Unvegetated substrates	Rocky shores and reefs	rock sandpiper, wandering tattler, ruddy turnstone, winter wren, fur seal, walrus
	Beaches and tidal flats	gulls, rock sandpiper, sanderling
	Barrier islands	gulls, arctic terns, harbor seal

Bering Sea Unit

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
	Cliffs	murres, kittiwakes, cormorants, northern fulmar, peregrine falcon, common raven
	Block fields	least auklets, crested auklets, parakeet auklets, puffins, winter wren
	Subterranean soil	least auklets, crested auklets, parakeet auklets, puffins, winter wren, voles, shrews, foxes, ground squirrels
	Scree, barren fellfield	McKay's bunting, snow bunting, rosy finch
Fresh or brackish water	Lacustrine	phalaropes, pintail, loons, oldsquaw, green-winged teal, dolly varden, stickleback, blackfish
	Fluviatile	green-winged teal, dolly varden, blackfish
Meadows	Wet meadow	song sparrow, lapland longspur, red-necked phalarope
	Mesic meadow	pintail, green-winged teal, ruddy turnstone, rock sandpiper, lapland longspur, voles
Shrubs	Dwarf shrub mat	rock ptarmigan, golden plover, golden plover, ruddy turnstone, rosy finch, lapland longspur, rock sandpiper

Bering Sea Unit, continued

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
	Low shrubs	Wilson's warbler, fox sparrow, song sparrow
	Medium to tall shrubs	redpoll, tree sparrow
Forests	Coniferous some deciduous mixed in	none in unit
Marine	Nearshore	eiders, harlequin ducks, gulls
	Inshore	gulls, eiders, guillemots
	Mid-shelf	shearwaters, kittiwakes, murres, puffins, auklets, jaegers
	Outer shelf	fulmar, storm petrels, murres, kittiwakes
	Oceanic waters	fork-tailed storm petrel, red-legged kittiwake, northern fulmar, shearwaters, fur seal
	Sea ice edge	
Man-made habitats		rosy finch, snow bunting

Aleutian Islands Unit

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
Unvegetated substrates	Rocky shores and reefs	harlequin duck, rock sandpiper, wandering tattler, black oystercatcher, pigeon guillemot, harbor seal, sea otter

Aleutian Islands Unit, continued

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
	Beaches and tidal flats	bald eagles, gulls, sandpipers, plovers, geese, ducks, terns, common raven, winter wren, peregrine falcon
	Barrier islands	none in unit
	Cliffs	northern fulmar, cormorants, peregrine falcons, kittiwakes, murres, common raven
	Block fields	least auklets, crested auklets, parakeet auklets, whiskered auklets, gulls, puffins, guillemots, fox
	Subterranean soil	storm petrels, puffins, ancient murrelets, Cassin's auklets, rhinoceros auklets, voles, ground squirrels
	Scree, barren fellfield	snowy owls, Kittlitz's murrelets, marbled murrelets, snow buntings, rosy finches
Fresh or brackish water	Lacustrine	loons, gulls, kittiwakes, phalaropes, dolly varden, red salmon
	Fluviatile	green-winged teal, Canada goose, mergansers, bald eagle, American widgeon
Meadows	Wet meadow	green-winged teal, mallard, bald eagle, peregrine, terns
	Mesic meadow	Canada goose, song sparrow, common eider
Shrubs	Dwarf shrub mat	green-winged teal, mallard, merganser, bald eagle, peregrine, rock ptarmigan, rock sandpiper, phalarope, parasitic jaeger, gull, terns, common raven, song sparrow, lapland longspur, snow bunting, rosy finch, Canada goose
	Low shrubs	rock ptarmigan, song sparrow,
	Medium to tall shrubs	not found
Forests	Coniferous some deciduous mixed in	not found
Marine	Nearshore	mergansers, bald eagles, phalaropes, jaegers, gulls, kittiwakes, murrelets, loons, grebes, emperor goose, Aleutian Canada goose, scaup, common eider, harlequin duck, oldsquaw, scoters, common goldeneye, bufflehead
	Inshore	loons, grebes, scaup, common eider, harlequin duck, oldsquaw, scoters, common goldeneye, bufflehead, mergansers, jaegers, gulls, kittiwakes

Aleutian Islands Unit, continued

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
	Mid-shelf	
	Outer shelf	
	Oceanic waters	
	Sea ice edge	
Man-made habitats		

Alaska Peninsula Unit

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
Unvegetated substrates	Rocky shores and reefs	harlequin duck, scoters, common eider, rock sandpiper, turnstones, wandering tattler, black oystercatcher, harbor seal, sea lion, sea otter
	Beaches and tidal flats	emperor goose, black brant, semipalmated plover, black oystercatcher, least sandpiper, gulls, arctic terns, brown bear, harbor seal
	Barrier islands	none in the unit
	Cliffs	bald eagle, rough-legged hawk, peregrine falcon, northern fulmar, cormorants, kittiwakes, murres, horned puffins, common ravens

Alaska Peninsula Unit, continued

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
	Block fields	least auklets, crested auklets, parakeet auklets, fork-tailed storm petrels, black oystercatcher, gulls pigeon guillemots, winter wren, song sparrow, snow bunting
	Subterranean soil	storm petrels, puffins, ancient murrelets, Cassin's auklets, rhinoceros auklets, voles, ground squirrels, shrews, hares, foxes
	Scree, barren fellfield	Kittlitz's murrelets, marbled murrelets, snow buntings, rosy finches, lapland longspur
Fresh or brackish water	Lacustrine	mew gull, phalarope, mergansers, scoters, eider, mallards, pintail, widgeon, swans, green-winged teal, red salmon, otters
	Fluviatile	pink salmon, dolly varden, wandering tattler, merganser, dipper, green-winged teal
Meadows	Wet meadow	phalarope, northern harrier, song sparrow
	Mesic meadow	crested auklets, least auklets, rhinoceros auklets, golden-crowned sparrow, Canada goose

Shrubs	Dwarf shrub mat	snow bunting, rosy finch, golden plover, water pipit, Kittlitz's murrelet, whimbrel, rock sandpiper, lapland longspur, rock ptarmigan, parasitic jaeger, voles, ground squirrels
	Low shrubs	snow bunting, lapland longspur, rosy finch, rock ptarmigan, song sparrow, golden-crowned sparrow, water pipit
	Medium to tall shrubs	Wilson's warbler, song sparrow, fox sparrow, orange-crowned sparrow, pine grossbeak, tree sparrow, tree swallow, golden-crowned sparrow, redpoll, black-billed magpie
Forests	Coniferous some deciduous mixed in	only introduced stands
Marine	Nearshore	harlequin ducks, scaup, goldeneyes, phalaropes
	Inshore	eiders, scoters, harlequin ducks, kittiwakes, arctic terns, common murres
	Mid-shelf	kittiwake, murres, Cassin's auklets, rhinoceros auklets, ancient murrelets, tufted puffins, horned puffins

Alaska Peninsula Unit, continued

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
	Outer shelf	murres, northern fulmar, fork-tailed storm petrels, shearwaters, kittiwakes
	Oceanic waters	shearwaters, least storm petrel, albatross, northern fulmar
	Sea ice edge	none in unit
Man-made habitats		rosy finch, snow bunting, winter wren, pigeon guillemot, song sparrow

Gulf of Alaska Unit

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
Unvegetated substrates	Rocky shores and reefs	harlequin duck, scoters, common eider, turnstones, rock sandpiper, wandering tattler, sea otter, black oystercatcher, harbor seal, sea lion
	Beaches and tidal flats	harlequin duck, harbor seal
	Barrier islands	none in the unit
	Cliffs	cormorants, kittiwakes, murres, horned puffins, common raven
	Block fields	fork-tailed storm petrels, black oystercatchers, gulls, least auklets, crested auklets,

Habitat	Subdivision	Typical Birds and Mammals Found in Habitats
		pigeon guillemots, winter wren, song sparrow
	Subterranean soil	storm petrels, puffins, Cassin's auklets, rhinoceros auklets, ancient murrelets, marmot
	Scree, barren fellfield	Kittlitz's murrelet, marbled murrelet
Fresh or brackish water	Lacustrine	mallards, pintails, loons, kittiwakes, mew gulls, stickleback
	Fluviatile	gulls, coho salmon, sculpin, stickleback
Meadows	Wet meadow	northern harrier, song sparrow, teal, mallard
	Mesic meadow	Canada goose, Cassin's auklet, least auklet, rhinoceros auklet, golden-crowned sparrow
Shrubs	Dwarf shrub mat	snow bunting, rosy finch, golden plover, Kittlitz's murrelet, whimbrel, rock sandpiper, lapland longspur, rock ptarmigan, parasitic jaeger, ground squirrel
	Low shrubs	snow bunting, lapland longspur, rosy finch, rock ptarmigan, golden-crowned sparrow, song sparrow, water pipit
	Medium to tall shrubs	Wilson's warbler, song sparrow, water pipit, fox sparrow, yellow warbler, pine grossbeak, black-capped chickadee, tree sparrow, redpoll
Forests	Coniferous some deciduous mixed in	white-winged rossbill, robin, varied thrush, Townsend's warbler, golden-crowned kinglet, bald eagle, rufous hummingbird
Marine	Nearshore	loons, mew gulls, glaucous winged gulls, mallards, bufflehead, mergansers
	Inshore	horned puffins, black-legged kittiwakes, gulls, pigeon guillemot, crested auklets
	Mid-shelf	kittiwakes, murres, Cassin's auklets, rhinoceros auklets, ancient murrelets, tufted puffins, horned puffins
	Outer shelf	murres, northern fulmar, fork-tailed storm petrels, shearwaters, kittiwakes
	Oceanic waters	shearwaters
Man-made habitats		rosy finch, snow bunting, Wilson's warbler, pigeon guillemot, song sparrow

APPENDIX D. Breeding status and distribution of birds on Alaska Maritime Refuge.

* Breeds in unit + Occurs (nonbreeder)	Refuge Unit Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Red-throated Loon	*	*	*	*	+
Pacific Loon	+	+	*	+	+
Common Loon	*	+		*	+
Yellow-billed Loon	+		*	+	+
Horned Grebe	+	+		+	+
Red-necked Grebe	+	+	*	+	+
Western Grebe	+				
Short-tailed Albatross	+	+			
Black-footed Albatross	+	+			+
Laysan Albatross	+	+			+
Northern Fulmar	*	*	+	*	*
Mottled Petrel	+	+			+
Cook's Petrel	+				
Pink-footed Shearwater	+				+
Flesh-footed Shearwater					
Sooty Shearwater	+			+	+
Short-tailed Shearwater	+	+	+	+	+
Fork-tailed Storm-Petrel	*	+		*	*
Leach's Storm-Petrel	+	+		*	*
Double-crested Cormorant	*	+		*	*
Pelagic Cormorant	*	*	*	*	*
Brandt's Cormorant					+
Red-faced Cormorant	*	*		*	*
Great blue Heron					+
Black-crowned Night Heron	+	+			
Chinese Egret	+				
Tundra Swan	+	+	*	*	+
Whooper Swan	+	+			
Greater White-fronted Goose	+	+	*	+	+
Bean Goose	+	+		+	
Snow Goose	+	+	+	+	+
Emperor Goose	+	+	*	+	+
Brant	+	+	*	+	+
Canada Goose	*	+	*	*	*
Green-winged Teal	*	+	*	*	+
Baikal Teal					
Falcated Teal	+				
Mallard	*	+	*	*	*
Spot-billed Duck	+				
Northern Pintail	*	*	*	*	+
Garganey	+				
Northern Shoveler	+	+	*	*	+

* Breeds in unit + Occurs (nonbreeder)	Refuge Unit Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Gadwall	+			*	+
Blue-winged Teal	+				+
Eurasian Wigeon	+				+
American Wigeon	+		+	+	+
Common Pochard	+	+			
Canvasback	+	+		+	+
Redhead		+			+
Tufted Duck	+	+		+	
Ring-necked Duck	+	+		+	+
Greater Scaup	*	+	*	*	+
Lesser Scaup	+	+			+
Common Eider	*	*	*	*	*
King Eider	+	+	*	+	+
Spectacled Eider		+	*		
Steller's Eider	+	+	*	+	+
Harlequin Duck	+	+	*	+	+
Oldsquaw	+	*	*	+	+
Black Scoter	+	+	+	+	+
Surf Scoter	+	+	+	+	+
White-winged Scoter	+	+	+	+	+
Common Goldeneye	+	+	+	*	+
Barrow's Goldeneye	+	+		+	+
Bufflehead	+	+		+	+
Smew	+	+			
Common Merganser	+	+			
Hooded Merganser	+	+		+	+
Red-breasted Merganser	*	+	*	*	+
Northern Harrier	+	+	*	*	+
Osprey	+	+		+	+
Bald Eagle	*	+	+	*	*
White-tailed Eagle	*	+			
Stellar's Sea Eagle	+			+	
Sharp-shinned Hawk					+
Northern Goshawk	+				+
Red-tailed Hawk					+
Rough-legged Hawk	+	+	*	*	+
Golden Eagle	+		*	*	+
American Kestrel					+
Eurasian Kestrel	+				
Merlin	+		+	+	
Peregrine Falcon	*	+	*	*	*
Gyrfalcon	+	+	*	*	+
Northern Hobby	+				
Spruce Grouse			*	*	+
Willow Ptarmigan					+

* Breeds in unit + Occurs (nonbreeder)	Refuge Unit: Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Rock Ptarmigan	*		*	*	*
White-tailed Ptarmigan					+
Sandhill Crane	+	+	*	+	+
Eurasian Coot		+			
Black-bellied Plover	+	+	+	+	+
Lesser Golden Plover	+	+	*	+	+
Mongolian Plover	+	+			
Common Ringed Plover	+	*			
Semipalmated Plover	+	*	*	*	*
Little Ringed Plover	+				
Killdeer		+			+
Eurasian Dotterel	+	+			
Black Oystercatcher	*	+		*	*
Black-winged Stilt	+				
Oriental Pratincole	+				
Common Greenshank	+	+			
Greater Yellowlegs	+	+		+	+
Lesser Yellowlegs	+	+	+	+	+
Marsh Sandpiper	+				
Spotted Redshank	+	+			
Wood Sandpiper	+	+		+	
Solitary Sandpiper		+			+
Green Sandpiper	+				
Wandering Tattler	+	+	*	+	+
Gray-tailed Tattler	+	+			
Terek Sandpiper	+	+			
Spotted Sandpiper				+	+
Common Sandpiper	*	+			
Upland Sandpiper					+
Whimbrel	+	+	*	+	+
Bristle-thighed Curlew	+	+		+	+
Far Eastern Curlew	+	+			
Hudsonian Godwit			+		+
Bar-tailed Godwit	+	+	*	+	+
Black-tailed Godwit	+	+			
Marbled Godwit					+
Ruddy Turnstone	+	*	*	+	+
Black Turnstone		+	+	+	+
Surfbird				+	+
Red Knot	+	+			+
Great Knot	+	+	*		
Sanderling	+	+	+		+
Semipalmated Sandpiper	+	+	*		+
Western Sandpiper	+	+	*	+	+
Rufous-necked Stint	+	+	+		
Little Stint	+	+			

* Breeds in unit + Occurs (nonbreeder)	Refuge Unit: Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Temminck's Stint	+	+			
Long-toed Stint	+	+			
Least Sandpiper	+	*		*	*
Baird's Sandpiper	+	+	*		+
Pectoral Sandpiper	+	+	*	+	+
Sharp-tailed Sandpiper	+	+			+
Rock Sandpiper	*	*		*	+
Dunlin	+	+	*	+	+
Curlew Sandpiper	+	+			
Stilt Sandpiper		+			
Spoonbill Sandpiper	+				
Broad-billed Sandpiper	+				
Buff-breasted Sandpiper	+	+	+		
Ruff	+	+			
Short-billed Dowitcher		+			+
Long-billed Dowitcher	+	+	*	+	+
Common Snipe	*	*	*	*	+
Jack Snipe		+			
Pin-tailed Snipe	+				
Red-necked phalarope	*	*	*	*	+
Red Phalarope	+	*	*	+	+
Pomarine Jaeger	+	+	*	+	+
Parasitic Jaeger	*	+	*	*	+
Long-tailed Jaeger	+	*	*	+	+
South Polar Skua	+				
Bonaparte's Gull	+	+		+	+
Franklin's Gull		+			+
Common Black-headed Gull	+	+			
Black-tailed Gull	+				
Mew Gull	+	+	*	*	*
Ring-billed Gull	+			+	+
Herring Gull	+	*	+	+	+
Thayer's Gull					+
Slaty-backed Gull	+	+		+	
Glaucous-winged Gull	*	*	+	*	*
Glaucous Gull	+	*	*	+	+
Black-legged Kittiwake	*	*	*	*	*
Red-legged Kittiwake	*	*		+	
Sabine's Gull	+	+	*	+	+
Ivory Gull		+	+		
Ross' Gull	+	+	+		
Common Tern	+	+			
Arctic Tern	*	+	*	*	+
Aleutian Tern	*	+		*	+
White-winged Tern	+				

* Breeds in unit + Occurs (nonbreeder)	Refuge Unit: Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Dovekie	+	+			
Common Murre	*	*	*	*	*
Thick-billed Murre	*	*	*	*	*
Black Guillemot			*		
Pigeon Guillemot	*	*	*	*	*
Ancient Murrelet	*	+		*	*
Kittlitz's Murrelet	*	*	*	*	*
Marbled Murrelet	*	+		+	*
Parakeet Auklet	*	*		*	*
Cassin's Auklet	*			*	*
Crested Auklet	*	*	+	*	+
Least Auklet	*	*	+	*	
Whiskered Auklet	*				
Rhinoceros Auklet	*			*	*
Tufted Puffin	*	*	*	*	*
Horned Puffin	*	*	*	*	*
Rock Dove					+
Common Cuckoo	+	+			
Oriental Cuckoo	+	+			
Oriental Scops-Owl	+				
Great Horned Owl					+
Snowy Owl	*	*	*	+	+
Northern Hawk-Owl					+
Northern Pygmy Owl					+
Great Gray Owl					+
Short-eared Owl	*	+	*	+	+
Boreal Owl		+			+
Northern Saw-whet Owl		+			+
Common Nighthawk					+
Jungle Nightjar	+				
Chimney Swift		+			
White-throated Needletail	+				
Common Swift		+			
Fork-tailed Swift	+	+			
Rufous Hummingbird	+				+
Belted Kingfisher	+			*	+
Great Spotted Woodpecker	+				
Yellow-bellied Sapsucker					+
Downy Woodpecker					+
Hairy Woodpecker					+
Three-toed Woodpecker					+
Northern Flicker	+	+			+
Arctic Woodpecker					+
Eastern Kingbird		+			
Olive-sided Flycatcher					+
Western Wood-Pewee					+

* Breeds in unit + Occurs (nonbreeder)	Refuge Unit: Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Alder Flycatcher					+
Hammond's Flycatcher					+
Say's Phoebe			*	+	+
Eurasian Skylark	+	+			
Horned Lark	+	+	*	+	+
Purple Martin		+			
Common House Martin		+			
Tree Swallow	+	+	+	*	+
Violet-green Swallow	+	+		+	+
Bank Swallow	*	+	*	*	+
Cliff Swallow	+	+	+		+
Barn Swallow	+	+	+	+	+
Gray Jay					+
Steller's Jay					+
Black-billed Magpie				*	+
Common Raven	*	*	*	*	+
Northwestern Crow				+	*
Black-capped Chickadee				*	+
Boreal Chickadee			+		+
Chestnut-backed Chickadee					+
Red-breasted Nuthatch				+	+
Brown Creeper					+
Siberian Tit					
Winter Wren	*	*		*	+
American Dipper	*			+	+
Middendorff's Grasshopper Warbler	+	+			
Lanceolated Warbler	+				
Pallas' Grasshopper Warbler					
Arctic Warbler	+	+	*		
Wood Warbler	+				
Dusky Warbler	+				
Golden-crowned Kinglet		+			+
Ruby-crowned Kinglet		+	+		+
Pale-legged Willow-warbler					
Mugimaki Flycatcher					
Red-breasted Flycatcher	+				
Siberian Flycatcher	+				
Gray-spotted Flycatcher	+				
Brown Flycatcher	+				
Siberian Rubythroat	*	+			
Bluethroat	+		*		
Siberian Blue Robin	+				
Red-flanked Bluetail	+				
Northern Wheatear	+	+	*		+
Mountain Bluebird					+

* Breeds in unit + Occurs (nonbreeder)	Refuge Unit Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Stonechat					
Gray-cheeked Thrush	+	+	*		+
Eye-browed Thrush	+	+			
Swainson's Thrush					+
Hermit Thrush				*	+
American Robin	+	+	*	+	+
Varied Thrush			+	+	+
Dusky Thrush	+				
Siberian Accentor	+				
Yellow Wagtail	+	+	*		
Gray Wagtail	+	+			
White Wagtail		+	+		
Black-backed Wagtail	+				
Water Pipit	*	*	*	*	+
Olive Tree Pipit	+	+			
Red-throated Pipit	+	+	*		
Pechora Pipit	+				
Bohemian Waxwing	+	+		+	+
Northern Shrike	+		+	*	+
Brown Shrike	+				
Red-eyed Vireo					+
Orange-crowned Warbler		*		+	+
Yellow Warbler	+	*	+	*	+
Yellow-rumped Warbler	+	+	+		+
Townsend's Warbler	+				+
American Redstart					
Blackpoll Warbler					
Northern Waterthrush		+			+
Wilson's Warbler		+	+	+	+
American Tree Sparrow			*	+	+
Savannah Sparrow	*	*	*	*	+
Fox Sparrow	+	+	*	*	*
Lincoln's Sparrow					+
Song Sparrow	*	+		*	*
Golden-crowned Sparrow	+	*	+	*	*
White-crowned Sparrow	+	+	*	+	+
Dark-eyed Junco	+	+	+		+
Lapland Longspur	*	*	*	*	+
Snow Bunting	*	*	*	*	+
McKay's Bunting	+	*		+	
Pine Bunting	+				
Little Bunting	+				
Rustic Bunting	+	+			
Gray Bunting	+				
Pallas' Reed Bunting	+				
Common Reed Bunting	+	+			

* Breeds in unit + Occurs (nonbreeder)	Refuge Unit Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Common Grackle			+		
Rusty Blackbird		+			+
Brambling	+	+			
Rosy Finch	*	*	+	*	+
Pine Grosbeak	+	+		*	+
Common Rosefinch	+	+			+
White-winged Crossbill	+	+			+
Red Crossbill	+	+			+
Common Redpoll	*	+	*	*	+
Hoary Redpoll	+	+		+	+
Eurasian Siskin	+				
Pine Siskin	+	+		+	+
Oriental Greenfinch	+				
Hawfinch	+	+			
Eurasian Bullfinch	+	+			

APPENDIX E. Distribution of mammals on Alaska Maritime Refuge.

	Refuge Unit				
+ Occurs in unit	Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Masked Shrew			+	+	+
Pribilof Shrew		+			
Dusky Shrew				+	+
Arctic Shrew			+		
Little Brown Bat					+
Northern Hare*				+	
Snowshoe Hare					+
European Rabbit*					+
Hoary Marmot			+	+	+
Arctic Ground Squirrel	+*	+*	+*	+	+*
Red Squirrel					+
Beaver					+
Muskrat			+		
St. George Lemming		+			
Collared Lemming	+*		+	+	
Brown Lemming			+	+	
Insular Vole		+			
Northern Red-backed Vole			+	+	+
Singing Vole			+		
Tundra Vole	+		+	+	+
Coronation Island Vole					+
Insular Vole		*			
Sitka Mouse					+
Meadow Jumping Mouse				+	
Norway Rat*	+				
House Mouse*		+			
Porcupine			+	+	
Northern Right Whale	+			+	
Gray Whale	+			+	+
Blue Whale	+			+	
Fin Whale	+			+	+
Sei Whale	+			+	+
Minke Whale	+			+	+
Humpback	+			+	+
Sperm Whale	+			+	
Baird's Beaked Whale	+			+	+
Stejneger's Beaked Whale	+			+	
Cuvier's Beaked Whale	+			+	
Killer Whale	+			+	+
Long-finned Pilot Whale				+	
Pacific Pilot Whale					+
Pacific White-sided Dolphin				+	

*introduced
**recorded in vicinty but not in unit

	Refuge Unit				
+ Occurs in unit	Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Northern Right Whale Dolphin				+	
Harbor Porpoise	+			+	+
Dall Porpoise	+			+	+
Coyote			+**	+	
Wolf			+	+	
Arctic Fox	+*	+	+	+*	
Red Fox	+	+	+	+	
Black Bear					+
Grizzly or Brown Bear			+	+	+
Polar Bear			+		
Pine Marten					+
Short-tailed Weasel or Ermine			+	+	+
Least Weasel			+		+
Mink			+**	+	+
Wolverine			+	+	+
River Otter			+**	+	+
Sea Otter	+	+		+	+
Lynx			+**		
Northern Fur Seal	+	+		+	+
Steller Sea Lion	+	+		+	+
Walrus	+	+	+	+	
Harbor Seal	+	+		+	+
Ringed Seal			+		
Bearded Seal			+		
Northern Elephant Seal	+				
Sitka Black-tailed Deer					+
Moose			+		
Caribou (Reindeer)	+*	+*	+	+	
Muskox**			+		
Dall Sheep**			+		
Bison*				+	
House Cat*		+			
Cow*				+	

*introduced
**recorded in vicinty but not in unit

APPENDIX F. Memorandum of Understanding between the Alaska Department of Fish and Game, Juneau, Alaska, and the U.S. Fish and Wildlife Service, Department of the Interior, Anchorage, Alaska.

This Master Memorandum of Understanding between the State of Alaska, Department of Fish and Game, hereinafter referred to as the Department, and the U.S. Fish and Wildlife Service, hereinafter referred to as the Service, reflects the general policy guidelines within which the two agencies agree to operate.

WHEREAS, the Department, under the Constitution, laws and regulations of the State of Alaska (Appendix I), is responsible for the management, protection, maintenance, enhancement, rehabilitation, and extension of the fish and wildlife resources of the State on the sustained yield principle, subject to preferences among beneficial uses; and

WHEREAS, the Service, by authority of the Constitution, laws of Congress and regulations of the U.S. Department of Interior (Appendix II) has a mandated management responsibility for certain species or classes of wildlife and is responsible for the management of Service lands in Alaska, and the conservation of fish and wildlife resources on these lands; and

WHEREAS, the Department and the Service share a mutual concern for fish and wildlife resources and their habitats and both are engaged in extensive fish and wildlife conservation, management, and protection programs and desire to develop and maintain a cooperative relationship which will be in the best interests of both parties, the concerned fish and wildlife resources and their habitats, and produce the greatest public benefit; and

WHEREAS, it has been recognized in the Alaska National Interest Lands Conservation Act and subsequent implementing Federal regulations that the resources and use of Service lands in Alaska are substantially different than those of other states; and

WHEREAS, the Department and the Service recognize the increasing need to coordinate resource planning and policy development;

NOW, THEREFORE, the parties hereto do hereby agree as follows:

THE DEPARTMENT OF FISH AND GAME AGREES:

1. To recognize the Service as the agency with the responsibility to manage migratory birds, endangered species, and other species mandated by Federal law, and on Service lands in Alaska to conserve fish and wildlife and their habitats and regulate human use.

2. To manage fish and resident wildlife populations in their natural species diversity on Service lands.

3. To consult with the Regional Director in a timely manner and comply with applicable Federal laws and regulations before embarking on enhancement or construction activities on Service lands.

THE FISH AND WILDLIFE SERVICE AGREES:

1. To recognize the Department as the agency with the primary responsibility to manage fish and resident wildlife within the State of Alaska.

2. To recognize the right of the Department to enter onto Service lands at any time to conduct routine management activities which do not involve construction, disturbance to the land, or alterations of ecosystems.

3. To cooperate with the Department in planning for enhancement or development activities on Service lands which require permits, environmental assessments, compatibility assessments, or similar regulatory documents by responding to the Department in a timely manner with requirements, time tables, and any other necessary input.

4. To manage the fish and wildlife habitat on Service lands so as to insure conservation of fish and wildlife populations and their habitats in their natural diversity.

5. To consider carefully the impact of any proposed treaties or international agreements relating to fish and wildlife resources on the State of Alaska which could diminish the jurisdictional authority of the State and to consult freely with the State when these treaties or agreements have a primary impact on the State.

6. To review present U.S. Fish and Wildlife Service policies and any future proposed changes in those policies in consultation with the Department to determine if modified or special policies are needed for Alaska.

7. To adopt refuge management plans whose provisions--including provision for animal damage control--are in substantial agreement with the Department's fish and wildlife management plans, unless such plans are determined formally to be incompatible with the purposes for which the respective refuges were established.

8. To utilize the State's regulatory process to maximum extent allowed by Federal law in developing new or modifying existing Federal regulations or proposing changes in existing State regulations governing or affecting the taking of fish and wildlife on Service lands in Alaska.

THE DEPARTMENT OF FISH AND GAME AND THE FISH AND WILDLIFE SERVICE MUTUALLY AGREE:

1. To coordinate planning for management of fish and wildlife resources on Service lands so that conflicts arising from differing legal mandates, objectives, and policies either do not arise or are minimized.

2. To consult with each other when developing policy and legislation which affects the attainment of wildlife resource management goals and objectives, or management plans.

3. To recognize that the taking of fish and wildlife by hunting, trapping, or fishing on Service lands in Alaska is authorized in accordance with applicable State and Federal law unless State regulations are found to be incompatible with documented Refuge goals, objectives, or management plans.

4. To develop such supplemental memoranda of understanding between the Commissioner and the Regional Director as may be required to implement the policies contained herein.

5. That this Master Memorandum of Understanding shall become effective when signed by the Commissioner of the Alaska Department of Fish and Game and the Alaska Regional Director of the U.S. Fish and Wildlife Service and shall continue in force until terminated by either party by providing notice in writing 120 days in advance of the intended date of termination.

6. That amendments to this Master Memorandum of Understanding may be proposed by either party and shall become effective upon approval by both parties.

STATE OF ALASKA	U.S. DEPARTMENT OF THE INTERIOR
Department of Fish and Game	Fish and Wildlife Service
Ronald O. Skoog, Commissioner	Keith M. Schreiner, Regional Director, Alaska
March 13, 1982 Date	March 13, 1982 Date

APPENDIX G. Memorandums of Understanding between the military and the Department of Energy, and the U.S. Fish and Wildlife Service.

1. Use agreement on the Naval Station at Adak between the U.S. Fish and Wildlife Service and the Department of the Navy.

All correspondence in connection with this contract should include reference to Navy Contract No. N62474-80-RP-00056

N62474-80-RP-00056

Use Agreement

Naval Station Adak

This Use Agreement between the Department of the Navy (hereinafter called NAVY) and the Department of the Interior, Fish and Wildlife Service (hereinafter called TENANT) provides for the use by the TENANT of Facilities at the Naval Station Adak, in connection with construction, operation and maintenance of an office building.

1. TENANT shall have exclusive use of an area, containing 2.75 acres, more or less, described in "Exhibit A" and delineated with legend on Land Use Agreement Site Map E.F.D. Drawing No. A-101043, marked "Exhibit B", both of which are attached hereto and made a part hereof, for purpose of constructing, operating and maintaining a building for office and related purposes.

2. TENANT shall have the right to use in common with NAVY, and with such other parties as NAVY may authorize:

   (a) Use of existing roads for access to site.

3. Siting of TENANT facilities shall conform with the Station Master Plan except as otherwise provided in writing by NAVY. Standards of design and construction shall conform with criteria and directives of NAVY.

4. TENANT shall not transfer or assign the use herein granted.

5. TENANT shall not make any structural alteration, addition or betterments of NAVY owned property without coordination and written consent of the Commanding Officer, Western Division, Naval Facilities Engineering Command, P. O. Box 727, San Bruno, California.

6. Any alterations, additions or betterments to the premises which TENANT considers necessary or desirable in connection with its use, shall be at TENANT's sole cost and expense.

7. If requested by NAVY, upon termination of this Agreement, TENANT shall remove improvements and restore the premises to a condition equivalent to that at the time of TENANT occupancy, reasonable wear and tear excepted.

8. TENANT shall reimburse NAVY for the cost of utilities and services, if any, furnished in accordance with applicable statutes, regulations and instructions.

9. NAVY reserves the right to use the premises providing such use will not interfere with the use hereby granted.

10. All activites authorized hereunder shall be subject to such rules and regulations as regards supervision or otherwise as may from time to time be prescribed by the Commanding Officer, Naval Station, Adak who is hereby designated as the Local Representative of NAVY.

N6247480RP00135

THIS USE AGREEMENT shall be effective on 1 January 1980 and remain in effect until terminated by the Secretary of the Navy.

FOR THE DEPARTMENT OF THE NAVY

By _____

_____
(Date)

WARREN K. BRANSCUM
Director
Real Estate Division

Concurrences:

_____

10 JUNE 1980
(Date)

FOR THE DEPARTMENT OF THE INTERIOR,
FISH AND WILDLIFE SERVICE

By _____

5/12/80
(Date)

Doc. No. 4949R

MEMORANDUM OF AGREEMENT

between the

U. S. FISH AND WILDLIFE SERVICE

and the

DEPARTMENT OF THE NAVY

This Memorandum of Agreement (MOA) between the U.S. Fish and Wildlife Service (Service), Department of Interior, and the Navy (Navy), Department of Defense (DOD) establishes mutual agreement for the joint use of Amchitka Island by the Service and the Navy as specified in Section 1310(b) of the Alaska National Interest Lands Conservation Act (ANILCA).

WHEREAS, Executive Order 1733, dated March 3, 1913, reserved the Aleutian Islands as a wildlife and fisheries refuge under the administrative jurisdiction of the Department of Interior, but only insofar as it shall not interfere with the use of the islands for military or naval purposes;

WHEREAS, Amchitka Island is part of the Alaska Maritime National Wildlife Refuge as established by ANILCA dated December 2, 1980.

WHEREAS, the Service has instituted certain programs on Amchitka Island to minimize environmental damage to protect designated wilderness and to recover and reestablish an endangered species;

WHEREAS, the Navy requires use of Amchitka Island to establish a facility for the national defense, which use is in the public interest;

WHEREAS, the Navy wishes to coordinate its use of Amchitka Island with the Service to preserve the integrity of the Service's programs on the island;

NOW, THEREFORE, the Navy and the Service, agree to the following:

1. Area of Use: The Navy may use the three parcels of land described below plus a 100 foot corridor on each side of the existing Infantry Road which bisects the Island.

   a. Parcel 1: All of that land east of Longitude 179° 05' 12" East.

   b. Parcel 2: The land west of a line starting at the mouth of a stream which empties into the Bearing Sea at Latitude 51° 38' 29" North, Longitude 178° 42' 32" East; thence, upstream in a Southwesterly direction to the head of that draw; thence, due south following the draw of an intermittent stream to its mouth where it empties into the Pacific Ocean at Latitude 51° 36' 34" North, Longitude 178° 41' 26" East.

   c. Parcel 3: The high point of the island, the hill at peak elevation 1,160 feet, located at Latitude 51° 36' 23" North, Longitude 179° 48' 40" East, and that land lying within a radius of one-half mile from the peak of that hill.

DUPLICATE ORIGINAL

2. Obligations of the Navy: During its use of Amchitka Island under this MOA the Navy agrees to:

a. Comply with all permitting requirements under applicable Federal, State and Local law prior to initiating any development on Amchitka.

b. Consult with the Director, Fish and Wildlife Service Region 7, Anchorage, Alaska or his designee, prior to constructing or utilizing any improvement on Amchitka. Such consultation shall occur through the Navy's preparation of written plan(s) of operations describing the improvement(s) and operation(s) and its use, for review and comments by the Regional Director. The Regional Director may object to any plan(s) of operation(s) or portion of such plan(s) and provide the Navy written explanation thereof within 30 days receipt of such plan(s) if the plan(s) of operation(s) would result in significant damage to Amchitka Island wildlife populations or habitats or would be detrimental to reestablishment of an Aleutian Canada goose population on the Island. In such written explanation, the Regional Director shall attempt to specify alternatives which accomodate the objectives the Navy has identified in the plan(s) of operation(s) while reducing adverse environmental consequences. The Navy shall adopt all comments and recommendations received from the Regional Director during consulatation unless the Navy provides amplifying

information in writing within 30 days of receipt of the Regional Director's recommended alternatives. The Navy shall have the right to implement the submitted plan of operations after the earliest of the expiration of 30 days following Service receipt of the plan without the Navy's receipt of any written recommendations from the Regional Director or the adoption of a mutually agreed alternative plan. For the purpose of this MOA "improvement" means any structure located on or significant land alteration of Amchitka Island. For the purpose of this MOA "significant" shall mean major decline in the affected wildlife population or degradation of wildlife habitat.

c. During the period a Navy defense facility is established and in operation on Amchitka, support the Service monitoring staff by providing the following:

(1) Assumption of responsibility for the formal and informal permitting function for ingress, egress, or occupancy of Amchitka Island by all DOD personnel and its Contractors. The Service will retain permitting responsibility for all other parties with concurrence of Navy for security purpose.

(2) Assumption of responsibility for securing and protecting the Island against unauthorized occupancy or use.

(3) Provide visiting Service personnel, the best available facility relative to berthing and messing on a direct cost reimbursable basis.

(4) Reimbursable passage for Service personnel on base support aircraft, small vessels, pickup trucks or snowmachines with the approval of the facility commander, provided that such approval shall not be unreasonably withheld when space is available on such aircraft, vessels, trucks or snowmachines.

(5) Reimbursable fuel and maintenance services for Service vehicles or boats located on Amchitka.

(5) Provide up to 2,300 square feet of dry storage space as required by the Service.

d. All Navy operations shall be conducted in a manner that minimizes adverse environmental consequences and are conducive to restoration of Amchitka to environmentally sound conditions. The Navy's activities on Amchitka shall be conducted in accordance with following principles:

(1) Natural drainage patterns shall be maintained with any culverts, flumes or other practical methods required to maintain such patterns; any required terraces, dikes, settling ponds, or other such facilities will be used as necessary to minimize silt in runoff waters; and beach erosion or changes in tidal current patterns or longshore sediment transport caused or exacerbated by the Navy's activity shall be minimized.

(2) Electric transmission lines shall be installed on the ground surface except that they may be enclosed in above-ground utility corridors, buried in built-up roadways or buried beneath other gravel or earth works.

(3) Electric power generators shall be housed and muffled to reduce noise to a decibel level of 85 dBA or less at a distance of three feet from the generator.

(4) Personnel inhabiting Amchitka shall not kill, harass, bait or feed fish or wildlife, disturb nest or den sites, or possess parts or products of indigenous animals, except as authorized by a permit or license issued in accordance with State or Federal law or this MOA. No personal firearms shall be permitted on the island.

(5) Personal domestic pets, livestock, or other exotic wildlife species are prohibited on Amchitka; the Navy shall use reasonable means to prevent introduction of such animals or any other species that are not native to the island.

(6) Dogs used for law enforcement will be contained within fenced areas or on a leash at all times.

(7) Except for those who visit in emergencies or during brief stopovers, all Amchitka visitors will be required to attend

an orientation program approved by the Regional Director prior to or upon initial entry to Amchitka. The program shall be developed and presented in accordance with a Service approved plan.

(8) Petroleum products may not be introduced to Amchitka prior to the Regional Director's review of a Spill Prevention Control and Countermeasure Plan. Such plan must provide for the construction of containment dikes or other structures which have a capacity of at least 110% of tank storage capacity and are impervious to products they are intended to contain.

(9) Solid waste will be disposed of by incineration, buried in a designated land fill area, or removed from the Island.

(10) In consultation with the Regional Director, the Navy shall ensure the protection of archaeological, historic, and cultural resources of Amchitka in a manner consistent with all applicable State and Federal regulations.

(11) The Navy will be responsible for leaving the facilities on Amchitka in the same or better condition than existed upon initiation of Navy use thereof.

e. All Navy agreements with other federal agencies to use the facilities on Amchitka Island will be subject to the terms and conditions contained in this MOA.

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f. In recognition of the existing agreement between the Service and Department of Energy (DOE) for purpose of conducting annual environmental monitoring, the Navy will provide DOE the following support:

(1) Air and sea transportation for DOE mission personnel, material, and equipment between Amchitka Island and Alaska mainland or other points of embarkation, when available and on a direct cost-reimbursable basis,

(2) The best available facilities, relative to berthing, messing, and work spaces, to support annual DOE environmental testing on Amchitka Island.

(3) Upon request by DOE, a dedicated, 10' X 12' storage room for DOE environmental test equipment and related supplies, as mutually agreed to by the DOE and the Navy. This space will include power and heat. Two additional 10' X 12' work areas for sample prep/counting room will be established, upon request, for the period during the DOE environmental sampling visits. These work areas will also inlude power and heat, and hot and cold running water. DOE requirements for tables, chairs, cabinets, laboratory sink, and storage shelf, will be provided by the DOE or by the Navy on a direct cost-reimbursable basis.

(4) The use of Navy vehicles to the DOE during annual environmental sampling visits or storage for two (2) DOE vehicles, unless DOE otherwise provides this support. Fuel used in either Navy or DOE vehicles and/or maintenance for DOE vehicles will be provided on a direct cost-reimbursable basis.

(5) Access to local procurement of supplies and fuel, and building and equipment maintenance on a direct cost-reimbursable basis.

(6) Reimbursement to DOE for any direct costs incurred for goods and services furnished at the request of the Navy.

(7) Cooperation with DOE regarding access to, and use of, the airfield, dock facilities at Constantine Harbor, utilities, and other services and facilities on Amchitka Island.

3. Obligations of the Service: During Navy use of Amchitka Island under this MOA the Service agrees to:

a. Provide Navy an orientation program which will be presented to personnel permitted by the Navy prior to or upon initial entry at Amchitka.

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b. Provide the Navy with necessary Service employee information to meet Navy security requirements.

c. Provide the Navy with prompt wildlife and/or environmental information and/or determinations when required for on-site work or recreational activities, including all established general rules for fish and wildlife protection.

d. Provide the Navy with trespass control in the Wilderness portion of the island, including written identification of the Wilderness Area by defining the boundary by latitude and longitude and by posting the Area on the ground along the Military Road which bisects the Area.

e. Provide closure regulations and enforcement or other applicable regulations to protect Navy and/or Service interests.

f. Not require of Navy, Navy contractor or DOD, DOD contractor any formal or informal permit or permission for ingress, egress, or occupancy of Amchitka Island.

4. The Service and Navy agree that all Service property on Amchitka (except for the Pumphouse Lake residence and bath-house building located at Pumphouse Lake, and Dry Storage Building located Southwest of the Air Terminal Building) may be used exclusively by the Navy and

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that the Navy will be responsible for maintenance and care of Navy occupied structures and facilities, even though these properties remain in Service ownership. Any new property installed by the Navy will remain in Navy ownership if left on Amchitka as per operational plan, or may be removed from the Island by the Navy upon termination of this MOA.

5. The Service and Navy agree Amchitka Airport will be operated as a military airfield during period a DOD facility is on the Island.

6. This Agreement shall continue in effect until the Navy removes its facility and restores pre-MOA status to Amchitka. The Navy will give the Service 180 days written notice of its intent to vacate Amchitka Island and terminate this MOA. This MOA may be modified only by mutual written agreement of both parties.

IN WITNESS WHEREOF, the Navy and the Service have approved and accepted the conditions set forth above.

DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service

By: _____

Title: _____

Date: _____

DEPARTMENT OF THE NAVY
Western Division
Naval Facilities Engineering Command

By: _____
CHARLES J. WILLIAMS

Title: Director
Real Estate Division

Date: May 12, 1986

APPROVED 9 APR 1986
DARYL C. DAWSON
Associate Counsel
WESTNAVFACENGCOM

11

14-16-0007-86-8602

DE-GM08-86NV10535

MEMORANDUM OF UNDERSTANDING (MOU)

Involving the U.S. Department of Energy's Use and Future Interest In Amchitka Island (Alaska Maritime National Wildlife Refuge), Alaska.

Between the U.S. Department of the Interior, Fish & Wildlife Service (USFWS), and the U.S. Department of Energy (USDOE).

I. Introduction

This MOU is entered into between the USFWS and the USDOE to identify each Department's interest and responsibilities for the management and use of Amchitka Island. The USFWS has management authority for Amchitka Island. The USDOE has used the island for underground nuclear weapons testing and continues annual visits to conduct radiological monitoring studies. The USDOE may need Amchitka for future underground nuclear testing purposes as a part of the National Defense program.

II. Objectives

A. USFWS

1. Conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to marine mammals, marine birds, and other migratory birds.

2. Fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats.

3. Provide, in a manner consistent with the first two objectives, the opportunity for continued subsistence uses by local residents.

4. Conduct scientific study of marine resources.

5. Protect water quality and quantity.

6. Protect and manage endangered species.

7. Manage wilderness, as established by Alaska National Interest Lands Conservation Act (ANILCA).

8. Preserve historical and archaeological sites.

B. USDOE

1. Maintain future USDOE options for underground nuclear testing.

2. Conduct continued annual radiological monitoring studies.

III. Authorities

A. Executive Order No. 1733, dated March 3, 1913.

B. Proclamation No. 2416, dated July 25, 1940.

C. The Alaska National Interest Lands Conservation Act (P.L. 96-487), dated December 2, 1980.

D. The Atomic Energy Act of 1954, as amended (42 U.S.X. 2011 et seq.)

IV. WHEREAS, the USFWS has management authority for Amchitka Island, a unit of the Alaska Maritime National Wildlife Refuge; and

WHEREAS, it is the policy of the United States to maintain a strong National Defense; and

WHEREAS, the DOE is authorized by law to engage in work related to the military application of atomic energy; and

WHEREAS, Amchitka Island may be used for military purposes and has been used for underground nuclear testing by USDOE and may be proposed for such use in the future;

NOW, THEREFORE, it is mutually agreed that USDOE and USFWS will cooperate in the following ways:

A. USDOE & USFWS will

1. Identify buildings and other facilities that will be maintained for the joint use of both agencies.

2. Share in the maintenance costs of these buildings and facilities. Maintenance and repairs will be subject to mutual agreement of both parties.

B. USFWS will

1. Allow USDOE to review and comment on all applications from other government agencies for permanent-type uses (e.g., withdrawals, cooperative agreements, rights of way) for Amchitka.

2. Advise USDOE of any temporary or short-term authorized use of the island by others.

3. Not authorize any use that would jeopardize USDOE's future interest in the possible use of Amchitka.

4. Cooperate with USDOE by issuing special-use permits to allow temporary occupancy of USFWS facilities as needed for site studies, radiological monitoring, the collection of environmental samples, and maintenance of on-island facilities, as appropriate.

5. Prohibit any use of those areas designated as restricted areas as a result of nuclear tests formerly conducted on the island, except for those uses required for administration of the refuge.

C. USDOE will

1. Submit to USFWS any proposals for future underground nuclear testing on Amchitka Island. Such proposals will be subject to a determination of compatibility with refuge purposes and compliance with applicable environmental laws and regulations.

2. Reimburse USFWS for any expense it encounters that is associated with USDOE use of the island.

3. Protect wildlife and wilderness values.

V. This MOU will become effective upon signature by both parties. Amendments to this MOU may be proposed at any time by either signatory and shall be effective upon approval by both. This MOU may be terminated by either party 90 days after written notification by one party to the other.

United States Department of Energy	United States Fish & Wildlife Service
Thomas R. Clark, Manager Nevada Operations Office U.S. Department of Energy	Robert Gilmore, Regional Director U.S. Department of the Interior U.S. Fish & Wildlife Service
Date: JAN 8 1986	Date: JAN 3 1986 hr CGS

MEMORANDUM OF UNDERSTANDING

U.S. Fish and Wildlife Service
Department of the Interior

and

Department of the Air Force

WHEREAS, the Aleutian Islands Unit, Alaska Maritime National Wildlife Refuge is administered by the Department of the Interior, United States Fish and Wildlife Service, hereafter referred to as the Service, as a national wildlife refuge pursuant to the Alaska National Interest Lands Conservation Act (ANILCA)(PL96-487) dated December 2, 1980; and

WHEREAS, it is the desire and intent of the Department of the Air Force; hereafter referred to as the Air Force, to control, operate and maintain the air navigation installation, related facilities, and other defense-related facilities, situated on Shemya Island, a part of the aforesaid refuge, in the interests of national defense and for the benefit of private, commercial and governmental aircraft; and

WHEREAS, Section 1310(a) ANILCA, provides for reasonable access to and operation and maintenance of facilities for national defense purposes and related air and water navigation aids within or adjacent to such areas; and

WHEREAS, the Service, desires to cooperate fully with the Air Force and has determined that the use of Shemya Island by the Air Force for the operation and maintenance of the said air navigation installation and related defense facilities is in accordance with the provisions of ANILCA Section 1310(a); and

WHEREAS, it is mutually agreed by and between the Service, and the Air Force, that it is desirable to maintain Shemya Island availability to the Air Force for the purposes specified herein under the provisions of this Memorandum of Understanding:

NOW,THEREFORE, the Service and the Air Force agree as follows:

1. Shemya Island shall not be used except by the concurrence of the Regional Director, U.S. Fish and Wildlife Service, Anchorage, Alaska, for any purpose other than the installation, operation, and maintenance of an air navigation facility and for national defense.

2. The Air Force shall require compliance on the part of all persons on the island with all Federal laws and regulations applicable to national wildlife refuges.

3. Close liaison shall be maintained with the Service in all matters where fish and wildlife interests are involved.

4. Authorized representatives of the Service shall be granted access to Shemya Island for the conduct of official business.

5. Consistent with the existence and operation of the defense facilities, the use of the lands of Shemya Island by the Air Force shall be in accordance with the use of the said premises by the Service as a national wildlife refuge, and the Air Force shall not do nor suffer to be done by any of its employees, agents or contractors any act which may interfere with or adversely affect the wildlife values of the island.

6. This Memorandum of Understanding shall become effective on the date of its execution and shall continue in effect until terminated at the option of either party by the giving of not less than one hundred twenty (120) days advance written notice of the effective date of termination, but in no event beyond June 30, 2011.

7. If at any time during the continuance of this agreement, or at its termination, the air navigation facilities and defense related facilities shall cease to be used as such, the Air Force shall, within a reasonable time from such cessation, remove the facilities or abandon the site in such a condition as approved by the Service.

8. The designated representative of the Service in matters relating to the application of this agreement shall be the Refuge Manager, Aleutian Islands Unit, Alaska Maritime National Wildlife Refuge, Adak, Alaska, and the designated representative of the Air Force shall be the Commanding Officer, Shemya Air Force Base, Shemya Island, Alaska.

9. To develop such cooperative/interagency agreements or memorands of understanding between the parties as may be required to implement the policies contained herein or as needed to address other operational matters.

10. That nothing in this agreement shall obligate either party in the expenditure of funds, or for future payments of money in excess of appropriations authorized by law.

11. That amendments to this Memorandum of Understanding may be proposed by either party to this agreement and shall become effective upon written approval by the authorized representative for each party.

12. That nothing in this agreement is intended to enlarge or diminish the responsibility and authority of the Secretary of Interior or the Secretary of the Air Force.

IN WITNESS WHEREOF, the parties hereto have caused this Memorandum of Understanding to be executed the first day of July 1986.

Chief, Real Estate Division, U.S.
Army Engineer District, Alaska

Regional Director, U.S. Fish
and Wildlife Service,
Department of Interior

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

ADDRESS ONLY THE
REGIONAL DIRECTOR

730 N. E. PACIFIC STREET
P. O. BOX 3737
PORTLAND, OREGON 97208

April 12, 1967

IAEO-Alaska
Aleutian Islands

Ref: 4760

Commander
17th Coast Guard District
P. O. Box 3-5000
Juneau, Alaska 99801

Dear Sir:

We have considered the requests submitted in your letters of December 15, 1966 and March 21, 1967.

No. 1. We therefore, by this letter, agree not to take any action on the land described as Tract 1 below which would affect the watershed so as to render the water non-potable for human consumption.

Tract 1 - Beginning at a point, corner No. 1, 52 deg. 50 min. 40 sec. N, 173 deg. 08 min. 57 sec. E, which is also the northwest corner of the 1709 acre Coast Guard reservation, thence north 4800 feet to corner No. 2, thence east 2070 feet to corner No. 3 which is also approximately the summit of Terrible Mountain, thence south 45 deg. 00 min. 00 sec. E 6760 feet to corner No. 4, thence west 6780 feet to corner No. 1, the point of beginning, including an area of approximately 486 acres. (Also see attached map Exhibit "A")

No. 2. We further agree to the use by the U.S. Coast Guard of Tract 2, an existing right-of-way for an access road approximately 6 miles long and 16 feet wide, together with one square acre (shown on Exhibit "B").

Subject to the following terms and conditions:

1. The Coast Guard shall, prior to installation, notify the Bureau of the location and type of any temporary building or structure that may be erected or installed. Permanent buildings and structures will not be allowed on the subject area, except existing structures or buildings.

2. Any use of tract one, other than for watershed protection, shall be referred to this Bureau for approval.

3. This agreement may be terminated by the Coast Guard at such time as there is no longer any need for the land for the purposes requested or will automatically terminate after two (2) consecutive years of nonuse.

4. Upon termination of use the lands will be restored to as near original condition as possible and any temporary buildings or structures shall be removed within one year following termination.

This letter of agreement will become effective when signed by your District Commander below and the original returned to this office.

Paul T. Quick
Regional Director

Enclosures

I agree:
District Commander
17th Coast Guard District
Juneau, Alaska

5. Agreement between the U.S. Fish and Wildlife Service and the U.S. Coast Guard on Attu Island.

APPENDIX H. Consistency determination for Alaska Coastal Zone Management policies.

Section 307(c) of the Coastal Zone Management Act of 1972, as amended (PL 92-583), states that "each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state coastal management programs."

The Alaska Coastal Management Act of 1977, as amended, and the subsequent Alaska Coastal Management Program (ACMP) and Final Environmental Impact Statement of 1979 set forth policy guidelines and standards to be used for the review of projects. The state's coastal management districts develop more specific policies for specific sections of Alaska's coast. Once approved by the state and the federal government, the district programs become an integral part of the ACMP. In the case of the Alaska Maritime Refuge, nine coastal districts have developed (or are in the process of developing) coastal management programs, with differing standards and policies: There are approved coastal district programs for the Cenaliulriit (Yukon-Kuskokwim) Coastal Resource Service Area, Kodiak Island Borough, and the City and Borough of Sitka; the North Slope Borough, Northwest Arctic Coastal Resource Service Area, Bering Straits Coastal Resource Service Area, City of St. Paul, and Aleutians East Borough programs have been approved by the state and are awaiting federal approval; the Kenai Peninsula Borough is preparing a revised hearing draft and the Aleutians West Coastal Resource Service Area has recently been formed.

Consistency with the Alaska Coastal Management Program

The Alaska Maritime Comprehensive Conservation Plan is a general land use plan that provides broad policy guidance for managing the refuge. The following consistency determination for the Alaska Maritime Refuge management alternatives was based on the management directions for each alternative that relate to coastal land and water uses and the environmental effects of each alternative. Specific management actions may require more detailed environmental assessments, and site-specific coastal zone consistency determinations will be prepared at that time.

The Alaska Coastal Management Program identifies 12 primary categories that are to be used in the consistency evaluation:

Coastal development
Subsistence
Recreation
Energy facilities
Transportation and utilities
Fish and seafood processing
Timber harvest and processing
Mining and mineral processing
Geophysical hazard areas
Habitats
Air, land, and water quality
Historic, prehistoric, and archaeological resources

The Service has determined the preferred alternative and other proposed alternatives in the Alaska Maritime Comprehensive Conservation Plan to be consistent with the Alaska Coastal Management Program. The following table evaluates the consistency of the management alternatives with the requirements of each of the categories noted above.

IX-34

ACMP section	Policy (condensed from standards)	Evaluation of preferred and other alternatives	Consistency
Coastal Development 6 AAC 80.040	a) In planning for and developing coastal areas, priority is given to: 1) water-dependent uses and activities; 2) water-related uses 3) non-water related or water dependent uses or activities	Developments in all of the alternatives must be compatible with the purposes for which the refuge was established. Little development would occur on the refuge's coastal lands in the alternatives. In non-wilderness marine areas, primarily around Afognak Island and in Womens Bay a variety of uses would be considered on a case by case basis. If oil or gas is discovered and leased in moderate or intensive management areas of the refuge, compatible production and support facilities could be built in the refuge. Future site-specific EIS's that address all phases of development would consider potential impacts and coastal zone consistency.	C
	b) Placement of structures and discharge of dredged or fill material shall comply with 33 CFR, Parts 320-323.	No dredged or fill material would be used in any alternative. No structures would obstruct navigable waters. Structures permitted in marine refuge areas would also have to comply with applicable local, state and federal regulations. Alternatives conform to all other requirements of 33 CFR, Parts 320-325 and 330.	C
Geophysical Hazard Areas 6 AAC 80.050	Known geophysical hazard areas and areas of high development potential in which there is substantial geophysical hazard will be identified.	The refuge includes some of the most seismically active areas in the world. Four refuge units are identified as having high potential for future earthquakes. Volcanic activity in the Aleutian Islands Unit is also discussed; most of this unit is currently designated wilderness.	C
Recreation 6 AAC 80.060	In designating areas for recreational use, priority is given to areas which: 1) receive significant recreational use or are a major tourist destination; 2) have potential for high quality recreational use because of physical, biological, or cultural features; and 3) achieve the high priority of increasing public access to coastal water.	Opportunities for recreational use would be provided consistent with refuge purposes. All of the alternatives would allow for continued recreational use of the refuge, including commercial guiding and outfitting. Recreational use on the refuge is expected to increase in the future, with increased regulation and management of use possible in order to limit resource degradation.	C

ACMP section	Policy (condensed from standards)	Evaluation of preferred and other alternatives	Consistency
Energy Facilities 6 AAC 80.070	The siting and approval of major energy facilities must be based, to the extent feasible and prudent, on 16 standards identified by the state.	Under all the alternatives, oil and gas development could occur with facilities being built on the refuge. Federal regulations, lease stipulations, and a monitoring program would minimize impacts from these facilities. Future site-specific EIS's or environmental assessments would address potential impacts and coastal zone consistency.	C
Transportation and Utilities 6 AAC 80.080	a) Transportation and utility routes must be compatible with district programs. b) Transportation and utility routes and facilities must be sited inland from beaches and shorelines unless the route or facility is water dependent or no inland alternative exists.	None of the alternatives identify or propose any new trasportation or utility routes on beaches or shorelines. Under Title XI of ANILCA, transportation and utility systems could be constructed on or across the refuge, including through wilderness (with Congressional approval), in all management categories under all alternatives. However, normal local, state and federal regulatory requirements would also apply. Federal regulations, permit stipulations, and a monitoring program would minimize impacts of future proposals; site specific EIS's or EA's would address potential impacts and coastal zone consistency.	C
Fish and Seafood Processing 6 AAC 80.090	Districts shall identify and may designate areas of the coast suitable for the location or development of facilities related to commercial fishing and seafood processing.	Under section 304(d) of ANILCA the Service will continue to permit individuals with valid commercial fishing rights or privileges to operate on the refuge. In marine areas, commercial fishing will continue to be managed by the state. Floating processors may be permitted in marine areas zoned for moderate or intensive management.	C
Timber Harvest and Processing 6 AAC 80.100	Regulations and procedures adopted under the state Forest Resources and Practices statute with respect to the harvest and processing of timber are components of the Alaska coastal management program.	Few refuge areas are forested and most that are are already designated wilderness. In the Afognak area, permitting of log transfer facilities and other timber related facilities is subject to Title XI of ANILCA, as well as normal local, state and federal regulatory requirements.	C
Mining and Mineral Processing 6 AAC 80.110	a) These uses in the coastal area must be regulated, designed, and conducted so as to be compatible with state standards, adjacent uses and activities, state-wide and national needs, and district programs.	In all the alternatives holders of valid rights can mine hardrock locatable minerals on lands within the refuge boundary. All mining operations would comply with federal regulations, and would be monitored to minimize impacts.	C

ACMP section	Policy (condensed from standards)	Evaluation of preferred and other alternatives	Consistency
Mining and Mineral Processing 6 AAC 80.090, continued	b) Sand and gravel may be extracted from coastal waters when there is no feasible and prudent alternative to coastal extraction which will meet the public need for sand and gravel.	Sand and gravel mining, as a commercial operation, would not be permitted on the refuge under any of the alternatives. Sand and gravel extraction associated with other development permitted on the refuge would be allowed (e.g., extraction of sand and gravel necessary for drill pad construction or for other oil and gas related facilities). Special use permit stipulations and monitoring would minimize impacts. A site-specific assessment would address potential impacts and coastal zone consistency before permits are issued.	C
Subsistence 6 AAC 80.120	Opportunities for subsistence use of coastal areas and resources shall be recognized and assured. Before a potentially conflicting use or activity may be authorized in subsistence zones, a study of the possible adverse impacts on subsistence use must be prepared and safeguards provided to assure subsistence use.	Providing for subsistence use is one of the primary purposes for which the refuge was the established and shall be managed. All of the alternatives maintain subsistence use opportunities. Section 810(a) evaluations are included in the plan. Additional detailed section 810(a) evaluations would be prepared as appropriate for specific management actions.	C
Habitats 6 AAC 80.140	The habitats identified in this section must be managed so as to maintain or enhance the biological, physical, and chemical characteristics of the habitat which contribute to its capacity to support living resources.	Conservation of fish and wildlife habitats is one of the primary purposes for which the refuge was established and shall be managed. In general, the management directions in the preferred alternative and the other alternatives would maintain the integrity and biological health of coastal habitats. Some potential impacts to could occur if oil and gas development occurs, either on federal lands or offshore. However, federal regulations, lease stipulations, and a monitoring program would minimize impacts. Impacts from mariculture activities in marine refuge areas would be similarly managed. The Service would consult with the state to avoid or mitigate impacts of oil and gas development, mariculture and public use on the refuge.	C
Air, Land, and Water Quality	Regulations and procedures of the Alaska Department of Environmental Conservation pretaining to the protection of air, land, and water quality are components of the ACMP.	All standards would be met by the alternatives. The Service would cooperate with the state in enforcing air and water standards. Oil and gas development and mariculture could result in some impacts to water quality, but state and federal regulations, lease stipulations, and monitoring would minimize these impacts.	C
Historic, Pre historic, and Archeological Resources 6 AAC 80.150	Areas of the coast which are important to the study, understanding, or illustration of national, state, or local history or prehistory will be identified.	In all the alternatives, all identified significant historic and cultural resources would be protected as required under federal law.	C

APPENDIX I. Comments on the draft Alaska Maritime plan and selected Service responses.

The Service received 51 letters on the Alaska Maritime Refuge draft plan during the comment period. Comments on the draft plan were considered in preparing the final plan. These letters and the Service's responses to selected comments are printed here. All of the letters are on file at the Fish and Wildlife Service's regional office in Anchorage, Alaska. Individuals and groups responding to the plan are listed below.

Federal
U.S. Department of the Navy
U.S. Environmental Protection Agency
U.S. Department of Health and Human Services
U.S. Department of the Interior, Bureau of Mines

State of Alaska
Citizens' Advisory Commission of Federal Areas
Office of the Governor

Local Government
Kodiak Island Borough
City of Kodiak

Native Organizations
Afognak Joint Venture
Afognak Native Corporation
Bristol Bay Native Corporation
Isanotski Corporation
Jamin, Ebell, Bolger & Gentry (for Old Harbor Native Corporation)
Koniag, Inc.

Organizations
The Alaska Wildlife Alliance
Alaska Oil and Gas Association
Exxon Company, U.S.A.
Foundation of Biological Research
Homer Society of Natural History
Kodiak Audubon Society
Koncor Forest Products Company
National Audubon Society
National Wildlife Refuge Association
Pacific Seabird Group
Resource Development Council
Sierra Club (received after close of comment period)
The Wilderness Society
Womens Bay Community Council

Individuals

Jeff Allen	Kodiak, AK
Paul J. Anderson	Kodiak, AK
Charles Arthur	Juneau, AK
Robert D. Bacon	Anchorage, AK
Gerald R. Brookman	Kenai, AK
Tosha Galaktionoff	Kodiak, AK
Mrs. Frank Hutton	Sacramento, CA
Richard MacIntosh	Kodiak, AK
Eric Munk	Kodiak, AK
Remie Nelle Murray	Kodiak, AK
Judith Oravec	Seward, AK
Gary L. Peed	Nome, AK
Carol Razewski Pfeifer	Kodiak, AK
Robert C. Pfutzenreuter	Kodiak, AK
Christopher Provost	Kodiak, AK
Leah M. Ridgeway	Anchorage, AK
Eva G. Rugg	Ft. Myers, AK
Elizabeth Smith	Los Angeles, CA
John R. Swanson	Minneapolis, MN
Ethel W. Thorniley	Detroit, MI
Paul E. Turner	Kenai, AK
Judith B. Ungermann	St. Augustine, FL
Ken Zafren	Anchorage, AK

DEPARTMENT OF THE NAVY
NAVAL AIR STATION ADAK, AK.
FPO SEATTLE 98791

IN REPLY REFER TO
11015
Ser 70/ 7152
28 MAR 88

United States Department of the Interior
Fish and Wildlife Service
ATTN: William Knauer
1011 E. Tudor Road
Anchorage, AK 99503

Gentlemen:

Thank you for the Draft Summary of the Aleutian Comprehensive Conservation Plan (CCP). The document appears very thorough and complete. I hope that funding will permit you to carry out your "preferred alternative" for future wildlife management.

In proofreading the CCP, may I offer the following suggestions:

a. Page 67 - What are the small parcels of land selected within sections north of the refuge boundary on Adak Island to be used for? | 1

b. Page 97, paragraph 4, sentence 3, has a typo "lalready" should be "already." | 2

c. Page 117, paragraph 4, sentence 2 - the Coast Guard does not maintain a base on Adak. | 3

d. Page 185 - the map incorrectly shows Naval Air Station Adak too far to the north. It is located where the Aleutian Headquarters Office is shown. | 4

My compliments to the drafter of this comprehensive Wildlife Management Plan. Should you have any questions, please feel free to call CDR M.R. Johnson or LCDR G.J. Buchanan at (907) 592-8065.

Sincerely,

M. R. JOHNSON
Commander, U.S. Navy
By direction of
the Commanding Officer

Responses to Department of the Navy:

1. The selections referred to are historic sites selected under the provisions of the Alaska Native Claims Settlement Act.
2. The correction has been made.
3. The correction has been made.
4. The correction has been made.

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

MAY 18 1993

REPLY TO ATTN OF: WD-136

Walter O. Stieglitz
Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Dear Mr. Stieglitz:

The Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS)/Comprehensive Conservation Plan (CCP)/ Wilderness Review prepared by the Fish and Wildlife Service (FWS) for the Alaska Maritime National Wildlife Refuge (NWR). The DEIS evaluates three alternatives for managing the 4.9-million-acre Alaska Maritime NWR which encompasses the numerous islands, coastal escarpments, barrier islands, bays, and inlets along the Alaska coastline. Our review was conducted in accordance with the National Environmental Policy Act and our responsibilities under Section 309 of the Clean Air Act.

The FWS staff who prepared this document should be commended for their efforts. Even though the Alaska Maritime NWR covers five broad and distinct geographic refuge units, the DEIS/CCP was well organized and presented the essential information for each of these units in a clear and informative manner. The excellent maps, graphics, and tables present useful information in a concise format that facilitates review of the document.

The affected environment section presents an excellent discussion of species distribution, life cycle stages, population dynamics, status (declining, stable, increasing population levels), trophic interactions, as well as present and foreseeable conservation issues for each biological resource. The status of a population and whether it is comprised of opportunistic or selective feeders have important implications for the evaluation of environmental consequences. The discussion of the interactions between various off-refuge activities (commercial fishing, fish processing, mariculture, oil and gas activities, logging, and marine debris) and refuge biological populations provides a comprehensive wildlife conservation perspective.

Based on our review, we are rating the Alaska Maritime NWR DEIS/CCP LO (Lack of Objections). Alternative C, the preferred alternative, would provide reasonable protection for refuge resources and values while providing flexibility for a variety of uses in localized areas that are already experiencing more intensive human use. An explanation of the EPA rating system for Draft EISs is enclosed for your reference. This rating and a summary of our comments will be published in the Federal Register.

We appreciate the opportunity to review this report. If you have any questions about our comments, please contact Sally Brough in our Environmental Review Section at (206) 442-4012 or (FTS) 399-4012.

Sincerely,

Robert S. Burd
Director, Water Division

Enclosure

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta GA 30333

March 22, 1988

William W. Knauer
U.S. Department of the Interior
Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Dear Mr. Knauer:

Thank you for sending the Draft Comprehensive Conservation Plan, Environmental Impact Statement (EIS) and Wilderness Review for "The Alaska Maritime National Wildlife Refuge, Alaska." We are responding on behalf of the U.S. Public Health Service. We have reviewed the document and have no comments to offer at this time.

Thank you for sending this document for our review. Please insure that we are included on your mailing list for further documents which are developed under the National Environmental Policy Act (NEPA).

Sincerely yours,

David E. Clapp, Ph.D., P.E., CIH
Environmental Health Scientist
Special Programs Group
Center for Environmental Health
and Injury Control

IX-41

United States Department of the Interior

BUREAU OF MINES
Alaska Field Operations Center
201 E. 9th Avenue
Suite 101
Anchorage, Alaska 99501

May 27, 1988

Regional Director
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Attention: William W. Knauer

RE: Alaska Maritime National Wildlife Refuge Draft CCP/EIS/WR

Dear Mr. Knauer:

Thank you for the opportunity to review the above document which is especially significant because of the large areas of Alaska which it covers. Decisions impacting coastal areas may also affect inland developments by reducing access and restricting construction of infrastructure.

Alaska Field Operation Center staff found the discussions of geology and mineral resources incomplete and inconsistent. Geologic coverage varies from unit to unit and seems to emphasize surficial geology. Mineral terrains are not addressed in an informative manner. One obtains the impression overall that the more mineralized a unit is the less emphasis is placed on geology and mineral resources. 1

Comments more specific to each unit are made below. Also, Bureau staff have made a substantial effort to compile mineral deposit information for each unit based upon data in the Kardex and Minerals Availability System. Tables and maps showing locations are attached for your use.

In the Chukchi Sea Unit, the occurrence of a coal belt 5 miles wide is mentioned. Merritt & Hawley (U.S. Geol. Surv. Spec. Rep. 37) estimate that the field is about 16 miles wide. Reserves are greater than 50,000 MM st (MAS property files). As seen in the attachments, placer gold and other minerals also occur in this region. The Red Dog property was not even mentioned. As a world class deposit undergoing development so close to refuge lands, it would be appropriate to mention it. 2

In the Bering Sea Unit, the authors make repeated mention of MMS, but never refer to the Bureau of Mines or any other mineral resource oriented agency. The Bureau and other Federal and State agencies have published numerous reports concerning mineral resources in this unit. Nome and Goodnews Bay, major producers of gold and critical & strategic minerals are not discussed. The BIMA is not referenced. The Bluff area also has more than 5 placer claims that have produced placer gold. Existing industry activities could be impacted by land management decisions made by the Fish and Wildlife Service. 3

In the Aleutian Islands Unit, the whole area is written off as a mineralogically unproductive unit because of the "remoteness and inaccessability of the area". This problem did not stop early Alaskan prospectors. Our technology has improved enough in 90 years to make those remote areas easier to reach. 4

The authors suggest that the Alaska Peninsula Unit is also too remote for mineral development. Unga Island is mentioned, but the current work on that island is not discussed. The draft states that no commercially economic deposits have been discovered recently. This is in part due to recent land status designations which discourage exploration by industry. The U.S. Geological Survey may be assessing mineral resources of the unit in the near future and should be contacted regarding their data base. In the discussion on geology, half of it concerns the history of earthquakes in the area. 5

The Gulf of Alaska Unit is perhaps the most poorly covered of all. Once again, the draft states, "no economic deposits are known to occur in this area." Yakataga Beach Sands, Nuka Bay Gold, and Chichigof are only a few of the major deposits not mentioned. MAS property files list more than 250 deposits in the area. 6

In light of the poor geology and mineral resource coverage of the areas, the recently published U.S. Geol. Surv. Bull. 1786, "Significant Metalliferous Lode Deposits and Placer Districts of Alaska" may also prove very helpful to the authors of this report. This book summarizes mining history and amounts of mineral commodities produced in the state.

Sincerely,

Robert B. Hoekzema
Chief, Anchorage Branch

Attachment (3)

cc: P. Gates
M. Gloster

RBH:DAH:cto:1215M

Responses to the Bureau of Mines:

1. The discussions of geology and mineral resources were intended to focus, as much as possible, only on refuge lands. Detailed technical discussions were kept to a minimum due to the sheer size of the plan.

2. Thank you for the information.

3. Again, mineral resources and extraction activities that are not actually on the refuge are generally not addressed. The Bluff area is Native selected and due to be conveyed soon.

4. Section 1010 of the Alaska Lands Act provides for assessment of oil, gas, and other mineral potential on public lands. The Aleutian Islands have low hydrocarbon potential due to their igneous nature. Except for valid existing rights, refuges are closed to location, entry and patent under the mining laws.

5. Most of the land on Unga Island is privately owned. Most of the land in the Alaska Peninsula Unit is Native selected. The state coastal zone management program requires identification of areas of geologic hazard.

6. It would be more accurate to say "no economic deposits are known to occur on refuge lands in this area."

Citizens' Advisory Commission on Federal Areas

515 Seventh Avenue
Suite 310
Fairbanks, Alaska 99701
(907) 456-2012

May 18, 1988

Mr. Walter O. Stieglitz
Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Dear Mr. Stieglitz:

The Citizens' Advisory Commission on Federal Areas has reviewed the Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review (CCP/EIS/WR) for the Alaska Maritime National Wildlife Refuge. We offer the following comments for your consideration as your staff works to revise the plan.

Overall, the Commission believes the planning team has done a commendable job in describing the resources of the refuge. We appreciate the enormous task the Service faces in managing the geographically vast Alaska Maritime NWR. In order to protect the many unique resources of the refuge while allowing for the continuation of traditional activities and access on refuge lands, the Service will need to cooperate closely with a number of local, state, and federal agencies as well as cultivate the enthusiastic support of the public for its programs and regulations. Generally, we find the tone of the plan to be conducive towards these ends. We do have some concerns which we believe need to be addressed however, some of which have been raised previously for other refuge plans and some which are specific to the Alaska Maritime NWR.

DISPUTED OWNERSHIP OF SHORELANDS, TIDELANDS, AND SUBMERGED LANDS

The plan recognizes the State's assertion of ownership of, and jurisdictional authority over the submerged lands, water column and tidelands surrounding the Semidi Islands, Simeonof Island, Wolcott Reef to Sturgeon Lagoon in the Karluk area, Afognak Island, and Woman's Bay near Kodiak (Vol. One, page II-4; Vol Two, page III-37-38). The plan indicates that the Service disputes the State's ownership assertion but acknowledges that all other tidal and submerged lands in the refuge are State owned. The plan indicates the Service's belief that the issue of the disputed lands and waters will likely be resolved in the courts.

The Commission supports the State's assertion of ownership and it's authority to manage the resources associated with these lands and waters. Unfortunately, until the ownership disputes are resolved, there exists a potential for conflict which could have serious consequences for effective management of resources and impair economic growth in some communities. The plan states in Table 35 (page III-11) that the provisions of ANILCA Section 304(d) relating to commercial fishing would be applicable in the

marine areas of the Alaska Maritime NWR, including those which ownership is in dispute. ANILCA 304(d) states:

> "The Secretary shall permit within units of the National Wildlife Refuge System designated, established, or enlarged by this Act, the exercise of valid commercial fishing rights or privileges obtained pursuant to existing law and the use of Federal lands, subject to reasonable regulation, for campsites, cabins, motorized vehicles and aircraft landings directly incident to the exercise of such rights or privileges: Provided, that nothing in this section shall require the Secretary to permit the exercise of such rights or privileges or uses of the Federal lands... which he determines...to be inconsistent with the purposes of a unit of the National Wildlife Refuge System...and to be a significant expansion of commercial fishing activities within such unit beyond the level of such activities during 1979."

There appears to be a general lack of understanding between the State of Alaska and the Department of the Interior (DOI) regarding the meaning of ANILCA 304(d). (see also our comment on Wilderness Management below) If the FWS is proposing to limit or restrict commercial fishing activities on these waters by applying the standard of "significant expansion of commercial fishing activities...beyond the level of such activities during 1979" found at ANILCA 304(d), the Service must also demonstrate that commercial fishing activities are inconsistent with the purposes of the refuge. We reiterate the State's contention that these shorelands, tidelands and submerged lands are State owned. Proposals to restrict, prohibit or limit commercial fishing based upon the provisions of ANILCA 304(d) would not be enforceable against activities conducted in State owned waters. 1

We encourage the Service to discuss in detail its interpretation of this provision of the law to make it clearer to all parties how ANILCA 304(d) will affect the management of the Alaska Maritime NWR, the Kodiak NWR and other refuges in Alaska. Such clarification is necessary regardless of how the disputed ownership claims are resolved. ANILCA 304(d) has been and will remain an issue on the Alaska Maritime and other NWR's in Alaska where commercial fishing activities occur.

The plan states on page III-13 the Service's intention to develop cooperative agreements with the State of Alaska for the management of the Karluk, Afognak and Woman's Bay marine areas which are intensively used by the commercial fishing industry. While we are pleased to see that the Service recognizes the experience and expertise of the ADFG in managing these resources, the marine areas are owned by the State of Alaska, thus responsibility and authority for their management is already vested with the ADFG. 2

LAND USE CATEGORIES IN WOMAN'S BAY

Much of the already developed urban waterfront of Woman's Bay in Kodiak is proposed for Minimal Management in the plan. The industrial uses which are already occurring in Woman's Bay include a cannery, fish waste plant, the State airport, and the nearby Coast Guard base with a variety of intensive uses of its own. Potential exists for further economic development in Woman's Bay. While this area is included among those lands of which ownership is in dispute, we believe the Final CCP should recognize the 3

intensive industrial use occurring in Woman's Bay by managing the areas proposed for Minimal Management as Moderate Management (excepting the head of the bay) and those areas proposed as Moderate Management in the Intensive Management categories. The majority of the Alaska Maritime NWR is remote from urban settlement and economic activity. Much of it is already designated Wilderness. We believe that providing for more intensive uses on the small portion of the refuge in close proximity to the Kodiak urban area is not unreasonable considering that there are a number of local, state and federal requirements which would be enforced to protect resources. 3

WILDERNESS MANAGEMENT

The statement on page I-39 that "Shore based facilities in support of commercial fishing would not be permitted in designated wilderness" is not consistent with the provisions of ANILCA 304(d) which we have discussed above. In Wilderness areas, Congressional intent is further indicated by the provisions of ANILCA 1316(a) which states:

> "On all public lands where the taking of fish and wildlife is permitted in accordance with the provisions of this Act or other applicable State and Federal law the Secretary shall permit, subject to reasonable regulations to insure compatibility, the continuance of existing uses and the future establishment, and use, of temporary campsites, tent platforms, shelters, and other temporary facilities and equipment directly and necessarily related to such activities." 4

On page III-3 in the discussion of the Designated Wilderness management category the statement is made that "In marine environments, commercial fishing is not permitted." This is not correct. ANILCA 304(d) allows for the exercise of valid commercial fishing rights or privileges obtained pursuant to existing law, i.e. valid commercial fishing rights in NWR's which predate the area's designation as a Refuge Wilderness shall be permitted.

We have discussed in our comments on numerous other CCP's the reasons why we cannot endorse additional Wilderness designation in Alaska. Primary among those reasons is the failure of federal land managing agencies to observe the special provisions of ANILCA which effectively modified the Wilderness Act with respect to its implementation in Alaska.

MARICULTURE

The plan's intent to provide opportunities for mariculture in Moderate and Intensive categories in refuge waters is commendable. This emerging industry may become an important component of Alaska's overall economy in the future. The Alaska Legislature is only beginning to formulate statutory guidelines that will govern mariculture activities. As State policy becomes more clear in the coming years, we encourage the FWS to work closely with the ADFG to develop mutually acceptable objective standards for evaluating mariculture project proposals on all FWS lands and waters, including the Alaska Maritime NWR. As part of its normal CCP updating process, the Service should consider undertaking a review, in cooperation with the ADFG, of those lands and waters in other refuges which may have potential for mariculture activities. 5

PUBLIC PARTICIPATION

The Commission is generally pleased with the efforts of the planning team to engage public participation in the development of the Alaska Maritime NWR Draft CCP. As the Service begins to develop "step down" plans for the refuge, we encourage continued efforts to provide the public with every opportunity to respond to the Service's management initiatives.

We hope you will find our comments useful as you revise the Alaska Maritime NWR Draft CCP/EIS/WR. We look forward to continued participation in the planning efforts for this and other National Wildlife Refuges in Alaska.

Sincerely,

Stan Leaphart

Stan Leaphart
Executive Director

Responses to Citizens' Advisory Commission on Federal Areas:

1. The Service agrees that section 304(d) of the Alaska Lands Act has the two standards of compatibility as well as significant expansion beyond 1979 levels. This is discussed on page III-33 (Volume II) of the draft plan. See response to Kodiak Island Borough comment #4 for additional discussion.

2. The Service contends that it owns the marine areas around Afognak Island, in Womens Bay, and near Karluk. Section 303(1)(v) of the Alaska Lands Act specifically mentions the addition of marine areas. See response to Kodiak Island Borough comment #3 for additional discussion.

3. The preferred alternative in the final plan proposes areas with the greatest biological importance or documented subsistence or recreational uses for minimal management. The rest of the area is now proposed for intensive management.

4. See response to State of Alaska comment #6.

5. See response to State of Alaska comment #5.

STATE OF ALASKA

OFFICE OF THE GOVERNOR

DIVISION OF GOVERNMENTAL COORDINATION

STEVE COWPER, GOVERNOR

STATE CSU COORDINATOR
2600 DENALI STREET, SUITE 700
ANCHORAGE, ALASKA 99503-2798
PHONE: (907) 274-3528

May 20, 1988

Mr. Walter O. Stieglitz
Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

Dear Mr. Stieglitz:

The State of Alaska has reviewed the draft Comprehensive Conservation Plan (CCP) for the Alaska Maritime National Wildlife Refuge. This letter is submitted on behalf of state agencies and represents a consolidation of agency comments and concerns. Given the dispersed nature of the refuge, we appreciate the U.S. Fish and Wildlife Service (FWS) efforts to produce such a comprehensive plan.

Alaska Coastal Management Program

The consistency determination which is normally located in the Appendix of each CCP (e.g., ANWR, page 451) has been inadvertently omitted. We are aware, however, that the FWS has determined that the plan is consistent with the Alaska Coastal Management Program. To assist in preparation of the final CCP, we have provided, under separate cover, a current status report of coastal district implementation of the ACMP. In the interim, the state has completed an advisory consistency review of the plan. Based on the information presented, it appears that the plan will be consistent with the ACMP. A conclusive review will be made after the final CCP has been issued for public review. 1

Shorelands, Tidelands, and Submerged Lands

On page III-38, the CCP acknowledges that the state and the FWS disagree over the ownership of certain tide and submerged lands adjacent to the refuge. We request inclusion of a discussion about how these lands will be managed in light of this disagreement. The state has previously suggested the plan discuss pursuit of cooperative agreements when a case-by-case resolution of management issues proves unacceptable to the FWS and the state. Therefore, the state recommends that the following language be included to provide direction to managers in the event that conflicts arise. 2

"The FWS and the State of Alaska disagree about who owns tide and submerged lands around (location). Based on the Equal Footing Doctrine, the Submerged Lands Act of 1953, and Section 6(m) of the Alaska Statehood Act, the state asserts that it owns all tide and submerged lands adjacent to the refuge, including those lands adjacent to (location). The FWS acknowledges that the state owns all tide and submerged lands, with the exception of those lands adjacent to the (location). The FWS asserts ownership of the submerged land (location) based on a pre-statehood withdrawal which has been interpreted by the Department of Interior Solicitor's Office to preclude the passage of title to submerged land to the State of Alaska at the date of Statehood.

"The U.S. Supreme Court recently ruled in a case involving Utah Lake that pre-statehood withdrawals do not defeat the state's title to tide and submerged lands. The state currently is involved in litigation with the federal government on a similar issue on the North Slope which should provide the basis for resolving this ownership question.

"The FWS and the state acknowledge their disagreement on this issue. Until ownership is decided, the FWS agrees to work with the state to manage these lands. The state has expressed a corresponding willingness to work with FWS. Cooperative management agreements may be pursued by either the state or FWS when a case-by-case resolution of management issues proves unacceptable to either party." 2

The state is concerned about restrictive classifications of refuge uplands adjacent to state-owned tide and submerged lands, as well as those tide and submerged lands where ownership is in dispute. The Department of Natural Resources (DNR) expects that over the next 20 years it will receive an increasing number of requests for use of tidelands for commercial development, e.g., fisheries processing plants and mariculture. Since the state has the ability to issue permits and leases for use of tidelands, conflicts may develop with the upland refuge land classifications. The state is particularly concerned about this issue at Afognak Island, Middle and Women's Bay near Kodiak, and Semedi and Simeonof Islands where permits and leases are most likely to be requested.

For land use activities requiring authorizations for both uplands and tidelands, the state and FWS should coordinate. The relationship between FWS (the upland owner) and DNR (the

tideland and submerged landowner) needs to be clarified in the common management direction section of the plan. Whether or not there is a dispute over ownership of tidelands, the state recommends that the state and FWS pursue cooperative agreements when a case-by-case resolution of an issue proves unacceptable to the state or FWS. 2

Semedi, Simeonof, Kodiak, and Afognak Islands

On pages II-256, II-264, and II-302, the plan says the state disagrees that FWS is responsible for management of tide and submerged lands adjacent to these islands. The state would like to stay on record with this disagreement and encourages the FWS to reference the previous language in these locations. This language should also be included or referenced in the discussion of the preferred alternative on pages III-80 through 87. During the scoping phase of this plan in late 1987, the state also submitted extensive comments regarding state assertion of ownership of areas surrounding Kodiak Island, Women's Bay, and Wolcott Reef to Sturgeon Lagoon. 3

The state requests that there should be greater consistency between the Kodiak refuge and the Maritime refuge CCPs. Specifically, we request that all Minimal Management areas in the Maritime refuge that are adjacent to the Moderate Management uplands on the Kodiak refuge be classified as Moderate Management. 4

At Women's Bay, the Kodiak Island Borough is particularly concerned that the plan, as written, will preclude the development of a public sewer system. We request that a special provision be made for effluent discharge in Women's Bay regardless of how the bay is classified. State and federal permitting agencies should be allowed the opportunity to cooperate with the Borough in the design of a system which will not degrade the marine environment.

As explained above, the state believes that the FWS does not have jurisdiction or management authority seaward of the mean high tide line in the refuge. However, since this has not been affirmed by the courts, the state offers the remaining comments on the plan as currently written.

Mariculture

The state supports the FWS's plan to provide opportunities for mariculture on the refuge, subject to applicable law and a compatibility determination. However, the FWS has not developed compatibility criteria for analyzing individual mariculture projects on federal lands. Objective criteria are needed to ensure that the permitting process is 5

uniformly administered and to provide a basis for compatibility determinations. We urge the FWS to develop such criteria as a priority component of step-down planning for the refuge. A state mariculture policy is being developed through the administrative and legislative processes. Detailed permitting criteria will also be developed by the state for the siting and approval of mariculture activities on state lands. We believe that any criteria established by the FWS should be coordinated with state permitting requirements for state-owned tidelands. 5

The state also requests that coastal areas adjacent to protected bays on Unalaska Island be classified moderate management to provide opportunities for on-shore support of mariculture activities on adjacent state tidelands. These areas, currently proposed for Minimal Management, have many of the same characteristics as the Kodiak Archipelago. While the state has no specific plans to develop mariculture in these areas, we believe that the option should remain available.

Since there is still little information available on a statewide basis regarding suitable mariculture sites, the state recommends that the FWS take a close look at mariculture potential during the three-year revision process, including looking at requests from the public. The Shumigan Islands should be studied in this context. The state also requests a commitment in the CCP that during the revision process, any Minimal Management areas with newly-identified mariculture potential be reclassified to permit mariculture unless specific biological factors suggest otherwise.

In the discussion of mariculture on page II-85 of the CCP, the terms "aquaculture" and "mariculture" appear to be used interchangeably to describe the same activity. We request that the FWS clarify the meaning of these terms if they are not intended to be synonymous. Commonly "aquaculture" refers to fresh water activities while "mariculture" refers to marine activities.

Fisheries

According to Vol. I, page I-39, "Shore-based facilities in support of commercial fishing would not be permitted in designated wilderness." As previously noted, we believe this policy is inconsistent with ANILCA 304(d), which states that the Secretary "shall permit . . . the exercise of valid commercial fishing rights or privileges obtained pursuant to existing law and the use of Federal lands, subject to reasonable regulation . . . ." This intent is also reflected in ANILCA Section 1316(a): 6

> "On all public lands where the taking of fish and wildlife is permitted in accordance with the provisions of this Act or other applicable State and Federal law the Secretary shall permit, subject to reasonable regulation to insure compatibility, the continuance of existing uses and the future establishment, and use, of temporary campsites, tent platforms, shelters, and other temporary facilities and equipment directly and necessarily related to such activities." [Emphasis added.]

Accordingly, we believe that commercial fishing is permissable in both Wilderness and non-Wilderness portions of the refuge.

As previously mentioned, the state does not acknowledge FWS jurisdiction of off-shore submerged lands and waters. Even if the courts determine that FWS has such jurisdiction, however, the state believes that the above ANILCA provisions apply to Wilderness waters as well. Thus the state does not agree with the statement on page III-3 that "In marine environments, commercial fishing is not permitted" (in designated wilderness areas). This comment also applies to the "Commercial Fishing" language on page III-11. 6

In Vol.II, page III-13, the CCP references a desire to seek cooperative agreements with the state for management of commercial fishing. The state manages these fisheries in a manner which, to our knowledge, is satisfactory to the FWS. The need for formalized cooperative agreements should therefore be addressed if the existing memorandum of understanding with the Department of Fish and Game (DFG) is not adequate.

We also believe that the fisheries management concepts contained in Vol. II, page III-23, are premature and should more appropriately be established during the development of the refuge step-down fishery management plan.

In addition, the state reiterates its request that the CCP clarify that the FWS has the discretion to allow limited use of motors (e.g., chainsaws and generators) within Wilderness areas, if such use was established prior to designation of the area. (See 50 CFR 35.5). We note that the Alaska Land Use Council, at its meeting on November 24, 1987, unanimously urged the FWS to maintain flexibility to allow limited use of mechanized equipment where necessary to support traditional activities, and where it would not significantly detract from Wilderness values within a Wilderness, and where such uses occurred prior to 1980, consistent with FWS regulations.

Public Participation

The state appreciates the FWS commitment to include public participation in all phases of preparation, revision, and implementation of the CCP, as reflected in the statement in Vol. I, page I-12: "Public involvement and cooperative planning efforts are continued through the completion of the detailed management plans." However, Vol. I, page I-10 states that public involvement in step-down plans will be sought where "management plans deal with a subject of known special interest or controversy." (Similar language occurs in Vol. II, page III-43). The state urges the FWS to solicit public participation for all step-down management plans since public interest and controversy can be difficult to anticipate. 7

Geothermal Resources on Atka Island

Recent information compiled by John Reeder, Alaska Division of Geological and Geophysical Surveys, indicates additional geothermal resources beyond those reported on pages II-203 to 204. Based on field work in 1983, Reeder found six previously unreported, active fumaroles and/or hot-spring fields on the northern part of the island which are proposed for Wilderness designation. Reeder describes them as "probably some of the best hydrothermal resources in Alaska." The northern part of Atka Island is the largest volcanic center for the central Aleutian Islands, possibly with a large water-dominated reservoir in the Mount Kluichief region. The principal resource area according to Reeder's report is circled on the attached map. 8

For more information, please refer to the following:

> Reeder, J.W., Hydrothermal Manifestations of the Northern Part of Atka Island of the Aleutian Arc, and their Geologic and Tectonic Setting, Abstracts and Time Schedule for IAVCEI 1985 Scientific Assembly.

There may be some long-term interest in developing these geothermal resources through a land exchange. Wilderness status in this area would likely inhibit an exchange, therefore we request the area be deleted from the Wilderness recommendation.

Access

In several places (i.e., Table 34; pages III-21; III-68; and III-69), the CCP indicates that low flying aircraft could adversely affect bird populations and habitat and therefore reasonable regulations could be imposed on aircraft operations in the future. If such regulations are 9

developed, they should not compromise safety. Regulations should not prohibit flying close enough to the coast to maintain visual bearing. This is especially important during marginal weather when the ability to navigate by the coastline is critical. A statement in the plan addressing this situation would be helpful. 9

Page III-18, second paragraph. The last sentence of this paragraph incorrectly notes that the road across the Safety Sound parcel does not have an official right-of-way. The road is part of the Nome-Council Highway and is on the Federal Aid Secondary Highway System (FAS-130). Public Land Order 601 (8/16/49) established a 200-foot wide right-of-way for the route. Subsequent PLO's and executive orders retained that right-of-way. The Statehood Omnibus Act Quit Claim Deed transferred the right-of-way to the state in 1959. 10

Page III-45 - Safety Sound Barrier Island. This table refers to the "road bed" which will be subject to Intensive Management. We request that the phrase "road right-of-way" be substituted since it more accurately reflects the property interest involved and avoids potential administrative problems with routine activities, such as snow plowing and ditch maintenance. The Federal interests in the land within the entire width of the right-of-way should therefore be classified for Intensive Management. 11

We commend the FWS for recognizing, and designating routes for, traditional use of ORVs. We request that the FWS clarify how the traditional use areas identified on page III-25 were derived. We also request that this paragraph acknowledge that new routes could be designated if new information showed additional traditional useage. This provision should also apply to designated Wilderness. 12

Cabins

We request that Table 34 in Vol. II (page III-7) indicate that cabins are not for private recreational use. In addition, there may be cabins on the refuge which are not currently under permit. The state encourages FWS to allow intermittent, public use of such cabins on an informal basis for authorized refuge activities. The National Park Service has adopted a policy which allows such use in the Gates of the Arctic National Park and Preserve. (See Gates of the Arctic General Management Plan, page 158). 13

Maps and Land Status

The location maps need to distinguish between uplands and tide and submerged lands. To do this, the map notes on 14

pages II-111, II-143 through 145, II-182 through 184, II-257, and II-303 through 305 should be changed to read:

> Note: Refuge area shown in black; the refuge includes uplands on offshore islands, islets, rocks, reefs, and spires.

We appreciate the references to state-owned lands in the legend to the land status maps (pages II-112, II-147, II-186, II-258, and II-306). However, the maps (and legend) would be more clear if they simply contained a note stating that all tide and submerged lands adjacent to the refuge uplands are state owned. It would also be helpful to define these terms in the note. Tidelands are lands subject to tidal influence. Submerged lands are lands seaward from tidelands. This comment applies to the maps located on pages II-111 through 118, II-148 through 155, II-186 through 263. 14

The tables and discussions of land status should include a statement that all shorelands within the refuge, and tide and submerged lands adjacent to refuge uplands are in state ownership. This statement should be included in the discussion and the tables on pages II-110, II-146, II-185, II-256, II-264, II-302, and II-317.

The map on page II-145 shows Nunivak Island as part of the Yukon Delta National Wildlife Refuge. The boundary includes tide and submerged lands that the state asserts are in state ownership. As previously discussed, this boundary should be drawn to include only the uplands on the island, or alternatively, a footnote should be added to the map that clarifies the status of land ownership of tide and submerged lands adjacent to the refuge.

The FWS should include in its land status discussion for each unit of Wilderness a statement that shorelands within the unit and tide and submerged lands adjacent to a unit are in state ownership.

DNR is currently researching the land status and refuge boundary of Chamisso Island (page II-117), the former Bering Sea NWR (page II-316), Pribilof Reservation (page II-155), Hazy Island (page II-316), and St. Lazaria (page II-316). The state may submit additional comments on these areas at a later date.

Pages III-59, III-73, III-83 - Figures depicting land use designations around Afognak Island should be corrected to indicate that Afognak Lake is not tidal, and that it is not a component of the Alaska Maritime Refuge.

Page II-308 - In light of the reference to Sturgeon Lagoon on page III-25, we suggest that this place name be identified on the corresponding map on this page. 14

The maps on pages II-308 and II-309 should include a footnote that acknowledges there is a disagreement over the ownership of these lands.

Fish and Wildlife Management

We recommend deletion of the following statement in Vol. II, page III-19: "ANILCA obligations to maintain natural diversity by managing indigenous populations so that they do not decline unnaturally below the levels that existed on December 2, 1980 . . . ." We recommend deletion of this statement since the FWS and the DFG should not be bound to an artificial population goal, and ANILCA does not specify management be based upon any single year (1980) population level. In addition, we note that there is little data documenting "natural population levels" and/or levels in 1980. 15

For consistency, and to clarify that trapping is managed independently of subsistence or recreational uses, we request that "trapping" be added to discussions of hunting, fishing, subsistence, and recreational uses in the following locations: Vol. I--xx, Alternative A paragraph 2; xxi, Management Directions, 8th o; xxv, Alternative B, paragraph 2; xxvi, Management Directions, 8th o; xxxi, Alternative C, paragraph 1; xxxi, Management Directions, 7th o; I-44 through I-45; Vol. II--xix, Common Management Directions, 6th o; III-28, paragraph 1; III-44, Alternative A, paragraph 2 and 7th o; III-70, Alternative B, paragraph 2 and 8th o; III-80, Alternative C, paragraph 2 and 7th o.

Subsistence/Section 810 Evaluations

We appreciate the FWS acknowledgement in the Section 810 evaluation of the need to conduct additional assessments if future actions are proposed which might affect subsistence uses.

The CCP has not identified all communities that are known to use the refuge for subsistence purposes (see page-specific comments that follow). This is symptomatic of our general concern that Section 810 evaluations often appear to lack adequate background information for the communities and areas affected, making it difficult to accurately assess impacts on subsistence uses. Alaska Land Use Council (ALUC) guidelines for Section 810 evaluations also call for complete background data. 16

Page I-27 - Subsistence Monitoring. The second sentence might be more accurate as follows: "Subsistence uses of migratory birds in Alaska have been poorly documented in the past, and only recently have harvest monitoring programs been implemented in some areas for some species." 17

Page II-130 - Communities. Mapped information recently developed for the state's Northwest Area Plan indicates that the Maritime refuge has been used for subsistence by the communities of Kivalina, Buckland, Noatak, and Noorvik. We recommend the latter three communities be added to the list of those communities presented in the third paragraph. Additional information regarding communities that use the refuge and adjoining areas may be obtained from DFG through the FWS/DFG liaison. The following published source materials are also available from DFG: 18

> Schroeder, R.; D. Andersen; and G. Hildreth. 1987. Subsistence Use Area Map Atlas for Ten Kotzebue Sound Communities. DFG, Division of Subsistence and Maniilaq Corporation. Juneau.
>
> Alaska Department of Fish and Game. 1985. Alaska Habitat Management Guide - Arctic Region. Habitat Division. Juneau.

Page II-169 - Bering Sea Unit, Communities. The DFG Habitat Management Guide for Southwest Alaska indicates that the refuge has also been used for subsistence purposes by the communities of Twin Hills, Manokotak, Clarks Point, and Aleknagik. We recommend specific mention of these communities since documentation of their use of the refuge is available. 19

Page II-180. Kikegtak Island, et al. In 1987, the Alaska Board of Fisheries created the Cape Avinof herring fishery. The district boundary for this fishery includes the Pingurbek, Kikegtek, and Kwigluk islands. 20

Page II-236 - We appreciate the comparatively detailed discussion of subsistence uses in Unalaska. Wherever possible, we request that discussion of other communities receive similar attention. We also hope subsistence use studies are given high priority in refuge management and in step-down planning. 21

Page II-334 - Subsistence. A more current source of information on subsistence uses on Kodiak Island is: Kodiak Area Native Association (KANA), December 1983, Kodiak Island Area Local Fish and Resource Guide (96 pp.). This report was prepared by KANA with assistance from DFG Division of Subsistence and the Bureau of Indian Affairs. 22

Page II-341 - Sitka, Subsistence. We suggest that the FWS refer to the Division of Subsistence Technical Paper No. 90 for information on resource uses in Sitka. Maps in this report indicate that the southern portion of Kruzof Island and the Sitka Sound areas are harvested by Sitka residents. Specific attention is not given to St. Lazaria Island, but we recommend that the documentation of subsistence uses near the refuge be noted in the CCP, particularly since management actions on the refuge or in adjacent areas may affect overall patterns of subsistence harvest and use. 23

Pages III-24 through III-26 - Subsistence. We appreciate the FWS commitment to working cooperatively with DFG in its subsistence monitoring efforts. In some instances, however, baseline community harvest data will be required before effective and meaningful monitoring efforts can be initiated. Baseline biological and population data are also necessary prerequisites for decisions concerning harvest regulations.

Page IV-3 - Environmental Consequences, Subsistence 810 Evaluation. We suggest that the second sentence of the third paragraph be revised to read, "continued access of local rural residents . . . ." This wording will more accurately reflect the composition of rural communities being referred to in this section. 24

Geology

In general, sections on geology could be improved by modifying the technical language so that the discussion is more comprehensible to the general public. More frequent and updated references would also assist those readers who wish to research the topic more throughly. We have informally provided some suggestions for improving these technical discussions. 25

Page II-89, paragraph 1 - We request that the second sentence be revised as follows: "The exploration process involves preliminary geophysical (seismic) exploration with vessels." The CCP's use of 'usually' and 'some' in this sentence gives the impression that such activity is optional. No exploration for oil and gas by drilling would exclude such initial geophysical exploration. For clarity, we also suggest that the order of sentences 1 and 2 be reversed. 26

Page II-90, last sentence - For clarity, we suggest this sentence be re-phrased as follows: "Typically, there is low probability of finding enough oil resources to be developed in most of the new lease areas." Then the next sentence at the top of page II-91 could be restated: "For example, there 27

is only a 20 percent chance of sufficient oil and gas resources for development in the North Aleutian Basin, which is near Unimak Island." We also request that a reference be cited for the probability value. 27

Page II-119, paragraph 3 - A figure showing these Chukchi Sea geological features would be helpful. 28

Page II-120, paragraph 2 - The third sentence indicates occurrences of "Limestone of possible cement grade". We suggest that this information be accompanied by a reference. 29

Page II-202, paragraph 7, sentence 3 - We suggest that a citation be provided for this reference of undiscovered recoverable oil and gas resources. 30

Page III-29, paragraph 5 - It would be helpful to specify the percentage of the refuge that will be in Wilderness if the areas proposed are designated. 31

Grazing

Grazing occurs on several of the islands within the Alaska Maritime Refuge. Page III-9 says that no new or increased levels of grazing will be permitted, however existing grazing is not addressed. We therefore request that Table 34 be modified to include how existing grazing will be managed. By implication it appears that grazing will be allowed to continue at its exiting levels in those areas currently used for this purpose. 32

Kodiak Island Borough Comments

The Kodiak Island Borough has submitted extensive comments on the Alaska Maritime CCP. A number of the Borough's concerns are shared by the state, as reflected in this letter. We urge the FWS to carefully consider the Borough's comments and foster a close working relationship with them as the plan is finalized and implemented.

On behalf of the State of Alaska, thank you for the opportunity to review this draft. If we can be of assistance in clarifying these comments, please contact this office.

Sincerely,

Robert L. Grogan
Director

by: Sally Gibert
State CSU Coordinator

cc: Commissioner Judith M. Brady, DNR
Commissioner Don W. Collinsworth, DFG
Commissioner Dennis D. Kelso, DEC
Commissioner Mark S. Hickey, DOT/PF
Mr. Rod Swope, Office of the Governor

Responses to the State of Alaska:

1. A consistency determination has been included in the final plan.

2. The Service acknowledges the state's position on this issue and remains willing to pursue cooperative management agreements when a case by case resolution of management issues proves unacceptable to either party. Some of the suggested wording has been added to the text.

3. The Service acknowledges the state's position on this issue.

4. Several islands have been proposed for transfer to Kodiak Refuge in the final plan (see response to Kodiak Island Borough comment #5). These islands are still proposed for minimal management to simplify administration; current uses of these islands can be accommodated in minimal management areas. If the Service receives additional lands on Sitkalidak Island through a land exchange, it would consider designating moderate management along the shoreline.

5. The Service notes that a mariculture bill had not been passed by the state legislature at the time the draft plan was published. The Service expects to prepare a step-down plan for the Afognak area. Any criteria for evaluating mariculture proposals will be consistent with state guidelines to the maximum extent possible, when such guidelines become available. Future interest in developing mariculture projects in other parts of the refuge will be evaluated as part of the normal plan revision process.

   As used in the text, mariculture is the farming for profit of shellfish, finfish, and sea vegetables in the marine environment. Aquaculture includes mariculture, ocean ranching, and farming in fresh water. This usage is consistent with that in the brochure "Mariculture in Alaska" published by the Alaska Department of Commerce and Economic Development, Office of Commercial Fisheries Development.

6. The marine wilderness areas referred to in the plan predate passage of the Alaska Lands Act. Section 1316(a) does not apply to these areas. This was affirmed in an Interior Board of Land appeals decision concerning set-net cabins on Chisik Island.

   With respect to management of commercial fishing in marine refuge areas, the Service now believes the existing Memorandum of Understanding with the Alaska Department of Fish and Game is adequate.

7. The text has been changed to indicate that the Service will seek appropriate public involvement during preparation of step-down plans.

8. Thank you for the additional information. The text has be revised to note Service willingness to explore a land exchange in this area in the future. Since such an exchange is possible regardless of wilderness status, the area was not dropped from the wilderness proposal.

9. The Service would not promulgate any regulations that would adversely affect flight safety.

10. Statements about the Nome-Council Road have been corrected.

11. The requested change has been made.

12. The requested change has been made.

13. The cabins referred to are pre-Alaska Lands Act cabins. The actual cabins, although not the land they sit on, are private property. The Service has no authority to allow public use of private property.

14. Many of the maps in the final plan have been revised.

15. The Service acknowledges the state's comments on population levels. Trapping was added to the list of uses in all of the places requested except for the common management directions section on recreational uses.

16. The Service agrees that more detailed subsistence use data would be desirable, and notes that none of the management proposals would significantly affect subsistence use since, for the most part, they maintain the status quo.

17. The requested change has been made.

18. Buckland, Noatak, and Noorvik have been included as communities which use refuge lands.

19. Clarks Point and Aleknagik have been included in the list of communities which may use the refuge. The source referred to in this comment shows that these communities use lands or waters adjacent to the Alaska Maritime Refuge. The other two communities' use areas are not shown to include any lands in Alaska Maritime Refuge or any lands or waters adjacent to the refuge.

20. The text has been changed to reflect this information.

21. The Service agrees that more detailed subsistence use data would be desirable.

22. The text has been changed to incorporate data from the "Kodiak Island Area Local Fish and Resource Guide."

23. The text has been changed to incorporate data from Division of Subsistence Technical Paper No. 90.

24. The suggested wording has been substituted in the text.

25. Informal comments provided on the draft plan have been incorporated wherever possible.

26. The requested change has been made.

27. The requested change has been made.

28. Comment noted.

29. We were not able to locate the requested reference so the statement has been deleted.

30. The citation has been provided.

31. The requested addition has been made.

32. The Service will manage current grazing within proper range management guidelines.

Kodiak Island Borough

710 MILL BAY ROAD
KODIAK, ALASKA 99615-6340
PHONE (907) 486-5736

May 9, 1988

Walter O. Stieglitz, Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503-6199

Attention: William Knauer

Re: Alaska Maritime NWR Draft CCP

Dear Mr. Stieglitz:

The Kodiak Island Borough has reviewed the Draft Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review for the Alaska Maritime National Wildlife Refuge (CCP).

Although we have significant concerns about the draft CCP, we do not believe that it is inconsistent with the Kodiak Island Borough Coastal Management Program (KIBCMP) or the Alaska Coastal Management Program (ACMP). Therefore, the remainder of this letter contains general, non-consistency related comments on the draft CCP which we have also transmitted to the State of Alaska. We are sending these comments to you hoping that the U.S. Fish and Wildlife Service (Service) will incorporate these comments into the final CCP for the Alaska Maritime National Wildlife Refuge.

INTRODUCTION

The Kodiak Island Borough has two major concerns about the Alaska Maritime National Wildlife Refuge.

First, the Borough is concerned about the cumulative impacts of two federal National Wildlife Refuges on the economic development of the Borough. The managers of the Kodiak National Wildlife Refuge have either direct or indirect control over approximately three-quarters of Kodiak Island. It is clear from the Record of Decision (ROD) for the Kodiak National Wildlife Refuge that the Refuge will be managed conservatively. Although we acknowledge and accept this conservative management position, we also recognize the limitations that it will place on economic development in the Borough. We cannot and will not accept such a management position for the Alaska Maritime National Wildlife Refuge.

Second, in the Kodiak Island Borough, the Alaska Maritime National Wildlife Refuge contains large marine areas. In this regard, we are unique in all of the United

States. Typically, National Wildlife Refuges are land-based. In fact, the Alaska Maritime National Wildlife Refuge is land-based, although most of these lands are small islands and rocky islets. We are the only local government in the United States faced with direct federal control of marine areas within our jurisdiction due to their inclusion in a National Wildlife Refuge.

While the Kodiak National Wildlife Refuge limits land-based commercial activities, including fishing support facilities, the Alaska Maritime National Wildlife Refuge has the potential for limiting commercial fishing in some of our most productive commercial fishing areas, as well as limiting the economic expansion of our developed, industrialized urban coastline.

The reality is that very little of the Kodiak Island Borough is outside of the control or influence of the Service. This situation severely limits our economic opportunities, the cornerstone of our society.

As a result, the Borough would like to propose a solution and some alternatives that will eliminate or reduce our concerns. Because these concerns focus on the marine areas of the Refuge, our comments on this aspect of the plan are presented first, followed by our comments on the land-based areas of the Refuge. We conclude with general comments about the plan itself.

MARINE AREAS

As noted previously in our comments, the Kodiak Island Borough is especially concerned about the three marine areas of the Borough that are part of the Refuge. They are: Karluk, Womens Bay, and Afognak.

All of these marine areas are heavily used by the commercial fishing industry which harvests a variety of species in each of the areas. The Womens Bay area, in addition, includes a major developed portion of the Kodiak urban waterfront and all of the developed coastline of the U.S. Coast Guard base.

The Kodiak Island Borough requests Service support for federal legislation that would remove the following marine areas from the Alaska Maritime National Wildlife Refuge:

1. **All of the Karluk marine area;**
2. **All of the Womens Bay marine area from Gibson Cove up to and including Frye Point; and**
3. **The marine areas surrounding the logging camps, log transfer sites, and Kitoi Hatchery on Afognak Island.**

1

We believe that there is more than sufficient justification to support removal of these areas from the Refuge. None of these areas include unique or special habitat for or populations of marine mammals or marine birds. All of these areas are developed and are not suitable for inclusion in a National Wildlife Refuge. Specifically:

1. In the Karluk area, the State of Alaska and the Kodiak Island Borough are spending $300,000 to rehabilitate the Karluk salmon fishery. The express intent of this program is to provide a significant expansion of commercial fishing opportunities in the area.

2. The Womens Bay area contains a significant part of the developed waterfront of the Kodiak urban area, including: a fish waste plant, cannery, State airport, and the U.S. Coast Guard base, which in itself includes a port with numerous industrial uses.

3. The bays identified on Afognak Island already contain significant industrial development. The expansion of these facilities should not be negatively impacted by a peculiarly located National Wildlife Refuge.

In the interim, while these areas still remain in the Refuge, we support their classification as intensive management as they have been designated in the preferred alternative in the draft CCP.

In addition, the Kodiak Island Borough would like all marine areas remaining in the Refuge to be classified as intensive management, with the exception of the marine area adjacent to that portion of the Kodiak National Wildlife Refuge on Afognak Island, and the head of Womens Bay (inside of a line extending from Frye Point to Bruhn Point - please see Map A). We also urge that the Service "permit" all the uses listed in Table 4 of the CCP draft summary in areas designated as intensive management.

The Borough specifically supports the classification of the head of Womens Bay as minimal management; but we are concerned about a specific activity that is identified in the draft CCP as not being permitted in minimal management areas. That activity is effluent discharge. It is possible, as a result of upland growth in the Womens Bay area, that within the next ten years a public sewer system will be constructed in the area. Obviously, this would necessitate an effluent discharge pipe into Womens Bay. The Kodiak Island Borough feels strongly that effluent discharge should be permitted on a case-by-case basis in minimal management areas, based on the potential growth of the Womens Bay area. 2

It is unfortunate that the public hearing on the draft CCP was held in Kodiak at a time that did not allow commercial fishermen to testify. At the public hearing,

the Refuge staff stated that all commercial users of the Refuge would be required to obtain special use permits prior to using the Refuge, except for commercial fishermen. It was stated that commercial fishing would be "permitted" by the Alaska Department of Fish and Game (ADF&G) as a result of a Memorandum of Understanding (MOU) between ADF&G and the Service. The Borough would like to be assured that the existing MOU is adequate to ensure that commercial fishermen will not be required to obtain permits prior to fishing in the marine areas of the Refuge. If the existing MOU is not adequate, we urge the Service to develop a new MOU that gives ADF&G complete management authority over commercial fishing. 3

The Borough would also like to see this type of "permitting" established for other economic activities in the marine areas of the Refuge, especially uses such as: mariculture, hatcheries, and charter operations (both air and marine). Perhaps a system like the U.S. Army Corps of Engineers (Corps) general or nationwide permits could be implemented, or the previously mentioned uses could be covered by the MOU with ADF&G. In fact, the Kodiak Island Borough would like to see the requirement for special use permits for individual users and activities eliminated in the marine areas of the Refuge. **We do not believe that there is a need to do a case-by-case review of each individual activity prior to issuing a permit.** We understand that permits provide the Service with information about the number and location of people using the Refuge, and we do not object to this as long as the permits (for permitted uses) are not individually reviewed. There are already many other local, state, and federal permits that are required for the placement of any structure in the marine areas of the Refuge. Review of an activity by the Service for a special use permit adds nothing beneficial to an already cumbersome permitting process that takes the Service's views into account. This seems especially true for uses that we hope will be identified as permitted uses in the final CCP.

Due to the significance of these marine areas to the local economy, we believe that the Alaska Maritime National Wildlife Refuge should have management and administrative staff located in Kodiak; this is especially crucial if our comments regarding Refuge permitting are not accepted and implemented.

We also strongly believe that step-down management plans must be completed in a timely manner for any marine areas that remain in the Refuge, with the Borough involved as a full partner in the planning process.

We are especially concerned about how Section 304(d) of ANILCA will be applied in these marine areas. It is clear that the Service has authority over the extent to which commercial fishing will be allowed in these areas. The Borough urges the Service to provide a clear and detailed explanation in the final CCP of how Section 304(d) of ANILCA will be applied to these marine areas. Until we know how the Service will interpret this provision of ANILCA, the Borough cannot adequately assess the true impacts of the Refuge on our communities. 4

LAND AREAS

The Kodiak Island Borough strongly recommends that those large land areas in the Borough which are part of the Refuge be transferred to the Kodiak National Wildlife Refuge. If these areas, for whatever reason, are not transferred to the Kodiak National Wildlife Refuge, they should at the very least be managed by the Kodiak National Wildlife Refuge.

Specifically, we believe that at least the following islands or portions of these islands controlled by the Service should be transferred to the Kodiak National Wildlife Refuge:

Aikatalik Island; and
Sally Island;
Sheep Island;
Sitkalidak Island

We believe that these land areas are more compatible in their characteristics with the purposes for which the Kodiak National Wildlife Refuge was established than with the purposes for which the Alaska Maritime National Wildlife Refuge was established.

In addition, their proximity to the Kodiak National Wildlife Refuge and their lack of special habitat for marine birds and mammals makes consistency in the management of these federal lands more important than the specific Refuge in which they are included. Consistent and compatible management of these lands will not only benefit the resources in these areas, but will simplify the permitting process for users.

GENERAL CCP COMMENTS

The Kodiak Island Borough believes that of the Alternatives presented in the draft CCP, the "preferred alternative" is indeed the best alternative. But we also agree with a resident's statement at the Refuge public hearing in Kodiak, on April 12, 1988, that "the Alternatives are a matter of degree, not choice." The Kodiak Island Borough urges the development of an Alternative that really provides a choice. We believe if the Service implements our recommendations, that we will be provided a choice.

There are two specific errors in the maps included in the draft CCP that were acknowledged by the Service at the public hearing in Kodiak on April 12, 1988. These include:

1. The inclusion of Afognak Lake (a fresh water lake) in the Refuge. Afognak Lake is not part of the Refuge; and

5

6

IX-55

2. The fact that the intensive management category in Womens Bay is not mapped to include all of the U.S. Coast Guard base. The intensive management category should surround Nyman Peninsula and include all of the inner bay and Shannon Point, recognizing the current industrial use of this area. Please see Map B.

7

We believe that the differences between Table 3 and Table 4 in the CCP draft summary need to be clarified. As we understand it, Table 3 applies only to land-based activities, and Table 4 applies only to marine based activities. This distinction needs to be highlighted. We are very concerned that only one use listed in Table 4 is permitted in any management category. As noted earlier, we believe all of the identified uses should be permitted in the intensive management classification. We do not believe that this will harm the integrity of the Refuge because, as the Service's Refuge Manual states:

> "A positive determination of compatibility should not be viewed as the final word on whether a particular use will be permitted." (Section 20.11),

8

since, as we stated earlier, all of the listed activities are already highly regulated by many other local, State, and federal permitting processes. All of the identified uses are activities that are traditionally associated with marine development in Alaska and the Kodiak Island Borough. We also believe some general permit process should be developed for activities that are permitted in the intensive management category.

We are additionally concerned that a specific activity that relies on the marine areas of the Refuge is not included in Table 4. Commercial charter operations (boat and air) should be added to Table 4 under the economic use category. We also believe that this activity should be permitted in all the management categories.

9

We continue to be concerned about those uses that may remain subject to a case-by-case compatibility review. As we commented during the planning process for the Kodiak National Wildlife Refuge, the Service's criteria for making compatibility determinations need to be spelled out in the final CCP. Although the Service has asserted that such criteria exist, the Service's own Refuge manual states:

> "The following guidelines provide a procedure for review of all proposed uses for compatibility. (Emphasis Added)

10

The Borough believes that more than just a procedure needs to exist for establishing the compatibility of an activity within the Refuge. We believe that specific criteria for evaluating activities on the Refuge need to be developed, with public input, and adopted through a formal rule-making process. Currently,

the only criterion for making a compatibility determination identified in the Refuge manual is:

> "The determination of compatibility must be based upon a site specific biological analysis of the anticipated impacts of a particular action in terms of the resources (generally wildlife populations and habitats) which represent the purposes for which a Refuge was established."

We do not believe that this criterion is adequate basis for the important decisions that will be made about the use of the Refuge through the compatibility determination process. Case-by-case compatibility determinations will ultimately decide the allocation of Refuge resources, will assess the cumulative impacts of activities on the Refuge, and may have a significant and negative impact on the economy of the Kodiak area. We believe it is incumbent upon the Service to develop adequate, clear, and appropriate criteria for this purpose. 10

In addition, we believe that a clear and comprehensive appeal process for compatibility decisions must also be adopted through a formal rule-making process.

In closing, we would like to urge the U.S. Fish and Wildlife Service to incorporate our comments into the final Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review for the Alaska Maritime National Wildlife Refuge.

Thank you for the opportunity to comment. If you have any questions about these comments, please call Linda Freed of the Borough's staff.

Sincerely,

Jerome M. Selby
Borough Mayor

enclosures: Maps A and B

cc: Senator Ted Stevens
Senator Frank Murkowski
Representative Don Young
Donald Hoedel, Department of the Interior
Frank Dunkle, Director, USFWS
Leslie Kerr, USFWS Planning Team
John Martin, Refuge Manager, Alaska Maritime National Wildlife Refuge
Ed Jack, Interested Citizen
Nell Murray, Interested Citizen
Chris Provost, Interested Citizen

Responses to Kodiak Island Borough:

1. The Service will not support legislation that would remove the listed areas from this refuge. However, it would consider trades that would benefit refuge purposes. The Service has placed most of these areas in intensive management.

2. The requested change has been made.

3. The Service will develop a Memorandum of Understanding with the Alaska Department of Fish and Game which will relieve commercial fishermen of the refuge special use permitting process.

4. Under section 304(d) of the Alaska Lands Act, a fishery which would be a significant expansion of 1979 levels would have to be compatible with refuge purposes. The Service recognizes that fisheries' levels are cyclic and will take that into consideration when applying the 1979 level criteria. Any new fishery will have to meet the compatibility standard.

5. The final plan recommends transfer of Sally, Sheep, and Sitkalidak islands to Kodiak National Wildlife Refuge.

6. The mistake has been corrected.

7. The map of Womens Bay has been revised.

8. The Borough is correct in their understanding that one table refers to land based activities and the other refers to marine activities. This distinction has been highlighted in the final plan, and some minor changes have been made in the list of permitted uses.

9. This correction has been made.

10. The Service must presently follow the criteria listed in the refuge manual. The Service must have criteria broad enough to meet the many varied activities that must be evaluated. Comprehensive planning is not the appropriate process to develop more concise criteria.

CITY OF KODIAK
ALASKA

April 12, 1988

Mr. John L. Martin, Refuge Manager
U. S. Department of the Interior
Alaska Maritime National Wildlife Refuge
202 W. Pioneer Avenue
Homer, AK 99603

RE: Alaska Maritime Comprehensive Conservation Plan

Dear Mr. Martin:

As I am unable to attend the public hearing tonight on the above referenced matter, I would like to have this letter read into the record as the City of Kodiak's objection to placing Gibson Cove within the boundaries of the Wildlife Refuge. 1

There is presently a cannery located in the cove, as well as the fish parts reduction plant located above the area. The City feels this refuge would prohibit further development of the area thereby making it a detriment to the economic development of the City of Kodiak.

Very truly yours,

CITY OF KODIAK

Herman T. Beukers
City Manager

HTB/keh

POST OFFICE BOX 1397, KODIAK, ALASKA 99615 PHONE (907) 486-3224

Response to City of Kodiak:

1. Congress placed Gibson Cove in the Alaska Maritime Refuge with passage of the Alaska Lands Act. The Service has proposed Gibson Cove for intensive management, the most liberal of its management categories.

AFOGNAK JOINT VENTURE

413 REZANOF DR.E. KODIAK, ALASKA 99615 (907) 486-6014

May 11, 1988

RECEIVED
MAY 16 1988
ALASKA

John Martin, Refuge Manager
Alaska Maritime National Wildlife Refuge
202 West Pioneer Avenue
Homer, Alaska 99603

Subject: Comments on the Alaska Maritime National Wildlife Refuge Draft of combined Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review

Dear Mr. Martin:

Afognak Joint Venture appreciates the opportunity to comment on the Alaska Maritime National Wildlife Refuge Plan.

We have reviewed the Draft for the Alaska Maritime National Wildlife Refuge (AMNWR) and consequently have comments regarding the Kodiak and Afognak areas because this is where our land ownership is affected and because these are the areas where we are knowledgeable. Afognak Joint Venture (AJV) will own more than 220,000 acres of land on Afognak and nearby small islands. Many of our shareholders individually own lands which are affected by AMNWR. Access to our lands, use of our lands, and the waters on which many of us depend for our liveliehoods are affected by AMNWR.

We could support Minimal and Moderate Management classifications of AMNWR holdings adjacent to public lands but we object to these classifications adjacent to our private lands. We are so concerned that those management classifications may unreasonably restrict our use of our lands that we strenously object to anything other than Intensive Management classification adjacent to private lands. Also, we support the comments submitted to you by Koniag as well as the Afognak Native Corporation.

Most importantly we believe that under the Alaska National Interest Lands Conservation Act's (ANILCA) Section 1110(b) provides us certain access rights to our lands that will be jeopardized by Minimal and Moderate Management Classifications proposed in the Draft. In spite of oral assurances that we our rights are protected we are extremely concerned. Our observations have convinced us that government organizations can require us to expend funds and effort vastly greater than is

warranted. The interpretation of Section 1110(b) may be sufficiently ambiguous so that it would require onerous litigation to establish our rights for access. We believe that practical and economical development of our property will result excessive bureaucratic planning and regulatory restrictions. We believe that the proposed management classifications will be interpreted by some regulatory officials in a way that will detract from our ability to reasonably manage our land for timber harvest or any other activities we may undertake.

We wish to call your attention to the technical corrections regarding the description of AJV and its lands which Koniag, Inc., commented upon to you in their letter regarding the Draft. We concur in their request that their suggested corrections be made. 1

If the proposed Arctic National Wildlife Refuge land exchange were to change the ownership status of proposed AJV lands into public domain then we would support Minimal Management classification for those areas which would come into the public domain and are not currently subject to intensive use activites.

We support wise management of the resources and therefore are appreciative and supportive of the efforts and intent of the Fish and Wildlife Service. Nevertheless we have major concerns regarding proposals made in the Draft because we believe that they confsicate future rights of private landowners and are potentially harmful to reasonable interests of private landowners.

Very truly yours,

Howard W. Valley

Howard W. Valley, Chairman
Afognak Joint Venture

HWV:pjo,jec

AMNWRLTB.JEC

Response to Afognak Joint Venture:

1. The requested corrections have been made.

AFOGNAK NATIVE CORPORATION

413 REZANOF DR.E. KODIAK, ALASKA 99615 (907) 486-6014

May 11, 1988

RECEIVED
MAY 16 1988
ALASKA

John Martin, Refuge Manager
Alaska Maritime National Wildlife Refuge
202 West Pioneer Avenue
Homer, Alaska 99603

Subject: Comments on the Alaska Maritime National Wildlife Refuge Draft of combined Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review

Dear Mr. Martin:

Afognak Native Corporation appreciates the opportunity to comment on the Alaska Maritime National Wildlife Refuge Plan.

We have reviewed the Draft for the Alaska Maritime National Wildlife Refuge (AMNWR) and consequently have comments regarding the Kodiak and Afognak areas because this is where our land ownership is affected and because these are the areas where we are knowledgeable. Afognak Native Corporation (ANC) owns more than 120,00 acres of land on Kodiak, Afognak, Raspberry and smaller nearby Islands. Many of our shareholders individually own lands which are affected by AMNWR. Access to our lands, use of our lands, and the waters on which many of us depend for our livelihoods are affected by AMNWR.

We could support Minimal and Moderate Management classifications of AMNWR holdings adjacent to public lands but we object to these classifications adjacent to our private lands. We are so concerned that those management classifications may unreasonably restrict our use of our lands that we strenuously object to anything other than Intensive Management classification adjacent to private lands. Also, we support the comments submitted to you by Koniag as well as the Afognak Joint Venture.

Most importantly we believe that the Alaska National Interest Lands Conservation Act's (ANILCA) Section 1110(b) provides us certain access rights to our lands that will be jeopardized by Minimal and Moderate Management Classifications proposed in the Draft. In spite of oral assurances that our rights are protected we are extremely concerned. Our experience in obtaining a log transfer facility permit has convinced us

that government organizations can require us to expend funds and effort vastly greater than is warranted. The interpretation of Section 1110(b) may be sufficiently ambiguous so that it would require onerous litigation to establish our rights for access. We believe that practical and economical development of our property will result in excessive bureaucratic planning and regulatory restrictions which, although they may be less complicated than a log transfer facility, would cause us unreasonable effort and expense. Furthermore not all projects or individuals which would be affected by the proposals would be able to mount the effort we have found necessary to cope with a cumbersome bureaucracy. Although for our log transfer facility we have achieved solutions we believe are mutually satisfactory to the Fish and Wildlife Service and ourselves and we have developed respect for a number of Fish and Wildlife Service professionals, we have nevertheless become irrevocably skeptical of the bureaucracy's ability to work for solutions in a manner practical enough to be tolerable. We believe that the proposed management classifications will be interpreted by some regulatory officials in a way that will detract from our ability to reasonably manage our land.

An example we perceive for inflexibility of the management classifications might be the extraction from beaches of small quantities of sand to be used for spreading on icy roads. We interpret that this might be precluded in a Moderate Management Classification even though it may make more sense than a larger extraction effort in an Intensive Management area. We suspect that other examples will develop in reasonable recreational use development of private lands as well as for other land uses.

We support wise management of the resources and therefore are appreciative and supportive of the efforts and intent of the Fish and Wildlife Service. Nevertheless we have major concerns regarding proposals made in the Draft because we believe that they confiscate future rights of private landowners and are potentially harmful to reasonable interests of private landowners.

Very truly yours,

Julie Knagin

Julie Knagin, President
Afognak Native Corporation

JK:pjo,jec

AMNWRLTA.JEC

Bristol Bay Native Corporation
800 CORDOVA / P.O. BOX 100220 / ANCHORAGE, ALASKA 99510 / (907) 278-3602
TELECOPY (907) 276-3924

April 19, 1988

Regional Director
Attn: William Knauer
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Re: Alaska Maritime N.W.R.

Dear Mr. Knauer:

Bristol Bay Native Corporation (BBNC) has reviewed the Draft Plan for the Alaska Maritime National Wildlife Refuge and submit the following comments.

In reviewing the distance between scattered lands of the refuge, we recommend that portions of the refuge be added to other refuges, parks and national forests. Why place Seal Cape, which abutts the Peninsula National Wildlife Refuge, under a separate management plan? The same can be said for many of the islands, islets, rocks and headlands which are directly adjacent to existing nationally designated parks, refuges, and forests. Only the Aleutian Islands west of False Pass should be designated the Alaska Maritime National Wildlife Refuge and only those parts of the plan which address this area should be considered. Having a national wildlife refuge scattered over 4,000 miles is preposterous. 1

Many of the refuge lands have provided subsistence resources to the Native People of Alaska for many thousands of years. We do not wish to see this cultural lifestyle impacted unless there is documented evidence that the resources are jeopardized by subsistence harvests.

There are many islands in the refuge which are currently owned, partially owned or have pending applications thereon. We would hope that the Department would wait until ownership is determined before these lands are considered for wilderness designation. 2

The south Alaska Peninsula islands and mainland bays are ideally suited for mariculture. This activity should be designated as an allowable use in the management plan.

The large number of reindeer grazing on Hagemeister Island appears to be a problem that needs to be resolved. The Service should sit down with the owner, Jack Gosuk of Togiak, and come to some agreement as to what the maximum number of animals the island can support.

In closing, we reiterate that the lands are scattered over such a wide area that the management of some islands and headlands should be incorporated within the existing adjacent federal land management systems.

Sincerely,

William P. Johnson
Director, Land and Regional Affairs

Responses to Bristol Bay Native Corporation:

1. The plan proposes transfer of Seal Cape to the adjacent Alaska Peninsula National Wildlife Refuge. Several other transfers are proposed where the Service felt lands and resources could be more effectively managed as part of another refuge for administrative reasons or because the wildlife resources of the lands were not primarily oriented toward the marine environment.

2. No selected lands are included in the wilderness proposals evaluated in the plan.

Isanotski Corporation
False Pass, Alaska 99583
(907) 548-2217
Aleut Hunting Hat

27 May 88

Mr. Walter O. Stieglitz
Regional Director
U.S. Fish & Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

Attn: Wm. Knauer

Dear Mr. Stieglitz:

We have reviewed the Draft CCP/EIS/WR for the Alaska Maritime Refuge and have the following comments:

In volume one, page II-184, the map of Unimak Island should show the lands conveyed to the Isanotski Corporation as separate from refuge lands. In the Draft Summary, page 17, the same error occurs again. | 1

In the Draft Summary, fig. 30, pg. 187, there is a map classification error in designating "minimal management" to land already conveyed to the Isanotski Corporation (all those lands that lie south of False Pass Village). The same error is repeated in Figure 36, pg. 193. | 2

Lastly, the information concerning ANCSA Section 22 (g) lands found on pages III-15, 16 should be updated by consulting with the Alaska Federation of Natives/Section 22(g) Study Group so that the latest agreed upon language can be used. | 3

We appreciate the immense amount of work and time the Service has put into these documents and find the work to be generally very good. We will continue to support the work of the Service and will cooperate in all matters of joint concern.

Sincerely,

Charles R. Martinson
Land Manager

Former Name: False Pass Corporation

IX-61

Responses to Isanotski Corporation:

1. The mistake has been corrected.
2. The mistake has been corrected.
3. The language has been modified; however, no final language has been agreed upon.

JAMIN, EBELL, BOLGER & GENTRY
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
323 CAROLYN STREET
KODIAK, ALASKA 99615

FACSIMILE: (907) 486-6112
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REPLY TO KODIAK OFFICE

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JOEL H. BOLGER

March 3, 1988

David Olsen
Regional Director
U.S. Fish and Wildlife Service
1011 E. Tudor
Anchorage, Alaska 99503

Re: Comments on Draft Summary of the Alaska Maritime National Wildlife Refuge Comprehensive Plan as it pertains to Sitkalidak Island
Old Harbor Native Corporation

Dear Mr. Olsen:

IX-62

The Board of Directors of Old Harbor Native Corporation (Old Harbor) has requested that we write to you with their comments regarding the Draft Summary of the Alaska Maritime National Wildlife Refuge Comprehensive Plan as it pertains to Sitkalidak Island, located on the southeast side of Kodiak Island. The Draft Summary contains several errors on the status of the ownership of Sitkalidak as well as the proposed wilderness designation of 7,680 acres on that island.

First, Figure 23A on page 83 entitled "Land status in the Gulf of Alaska Unit as of November 1987" and the accompanying legend on page 82, indicates that the majority of Sitkalidak Island is native land selected (subsurface). This is incorrect. The areas so designated on Figure 23A of Sitkalidak Island are the selected and conveyed surface acreage of Old Harbor Native Corporation. This acreage was selected and conveyed pursuant to the Alaska Native Claims Settlement Act. 1

Second, Table 2, entitled "State and Native lands suitable* for wilderness designation in the Alaska Maritime Refuge continued" on page 121, indicates that the Fish and Wildlife Service has selected 7,680 acres of Sitkalidak Island for wilderness designation. On page 122, however, the definition of wilderness areas states: 2

> *In order to be considered suitable an area must meet the size criteria (an island with no private inholdings, an area over 5,000 acres, or a size manageable as

> wilderness) and have outstanding opportunities for solitude or primitive recreation.

As the majority of Sitkalidak Island is private inholdings and the federal government does not own any land on the island, it is difficult to understand the wilderness designation by the Maritime Refuge. Moreover, there is no follow-up comment in the Draft Summary explaining the designation. In fact, there is no comment regarding Sitkalidak Island in any form. As Old Harbor owns the conveyed lands on Sitkalidak, the Board of Directors is concerned with the statements in the Draft Summary and would appreciate clarification. 2

The Board also would like to take this opportunity to recommend the transfer of Sitkalidak Island from the Alaska Maritime National Wildlife Refuge (Maritime Refuge) to the Kodiak National Wildlife Refuge (Kodiak Refuge) if the proposed land exchange of Old Harbor's inholdings for subsurface acreage in the Arctic National Wildlife Refuge is approved.

The Kodiak Refuge encompasses about 1,866,000 acres on Kodiak, Uganik, Afognak and Ban islands in the Kodiak Archipelago. It was established to preserve the natural feeding and breeding grounds of the Kodiak brown bear and other wildlife. In 1971, pursuant to the Alaska Native Claims Settlement Act (ANCSA), 310,000 acres of the refuge were conveyed to several Native corporations on Kodiak. Congress expanded the Kodiak Refuge in 1980 when it enacted the Alaska National Interest Lands Conservation Act (ANILCA) with an additional 50,000 acres from Afognak and Ban islands. 3

ANILCA modified the boundaries of the Kodiak Refuge were modified to include all public lands on Afognak and adjacent Ban islands not conveyed to Native Corporations under ANCSA. The legislative history states:

> Such action will vest management and authority for federal lands in the Kodiak Island group and protection of the fish and wildlife resources in one agency.[1]

It was clear to Congress the need for the Archipelago to be managed as a single unit in order to protect wildlife in general and the brown bear in particular.

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[1]Legislative History, 96th Cong.. 2nd Sess. P.L. 96-487, 94 stat. 2389, section 301 (a)(9), pg. 5133. 1979.

Both the Maritime and the Kodiak Refuges have similar purposes and are managed in concert with each other to preserve wildlife and accompanying habitat. The primary difference between the two refuges is in the first paragraph of their stated purposes. The Kodiak Refuge's specific objective is the preservation of the Kodiak brown bear, the salmon upon which it feeds, and sea otters, which were hunted almost to extinction until the latter half of this century. The Maritime Refuge's function is to preserve marine mammals, and marine and migratory birds. Bear and caribou are mentioned, but the emphasis is on marine wildlife.

The board believes the resources Sitkalidak Island offers are attuned more closely to the purpose of the Kodiak Refuge than Maritime Refuge. It has been recognized that the majority of the Kodiak Archipelago is good or optimum brown bear habitat, reporting some of the highest concentrations of brown bear in North America.

Though the exact number of bears on Sitkalidak Island is not known, there is considerable bear feeding and denning habitat on the northwestern side of the island; and the Rolling Bay area has a high concentration of bears. An unusual phenomenon occurs each year when bears swim across the narrow Sitkalidak Strait from Sitkalidak to Kodiak Island. The bears swim from the Kodiak Refuge's boundaries in late summer to feed and den on Sitkalidak Island for the winter and swim back to Kodiak in the spring. The seasonal migration between the two islands not only provides a unique visual experience, but also furnishes insights into the brown bear's denning and migrating patterns.

The presence of silver salmon on Sitkalidak Island provide a late season source of food for the bears. There are ten major streams on Sitkalidak that support spawning populations of salmon, as well as many bays, inlets and small lakes. Of the five species of salmon, the three that are found on the island are pinks, silvers and chum. The U.S. Fish and Wildlife Service has not conducted catch and return surveys on these streams, and many of them have not even been named. The island's bays and streams are, however, popular fishing grounds with the local residents from Old Harbor who set up annual fishing camps.

Sitka black-tail deer were introduced on Kodiak Island in 1934 and now virtually occupy all suitable habitats in the region. Within Southwest Alaska, these deer are found only on the islands within the Kodiak Archipelago. The largest black-tail deer anywhere are found here and deer hunting is the leading recreational use of lands on Kodiak and Sitkalidak islands. Sitkalidak has a high concentration of deer and is a favorite hunting area. Because of their size and due to the fact that

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Boone and Crockett has added the Sitka black-tail deer to its trophy annals, hunting on these islands has dramatically increased. The deer are also a source of food for brown bears.

In addition to the marine birds found in the area, 13 raptor species are found in the Kodiak Archipelago. The federally listed bald eagle is the most common of the raptors and is found on Sitkalidak and some of the smaller islands in the Strait. The eagles ground nest on the island, and feeding and nesting habitats are found along the coastlines and major drainages.

It is clear that the resources on Sitkalidak Island mirror those on the Kodiak Refuge. It is a comparatively large island in the Kodiak Archipelago and its semi-mountainous topography, the presence of salmon streams, lakes and drainages is similar to Kodiak Island. Sitkalidak is only .5 kilometers from Kodiak Island at its closest point. This proximity is closer than Ban, Uganik or Afognak islands, all of which are partially or completely within the Kodiak Refuge.

More importantly, Sitkalidak supports a significant population of Kodiak brown bear. As you know, this subspecies is unique to the Kodiak Archipelago. Its status as a world class trophy attracts hunters from every part of the world. The focal point of the Kodiak Refuge is the preservation of this largest of land carnivores. The legislative history of ANILCA states the importance of identifying areas on Afognak Island, for later acquisition by the Department of the Interior, that represent:

> ....important habitat for the Kodiak brown bear - a subspecies of national significance whose perpetuation is of concern to all people.[2]

It is apparent the importance Congress placed on identifying and acquiring brown bear habitat. Sitkalidak Island is not only the site of brown bear feeding, but also denning. According to Jay Bellinger, Kodiak Refuge manager, preservation of denning areas is key to the survival of the Kodiak brown bear.

The Maritime Refuge's management emphasizes marine and migratory birds. ANILCA intended to consolidate all such habitat vital to marine wildlife species into a single refuge unit because management of these species is quite different from that required

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[2]Legislative History, 96th Cong.. 2nd Sess. P.L. 96-487, 94 stat. 2389, section 301 (a)(9), pg. 5134. 1979.

on a traditional mainland refuge[3]. It is true that birds nest and feed in large numbers on the small islands surrounding Sitkalidak and fly back and forth between the islands. Migratory birds and marine animals, however, also are encompassed in the stated Kodiak Refuge purposes and would receive the same protection currently given by the Maritime Refuge.

Moreover, the Kodiak Refuge headquarters is located on Kodiak Island, within easy access to Sitkalidak Island. The Maritime Refuge headquarters is located on mainland Alaska in Homer, many miles from Sitkalidak. Another objective of the Maritime Refuge is a comprehensive program of scientific research in order to achieve greater understanding of marine birds and mammals, their role in maintaining the marine ecosystems and man's impact on them.[4] If Sitkalidak were part of the Kodiak Refuge, biologists from the refuge headquarters would have convenient access to the island and their findings would reflect the ecosystem in its entirety, as Sitkalidak is greatly affected by the events and people on Kodiak Island. The Kodiak Refuge is actively involved in marine studies and that information would be available to the Maritime Refuge, or they could pursue their own research. Proximity alone to the Kodiak Refuge lends itself to greater access and research of wildlife habitats and the impact on them, both natural and those introduced by man.

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Both the Kodiak and the Maritime Refuges allow for subsistence use of the lands within the refuges. Sitkalidak Island is utilized for subsistence primarily by the residents of Old Harbor. Residents use Sitkalidak for bear and deer hunting and for their annual fishing camps. As the Kodiak Refuge headquarters is on Kodiak, it is more efficient for federal and state regulations concerning subsistence use to be enforced by the Kodiak management rather than personnel from the Maritime Refuge in Homer. This aspect is particularly appealing in light of the exchanges. The majority of the land contiguous to Sitkalidak Island would be under Kodiak Refuge management.

Clearly, Sitkalidak Island should be preserved and protected; and this is the objective of the land exchanges. It would be a valuable addition to the Kodiak Refuge. For such a relatively small area, it offers a wide variety of wildlife, many species of which are federally protected. From the standpoint of refuge management, however, it would be more appropriate to have

[3]Legislative History, 96th Cong.. 2nd Sess. P.L. 96-487, 94 stat. 2389, section 302 (a)(1), pg. 5120. 1979.

[4]Legislative History, 96th Cong.. 2nd Sess. P.L. 96-487, 94 stat. 2389, section 303 (1)(b). 1979.

Sitkalidak Island as part of the Kodiak Refuge for the purposes of access, monitoring, research, subsistence use, and law enforcement. The resources on Sitkalidak as well as the proximity of the island to Kodiak and the Kodiak headquarters logistically lend itself to the Kodiak Refuge as opposed to the Maritime Refuge. Most importantly, maximizing the protection of the Kodiak brown bear, Pacific salmon, marine mammals and migratory birds would be best met if Sitkalidak Island were redesignated under the management of the Kodiak National Wildlife Refuge.

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If you need additional information concerning this issue, please do not hesitate to contact me.

Best regards.

Sincerely yours,

JAMIN, EBELL, BOLGER & GENTRY
Attorneys for Old Harbor
Native Corporation

C. Walter Ebell

C. Walter Ebell

cc: Old Harbor Native Corporation

a:\04(D)M.011

Responses to Jamin, Ebell, Bolger and Gentry:

1. The Service acknowledges ownership of the majority of Sitkalidak Island by Old Harbor Native Corporation. In addition, approximately 7,680 acres are Native selected. Several maps were "washed out" through the process of reproducing the plan, distorting the mapped ownership patterns.

2. The meaning of Table 2 in the summary has been clarified in the final text. Table 2 shows which state and Native selected lands meet the Wilderness Act criteria. None of these areas are proposed for wilderness designation since they are selected and eventual ownership is uncertain. Should the selections be relinquished, those areas could be considered for wilderness designation. The 7,680 acres on Sitkalidak Island are Native selected lands which had not been conveyed at the time the draft plan was prepared.

3. The final plan will recommend transfer of Sitkalidak Island to Kodiak National Wildlife Refuge. The supporting information provided will be forwarded to those responsible for preparing the actual transfer proposal.

Koniag, Inc.

May 17, 1988

Mr. Walter Stieglitz
Regional Director
U.S. Fish & Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Re: Comments on Environmental Impact Statement of Comprehensive Conservation Plan for the Alaska Maritime National Wildlife Refuge

Dear Mr. Stieglitz:

Koniag submits the following comments on the Draft Environmental Impact Statement ("DEIS") of the Comprehensive Conservation Plan ("CCP") of the Alaska Maritime National Wildlife Refuge ("AMNWR").

I. TECHNICAL ERRORS.

A. Bear, Teck, Hogg and Murphy Islands Are Not Refuge Lands.

In numerous places throughout the DEIS, and its Summary, the Fish and Wildlife Service ("U.S.F.W.S.") states that Bear, Teck, Hogg and Murphy Islands, all located off the coast of Afognak Island, are federal lands and therefore a part of AMNWR. This is incorrect. Section 1427 of the Alaska National Interest Lands Conservation Act ("ANILCA") makes it clear that these islands are to be conveyed to the Afognak Joint Venture ("AJV"). A Decision of Interim Conveyance which includes these islands has been issued to the AJV by the BLM. An appeal of that Decision has been dismissed, and the matter remanded to the BLM to issue the conveyance immediately. Accordingly, the DEIS should be modified to make it clear that these islands are private Native lands, not federal lands, and they should be deleted from Table 2 of the Summary ("State and Native selected lands suitable for wilderness designation") and Table 48 of the DEIS ("Summary of 1

Anglo Energy Building • 4300 B Street, Suite 407 • Anchorage, Alaska 99503 • (907) 561-2668 • Telecopier: 562-5258

the wilderness proposal by alternative for the Gulf of Alaska Unit").[1]

B. Delphin and Discoverer Islands Should Not Be Considered for Wilderness Designation.

The Summary includes both Delphin and Discoverer Islands in its list of State and Native selected lands eligible for wilderness designation. (See Table 2.) As the U.S.F.W.S. is aware, however, Section 1427(m) of ANILCA grants to the Afognak Joint Venture timber harvesting rights on Delphin and Discoverer Islands. This is a mandatory conveyance on the part of the Department of the Interior, not merely a selection application which could be relinquished once a full land entitlement is obtained. Judicial decisions interpreting similar statutes have held that equitable title to the property passes upon enactment of the statute and fulfillment of any necessary preconditions. Under this theory, the AJV already has equitable title to the timber. Accordingly, Delphin and Discoverer Islands should be deleted from Table 2.

C. Both the Surface and the Subsurface Estate of Sitkalidak Island Are Private, Native Lands.

Figure 23(a) on page 83 of the Summary ("Land Status in the Gulf of Alaska Unit as of November 1987") indicates that only the subsurface estate of Sitkalidak Island has been selected by a Native corporation. As was pointed out in a March 3, 1988 letter to David Olsen, Regional Director, U.S.F.W.S., by C. Walter Ebell, attorney for Old Harbor Native Corporation, that is incorrect. Both the surface and the subsurface estate of Sitkalidak Island are in Native ownership; the surface has been conveyed to the Old Harbor Native Corporation, and the subsurface to Koniag, Inc. Accordingly, this island is also not suitable for wilderness designation, and should be eliminated from the tables suggesting the same.

[1] It should also be noted that the correct name of the entity to receive this conveyance is the Afognak Joint Venture, not the Afognak Natives Joint Venture, or any of the other names which the Joint Venture is called throughout the DEIS.

D. Ownership of Tidelands in Womens Bay.

The DEIS states that the tidelands, submerged lands, and water column in Womens Bay are all included in the AMNWR. In Koniag's view, this statement is incorrect.

Section 303(1) of ANILCA established the AMNWR. Subsection (v) states that the Gulf of Alaska unit includes:

> whatever submerged lands, if any, were retained in federal ownership at the time of statehood surrounding Kodiak and Afognak Islands and all other such public lands on islands, islets, rocks, reefs, spires and designated capes and headlands within the Gulf of Alaska . . . .

Only Congress can establish National Wildlife Refuges. In Section 303(1) of ANILCA, Congress included only the submerged lands in Womens Bay, and not the tidelands or the water column, in the Refuge. Accordingly, neither the tidelands nor the water column are part of the AMNWR, and the DEIS should be amended to so reflect.

A substantial portion of the tidelands are not part of the AMNWR for the additional reason that they are owned by Koniag. On August 7, 1980, Koniag received an Interim Conveyance (IC No. 352) to a tract of land encompassing a portion of U.S. Survey No. 2539. The land description and resulting acreage calculations are based on U.S. Survey No. 2539, which was performed prior to the 1964 earthquake. As a result of that earthquake, the lands at the head of Womens Bay subsided, and the mean high tide land rose. In accordance with the general rules of land law governing avulsion and reliction, the conveyance to Koniag was made on the basis of the pre-1964 survey boundaries. Consequently, those tidelands at the head of the Bay above the 1964 high tide line were conveyed to Koniag, Inc. and charged against its entitlement. Accordingly, these lands are private lands, not public lands, and consequently not included within the Refuge. (See ANILCA § 103(c) and § 303(1).)

E. The Water Column Surrounding Kodiak and Afognak Islands is Not Part of the Refuge.

The DEIS states that the water columns around Afognak Island, in Womens Bay, and from Walcott Reef to Sturgeon Lagoon in the Karluk area are all part of the Refuge. In Koniag's opinion, this conclusion is incorrect.

Section 303(1) indicates that the AMNWR consists of eleven previously existing refuges, together with:

> [a]pproximately four hundred and sixty thousand acres of additional public lands on islands, islets, rocks, reefs, spires and designated capes and headlands in the coastal areas and adjacent seas of Alaska, and an undetermined quantity of submerged lands, if any, retained in federal ownership at the time of statehood around Kodiak and Afognak Islands. . . . (See also § 303(1)(v).)

Nowhere does it indicate that the water columns surrounding Kodiak and Afognak Islands are to be included in the Refuge. Rather, it is clear that only land, i.e., islands, islets, rocks, pinnacles, and, in certain instances, submerged lands, are to be included in the Refuge. The legislative history of this provision confirms this intent. (See Senate Committee on Energy and Natural Resources, Alaska National Interest Lands, S. Rep. No. 413, 96th Cong. 1st Sess. at 176 (1979); House Committee on Interior and Insular Affairs, Alaska National Interest Lands Conservation Act of 1979, H.R. Rep. No. 97, 96th Cong. 1st Sess. at 179 (1979).)

Nor is the water column "public land," as that term is defined in ANILCA. Rather, Section 102 defines public lands as federal lands, which are lands, the title to which is in the United States after the date of enactment of ANILCA. The federal government, however, does not hold title to the water column of the ocean. The Ninth Circuit has made it clear that ocean waters are not public lands for purposes of ANILCA. See Angoon v. Hodel, 803 F.2d 1016, 1027-28, at n.6. Thus, it is only the federally owned submerged lands surrounding Kodiak and Afognak Islands that are part of the Refuge and not the water column.

F. Errors in Land Status Maps.

Koniag has reviewed the land status maps, but is unable to provide any meaningful comment on them because of their small scale. This is particularly true for the maps of the Womens Bay area. On those maps, it is exceedingly difficult to tell which lands fall within which management categories. Koniag suggests that for areas such as Womens Bay, the U.S.F.W.S. consider using a larger scale map.

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II. PROCEDURAL OBJECTIONS.

A. The U.S.F.W.S. Failed to Identify and Describe Requirements for Access as Required by Section 304(g)(2).

Section 304(g)(2) of ANILCA requires the Secretary, before developing a plan for each Refuge, to identify and describe the "present and potential requirements for access with respect to the Refuge, as provided for in Title XI" [of ANILCA]. The Refuge plan is to be based upon these findings (§ 304(g)(3)). Nowhere, however, in the DEIS, does it indicate that such requirements were in fact identified, or describe what the results of such identification were. As a Native Corporation whose access across Refuge lands is guaranteed by Section 1110(b) of ANILCA, Koniag has a strong interest in seeing that the U.S.F.W.S. correctly identifies the present and potential requirements for access, as required by this Section, and uses that information in the development of the CCP. Koniag further believes that the DEIS should include a description of the potential access needs determined by the U.S.F.W.S. in fulfillment of this statutory obligation.

8

B. U.S.F.W.S. Failed to Consult With Koniag and Other Native Corporations as Required by Section 304(g)(4).

Section 304(g)(4) of ANILCA requires the Secretary, in preparing each plan and any revisions thereto, to "consult with the appropriate State agencies and Native Corporations." This is in addition to the requirement to hold public hearings on the plan. It should be abundantly clear that the U.S.F.W.S. cannot possibly fulfill its obligations under Section 304(g)(2)(d) to identify and describe present and potential requirements for access under Title XI without consulting with the Native Corporations whose lands are effectively surrounded by the Refuge. No effort was made, however, by U.S.F.W.S., to consult with Koniag with respect to either its need for access, or any other matter involving the Refuge and the CCP.

9

Koniag and the Native villages and Village Corporations within its Region have lands which are surrounded by the AMNWR, and the needs of the Corporations and their shareholders could be profoundly impacted by the management decisions concerning the Refuge. For this reason, it is extremely important that the U.S.F.W.S. fulfill its obligations under Section 304(g)(4) and consult with all of the Native Corporations in the Koniag Region prior to finalizing the CCP. Consultation with KANA, while

important, is not a substitute for consultation with the Koniag and the Village Corporations. In addition, in the future, such consultation should occur prior to the preparation of a draft plan. 9

C. The DEIS Should Explain Why Particular Lands Were Classified to the Various Management Categories.

The DEIS describes the three management categories which the U.S.F.W.S. uses to classify all of the lands within the AMNWR. That classification, in some instances, differs among the various alternatives. Nowhere, in the Summary, however, and in only a few instances in the DEIS, does the U.S.F.W.S. give the reasons why a particular management category was chosen for a specific tract of land. For example, in Womens Bay, under Alternatives A and B, 560 acres are classified as intensive management along the shoreline where the military installations are located, and the remainder are designated as minimal management. The only discussion of this classification, however, states that permit sites would be monitored and contaminate sources and levels would be studied. The description of the Womens Bay environment notes that Womens Bay accommodates "a wide variety of industrial, military, commercial, recreational and subsistence use." The DEIS lacks any explanation as to why the U.S.F.W.S. determined to designate one of the few areas of the Refuge which is easily accessible and in which substantial commercial and industrial development is occurring as appropriate for minimal management. 10

Alternative C designates the same 560 acres as intensive management, but places 5,460 acres in the moderate management category, and 340 acres in the minimal management category. There is no explanation in the Summary at all, however, discussing this proposal.

The DEIS contains a more extensive discussion of Womens Bay, but again does not explain why the particular management categories were chosen, or how they relate to the ongoing activities in the Bay. In the discussion of Alternative A, it states the head of the Bay would be designated minimal management to protect the area. Alternative A, however, designates far more than simply the head of the Bay as minimal management; it designates all of the Bay except a narrow band along the shoreline of the military areas as minimal management. This statement should be corrected, and an explanation given of why the particular management categories were chosen for the various areas.

III. SUBSTANTIVE ISSUES.

In addition to the above technical and procedural problems, there are a number of substantive issues in the CCP and DEIS which give Koniag serious concern. These items are discussed below.

A. Title XI Access Rights.

As the U.S.F.W.S. is well aware, Title XI of ANILCA provides for various types of access across conservation system units. The majority of the sections establish a procedure for permitting transportation and utility system corridors. In addition, Section 1110(a) guarantees traditional forms of access, and Section 1110(b) guarantees the State and private landowners whose lands are within or effectively surrounded by one or more conservation system units adequate and feasible access for economic and other purposes. As discussed above, the U.S.F.W.S. did not perform the required consultation, identification, and description of present and potential access needs. In addition, we believe that the access rights of inholders guaranteed under Section 1110(b) are inadequately recognized in the DEIS and CCP, potentially leading to confusion and misunderstanding concerning the scope and nature of those rights. 11

Page 1 of the DEIS states that no use may be made of Refuge lands unless that use is determined to be compatible with the purposes of the Refuge. Under Section 1110(b), however, the U.S.F.W.S. is required to provide adequate and feasible access, even if such access is not compatible with the purposes of the Refuge. While the U.S.F.W.S. has the authority to issue reasonable regulations to protect Refuge lands, if the need for access and the needs of the Refuge conflict, the access, under Section 1110(b), takes precedent. The DEIS should be modified to correctly reflect inholder rights under Section 1110(b).

Koniag also believes that the interface between the planning process and the resulting CCP and Title XI of ANILCA should be more fully described in the DEIS. It does appear that the U.S.F.W.S. made some effort to define what might be some basic access needs, and to incorporate those into the Plan. Thus, docks, piers, and log transfer facilities are permitted under all levels of management, subject to provisions of Section 1110. It is unclear, however, whether the U.S.F.W.S. is attempting to interpret and apply Title XI of ANILCA, and has concluded that the only access which it will permit are docks, piers, and log transfer facilities, or whether it is indicating that all docks, piers, and log transfer facilities will be

permitted, subject to whatever limitations may be required by Title XI. To the extent the former interpretation is correct, Koniag believes that the U.S.F.W.S. has erred in its interpretation of Title XI. For private inholdings, any type of access which is needed in order for the owner to make economic use of his land must be permitted, and the U.S.F.W.S. cannot arbitrarily limit it to docks, piers, and log transfer facilities. If, on the other hand, the latter interpretation is correct, then the U.S.F.W.S. must, after consultation with the appropriate parties, identify what are the anticipated access needs of the inholders. 11

The provisions of the DEIS relating to transportation and utility systems are also confusing. In the Summary, Koniag did not find any discussion of Title XI transportation and utility systems. Table 3 of the Summary indicates that transmission lines/pipelines may be permitted on a site specific basis in areas of intensive management, and not permitted in the other management categories. Table 34 of the DEIS, however, qualifies the "not permitted" language with "subject to the provisions of ANILCA Title XI," and the text of the DEIS states that "[u]nder Title XI of ANILCA, transportation and utility systems could be constructed on or across refuges. . . . in all management categories under all alternatives." (DEIS at III-32.) At the very least, these inconsistencies should be corrected. 12

Equally important, however, Koniag believes both the Summary and the DEIS are misleading. Title XI governs the permitting of transportation and utility systems, and the same standards and procedures apply irrespective of the management category to which the affected lands may be assigned. Koniag recommends that both the Summary and the DEIS be rewritten to discuss the provisions of Title XI, and to make it clear that the procedures and rights contained therein are independent of the management categories to which various lands are classified in the CCP. 13

The DEIS and the CCP also do not identify the impact, if any, the various management classifications will have upon the U.S.F.W.S. consideration of special use permits other than pursuant to Title XI. This issue should be discussed. 14

B. The Womens Bay Land Should Be Reclassified to Intensive Management.

In Alternatives A and B, a small strip of tidelands, submerged lands, and water column surrounding the military installations in Womens Bay are classified as intensive management, and the remainder of the Bay denominated minimal management. In Alternative C, the same areas are designated

intensive management, the inner two-thirds of the Bay is designated minimal management, and the outer one-third, along with the submerged lands and water of Chiniak Bay to the Refuge boundary, is delineated moderate management. Koniag objects to all the alternatives on the grounds that the land classifications are contrary to the findings in the DEIS concerning present and future use of Womens Bay, and unnecessarily infringe upon the rights of commercial users of the Bay and the owners of the adjacent land. In Koniag's view, the entire area should be classified for intensive management.

The DEIS states that lands "that have a potential public or economic use and require intensive management effort" should be included in the intensive management category. Womens Bay clearly meets these criteria. As the DEIS states, Womens Bay "accommodates a wide variety of industrial, military, commercial, recreational and subsistence use. . . ." (Summary at 113). The Coast Guard owns all of the land on Nyman Point, as well as other areas, and has constructed housing, airstrips, piers, and boat ramps. The area is used for docking of large ships. There are also several deep water military dumping grounds.

Koniag owns land bordering upon the western shoreline of Womens Bay, commencing at the Lash Dock site on the north, and extending around the head of the Bay, including, as discussed above, a substantial portion of the tidelands, up to and including Bruhn Point. Koniag also owns the land on Cliff Point. Koniag is considering various development proposals for Shannon Point. The area has been zoned industrial, and several commercial ventures are being considered. Koniag is also proposing subdivisions for Bruhn Point and Cliff Point and is considering the feasibility of developing a small boat harbor in the Frye Point area.

Commercial activity is also occurring at the Lash Dock on the northwest side of the Bay, a privately-owned site, as well as at Gibson Cove, where the City of Kodiak has a seafood by-products reprocessing plant. Numerous seafood processing plants also operate in the Bay.

Recreational and subsistence activities occur at the head of the Bay, primarily on lands owned by Koniag.

The Womens Bay lands which are owned by the federal government and included in the AMNWR are not particularly valuable wildlife habitat. In the Summary, Womens Bay is only mentioned once in the entire description of valuable habitats for wildlife species within the Refuge; it is listed, along with a number of other areas, as having "suitable habitat" for shore

birds. While the DEIS notes that the wetlands and tide flats at the head of the Bay serve as staging areas for waterfowl and shorebirds (DEIS at IV 134), the overwhelming majority of that area is owned by Koniag, and consequently is not a part of the Refuge.

The management categories selected for Womens Bay are not compatible with either the existing or the future needs for the Bay or the resources existing within it. As discussed above, significant commercial activities are occurring outside of the area designated intensive management already, and more will occur in the future. Koniag notes that the U.S.F.W.S. has specifically included all military establishments in intensive management areas but excluded all private, commercial development. This discrimination against private enterprise in favor of the government is an inappropriate management approach. At a very minimum, all areas of the Bay in which commercial development is occurring or which abut privately owned land should be designated intensive management.

Under all alternatives, with the exception of the small strips of intensive management, the inner two-thirds of the Bay is designated minimal management. The purpose of this designation is supposedly to protect Refuge habitat at the head of the Bay. Since this land belongs to Koniag rather than the federal government, however, there is no Refuge habitat to protect, and consequently no basis for designating the area as minimal management.

Even if the land were in federal ownership, the area designated minimal management under all of the alternatives encompasses a substantially greater area than the head of the Bay, which Koniag understands to be the area between just west of Bruhn Point northwest to a point just south of Frye Point. Moreover, if the goal of the U.S.F.W.S. is truly to protect the area, then intensive management, rather than minimal management, would be the appropriate management category, in order for the agency to have the authority and flexibility to respond to the heavy public use of the area projected in the DEIS.

The designation of the outer portions of the Bay as moderate management also does not fit with the goals of that management category. The purpose of a moderate management designation is to reduce the extent of public use while maintaining and restoring fish and wildlife populations in areas that receive public pressure. There is no evidence in the DEIS that the area designated as moderate management in Alternative C is in an area that is receiving too much public pressure, or that the

U.S.F.W.S. feels that public use should be restricted. Accordingly, this designation is inappropriate.

In light of the substantial industrial development and public use already occurring in the Womens Bay area, and the close proximity of this area to the City of Kodiak, Koniag believes that the entire area should be designated intensive management. It is clear from the legislative history of ANILCA that the primary reason this area was included in the AMNWR was because it was still federally owned at the time the Act passed by virtue of the Coast Guard withdrawal, and not because it included any outstanding wildlife habitat. The area has been, and will continue to be, an important commercial and industrial area for the City of Kodiak. It was not the intent of ANILCA to change that by including it in the Refuge. Koniag certainly has no objection to continued use of the area for recreation and other types of activities which typically occur within wildlife refuges. But it strenuously objects to efforts by the U.S.F.W.S. to turn this area into something it is not -- an area dedicated to fish and wildlife resources to the exclusion of all other activities. Koniag believes that military use, commercial development, recreation, and other fish and wildlife resource and habitat activities can co-exist in Womens Bay. But in order to do so, the area must be designated intensive management.

As an inholder, Koniag has the same access rights across the AMNWR pursuant to § 1110(b) irrespective of the management category ultimately selected by U.S.F.W.S. However, Koniag believes that designation of the entire Bay as intensive management will go a long way to resolving inconsistent expectations for this area, and consolidate within small areas of the Refuge commercial development. Increased development in this area would have positive socio-economic affects for the Kodiak area, which should be noted in the DEIS.

Ample areas of the Refuge exist which are suitable for minimal management designation. Womens Bay is not such an area. An unbiased application of the management criteria to the circumstances of Womens Bay leaves no choice but to designate all of Womens Bay as intensive management. The alternatives should be revised accordingly.

C. Afognak Island.

As the U.S.F.W.S. is aware, all of the land on Afognak Island, with the exception of certain lands in the northwest corner which are part of the Kodiak National Wildlife Refuge, is privately owned by various Native Corporations. There are also several hunting lodges and similar types of development on the

Island. The primary activity which will occur on Afognak Island is timber harvesting. There will also be use of the Island for hunting, fishing, and recreation. Of the three alternatives proposed by the U.S.F.W.S., Koniag prefers Alternative C. However, Koniag recommends that all the Alternatives be modified to designate all of the area intensive management except that adjacent to the Kodiak Wildlife Refuge.

Koniag notes that the DEIS indicates that a third log transfer facility may be built on the northern end of Afognak Island. The DEIS suggests that comprehensive planning for siting log transfer facilities on Afognak Island should receive priority in order to reduce the number of facilities necessary. This suggestion is not well taken for a number of reasons. First, it is based upon the erroneous assumption that the private landowners on Afognak Island will waste their money to build unnecessary log transfer facilities unless guided by the planning efforts of the U.S.F.W.S. Inasmuch as the Native landowners on Afognak Island have considerable expertise in timber management, and the U.S.F.W.S. has none, this assumption is wrong. Nor would such planning serve any purpose. The private owners are entitled to adequate, economically feasible access under Section 1110(b), and their specific requests for access must be evaluated on their merits and approved unless certain specific findings are made. Thus, the fact that a U.S.F.W.S. plan might designate a particular site for a log transfer facility is irrelevant for Section 1110(b) purposes if that location does not meet the access needs of the landowner. 15

Other factors also suggest that such a planning effort would not be worthwhile. As indicated above, the U.S.F.W.S. has no expertise in this area, and would need to hire consultants to assist it. Koniag suggests that there are more worthwhile uses for limited funds available to the Refuge. In addition, timber management is very dependent upon market conditions, which can and do fluctuate substantially. Thus, what might be a realistic plan at the time it was written could become quickly obsolete. For these reasons, Koniag believes the U.S.F.W.S. should not make such a planning effort a high priority.

In the DEIS, there is a discussion of the potential impacts of logging and log transfer facilities on Refuge lands and waters. Koniag questions the relevancy of this discussion, as the U.S.F.W.S. has no authority to control off-Refuge activities. Accordingly, Koniag suggests that it be deleted in its entirety. 16

Koniag also notes that a number of statements in the discussion are not reflective of the likely result of logging on 17

Afognak Island. For example, on page II-94, the DEIS states that "logging on shores directly above the water that belong to the Refuge could also alter it through deposition of wood waste or sediment, such a project is proposed near Whale Pass on Afognak Island." The first half of this statement is certainly true in the abstract. However, there is a continuing deposition of wood waste and sediment into the waters surrounding Afognak Island through natural processes. The question, therefore, is whether logging will result in increases in such depositions, and, if so, whether such increases will be significant from a resource point of view. Koniag is unaware of any basis for the U.S.F.W.S. to conclude that the logging operation proposed for Afognak Island is likely to cause a detectable alteration of the water quality of the adjoining ocean waters. 17

The Summary also states that there is an increased threat of fire during logging activities because of the accumulated woody debris and increased presence of people and machinery. This is undoubtedly a true statement. It also states that forest fires can lead to widespread sedimentation of nearby waters, again a correct statement. What the DEIS does not state, however, is that the danger of fire on Afognak Island is extremely low due to the climate. Thus, the probability of adverse impact to the Refuge as a result of a fire caused by logging operations is low. This point should be made in order that the DEIS is not misleading. 18

The DEIS states that wood and bark leachates have been found to be toxic to shrimp, crabs and certain life stages of salmonoids. (DEIS at IV-139.) These studies, however, were laboratory tests, using extremely high concentrations of wood and bark leachates. To Koniag's knowledge, evidence of such toxicity in the natural environment has never been documented. The discussion should so note. 19

The DEIS also states that log bundles may ground at low tides, causing possible adverse impacts. It has been many years, however, since any log transfer facility which allows logs to ground has been designed or permitted in this State. Grounding logs is not only harmful to the marine environment, but also to the logs, and consequently is a practice which has been avoided for a number of years. Accordingly, the statement should be deleted. 20

In general, the comments on log transfer facilities in the DEIS are outdated in light of current practices within the State of Alaska. While it is true that a number of years ago, the operational procedures used in a number of instances did result in substantial accumulations of wood waste on the 21

submerged lands. Under the regulatory framework existing in Alaska for the past decade, however, those procedures are no longer allowed, and accumulations of the type described in the DEIS are simply not found. Indeed, Koniag believes that the use of the word "log dump" by the U.S.F.W.S. perpetuates the image of the old style operation. Today's log transfer facilities, as they are referred to in the industry, are far different from the old "log dumps." Koniag believes that the phrase "log transfer facility" should be substituted in the DEIS for the phrase "log dump" to avoid any association with former practices and prejudicial feelings associated therewith and that the U.S.F.W.S. should revise its description of log transfer facilities to reflect the types of operations, and the impacts associated therewith, which are in use today. 21

Finally, the DEIS states that the effects of log transfer facilities can be minimized by restricting them to areas which disperse the debris from the logs. The U.S.F.W.S.'s policy with respect to the one log transfer facility which it has recently permitted, however, was to prohibit dispersion of the debris to the maximum extent possible, and to contain it within a relatively small area. Thus the philosophy stated in the DEIS is directly contradictory to that actuality employed by the U.S.F.W.S. in permitting log transfer facilities, and should be corrected. 22

D. Karluk Area.

The Summary states the beach in the Karluk area below the 200 foot contour would be designated off road vehicle areas. (Summary at 161.) It does not state whether or not the 200 foot contour is above or below the mean high water line, but presumably it is above. As the U.S.F.W.S. should be aware, Koniag is the owner of all of the land above the mean high tide line. It has not given its consent to public use of off-the-road vehicles in the area. Therefore, the Service should insure that all of the area below the 200 foot contour is in fact owned by the federal government and within the Refuge. It should also make it clear that all lands above the mean high tide line are owned by Koniag, and are open to the public only to the extent and upon such terms and conditions as the Corporation determines. 23

Koniag objects to the minimal management designation for the Karluk offshore strip. Both Karluk and Sturgeon Lagoons either now have, or are likely to have, some degree of development around them. Karluk Lagoon especially, because of its village location is, and has long been, used by all manner of small boats, fuel barges, etc. Consequently, Koniag strongly

believes that intensive management is the proper designation for the area.

IV. CONCLUSION.

Koniag concurs with the U.S.F.W.S. that Alternative C is the preferred alternative. However, Koniag believes that it should be modified to include all of Womens Bay and the area adjacent to privately owned lands on Afognak Island in the intensive management category. Koniag also requests that the DEIS be corrected in the manner outlined in this letter.

If you have any questions on any of the comments made by Koniag, please do not hesitate to contact us.

Sincerely,

KONIAG, INC.

John Merrick

John Merrick

cc: Afognak Joint Venture
Koniag Village Corporation Presidents
Kodiak Island Borough
City of Kodiak
Koncor
KANA
Brechan Enterprises
Lash Corporation
U.S. Coast Guard - Kodiak Base Commander

Responses to Koniag, Inc.:

1. The referenced islands were conveyed to the Afognak Joint Venture on June 24, 1988; subsurface rights were conveyed to Koniag.

2. Inclusion of Delphin and Discoverer islands in Table 2 of the draft Summary was a mistake which has been corrected. Elsewhere in the plan, most importantly in Table 6 of the draft Summary and the corresponding table in the draft plan, they were correctly listed as intensive management in all alternatives.

3. When the draft plan was published, approximately 7,680 acres on Sitkalidak Island were Native selected according to Service land status records. Unfortunately, this map was "washed out" during the printing process, distorting the mapped ownership patterns. Table 7 of the draft notes that this area would be suitable for wilderness designation if the selection was relinquished. This area was not proposed for wilderness designation in any of the management alternatives (see page III-53, Volume II, of the draft).

4. The name has been corrected.

5. Based on U.S. Survey 2539, dated 8/20/41 and resurveyed and subdivided on 8/10/82, the lands described by Koniag are within this survey. When the Bureau of Land Management issued Interim Conveyance 352 to Koniag on 8/7/80, the legal boundary of this particular tract of land was described in metes and bounds as being up to mean high tide. As a result of the 1964 earthquake, a portion of the interim conveyance described lands are now submerged. Once the interim conveyance has been surveyed, the acreage calculations will be adjusted according to the entitlement. Until the interim conveyance is surveyed, especially the meander corners along the shoreline, the legal boundary will continue to be recognized as the mean high tide mark.

6. The Service believes the referenced marine areas are within the refuge based on the 1892 Presidential Proclamation (and considering the language and purpose of the reserve), Public Land Orders 1182 and 1634, and Public Laws 92-203 and 96-487.

7. The map of Womens Bay has been revised.

8. Anticipated access requirements are described in the scenarios for each alternative in the environmental consequences chapter of the plan.

9. The Service solicited comments at several points during the planning process. Koniag, Inc. was first contacted about the Alaska Maritime plan by the Service with a letter dated December 20, 1985. In January 1987, Koniag, Inc. sent a letter (dated January 5, 1986) to the Regional Director commenting on the preliminary management alternatives as described in the October 1986 issue of the Plan-it. Information received from Koniag, Inc. was considered in preparing the draft plan. Other Native corporations had similar opportunities to participate in the planning process, and the Service received letters from many of them. All comments were considered in preparing the draft plan.

10. Additional text has been added to the full plan to explain management category designations. Unfortunately, size constraints prohibit inclusion of much discussion in the Summary.

11. Access rights granted by Title XI of the Alaska Lands Act are discussed in the section on common management directions, referenced in the tables depicting activities permitted in the various management categories, and noted in the text where relevant. The Service agrees with Koniag, Inc. that more detailed information on future access needs would be desirable; however, the Service feels this would be more appropriate as part of step-down plans specific to the Afognak and Womens Bay areas.

12. The inconsistencies have been corrected.

13. Section 1103 of the Alaska Lands Act notes that, "Except as specifically provided in this title, applicable law shall apply with respect to the authorization and administration of transportation and utility systems."

14. Special use permits are discussed in several places in the section on common management directions. In general, special use permits are required for commercial activities in refuges, pursuant to provisions of the Refuge Administration Act and Service policy.

15. The proposed step-down planning effort is needed to address cummulative impacts as required by the National Environmental Policy Act. The step-down plan would not affect Title XI access rights.

16. The Service has legal oversight authority under a number of federal laws. Also, maintenance of water quality and quantity within the refuge is a specific purpose of the refuge as described in section 303 of the Alaska Lands Act.

17. In a study of 32 inactive log transfer sites, Schultz and Berg (1976) found bark coverage ranging from a trace to nine acres; 78% of the sites had deposits of up to four acres. A more recent study conducted at 13 transfer sites found bark deposition ranging from 0 to 6.8 acres with a mean coverage of 2.9 acres (Freese 1987). Bark deposits remaining off log transfer facilities decompose slowly and would impact annual production of the marine biota for numerous years. This issue was significant enough to require formation of a Governor's task force which developed guidelines for siting, construction, operation and monitoring of log transfer facilities.

18. The text has been clarified.

19. No problems from leachates have ever occurred in other than wholly quiescent conditions (Cuccarese et al. 1987). This environment would not exist at proposed log transfer facilities. This statement has been corrected.

20. At the request of the various federal and state resource management agencies, Corps of Engineers permits issued today routinely stipulate that log bundles shall not ground.

21. A survey of log transfer facilities conducted over a decade ago (Schultz and Berg 1976) showed a mean bark coverage of 3.3 acres. The mean bark coverage of transfer facilities in operation in the last decade was 2.9 acres among four sites surveyed by Freese (1987). The Service is unaware of additional data that would change the conclusions in the environmental consequences section.

    Log transfer facility is the term used in recent years; the Service has no preference as to terminology.

22. The Service prefers locating log transfer facilities in areas where bark debris can be dispersed to depths beyond the photic zone. However, after long discussions with the Afognak Native Corporation, the Service accepted the applicant's conclusion that there were no feasible sites that met this criterion. The applicant was permitted to develop the site, with a number of mitigation requirements, because of Title XI access requirements.

23. The Summary states that "The beach in the Karluk area (Wolcott Reef to Sturgeon Lagoon) and Harvester Island below the 200 foot contour would be designated off-road vehicles areas." (emphasis added)

Alaska Oil and Gas Association

121 W. Fireweed Lane, Suite 207
Anchorage, Alaska 99503-2035
(907) 272-1481

May 16, 1988

Mr. William Knauer
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Alaska Maritime National Wildlife Refuge

Dear Mr. Knauer:

The Alaska Oil and Gas Association is a trade association whose member companies account for the majority of oil and gas exploration, production and transportation activities in Alaska. AOGA appreciates this opportunity to comment on the Draft Environmental Impact Statement and Comprehensive Conservation Plan for the Alaska maritime National Wildlife Refuge (AMNWR).

AOGA previously provided comments on the AMNWR plan during the scoping/management alternatives phase. We continue to urge the USFWS to include moderate or intensive management categories for lands potentially needed for the future siting of energy facilities. It is vitally important to state and national interests that onshore lands are available to develop nearby offshore state lands and OCS basins. Onshore installations could include facilities for hydrocarbon gathering, treatment, storage and transportation.

The description and location of potential onshore facilities needed for OCS development are discussed in scenarios found in the federal lease sale environmental impact statements prepared by the Minerals Management Service. AOGA member companies have conducted individual studies to identify suitable sites and routes which will be required to develop the oil and gas resources of the Bering Sea region. Information from these efforts should be considered in designating moderate or intensive management categories for lands needed for energy facility siting.

Thank you for this opportunity to comment.

Sincerely,

WILLIAM W. HOPKINS
Executive Director

WWH:tp13:1339

IX-74

EXXON COMPANY, U.S.A.

P.O. BOX 196601 • ANCHORAGE, ALASKA 99519-6601 • (907) 561-5331

DONALD E. CORNETT
ALASKA COORDINATOR

April 26, 1988

Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

Attention: Mr. William W. Knauer

Dear Mr. Knauer:

In response to the public notice issued by Federal Register on February 12, 1988, Exxon submits the following comments on the draft environmental impact statement for the proposed Comprehensive Conservation Plan and Wilderness Review for the Alaska Maritime National Wildlife Refuge (AMNWR). We appreciate the opportunity to comment.

Exxon submitted comments on the plan during the scoping process addressing our concerns with land use designations in the plan which could affect the future siting of energy facilities. Our earlier comments contained information and maps of lands on Akun and Unalaska Islands identified as potential sites or routes for OCS oil and gas development to be considered in the AMNWR plan.

We are encouraged and pleased that the plan does not recommend for Congressional approval further wilderness designation for Akun or Unalaska Islands. However, we urge that the plan establish Intensive Management designation for lands along possible pipeline corridors and onshore terminal sites located on Akun and Unalaska Islands. For your reference, we have enclosed maps identifying those areas.

In addition, we have the following specific comments on the plan:

Page II-92

The first scenario would not increase oil spill risk since TAPS is currently operating at maximum capacity. Future developments onshore on the North Slope, in state waters along the North Slope, and in the Beaufort Sea, Chukchi Sea, Hope Basin Planning Areas realistically could not increase TAPS throughput significantly beyond its current rate. 1

Page II-92

The second scenario should not rule out the possibility of requiring a transshipment terminal for the Chukchi Sea, Hope Basin, St. Matthew Hall, Aleutian Basin, and Bowers Basin planning areas. For the Chukchi Sea and 2

Hope Basin planning areas, marine transportation could potentially be required in place of offshore pipelines to TAPS. Further, this scenario inappropriately implies that the transshipment terminal could only be located on the Alaska Peninsula. Exxon's terminal screening survey recommended for further consideration sites on Unalaska and Akun Islands in addition to several sites on the Alaska Peninsula. Lastly, this scenario inappropriately concludes that offshore loading would likely occur at the point of production. It is clearly premature at this time to rule out scenarios that have pipelines going from the production facility to a centralized terminal. 2

Thank you for this opportunity to comment.

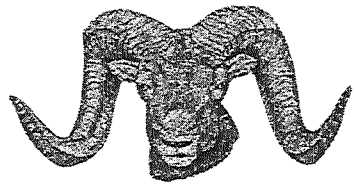
Sincerely,

EES/sjm/170

Responses to Exxon:

1. The scenario has been changed.

2. The scenarios have been modified.



FOUNDATION OF BIOLOGIC RESEARCH

PRIVATE INTERNATIONAL INSTITUTION

P.O. Box 32-505
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22/III/88

PSS/PL 1576C

In reply refer to: C(026)88

MR. W. KNAUER
Regional Director
U.S. Fish and Wildlife Service
Anchorage, Alaska

Dear Mr. Knauer:

After the revision of the Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review for the Alaska Maritime National Wildlife Refuge, I belive that the selection of Alternative C for the management of the Refuge would be a correct choice but not the better one.

This alternative only recommend for wilderness designation 3% of the non-wilderness refuge lands, while Alternative B recommend for wilderness 6% of this same lands. In the future will be very important that all lands that qualifies must be protected under the Wilderness Preservation System; we recommend that Alternative B must be selected for managing the Alaska Maritime N.W.R.

Sincerely

F.J. Pechir Ph. D.
President

FJP'as
P.S. One more copy will be send to you.

ALL RIGHTS RESERVED

HOMER SOCIETY OF NATURAL HISTORY
PRATT MUSEUM
3779 Bartlett Street
Homer, Alaska 99603
(907) 235-8635

May 17, 1988

William Knauer, Regional Director
Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

SUBJECT: COMPREHENSIVE CONSERVATION PLAN,
ENVIRONMENTAL IMPACT STATEMENT, WILDERNESS REVIEW

Dear Mr. Knauer,

The Homer Society of Natural History would like to respond to the Alaska Maritime National Wildlife Refuge's request for public comment on the Summary of the Draft Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review dated February 1988. Specifically we are responding to the plan to construct a visitor/interpretive center as part of the proposed headquarters in Homer, Alaska. All three alternatives propose approximately $10,000,000 for this complex.

We propose that the Refuge consider directing a portion of this $10 million to the Society to enable the completion of the Pratt Museum's facility master plan. This grass roots accredited educational institution already exists to provide interpretive public services on the region's natural and cultural history. The Society, nonprofit and publicly funded, has spent over $1.3 million on this plan since 1984 - more than $450,000 of which has been Federal monies. The master plan, 1/3 complete at this time, includes a major expansion of the marine aquarium system as well as additional interpretive exhibitions on coastal species, habitat, and culture. 1

The Society supports the Refuge's plan to establish a more permanent base and to improve support facilities in Homer. The Pratt Museum has had the pleasure and good fortune to work with Refuge biologists in the development of some of its public exhibitions, interpretative programs, and marine mammal retrieval activities. The presence of Refuge headquarters in Homer and the expertise of their staff has enabled the museum to improve its marine educational programs and update its collections of marine mammals and sea birds. The museum's small aquarium system has likewise benefitted as Refuge biologists periodically collect live specimens for this popular public exhibit.

In the interest of saving tax dollars and supporting an existing, community based facility, the Society is asking Refuge planners to consider collaborating with the museum on developing future interpretive exhibitions in areas where their respective missions overlap. In a community the size of

Homer, it is critical that organizations with similar purposes work together because of limited community resources. We are proposing two areas of potential collaboration.

1. public education in general, including current issues as they effect the health of the oceans and likewise the Refuge, and,
2. construction of a public aquarium with provisions for research work.

Construction, operation, and on-going maintenance of a large aquarium system is very costly. Such a specialized tax-supported facility need only be constructed once in a community the size of Homer. To date, the marine portion of the expansion is only on paper, but underground utilities have already been put in place during our recently completed first phase.

We propose that the Refuge assist the Society in completing its public gallery and aquarium and in turn the Society would continue to develop and carry out interpretive programs on the marine environment. Our current plan could be modified to provide more research/laboratory facilities for Refuge needs. There is suitable land adjacent to the museum to accommodate a dual purpose aquarium system as well as Refuge headquarters.

The challenges currently facing the public on marine issues are vast and many. Problems will only be addressed through increases in public education and awareness. The drastic decline of the Stellar sea lion and certain marine birds are examples of such challenges that loom ahead. Collaboration between suitable entities can be an effective way of focusing tax dollars. A private-public sector collaboration has many benefits and is on the leading edge of innovation in these days of limited tax dollars for both education and research. With the Society providing the educational services, Refuge dollars could better focus on critical research, technical support, and enforcement for the preservation of the vast Refuge resources as well as the entire marine ecosystem.

We hope you will consider our perspective. On behalf of the Board of Directors, I thank you for the opportunity for input.

Sincerely,

Betsy Pitzman

Betsy Pitzman
Museum Director

cc: Senator Ted Stevens
Senator Frank Murkowski
John Martin, Refuge Manager, Homer

Response to Homer Society of Natural History:

1. When the Service builds a visitor center/headquarters complex in Homer it will work with the Pratt Museum as well as agencies and organizations such as State Parks, National Park Service, Homer Chamber of Commerce, and others. The Service would hope to develop a facility that would provide multi-agency use for the community and benefit existing organizations.

KODIAK AUDUBON SOCIETY
P.O. BOX 1756
Kodiak, Alaska 99615

May 16, 1988

Regional Director
Attn: William Knauer
U.S. Fish & Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Dear Mr. Knauer:

The members of the Kodiak Chapter of the National Audubon Society welcome the opportunity to comment on the draft CCP for the Alaska Maritime National Wildlife Refuge. This letter will reinforce our comments made in earlier public hearings and written statements. They are basically concerned with the islands and submerged lands in the Gulf of Alaska unit.

Kodiak Aubudon would like to see Alternative B implemented as the Preferred Plan for the refuge.

Section 1317(a) of the Alaska National Interest Lands Conservation Act of 1980 states that all lands not designated as wilderness (by ANILCA) shall be reviewed as to their suitability or unsuitability for preservation as wilderness. Therefore, we strongly urge the inclusion of native-selected lands within the Alaska Maritine National Wildlife Refuge in the wilderness recommendation. Since many of these lands are over-selections which will remain in federal ownership, their wilderness potential should be determined. 1

The Barren Islands support over one-half million breeding sea birds which mandates a high level of protection. Therefore, we strongly recommend that all of the Barren Islands be designated wilderness, as proposed in Alternatives B and C.

Alternative B recommends that the following islets in Womens Bay be designated wilderness: Mary, Blodgett, Cliff, Ziamka, Puffin and Viesoki. These islands support breeding colonies and concentrations of tufted and horned puffins, red faced cormorants, common eider, black oystercatchers, pigeon guillinots, Aleutian terns, pelagic cormorants, glacous winged and mew gulls, red-breasted mergansers, and song sparrows. We would like to see these islands designated wilderness in Alternative C as well as Alternative B.

It is recommended that the nearshore areas in the vicinity of the Buskin River be placed in a management category which does not allow fill or other types of development. The Buskin is the most heavily used sportfishing stream on Kodiak Island. Nearshore waters in its vicinity are favored by commercial, subsistence, and sport fishermen.

Tidelands and water areas at the head of Womens Bay are used by a wide variety of waterfowl and shorebirds. Up to 200 emperor geese and some Brant and white-fronted geese utilize the Womens Bay shoreline. Waterfowl hunters and bird watchers make use of this area. Upland areas adjacent to the head of Womens Bay support colonies of both Arctic and Aleutian terns. Over 1,000 diving ducks usually inhabit this area. Sedge marsh habitats that are quite rare on Kodiak Island are found at the head of Womens Bay.

It is our opinion that Tugidak Island should be identified for land trades or acquisition. Tugidak has extremely high resource values including the largest colony of harbor seals in the world, and excellent waterfowl nesting habitat. Up to 1,500 emperor geese have been observed in the Tugidak Island lagoon. It is one of the largest islands in the State of Alaska in which virtually no cattle or fox introductions have taken place.

We concur in the recommendation in the preferred alternative to name the waters around Afognak Island adjacent to the Kodiak National Wildlife Refuge as part of the minimal management designation.

And finally, we would like to see log transfer facilities and pier and bulkhead facilities disallowed under the wilderness and minimal management designations in this plan.

Thank you for your serious consideration of our comments and concerns.

Barbara Rudio

Barbara Rudio
Conservation Chairman
Kodiak Audubon Society

Response to Kodiak Audubon Society:

1. Service policy is to not make wilderness recommendations on areas for which we do not have clear title such as the Native and state selected lands. Should these selections be relinquished management of these areas would be reevaluated and wilderness designation could be considered. The Service acknowledges in the Wilderness Review section of the Affected Environment Overview that overselections are common and that 80 percent of refuge lands which meet the Wilderness Act criteria for wilderness designation have been selected. However, these areas were evaluated and found to have wilderness characteristics as shown in Table 7.

KFP
Koncor Forest Products Company
3501 Denali, Suite 202
Anchorage, Alaska 99503
(907) 562-3335 FAX (907) 562-0593

April 27, 1988

United States Department of the Interior
Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Attn: William Knauer

Dear Mr. Knauer:

Koncor Forest Products Company would like to comment on the Summary of the Draft Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review for the Alaska Maritime National Wildlife Refuge, Alaska. Koncor Forest Products is one of the major timber owners and managers on Afognak Island, and has timber on the Kenai Peninsula near Seldovia and Port Graham, and throughout Prince William Sound. The draft plan impacts all of these areas but has the most dramatic impact on Afognak Island.

The Maritime Refuge surrounds Afognak Island and makes egress from those lands impossible without impacting the refuge in some fashion. The maps given on pages 87 and 89 do not show the existing land ownership patterns that have existed for the past ten years. Most of Afognak Island and much of the Kenai Peninsula is in private, Native corporation ownership. The ownership patterns are broken up and do not form contiguous, "block-type" holdings. The Native corporations are guaranteed access to their lands and cannot have their rights taken away through this plan. Your alternatives limit the opportunity to develop the lands that were given to the Native corporations. 1 2

Specifically, on page 161 the draft plan limits the number of log transfer facilities to three on Afognak Island. Given the ownership pattern, the Interior Department cannot limit the number of facilities and be consistent with present and future needs of the upland owners. Why would the plan even address the number of facilities? As the need arises, plans and permits by the upland owner will be submitted according to state and federal permitting guidelines. All environmental concerns regarding the column of water which is the Afognak Maritime Refuge will be addressed. Beyond this, the draft plan has no right to step. 3

On page 26, the public comments are Pro-logging but only if it benefits wildlife. This is fine for logging on lands owned by the Department of the Interior but cannot be taken as an excuse for the attempted management of lands not owned by the government. Native corporations have the right to manage their lands in a manner they choose. On page 103, the plan addresses how logging could create roads and increase the access to remote lands of the refuge. There are no lands owned by the Department of the Interior in the refuge system that have the potential for any road system development. This is only a back door method to hinder develop on adjacent lands and imposes a defacto wilderness area on lands surrounding the Refuge. 4 5

Further on page 103, the plan states that wood waste could kill oceanic wildlife, logging will increase the threat of a fire, and logging could deposit wood waste and sediment into the water. These are all red herrings, as there is much greater death of oceanic wildlife due to fishing, fires are caused much more extensively by nature and recreational use than logging, and current laws and forest management practices prevent the deposition of logging wastes and sediments. Koncor has tried to work with every governmental agency to keep an environmentally sound operation on Afognak Island. The transfer facility using barges shown on page 102 is ours and we are proud of our record of sound timber harvest practices. We have not caused any significant harm to the wildlife or environment on or around Afognak Island and do not appreciate the comments to the contrary. 6

The draft plan states on page 208 that there will be negligible impacts on the economy if the draft plan is implemented. This is not true. The establishment of more red tape and imposition of "wilderness" characteristics on any part of the Refuge will make the timber industry on Afognak Island die out. The timber on Afognak Island is not of the high quality found in most of Southeast Alaska. The operation is marginal and the balance is tipped to the negative with each increase in governmental restriction. Koncor hires locally 100% of the longshore crews that load all log ships. A significant portion of the logging crew is hired locally. Supplies for the camp, fuel for the equipment, transportation to and from Kodiak, and miscellaneous parts and supplies are all purchased locally. Limiting the use of the Refuge without specific reason (which would be found out with every site specific review currently required) will cost the local economy many jobs and a much needed industry. 7

It is Koncor's recommendation that all of Perenosa Bay, Izhut Bay, Kazakof Bay and Marmot Bay shorelines from Kazakof Bay to Cape Izhut be designated as Intensive Management under the Preferred Alternative. In addition, the requirement should be for all logging related activities within the Refuge to meet with current and existing government regulations and standards and no further red tape or regulations be implemented. The current Coastal Zone Management process and the permit review and coordination by the Alaska Department of Governmental Coordination will meet all of the concerns the Department of Interior has with any proposed log transfer facility.

One further comment is that the Fish and Wildlife Service should recheck their land conveyances. Besides the ownership patterns previously noted, there are some apparent mistakes. Teck, Hogg, Murphy, and Bear Islands off Afognak Island will be conveyed to the Afognak Joint Venture, while Dicoverer and Delphin Islands will become the property of the Department of the Interior. These are switched throughout the draft plan. 8

Koncor appreciates the opportunity to comment on the draft plan and is looking forward to the inclusion of our recommendations in the final plan.

Sincerely,

Allan Foutch
Vice President, Operations

cc: John Sturgeon, President

ALF:alf

Responses to Koncor Forest Products Company:

1. The land status maps have been revised. The Afognak Island map has been revised to make it clear that the Alaska Maritime Refuge does not include any land on Afognak Island.

2. Access rights guaranteed by Title XI of the Alaska Lands Act are not affected by the plan. This is discussed in the section on common management directions in the full plan (page III-32, Volume II) and, briefly, on page 155 of the summary plan. The preferred management alternative has been modified in the final plan to include most of the marine areas around Afognak Island in the intensive management category.

3. The discussion referred to is the scenario used for analysis purposes, a set of reasonable assumptions about likely development within the ten year life of the plan. There are currently two log transfer facilities under permit and development of at least one more log transfer facility is anticipated within the next ten years.

4. The plan simply recounts public comments on logging, categorizing them as "general statements of belief."

5. Page 103 actually says ". . . logging roads, giving increased human access to remote lands adjacent to the refuge, could also affect refuge wildlife . . ." (emphasis added).

6. The caption of the photo of the Koncor log transfer facilitiy on page 102 of the summary notes that barge type log transfer facilities "keep the logs out of the water thereby minimizing the amount of woody debris that can sink to the bottom." The discussion of possible impacts of logging is general in nature and not intended to criticize any particular timber harvest company. See also the responses to Koniag, Inc. comments #17, 18, and 21.

7. None of the management proposals in the draft plan limit access to private lands on Afognak Island. As described in response to comment #2 above, Title XI of the Alaska Lands Act guarantees reasonable and feasible access across refuge lands or, in this case, waters. None of the marine area around Afognak Island is considered for wilderness designation in any alternative. In the final plan, the preferred alternative has been modified to classify most of the Afognak Island marine area for intensive management; in the draft plan, the preferred alternative for these areas was moderate management.

8. Ownership of the islands mentioned has been corrected.

IX-80

National Audubon Society
ALASKA REGIONAL OFFICE
308 G STREET, SUITE 219, ANCHORAGE, ALASKA 99501 (907) 276-7034

May 10, 1988

Walter O. Stieglitz
U.S. Fish & Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503
Attn: Bill Knauer

Dear Walt:

These are the comments and recommendations of the National Audubon Society on the "draft" Comprehensive Conservation Plan (CCP), Environmental Impact Statement and Wilderness Review for the Alaska Maritime National Wildlife Refuge (Maritime Refuge).

For the most part, we find the draft documents well researched and written. They contain a wealth of information on refuge resources that will prove invaluable to future protection and management of the refuge. Fish & Wildlife Service managers and planners are to be commended for their hard and very professional work on these documents.

The overriding problem in the draft CCP that must be resolved in the final plan is exclusion of all Native selected lands that are suitable as wilderness from being recommended for designation. The CCP does not address the fact that many, if not most of these lands represent overselections that were made pursuant to sections 14H1 and 14H8 of the Alaska Native Claims Settlement Act of 1971 (ANCSA). Nor does the document explain how provisions of 14H1 and 14H8 affect refuge land status now and in the future. 1

We recommend that all unconveyed refuge lands found suitable as wilderness be recommended for inclusion in the National Wilderness Preservation System. It appears highly unlikely these lands will even be selected and conveyed for Native interests. Those that might can then simply be withheld from wilderness designation at the time Congress acts.

It should also be made perfectly clear which refuge lands are designated wilderness and which are proposed. The CCP should also clearly differentiate between terrestrial and submerged wilderness so the reader isn't misled. For instance, of the 390,870 acres of existing wilderness in the Alaska Peninsula Unit, only 24,990 acres are terrestrial. The remainder are submerged lands or tidelands. 2

Another major problem in the draft CCP is the absence of a strategy for rounding out the Maritime NWR through acquisition of inholdings and exchanges with the State and/or Native interests. We recommend therefore, that a comprehensive acquisition strategy--complete with a prioritized list of land exchange proposals (already in draft form but not included in the CCP)--be included in the final CCP. Such a strategy should make clear the desirability of including such islands as Tugidak (state-owned) and Big Koniujii (Native-selected under 14H8) in the Maritime NWR. 3

We support Alternative B, providing the aforementioned recommendations are included.

Your consideration of these comments and recommendations is greatly appreciated.

Sincerely,

David R. Cline

David R. Cline
Regional Vice President

cc: Liz Raisbeck, National Audubon Society
Alaska Audubon Chapters
Other Conservation Organizations

Responses to National Audubon Society:

1. Additional text has been added clarifying the status of selected lands as it relates to wilderness designation. Selected lands which meet the wilderness criteria, shown in Table 7 (Table 2 in the summary), could be considered for wilderness in the future if the selections were relinquished.

2. Table 36 (Table 6 in the summary), "Management category designations by alternative," clearly shows which areas are designated wilderness and which are proposed wilderness under each alternative. Table 36 also distinguishes between land, water, and submerged lands. Table Table 34 has been revised to distinguish between terrestrial and marine wilderness.

3. The Service believes that a comprehensive acquisition strategy is better presented as a step-down plan. The comprehensive plan does note (page III-16 of the draft, Volume II) that land exchange priorities have been identified for each refuge unit.

IX-81

National Wildlife Refuge Association

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May 17, 1988

Mr. Walter O. Stieglitz
Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503

Dear Walt:

This letter is in response to your request for comments on the draft Comprehensive Conservation Plan/Environmental Impact Statement (CCP/EIS) for the Alaska Maritime National Wildlife Refuge.

We find the draft CCP to be well prepared. It should be a useful guide to managment as well as to future planning. The National Wildlife Refuge Association concurs in the selection of Alternative B as the preferred alternative.

Considering the complexity of the Maritime Refuge, staff planners are to be complimented for producing a highly professional document. However, a few oversights could be corrected to clarify some uncertainties and to strengthen the refuge's future capability to manage important coastal resources.

The CCP/EIS ignores the uncertain fate of Native land selections made pursuant to the Alaska Native Claims Settlement Act. A significant part of these may represent overselections that will revert to the refuge. We believe that the final plan should be modified to indicate that reverted lands would be included in the refuge, and, as appropriate, recommended for wilderness designation. 1

It would be well to clearly distinguish between terrestrial and submerged lands or tidelands to avoid misinterpretation of environs and habitats suitable for wilderness designation. 2

The CCP/EIS should include a discussion of the potential development of a mariculture industry. While state law temporarily limits this industry, worldwide trends indicate that its development will eventually occur. The establishment of a mariculture industry in waters adjacent to refuges lands could have significant impact on management of marine mammals and birds, and cause changes in the genetic composition of indigenous stocks of fish. Areas of the refuge adjacent to the Alaska Peninsula and the Kodiak Archipelago could be most significantly affected. 3

Lastly, we believe the CCP/EIS would benefit from inclusion of a strategy for expanding the refuge through acquisition of inholdings

and other key areas by purchase or exchanges with the State, other federal agencies, or native corporations. Much of the planning for such exchanges has already been accomplished by analyses conducted as part of the proposed exchanges related to petroleum developments on St. Matthew Island and the Arctic National Wildlife Refuge. In addition to inholdings, key areas that might be considered include Tugidak and Big Koniuji Islands.

Sincerely,

Charles A. Hughlett
President

Responses to National Wildlife Refuge Association:

1. Selected lands that would qualify for wilderness designation are listed in Table 7. Service policy is to not make wilderness recommendations on areas for which we do not have clear title such as the Native and state selected lands. Should these selections be relinguished management of these areas would be reevaluated and a wilderness proposal could be considered. The Service acknowledges in the Wilderness Review section of the Affected Environment Overview that overselections are common and that 80 percent of refuge lands which meet the Wilderness Act criteria for wilderness designation have been selected.

2. This has been clarified in Table 37 of the draft plan; Table 36 already distinguishes between terrestrial and marine areas.

3. Mariculture is discussed and evaluated in detail on pages IV-154 through IV-157, IV-162 through IV-164, and IV-167 through IV-168 (Volume II) of the draft.

Pacific Seabird Group

DEDICATED TO THE STUDY AND CONSERVATION OF PACIFIC SEABIRDS AND THEIR ENVIRONMENT
c/o U.S. Fish and Wildlife Service
Alaska Fish and Wildlife Research Center, 1011 E. Tudor Road
Anchorage, Alaska 99503

May 31, 1988

William Knauer
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Dear Mr. Knauer:

The Pacific Seabird Group is a scientific organization composed of over 400 seabird researchers and conservationists from 16 countries. Our group is dedicated to the study of Pacific seabirds and their environment. While our group is primarily interested in scientific endeavors, we have a conservation committee and feel we have a tremendous amount of relevant expertise to offer concerning conservation issues. This letter presents our comments on the draft Alaska Maritime National Wildlife Refuge Comprehensive Conservation Plan.

The wilderness designation portion of the plan is the most significant part. We favor the more extensive wilderness of Alternative B, as this designation offers the best protection for nesting colonies. Considering the vastness of the Refuge, adding more wilderness in the future could be difficult.

We are disappointed that Refuge lands which are Native selected but not conveyed are not included in your wilderness proposal. In actuality, only a very small percentage of these selections will ever be conveyed due to extensive over-selection by the Natives. These over-selections include some of the most magnificent and important Refuge islands (e.g., Barren Islands, Shumagin Islands).

We recommend that a list of lands that the Refuge feels are of high priority for acquisition be included in the plans. Also, a list of lands already in the Refuge with low wildlife value and suitable for exchange should be added. We would like to review these lists and feel that they would be helpful in the future as a guide for management of land exchanges.

We prefer the Refuge staffing pattern and visitor center as portrayed under Alternative C. This alternative, providing for the largest staff, still seems highly conservative. Having one biologist assigned to an area as large as the Aleutian Islands or Bering Sea is inadequate for simply monitoring populations of wildlife, let alone determining causes of declines.

We thank you for the opportunity to comment on the Alaska Maritime National Wildlife Refuge draft comprehensive plan, and we wish you the best of success with its implementation. We are particularly interested in this Refuge and will be glad to offer our further comments in any future public reviews.

Sincerely,

Scott A. Hatch
Chair

cc: Chair, Conservation Committee

Resource Development Council
for Alaska, Inc.

807 "G" Street, Suite 200, Anchorage, Alaska 99501-3440
Box 100516, Anchorage, Alaska 99510-0516 – 907/276-0700

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May 17, 1988

Mr. Walter O. Stieglitz
Regional Director
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503

re: Alaska Maritime National Wildlife Refuge Draft CCP/EIS/WR

Dear Mr. Stieglitz:

The Resource Development Council for Alaska, Inc. appreciates the opportunity to comment on the Draft Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Review for the Alaska Maritime National Wildlife Refuge.

The Resource Development Council for Alaska, Inc. (RDC) is a statewide private development organization. Its members come from all economic sectors-business, labor, local government, universities and a wide range of statewide associations. RDC focuses on the most serious economic challenges facing Alaska.

The Council recognizes that some of the most formidable roadblocks to the state's development--and these affect all economic sectors--are regulatory, tax and land use policies. RDC's board, staff, division directors and thousands of members work diligently to assure that the state's development policies create a favorable business climate.

RDC generally supports the conclusions of the Draft CCP/EIS/WR. We agree the inherent character of important habitat areas in the refuge can be fully protected with existing management programs. More rigorous protection regimes would require more personnel and capital resources than can be justified by the marginal gains in protection.

Furthermore, additional protection regimes, especially Wilderness designation, would unnecessarily limit alternative uses of refuge land and resources. It is clear this refuge will not be asked to support many of the commercial activities that could have public benefit on other Alaska refuges. The geography of the Alaska Maritime NWR does not lend itself to widescale subsurface development or timber harvesting. Yet there are a few commercial opportunities that should be

recognized for their potential public benefit and limited impact on refuge resources.

Mariculture is clearly one such industry. Federally-owned tidelands, especially in the Kodiak-Afognak area must be managed to support the potential adjacent upland use. In many cases a upland property owner may require some incidental use of tidelands to execute an environmentally harmless seafarm.

The same consideration should be given to log transfer facilities, seafood processing operations, floating lodges, docks and piers. Tideland management is crucial to most Alaska coastal development programs. Alaska has a very a poor overland transportation infrastructure; as such we must reasonably regulate access across, and use of, tideland areas.

Alaska is blessed with nearly two-thirds of the nation's coastline and the vast majority of its tide- and submerged lands. Management of these resources is absolutely crucial to the economic development of our state. **It is critical that the USFWS not to unduly limit the use and development of non-federal uplands by unreasonably restricting tideland use and access.**

The Draft CCP/EIS/WR seems to substantially address our concerns on these issues. RDC remains convinced that no additional Congressional action, especially Wilderness designation, is necessary at this time. The Service has all of the necessary enforcement powers to effectively protect refuge resources as spelled out in ANILCA.

Thank you for the opportunity to comment on this draft plan. We hope our remarks have been helpful to your staff.

Sincerely,

RESOURCE DEVELOPMENT COUNCIL
for Alaska, Inc.

Becky L. Gay
Executive Director

IX-84

Sierra Club
Alaska Field Office
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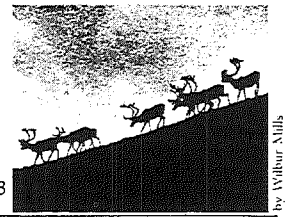

June 3, 1988

Mr. Walter O. Stieglitz, Regional Director
Attn. Mr. William Knauer
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage Ak 99503

Dear Mr. Stieglitz:

On behalf of the Sierra Club and its Alaska Chapter, I am submitting the following comments and recommendations on your Draft Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review for the Alaska Maritime Refuge.

Needed: a wilderness alternative

As in the case of the original Becharof CCP/EIS/Wilderness Review, the Alaska Maritime Draft Plan suffers from the lack of a full-scale wilderness alternative. In Alternatives A, B, and C of the Draft, the amount of proposed new wilderness ranges from none to 6 percent, with the Service recommending a mere 3 percent (109,648 acres). Yet 44 percent of the federal lands in the refuge, approximately 2.1 million acres, are not now designated wilderness and nearly all of it meets the criteria of the Wilderness Act, according to the Plan. 1

Accordingly, a genuine wilderness alternative D must be identified by the Service. I recommend that you do so in an Alaska Maritime Wilderness Review Amendment and publish it for public comment, just as you did in the case of the recent Becharof Wilderness Review Amendment.

In any event, the Sierra Club supports a full-fledged wilderness alternative D that proposes for wilderness designation all federal lands meeting the criteria of the Wilderness Act, whether in an unselected or overselected status. Any additional non-Act criteria supplied by the Service and used to declare federal lands as unsuitable for wilderness, such as "outstanding resource values," are arbitrary, legally suspect, and are not used in identifying the lands recommended for wilderness in alternative D.

Although all qualified overselections would be included in this new wilderness alternative, should some of these ultimately be patented to the Native corporations, they would of course cease to be designated wilderness.

The Draft, while acknowledging that "much" of the overselected land will revert to federal ownership, arbitrarily rules out overselected land for consideration as wilderness until all conveyances are final, at which time the Draft says that any unpatented land "should be considered for wilderness."

However, Congress in the Alaska Lands Act (ANILCA) did not provide for a formal two-stage wilderness review process for the refuges and parks in Alaska. Congress is likely to have completed action on the current refuge wilderness recommendations before the Service might, at its own discretion, undertake another wilderness review of any unpatented lands reverting to federal ownership in 16 refuges. Congress would probably be reluctant to re-visit the wilderness issue even if the Service volunteered supplemental recommendations. Therefore, to ensure a comprehensive review and decision by Congress, wilderness alternative D includes qualified overselections.

Inclusion of overselections has precedent in the National Park Service's Maximum Wilderness alternative in its Draft Wilderness Recommendation (1988) for Wrangell-St. Elias National Park and Preserve Wilderness. Faced with substantial Native overselections within the Park/Preserve, the Park Service recognizes that one way of dealing with the problem is to acknowledge that much or most of the overselections will revert to federal ownership, and that virtually all of the reversions are qualified for inclusion in the Wilderness System.

Incidentally, the AMNWR Draft Plan's land status presentation does not include Native corporation ANCSA land entitlements. Thus while 33% of the federal lands within the refuge have been "conveyed," and 19% more have been "selected," the public has no indication of how much of the "selected" is in excess of entitlement, i.e., is overselected. The final CCP should include an updated land status showing the amount of land conveyed to date, the amount remaining to be conveyed, if any, and the amount of overselections.

Other components of wilderness alternative D

1. Unimak Island would not be transferred to Izembek NWR, but would instead remain part of the Aleutian Islands unit of the AMNWR. As the largest island in the Aleutian chain, Unimak is an outstanding component of the Martitime Refuge. Unimak's habitats are an extension of the habitats on the Aleutian chain. Species found on the island also are similar to those found on other islands in the refuge.

Minimal management areas on Unimak in Alternatives B and C are proposed wilderness in wilderness alternative D.

2. Afognak Island area. This area would be managed as under Alternative A, except that (1) there would be no moderate management in Raspberry Straight and (2) for the state-claimed tidelands adjacent to the Kodiak Islands NWR subunit on northwest Afognak, the Service would seek the formal cooperation of the State in managing the tidelands in a manner equivalent to the minimal management afforded the submerged lands and the water column.

With respect to the tidelands surrounding Afognak, has the Service a formal legal opinion that the original federal reservation of Afognak Island uplands, onshore and offshore submerged lands, and the water column did not also reserve the tidelands? If not, on what basis does it make the assumption that the State of Alaska owns the tidelands?

3. Amchitka Island would be managed as in Alternatives B and C

4. Atka Island would be managed as in Alternative C.

Thank you for this opportunity to offer comments on your Draft Plan and Wilderness Review. Members of the Sierra Club look forward to reviewing your Alaska Maritime Wilderness Amendment.

Sincerely,

Jack Hession

Jack Hession
Alaska Representative

Responses to the Sierra Club:

Note: This comment letter was received approximately a month after the close of the comment period and after the plan had been revised and released in its final form for internal review.

1. Selected lands that would qualify for wilderness designation are listed in Table 7. Service policy is to not make wilderness recommendations on areas for which we do not have clear title such as the Native and state selected lands. Should these selections be relinguished management of these areas would be reevaluated and a wilderness proposal could be considered. The Service acknowledges in the Wilderness Review section of the Affected Environment Overview that overselections are common and that 80 percent of refuge lands which meet the Wilderness Act criteria for wilderness designation have been selected.

2. Approximately 1.3 million acres of land within the refuge are Native selected; of, approximately 0.9 million acres are probably so-called "overselections." Entitlements outstanding total approximately 0.2 million acres.

THE WILDERNESS SOCIETY

May 20, 1988

Mr. Walter Steiglitz, Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Dear Mr. Steiglitz:

The Wilderness Society, comprising over 220,000 members nationwide and over 1400 members in Alaska, submits the following comments on the Draft CCP/EIS for the Alaska Maritime National Wildlife Refuge (hereafter AMNWR). Although the documents demonstrate considerable effort on the part of the preparers and they are to be complimented for obviously condensing an enormous data base and complicated management situations into the two volume draft document, nevertheless, we must express great disappointment in these volumes both as a CCP and as an EIS.

IX-86

In the opinion of this reviewer, the documents fail to meet the minimum standards for a CCP, an EIS or wilderness review. As a CCP, the documents fail to provide a long range plan for the administration and management of this vast system of islands, islets, and other lands. They contain no vision for the future of this world class wildlife and habitat haven. Further, there is no commitment to seek development of such a vision. Rather, the documents merely prescribe a series of monitoring, predator control, and permitting actions that will surely lead to diminishment of both quality and quantity of habitats over time.

As an EIS, the documents fail to offer an appropriate range of alternatives, the assessment of impacts is often perfunctory and the constant use of percent of acreage in various categories of management compared with the Unit acreage or the acreage of the total refuge to imply magnitudes of effects presents a misleading picture of long-term affects. The reporting of relatively small acreages for intensive management fails adequately to explain the potential for loss or degradation of the uniqueness or the sometimes enormous values that may exist on any particular site or the relatively scarcity of that habitat type within the refuge or within the Unit of the refuge. For example, development of any one of the three known nesting sites 1

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for the red-legged kittiwake would hardly provide an impressive statistic in terms of its percentage of the entire AMNWR acreage that would be affected. However, the significance of allowing major non-conforming activities on one-third of the suitable nesting areas for this rare species would be enormous. As reviewers, we need to know, for example, if dredging in Peard Bay will displace its utilization by migratory birds, where the birds and other wildlife are expected to go, and whether or not this displacement will result in diminishment of the populations. Only with such details in hand can we be expected to decide whether or not to support the proposal to allow "moderate" management practices in this bay. 1

Management policies, as expressed in the common management directions are biased toward development and against protection of the basic resources this refuge was established to protect.

Finally, there are several misinterpretations of the laws governing the refuge and wilderness, which again tend to misinform and bias the reviewers. These shortcomings demand that this CCP/EIS be completely rewritten and reissued.

ISSUES

FAILURE TO UPHOLD REFUGE PURPOSES

"Sec. 101. (a) In order to preserve for the benefit, use, education, and inspiration of present and future generations certain lands and waters in the State of Alaska that contain nationally significant natural scenic, historic, archeological, geological, scientific, wilderness, cultural, recreational, and wildlife values, the units described in the following titles are hereby established.

"(b) It is the intent of Congress in this Act to preserve unrivaled scenic and geological values associated with natural landscapes; to provide for the maintenance of sound populations of, and habitat for, wildlife species of inestimable value to the citizens of Alaska and the Nation, including those species dependent on vast relatively undeveloped areas; to preserve in their natural state extensive unaltered arctic tundra, boreal forest, and coastal rainforest ecosystems; to protect the resources related to subsistence needs; to protect and preserve historic and archeological sites, rivers and lands, and to preserve wilderness resource values and related recreational opportunities including but not limited to hiking, canoeing, fishing, and sport hunting, within large arctic and subarctic wildlands and on freeflowing rivers; and to maintain opportunities for scientific research and undisturbed ecosystems." (emphasis added)

The above quotation is taken directly from Title I-Purposes, etc., of the Alaska National Interest Lands Conservation Act (ANILCA, P.L. 96-487). The enumerated purposes in that title were intended to overarch the more specific purposes of the later titles. Most Congressional enactments are so constructed and both the Congress and the Judicial Branch interpret their presence in a statute as providing such overarching directions. Yet, the FWS insists on ignoring the clear meaning of these purposes in its CCPs. As we have in previous CCP comments, The Wilderness Society once again urges that FWS adhere to the established principles of the law. It is our view that Alternative C, the preferred alternative fails to meet these threshold purposes. Alternative B, although better than the preferred alternative in that it recommends more wilderness, still falls notably short in meeting these purposes as intended by the Congress. Thus, FWS should redraft this CCP (and several earlier CCPs for other refuges) and offer a series of alternatives that properly encompasses these mandates.

FAILURE TO ASSERT EXISTING JURISDICTION

FWS should review Section 305 of ANILCA with regard to the prior authorities that were retained in establishing the new refuges and additions in 1980. Thus, it is not true that ANILCA "supercedes" prior refuge purposes. Rather, the act adds the new refuge lands and waters and specific purposes to the prior refuge lands and waters and purposes (except where such prior purposes are inconsistent with the act and ANCSA).

This Section is particularly important to the AMNWR in a fundamental way. All of the island refuges established in Alaska specifically designate the island(s) within an area "segregated by the dashed line" and shown on maps. The Wilderness Society strongly believes that the language of those withdrawals, the depictions and subsequent case law (i.e. Hawaiian Islands NWR) clearly establishes the presence of an on-going administrative jurisdiction in the FWS for the area segregated by the dashed lines on those maps even after Alaska Statehood. In some instances, the waters and submerged lands were also withdrawn (e.g. Afognak, Nunivak, Semidi). If the withdrawal did not specifically operate to reserve the submerged lands and waters off shore, those lands and waters may have become State owned pursuant to the Statehood Act. In any event, however, the presence of an Administrative jurisdiction sufficient to insure the capability of the refuge to achieve its establishing purposes remains as a viable element of refuge management and a condition of Statehood ownership even after the Statehood Act due to the pre-statehood segregation for federal purposes.

FWS should undertake discussions with their Solicitor and with the State to specifically develop a clear agreement regarding the presence, nature and extent of FWS jurisdiction in the waters surrounding the Aleutian Islands, and the surrounding

waters of all other pre-statehood refuge islands which were segregated as described above. This oversight on the part of FWS is but one example of the failure of this CCP to fulfill the requirements of ANILCA.

FAILURE TO EVALUATE LAND EXCHANGES, TRANSFERS, AND FUTURE NEEDS

Exchanges:

As with most other refuge CCPs, the preoccupation with land exchanges is troubling and seems unwarranted. The documents do not describe the existing or potential fish, wildlife, plant, habitat, historical, cultural, geological, scientific or any other values of the areas proposed for exchange. Rather, the reviewer is simply told that "the grazing situation" or some other problem, can only be resolved by extensive and expensive fencing, or that it cannot be resolved and the lands, therefore, should be exchanged. The public cannot be expected to so blindly endorse the removal of lands from the refuge system. Only following a thorough study of the values of the land areas involved including their respective potential for resources and values that fall within the ambit of the AMNWR purposes, the existing and potential problems and alternative solutions including relative costs, can the full benefits and future administrative and other costs be assessed. FWS has failed to do that in this case. No lands should be offered for exchange until definitive studies are completed and compliance with NEPA, the APA, ANILCA, and other refuge laws and mandates has been assured.

Refuge Land Transfers:

The proposals to transfer lands from the AMNWR to Izembek NWR and the Alaska Peninsula NWR are similarly flawed by lack of study and compliance with law. Taking the Unimak Island transfer proposal as an example: throughout the CCP documents there is explicit recognition of the great importance of Unimak pass and adjacent areas to the marine birds, mammals, and other natural features that AMNWR was established to protect and manage. Yet, the CCP provides nothing more than a statement of similarity between the units to be transferred and the receiving refuge to justify this extraordinary transfer. There is no detailed description of the resources, values, problems, and needs, or discussion of the basis for an apparent finding that the AMNWR cannot adequately manage these lands and resources in each of these units. There is no analysis of the effects on management, the applicability of the differing refuge purposes, the capability of the receiving refuge to assure consistency of management with AMNWR, or even a thorough discussion of the rationale used to make this decision.

Although there is similarity between refuge purposes for each of the 16 Alaska refuges, there are noteworthy differences. For instance, the AMNWR primary purpose includes the marine

resources and caribou while Izembek is directed to place emphasis on land resources and anadramous fish. The AMNWR has the specific charge to carry out research while Izembek lacks such a priority. Izembek may or may not have the staff expertise to be involved with marine resources and one must wonder about the wisdom of duplicating such expertise on Izembek for this one island while AMNWR already intends to have particular strength in the specific disciplines involved as well as special equipment to properly monitor, conduct research, and otherwise manage the marine resources.

In short, there is totally inadequate information for a reviewer to judge the merit of this proposed transfer. Yet, we are told that "technically, Unimak Island is not part of this proposal" owing to the proposed transfer. We strongly disagree. Any transfer requires an act of Congress and a separate EIS. Until the FWS has complied with all legal requirements and the Congress has passed an Act transferring those lands, they remain statutorily tied to the AMNWR and must be considered part of the refuge for planning and management purposes. 2

Future Land Needs:

The simple admission that the refuge has identified nearly 600,000 acres of lands desired for addition to the AMNWR is another example of leaving the reviewer without an adequate basis for decision making. Perhaps more lands are desirable, perhaps not. Nevertheless, the public should be fully informed on the location, resources, management intentions, special or other values, and problems, before they are expected to endorse such a statement. Similarly, based only on this CCP/EIS the Congress cannot be deemed to have sufficient information to deny or endorse such a proposal. Identification and analyses of future land needs was an intended part of the CCP process in ANILCA. As described in the current documents, however, the identification fails to include sufficient details. The revised CCP should fill that void.

UNWARRANTED EXPANSION OF COMMERCIAL USES IN SENSITIVE AREAS

The Society strongly objects to several of the intensive use designations proposed in the "preferred alternative". Specifically, we find no justification for the designation of the entire water area surrounding Afognak Island (proposed for moderate management), nor do we believe it necessary to designate the several small bays around Afognak as intensive management areas. The Afognak Island Reserve dates to 1892. The specific purposes for the two withdrawals that were placed on the island and the withdrawal of the adjacent waters were extremely protective in intent. As with the other Executive Orders remaining in place on previously established refuges, we believe that the Afognak withdrawal language remains a guiding purpose so long as it is not inconsistent with the legislative AMNWR purposes. The dredging of Peard Bay, the extensive area

designated on Amchitka "for establishing additional radar stations", the clearances for log transfer sites and mariculture are all excessive allowances which will degrade refuge habitats and resources. Also, all other legal requirements for any of these developments should remain necessary such as the requirements of Section 404 of the Clean Water Act as it relates to establishing docks and log transfer facilities. It is inappropriate to attempt to grant clearances for such prospective developments rather than simply designate areas in the refuge where such activities may be compatible with the specific finding to be made at the time that a specific proposal has been made.

INADEQUATE ANALYSIS OF STAFFING AND MANAGEMENT ALTERNATIVES

Perhaps the best example of the failure of the present document to address a sufficient range of alternatives with full evaluation of each as required by NEPA and ANILCA is the proposed staffing plan. Where are the staffs and proposed management concepts for the designated units of the refuge other than the Aleutian Islands Unit? There can be little doubt that Congress envisioned separate unit headquarters and programs for this far-flung refuge. The very establishment of designated units is prima facia evidence of that intent. The provisions in the Pribilof terms and conditions which specifically leased lands with office/living quarters provides additional proof that Congress expected staffing for the AMNWR to be associated with the diverse and geographically remote units of this refuge. But, the FWS "plan" has no indication of an intent to develop such staff or management capability. Thus, under all of the alternatives in the current CCP, the vast majority of the AMNWR will remain unmonitored, unprotected except by its refuge designation and unknown in terms of resources, needs, problems, values and potentialities. The CCP should have at least one alternative that describes a full staffing, management, monitoring, protection, research and public education/interpretation scenario for this refuge.

Finally, we note that of the alternatives offered in this CCP, the program outlined in the "preferred alternative" entails substantial budget and manpower increases over the better (but still inadequate) alternative B. Does this not demonstrate that wilderness designation provides a low cost and effective way of achieving the priority refuge objectives as now envisioned? Wouldn't the added wilderness designation also free manpower to gather and analyze data rather than administer permits and solve problems derived from the intensive management and moderate management areas? Isn't the lack of data about the refuge lands, and their resources the single largest problem facing the management staff today? In light of the severe data gaps and inadequacies isn't the more conservative management approach outlined in Alternative B, or an improved version of B, a far more preferable way to insure retention of management options and capability for the future?

INADEQUATE WILDERNESS REVIEW AND RECOMMENDATION

The Wilderness Society, and others, have consistently pointed out the fallacies of the current policy governing the FWS wilderness reviews in Alaska. In short, the current FWS policy for wilderness reviews preempts the Congressional perogative regarding wilderness by choosing among the suitable wilderness areas rather than simply identifying the areas of the refuges that meet the criteria for wilderness as set forth in the Wilderness Act. FWS continues to apply additional criteria not found in that act and to eliminate from the final recommendations vast tracts of refuge lands that fully qualify for designation. This anti-wilderness bent to avoid having refuge lands designated is rendered dangerous when one considers the fact that most of the species that the refuge is mandated to protect are climax related species; wilderness designation is not merely appropriate, but highly desirable as a low cost and efficient management strategy for such species. In the case of AMNWR, all suitable refuge lands should be recommended for wilderness including the native overselections and the non-viable state selections.

Wilderness designation does not prevent the FWS from undertaking necessary management actions to properly protect and provide for the needs of the wildlife or their habitats. Such designation does prevent the abuse of the lands, waters, and natural resources that comprise this far-flung refuge where adequate monitoring is currently not possible.

The FWS is also in error in stating that wilderness consideration is a one time event. Nothing in the Wilderness Act, ANILCA or any other law prevents the FWS from periodically making fresh wilderness recommendations to the Congress. The FWS should, in fact, establish a policy for a periodic review of all its lands and waters to determine if new land areas or changing conditions on previously established areas make them suitable for recommendation.

Finally, given the admitted inadequacies of detailed knowledge on the resources of the AMNWR and the statement that many areas have yet to be visited by refuge staff, it simply is not acceptable to claim compliance with the ANILCA wilderness review mandate. Actual on-site visits and full documentation of the resources, values, and suitability for wilderness under the law are required. FWS should acknowledge its failure to meet these requirements and establish an adequate plan and time-frame for accomplishing this mandate.

CONCLUSION

The CCP/EIS fails to meet the mandates of law and the needs of the public to understand the AMNWR, its needs, or the FWS vision for its future. The FWS should fully revise the draft documents and reissue them with additional alternatives, better analyses, more information about the lands, resources, values, protection and management needs, and the resources required to meet the challenges foreseen.

More attention should be devoted to the wilderness review and the role wilderness designation can play in accomplishing refuge objectives and in fulfilling international treaty obligations (e.g. the Western Hemisphere Convention).

All refuge lands should be planned for retention in this refuge until all legal requirements for exchange or transfer have been completed and the Congress has given its approval via an act making such transfers or exchanges.

The 40 million nesting marine bird species and the millions of birds that utilize the areas under protection by the AMNWR, the millions of marine mammals and tens of millions of other marine species for which this refuge was established are of ecological, educational, economic, scientific, cultural, esthetic, recreational and natural values to all pacific rim nations. Our Nation's commitments to these values and to the other nations is embodied in several treaties and the establishment of the AMNWR marked the national recognition of that commitment. The FWS now must uphold those responsibilities. The Maritime refuge represents an opportunity to demonstrate to the world the value and capability of the National Wildlife Refuge System to properly care for wildlife and habitats of national and international significance. By failing to capture that vision and challenge, the FWS would also fail in meeting treaty obligations and would abdicate the leadership position held by this nation in conservation and wildlife protection. We urge the FWS to develop and reissue a fresh draft that fully complies with law and provides the public and the Congress with a plan that demonstrates why the U.S. has been give a world leadership status in wildlife and wildland conservation.

Sincerely yours,

William C. Reffalt

William C. Reffalt
Program Director
National Wildlife Refuges

and

Karen Jettmar

Karen Jettmar
Regional Associate
Alaska

Response to Wilderness Society:

1. The boundaries of the refuge are those published in the Federal Register on February 24, 1983, pursuant to section 103(b) of the Alaska Lands Act. In regards to jurisdiction, the Service does have authority to regulate certain activities in water columns which are not in refuge ownership as explained in the water column discussion in the common management directions section (page III-39 of the draft, Volume II). These authorities for the purposes of protecting refuge lands and for conservation stem from two provisions of the Constitution of the United States, the Alaska Lands Act, and other authorities including the National Wildlife Refuge Administration Act of 1968, the 1899 Rivers and Harbors Act, the Fish and Wildlife Coordination Act of 1958, and the Migratory Bird Treaty Act.

2. Most of Unimak Island is Congressionally designated wilderness which limits Service management proposals in this comprehensive plan to proposing adjustments to the existing wilderness boundary. In several places the wilderness boundary needs to be extended to match the refuge boundary.

WOMENS BAY COMMUNITY
SR 7700 KODIAK, ALASKA 99615
(907) 487-4312

May 18, 1988

Walter O. Stieglitz, Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503-6199

Attention: William Knauer

Re: Alaska Maritime NWR Draft CCP

Dear Mr. Stieglitz:

We have reviewed the Draft Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review for the Alaska Maritime National Wildlife Refuge (CCP). Our comments apply only to the Refuge area termed in this report as the "Womens Bay Area."

Why the Womens Bay Area was included as part of the National Wildlife Refuge System is very questionable since it contains no wildlife populations or habitats of national significance. To the contrary, the Womens Bay Area has wildlife populations and habitats that are common throughout the Kodiak Archipelago. In addition, it is located adjacent to one of the most populated areas of Kodiak Island: the U.S. Coast Guard Base supports a population of approximately two thousand (2,000) people; and the Womens Bay Community (not even mentioned in the CCP) has a population of over six hundred (600). This area also is adjacent to a fish reduction plant, the State airport, and is a major traffic zone heavily used by commercial fishermen, cargo ships, tugs, U.S. Coast Guard vessels, and National Oceanic and Atmospheric Administration (NOAA) research vessels.

We doubt that the information provided for the Womens Bay Area is sufficient to adequately meet the requirements under NEPA, ANILCA, or U.S. Fish and Wildlife Service (Service) policies for establishing a comprehensive conservation plan or an environmental impact statement (EIS), as outlined in the CCP, for this area. Specifically, the following areas seem to have shortcomings concerning the Womens Bay Area and required policies:

Planning Process

No public hearings were held adjacent to the Womens Bay Area, i.e., Coast Guard Base or in the Womens Bay Community.

Management Directions

1. "Coordinating management with...owners of...adjacent lands including local governments and...councils." (Vol. I, xiv) This was not done. The Womens Bay Community Council has been established since 1981 and serves as the voice of the community, providing input to the Kodiak Island Borough government. 1

2. "Studying possible land exchanges and cooperative agreements that would ensure consistent management and protection of fish and wildlife habitats." (Vol. I, xiv) There is no mention of this having been done with the major adjacent land owners: the U.S. Coast Guard Base in Kodiak, the Kodiak Island Borough, or Koniag, Inc. 2

3. "Tidelands, waters, and submerged lands are managed in Womens Bay and the north half of Middle Bay on Kodiak Island." (Vol. I, Page II-302). We are unaware of any "management" of these lands now in place. 3

Resource Inventory

Generally, little data is presented on the distribution and abundance of fish and wildlife in the Womens Bay Area, other than that of seabird colony locations in the area. Crab, herring, salmon, and clams are mentioned but no identification of habitats and their use by season or their life histories is given. Subsistence areas for crab are not identified. Little or no data is given for the plankton, host of fish, and demersal invertebrates or algae, despite the fact that this marine area constitutes the majority of the Womens Bay Area. 4

Figures 63 and 77 are particularly poorly drawn. The Womens Bay Area includes only about one-twentieth (1/20) of these figures. The dots on the upland portion are not explained. The location of Mary Island (within the Womens Bay Area) is incorrectly shown. These figures lack the bathymetrics of the Womens Bay Area. No data on water currents, tides, or temperatures are given. 5

In summary, we question whether the Womens Bay Area is of national significance and whether the Womens Bay Area should be included in the Alaska Maritime National Wildlife Refuge. It appears that the resource information and planning processes for this area fall short of the standards necessary for a CCP or an EIS. We do not recognize any of the alternatives presented as well thought or applicable to the Womens Bay Area. Instead, we hope that the Service will join the Womens Bay Community in formulating a truly comprehensive plan for the Womens Bay Area. 6

The Womens Bay Comprehensive Planning Committee has been working on a comprehensive plan for the drainage area of Womens Bay for over one and a half

years. This effort has been supported by the Kodiak Island Borough and has received input from local citizens, the U.S. Coast Guard, the Alaska Department of Fish and Game, and Koniag, Inc. Two of these meetings have been attended by U.S. Fish and Wildlife Service personnel, including one by the Alaska Maritime National Wildlife Refuge Manager, John Martin.

The Womens Bay Community Council feels that only through a planning process which includes the major land owners and interested citizens (including the local population) can a plan develop which has the necessary resource information and management directions to be useful, flexible, and stand the test of time for fish, wildlife, humans, and their habitat needs.

Thank you for the opportunity to comment.

Sincerely,

Pat Reiland by SFB

Pat Reiland, President
Womens Bay Community Council

and

S. Forrest Blau

S. Forrest Blau
Womens Bay Community Councilman
and Comprehensive Plan Coordinator

cc: Senator Ted Stevens
Senator Frank Murkowski
Representative Don Young
Donald Hoedel, Department of the Interior
Frank Dunkle, Director, USFWS
Leslie Kerr, USFWS Planning Team
John Martin, Refuge Manager, Alaska Maritime National Wildlife Refuge
Governor Steve Cowper, State of Alaska
Senator Fred Zharoff, State of Alaska
Representative Cliff Davidson, State of Alaska
Jerome M. Selby, Kodiak Island Borough Mayor
Kodiak Island Borough Assembly
Linda Freed, Community Development Department Director, Kodiak Island Borough
John Merrick, Koniag, Inc.
Womens Bay Community Council and Planning Committee

Responses to Womens Bay Community Council:

1. The Service held a total of five public meetings in Kodiak during the planning process, published legal notices and display ads in the the Kodiak newspaper, participated in a radio interview about the refuge on KMXT, and provided a half hour video about the refuge and the plan that was broadcast on the local public television station and made available to the public on a loan basis. Throughout the planning process the Service maintained close coordination with the Kodiak Island Borough; all public comments were considered in preparing the draft plan.

2. Land exchanges and cooperative agreements are discussed on pages III-13 through III-16 of the draft plan (Volume II). The page noted, actually page xix, is part of the summary chapter hence its brief treatment of the topic.

3. Service management activities in the Womens Bay area are described several places in the plan. Pages IV-133 through IV-134 (Volume II) of the draft plan provide an overview of Service activity.

4. A plan for the entire Alaska Maritime Refuge cannot contain the degree of data accuracy desired by the Womens Bay Community Council. More accurate and detailed planning will be accomplished in step-down plans.

5. This map has been revised.

6. Womens Bay was included in the Alaska Maritime Refuge by Congress when it enacted the Alaska Lands Act. The waters and submerged lands were specifically listed in section 303(1)(v) of the Alaska Lands Act.

5/17

Mr. Walter G. Steiglitz
U.S.F.W.S.
1011 E. Tudor Rd.
Anchorage, Ak. 99503

Dear Mr. Steiglitz,

I am writing to express my desire that the head of Womens Bay, Kodiak, remain essentially undeveloped. This area is unusually productive biologically and myself and many other Kodiak residents derive a great deal of recreational benefit from it. It is the closest area to town where one can get a real feel for the natural beauty of our island and it would be a real shame to see it developed in any manner.

Thank you for your attention.

Sincerely,

Jeff Allen

Jeff Allen
911 Mission
Kodiak, Ak.
99615

P.O. Box 1561
Kodiak, AK 99615
May 18, 1988

Mr. Walter O. Stieglitz
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503

Dear Mr. Stieglitz:

I support management alternative B for the entire Maritime National Wildlife Refuge. I believe wilderness protection is necessary for the proper management of these critical sea bird habitats.

I also support the inclusion of the head of Women's Bay here in Kodiak as a fine addition to the Refuge with as strict a management alternative as possible. Over the last 15 years of residence here I have seen the possibility of encroachment on this biologically productive area, as adjacent areas developed. To maintain this area without development is a high priority among a lot of people here in Kodiak, sportsmen as well as birdwatchers.

Thank-you for the opportunity to comment on this plan so important to Kodiak Island residents.

Sincerely,

Paul J. Anderson

PSS-PL/1586C

April 19, 1988

Regional Director
Attn: William Knauer
Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99503

Dear Mr. Knauer:

I would like to comment on the draft EIS for the Alaska Maritime Wildlife Refuge. Overall, I prefer Alternative B because it provides the greatest protection to existing wildlife populations through wilderness designation and minimal management. In the Gulf of Alaska Unit, I strongly prefer Alternative B for these reasons.

Of particular note in reviewing proposed and existing uses for the Alaska Maritime National Wildlife Refuge is the acceptance of mariculture facilities. I strongly oppose allowing any mariculture facilities adjacent to National Wildlife Refuges because of their negative impacts on the wildlife and natural environment and because there are thousands of miles of alternative coastline in the state that can accommodate mariculture more consistent with the adjacent upland management.

It appears that some of your assumptions regarding the size of the facilities is grossly underestimated, and therefore, the anticipated consequences to the local environment. In Table 12, Summary of Impacts on the Gulf of Alaska Unit, you indicate that mariculture sites are expected to be only 0.5 acres in size. Although this may be the meager beginnings for an existing and very marginal operation, a shellfish farm would require more than 2 acres over the long run to have profitable operation. Indeed, the Alaska Shellfish Growers anticipate several shellfish farms to exceed 20 acres in size as the operations grow and become profitable. 1

Areas where there are concentrations of birds that feed on shellfish, such as Wildlife Refuges, present incredible management problems for the shellfish farmer; to the extent that they resort to shooting or some other violent means of repelling the predators. Similar problems occur with marine mammals, to the extent that shellfish farmers in Washington can get waivers from the Marine Mammal Protection Act to shoot hungry otters and seals. Standard mariculture siting guidelines in other states, British Columbia, and being developed for Alaska direct mariculture away from seabird and marine mammal concentrations due to conflicts with predation on cultured species. Protective netting or other measures have not proven to be satisfactory deterrents. Clearly, mariculture is inconsistent with proper management of a National Wildlife Refuge where protection of naturally occurring species unimpeded by human interruption is a primary goal. 2

Mariculture sites also require habitation facilities for caretakers which undoubtedly have negative impacts on refuge management. The sedimentation from wastes of shellfish farms is not negligible, nor the impacts of oxygen and food depletion for other naturally occurring species. Disease transmission from cultured to natural stocks is also a possibility.

Because there are so many alternatives for mariculture to develop in the rest of the state do not allow mariculture adjacent to the National Wildlife Refuges. Mariculture impacts the wilderness characteristics, the recreation experience, subsistence opportunities, and most importantly, the very wildlife the refuge is supposed to

protect.

I am also opposed to oil and gas development adjacent to concentrations of marine mammals, waterfowl, seabirds, or rich marine fauna. Without a viable national energy policy that plans for alternative sources of energy, it is a mistake to risk ruining rich habitat and valuable wildlife for the short-term profit from a non-renewable resource.

Thank you for the opportunity to comment.

Sincerely,

Charles Arthur
223 Gold St.
Juneau, AK 99801

Responses to Charles Arthur:

1. Assumptions used regarding the size of mariculture facilities have been revised. Thank you for your information.

2. The Service recognizes the potential conflicts between wildlife and mariculture. Effective wildlife exclosures would be required as described in the environmental consequences section of the draft plan. The Service would be consistent with state mariculture siting guidelines to the maximum extent possible.

9344 Strathmore Drive
Anchorage, Alaska 99515
March 26, 1988

Mr. William W. Knauer
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503

Re: Alaska Maritime NWR

Dear Mr. Knauer:

I urge you to reconsider the draft management plan for the Alaska Maritime NWR and select Alternative B. The draft does not adequately explain why Alternative C was chosen rather than Alternative B.

Initially, you are to be congratulated for developing a "preferred alternative" which recommends any new wilderness designations at all, in contrast to a number of the other Alaska refuge plans FWS has recently issued.

But there is little justification (and none at all articulated in the draft plan) for not recommending that Congress designate as wilderness those lands which are found suitable for wilderness status. Land that is suitable for wilderness will never be more suitable than it is today. The money spent on a wilderness review would seem to have gone to waste if land is found suitable but not recommended for wilderness status.

Every day the world's demand for wild land grows and the supply shrinks. It is a non-renewable resource. We can't make any more, and we can't reclaim what we allow to be used.

"Minimal management" classification is not an adequate substitute for wilderness designation. Administrative classifications can be changed too easily in response to political and economic pressure. Wilderness land is important enough that it should be protected more securely, through congressional designation.

Alternative B better protects these values than Alternative C. Alternative B should be your choice.

Sincerely,

Robert D. Bacon

715 Muir Avenue
Kenai, Alaska 99611

Department of the Interior
Fish and Wildlife Service
Attention: William Knauer
1011 East Tudor Road
Anchorage, Alaska 99503

Mr. Knauer:

I am writing concerning the Draft Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review on the Alaska Maritime National Wildlife Refuge.

I urge that Alternative B be adopted and implemented. In addition, I would urge that all islands in the Alaska Maritime National Wildlife Refuge that would qualify as Wilderness under the requirements set forth in the Wilderness Act be so designated. I understand that many of these islands are being held in a "residual land pool", which could be used to satisfy selections by native corporations or villages under the provisions of the Alaska Native Claims Settlement Act. I would urge that all of the islands not now included as wilderness areas under alternative B of the draft CCP/EIS/WR but otherwise qualifying as wilderness areas be so designated, subject to their not being selected by a qualified native corporation or village by a date certain, that date being ten years from the adoption of a final CCP, unless an earlier date is specified for such selections in the provisions of the ANCSA.

Sincerely,

Gerald R. Brookman

Gerald R. Brookman

I would very much like for you to file my letter with the AK. Maritime Refuge records and also with the sea-otter management records. Thank you.

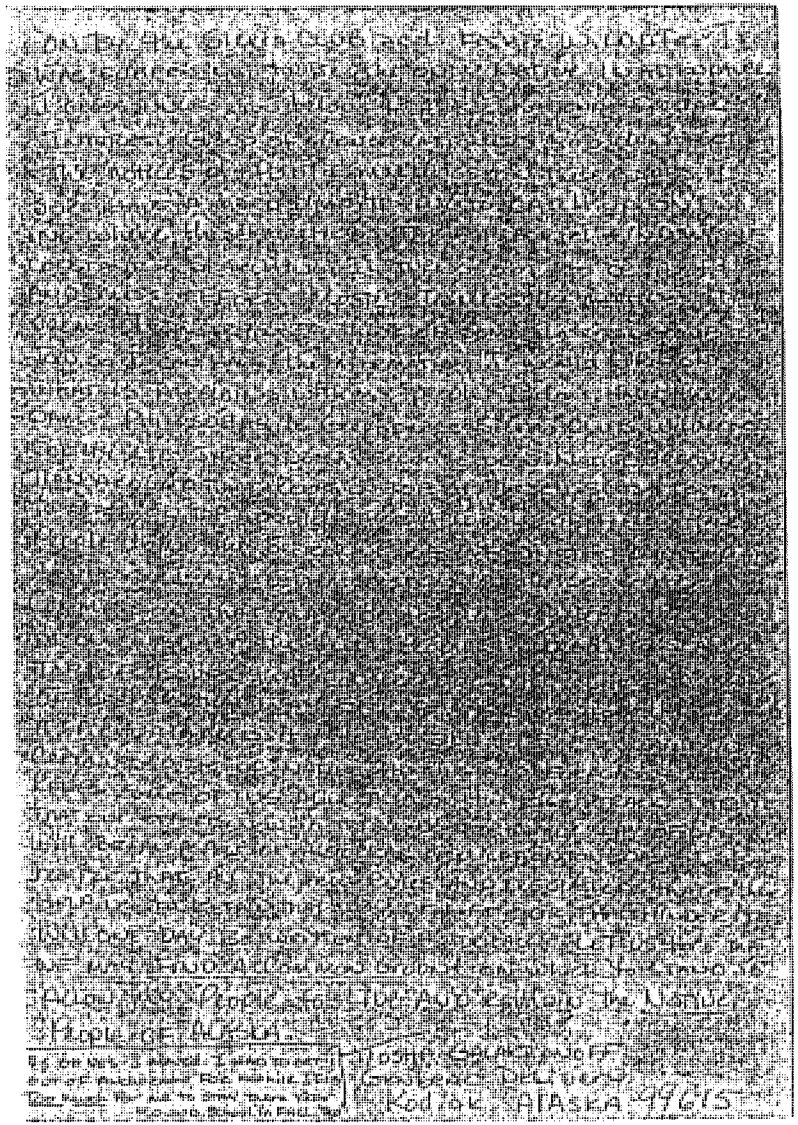
Tosha Galaktionoff (Can you have this retyped and added to these file

June 5, 1988

Dear Mr. Kerr,

Chom-ai. From Kodiak. You may remember me from the Alaska Maritime Refuge meeting for Public Comment back in April I believe the meeting was held there in the Fish and Wildlife Building on Old Seward and Tudor. I had asked you at that time to send me a copy of the comments made by myself and members of audience present. I would still very much like to have a copy of those comments. I did stop by to read them in the office there while you were away and I had asked at that time for the copies of the comments that I wanted but noone would comply.

How did the comprehensive plan turn out? Which alternative was choosen for the areas I expressed an interest in? (Kodiak, Unalaska, Atka?) I was very glad to see that sea lion hunting would remain unchanged for natives, but am concerned about the new regulation of tagging for sea-otter. How does a regulation of this type come about? I guess I missed the meetings for public comment on regulation of tagging sea-otter. I had gone to one public meeting on sea-otter management, but



May 11, 1998

U. S. Fish and Wildlife Service
Regional Director, Attention: William Knauer
1011 East Tudor Road
Anchorage, Alaska, 99503-6199

Dear Regional Director: Re: Alaska Maritime National Wildlife Refuge

In planning for this diverse, estraordinary place, the Alaska Maritime National Wildldlife Refuge, worldwide interests must be considered as well as our national interests. The International Treaty recognizes to an extent, but the whole spectrum should be included. Many species of birds and some other wildlife come from the far reaches of the world for the benefits of this refuge. The beautiful, inspiring, amazing birds play such an important role in the world's ecosystem as do other wildlife species in benefit to them and man too.

Even weather patterns are formed in this area. So much care must be taken for all kinds of proper protection, prevention of pollution/contamination and the clean-up of pollution/contamination where it has already occurred.

The military must clean up and keep clean all places it uses. Themilitary space should be reduced rather than expanded. Its exercises and research should not disturb the wildlife and its habitat. Immediate and effective measures must be enforced to prevent the gill net and other hazards destruction of marine wildlife. Too often man destroys, depletes resources on which he depends. His uncontrolled population increases are a real threat to air, water and land and all therein.

Generally I think Alternative B is the best plan as it calls for more wilderness. The 56% wilderness the refuge has now may seem like a lot of wilderness, but it must be viewed in broad and long terms. It is not a big area there considering the decrease and demise of so much wilderness in other parts of the world. For these reasons I favor Alternative B, although I think the larger staff in Alternative C would benefit the refuge. There must be effective enforcement. Hunting and subsistence must not be abused. Mining, oil, lumber (its logging roads), off-road vehicles, boats, planes all take their toll on wildlife and habitat. Their negative effects must be prevented and corrected.

Thank you for the privelige of commenting

Sincerely,

Mrs Frank Hutton

2132 Seventh Avenue
Sacramento, California, 95818

909 Mission Rd.
Kodiak, AK 99615
10 May, 1988

Mr. Walter O. Stieglitz
U. S. Fish and Wildlife Service
1011 E. Tudor Rd.
Anchorage, AK 99503

Dear Mr. Stieglitz,

I am writing in support of management alternative B for the Maritime National Wildlife Refuge. One reason I am in favor of Alternative B is that it affords Wilderness (maximum) protection for numerous small but important seabird nesting colonies (for example: Noisy Islands, Sea Lion Rocks, Sea Otter Island).

I am also particularly concerned that some extremely important nesting islands have not been considered for Wilderness status only because they have been tentatively selected by Native corporations (for example, the Barren Islands). If these lands are deserving of Wilderness status, as the Barrens certainly are, why not now recommend them for Wilderness designation, which would then not be implemented if the lands were conveyed to Native corporations.

Another Maritime Refuge issue that interests me is the status of the Womens Bay area. My main concern there is the area designated as Minimal Management in Alternative C: the head of Womens Bay. Despite its close proximity to intensive development, this remains a very productive area biologically and is aesthetically important as open space. I, and a lot of other people in the Kodiak area, would like to see it remain in the same condition it is in today. I am disturbed that pier and bulkhead construction would be allowed in minimal management areas and can see that this might have major impacts on the low gradient intertidal areas at the head of Womens Bay. Because of the low gradient, any pier or bulkhead construction along the margin of the bay that would provide access to vessels would require extensive fill and/or dock construction. These areas are very productive in terms of fisheries and bird life. Filling of the intertidal and subtidal areas is one of the greatest threats I see to the area. A disturbing trend at the head of Womens Bay is the ever increasing use of motorized vehicles both in the intertidal and the adjacent uplands. I would like to see the FWS prohibit this non-traditional activity in the intertidal zone.

If the wetlands, intertidal, and marine waters at the head of the bay are protected, in time the area will be known as the Potter's Marsh of Kodiak (but with hunting and commercial/ recreational fishing opportunities preserved to boot!).

Sincerely,
Richard MacIntosh
Richard MacIntosh

IX-97

K Maurer

May 18, 1988

Mr. Walter O. Stieglitz
USFWS
1011 E. Tudor Rd.
Anch., AK. 99503

Dear Mr. Stieglitz,

I ana writing in regard to your CCP for the Ak. Maritime NWR. I generally support alternative "B" and would also like to see protection for the Womens Bay area, specifically the head of the bay and those small islands in it. While the area is close to developments of one sort or another it is still used extensively for hunting, fishing, & other forms of recreation (please exclude 3wheelers tho) ... I would like to see these values protected.

Sincerely
Eric Munk
POB 2940
Kodiak, Ak.
99615

IX-98

13 April 1988

Dear Senator Stevens,

I want to thank you very much for your concern and your letters to the Fish & Wildlife Service regarding commercial fishermen camping on the Kodiak Island Wildlife Refuge during emergency openings.

Jay Bellinger, manager of the Kodiak Refuge, called me last month and informed me that they were going to allow camping this year! The restrictions that he mentioned were extively reasonable and we should have no further problems this year.

On a related subject, the Maritime Refuge held a public meeting last night and informed everyone that their comments must be written to be considered in the final draft. Their potential for limiting the fisheries in the future (based on 1979 figures) is frightening but the Kodiak Island Borough has put together a good set of objections that I hope will be incorporated into the final plan.

Thank you once again for help. I'm sure without your help the small group of us who need to camp down there would once again be sleeping in our skiffs.

Sincerely,
Renie Nelle Mundy

May 13, 1988

Box 498
Seward, AK 99664

Dear Mr. Knauer:

I attended the public meeting on the draft plan for the Alaska Maritime National Wildlife Refuge in Seward in April.

I am writing in support of Alternative B. My biggest concern with Alternative C, preferred alternative of the Fish and Wildlife Service, is the inclusion of the waters around Afognak Island and in Womens Bay for mariculture. Utilizing the areas in Raspberry Strait as proposed in Alternative B seems to be a more judicious approach. In this way it would be possible to monitor the affects of mariculture on the wildlife populations.

Your attention to my input is appreciated.

Sincerely,

Judith Oravec

Gary L. Peed
POB 1612 Nome AK.
99762

5-13-88

Mr. William W. Knauer

In regards to making Safty Sound a Wildlife Refuge I am already angry about the way the US government by the the government for the government has locked up the so called public lands in this state at any whim or phony excuse it can come up with for justification of the dictitorial way our public servants shove there desires down our (the public's) throats.

The state all ready protects the fish & game of the sound much better than the US governme will ever do it. To hell with international treaty's, other country's seldom worry about keeping their agreements with us and laugh at us for being so stupid for thinking they will.

Government controll is the biggest threat there is to the subsistence use of the sound.

The only reason government researches anything is to dream up an excuse to regulate the public out of its rights. The water is at the quality that nature regulates it to be which most likely does not meet government standards and would therefore give the

government bureaucrats an excuse to close the so called refuge to the public to protect its water quality. Safty Sound is now protected by E.P.A., State Fish and Game, Coastal Zone Management and most likely several other government & state agency's that no one even knows about yet until we get cited for breaking one of the thousands of laws most of us citizens don't know anything about. The problem with government agencies is they can make regulations and regulations like laws can jail & fine people. The Constitution of the U S says that only congress can make laws. If you think I am wrong just ignore the regulations of the IRS and see what happens to you. Perhaps this is just another strategic method to be sure the areas natives do not claim rights to Safty Sound under ANCSA. Safty Sound is used by a small local population of white people and Eskimo people alike and it is working out just fine the way it is. If it isn't broken then don't fix it.

Caustically

Gary L. Reed.

(PS I am not native)

IX-100

Box 2760
Kodiak, Alaska
May 12, 1988

U.S.Fish and Wildlife Service
1011 E. Tudor Rd.
Anchorage, Alaska

Dear Sirs:

I would like to see Alternative Plan B implemented as the preferred plan for the Alaska Maritime NWR area. I strongly urge that the entire Barren Islands area be recommended for wilderness designation. The fact that the Barrens are selected by a Native Corporation is not sufficient reason to deny them the important protection provided by wilderness designation.

Please retain Womens Bay tidelands in an undeveloped state. I strongly oppose any filling, building or other uses which would make the head of Womens Bay unavailable to migrating birds and the public. My family and I have enjoyed many hours in the area watching the birds.

Sincerely,

Carol Razewski Pfeifer

May 12, 1988
Box 1740
Kodiak AK 99615

Regional Director
Attn: William Knauer
U.S. Fish & Wildlife Service
1011 E. Tudor Road
Anchorage AK 99503

Dear Mr. Knauer:

I would like to strongly urge the following changes to the Alaska Maritime Refuge draft plan.

First, all islands, including those selected by native corporations, should be considered for wilderness designation. In the Kodiak area I feel that Noisy Islands, Flat Island and all of the Barren Islands merit wilderness designation due to the important seabird resources they support.

Please consider maintaining Womens Bay tidelands in an undeveloped state and do not allow filling or other uses which would ruin this area for birds and people alike. I also recommend wilderness designation for Mary, Blodgett, Zaimka and Cliff Islands in Womens Bay.

Tugidak Island and the Triplets should be considered for land trades or acquisition into the refuge.

Thank you for considering these suggestions.

Robert C. Pfutzenreuter

IX-101

P.O. Box 4068
Kodiak, Alaska 99615
May 17, 1988

Walter O. Stieglitz, Regional Director
U.S. Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503-6199
Attention: William Knauer
Re: Alaska Maritime NWR Draft CCP

Dear Mr. Stieglitz:

I am concerned about the proposed changes in Alaska Maritime National Wildlife Refuge. The proposed Alternative C will not adequately protect the coastline as it should be protected. I would like to see Alternative B chosen.

I am also concerned that all unconveyed refuge lands were not included for possible wilderness selection. I hope you have the foresight to include these lands in the final draft of the CCP. As I understand the Lands Act, Section 13-17, these lands should be included in the final draft CCP.

I would also recommend correct names and locations of bays be put on the maps. Currently this is some incorrect data on the maps. 1

Thank you for your time.

Sincerely,

Christopher Provost

Response to Christopher Provost:

1. The map of Womens Bay has been revised.

PAGE NO.

PREPARED BY

DATE

U.S. Fish & Wildlife Service 15 April 1988
1011 E. Tudor Road
Anchorage, AK 99503

Dear USF&WS;

I understand that the U.S. Dept. of Interior has recently released a draft plan regarding the potential allowance of mariculture projects within the Alaska Maritime National Wildlife Refuge. I would first like to say BRAVO! I believe that properly managed seavegetable and shellfish farms could serve as "early warning systems", or bioindicators of environmental pollution which may otherwise go unnoticed in coastal areas. Second, I am writing in request of a copy of the February USDI draft plan. If available, please send a copy to me at the address below. Thanx.

Sincerely,

Leah M. Ridgway

Leah M. Ridgway
6901 Tanaina Drive
Anchorage, AK 99502

executive

March 21, '8

Dear Sirs:
Just rec'd letter and have not rec'd the comment on the draft Alaska Maritime Refuge Comprehensive Conservation Plan, Environment Impact Statement, etc., which you say may have gotten lost in mail. We have a lot of that lately - I wonder why? I wish I could visit Alaska - only State I've not been in. Worked as a printer in 40. Am 88 and traveled quite a lot. Had a chance to print in Alaska but prices were too high and I had too many years build-up for good pension on N.Y. Herald Tribune.
Thanks for letting me on improving things in our last frontier. E. Rugg
I always give your papers to our bi

Ms Eva G Rugg
RR 5 Box 31A
Ft Myers FL
33908

NHES

George Wythe Patrio

USA 14

Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

April 17, 1988

US Fish and Wildlife Service
Attn: Bill Knauer
1011 East Tudor Road
Anchorage, AK 99503

Dear Mr. Knauer,

I urge you to save the Alaskan coastline from the construction of permanent structures. I am in favor of saving the area as a wildlife refuge.

Sincerely,
Elizabeth Smith

Elizabeth Smith
3704 Bentley #7
6A, CA 90034

JOHN R. SWANSON
P. O. Box 6554
Minneapolis, Minn. 55406

April 27, 1988.

Fish and Wildlife Service
1011 East Tudor Road
Anchorage, Alaska 99503.

Dear Sirs;

Please accept my Comments as follows, concerning —
Alaska Maritime National Wildlife Refuge Draft Environmental Impact Statement
Comprehensive Conservation Plan Wilderness Review.

The Alaska Maritime National Wildlife Refuge contains outstanding biological, wilderness and scenic resources of certain National and International significance.

As this Refuge provides a vital preserve for Man, and for all life, on this endangered planet. With this Refuge featuring unique varied and fragile resources that fully benefit Man, and all life, on this damaged Earth.

I, then, wish to advise that I oppose alternative C - Preferred alternative - as such will destroy certain portions of the Alaska Maritime National Wildlife Refuge and to guarantee that this Refuge may actually best serve Man, and all life.

I urge that the following alternative be accepted as the permanent management program;

Alternative Preservation: To preserve Biological Wilderness and Scenic Resources and to dedicate 7,265,000 acres of this Alaska Maritime National Wildlife Refuge as permanent Wilderness — National Wilderness Preservation System.

Also, to acquire all In holdings so as to establish this Refuge as a true National Wildlife Refuge with only U.S. Fish and Wildlife Service lands — waters within it exterior boundaries.

And to always consider this entire Refuge as a permanent National Biological Wilderness Sanctuary.

For when we save our Biological and Wilderness resources; we save America and the World!

Sincerely,

John R. Swanson.

April 20, 1988

Attn: William Knauer, Regional Director
907786-3399
1011 E Tudor Rd.

Anchorage. AK 99503

Dear Mr. Knauer:

While my friends and I were attracted to Alternative B We now believe that Alternative C is superior.

In order to live up to the name of refuge the protection of wildlife is the primary consideration. Wilderness protects ou wir and water--it is an infinite resource if protected. The rights of native people should also be protected--the white man has doe more damage in a relatively short time than have the natives.

Oil natural gas. thermal energy are finite resources and will not last forever--some studies have been carried on for years to discover infinite and nonharmful energy sources, some work has been done but more needs to be done.

Yours truly, Ethel W Thorniley and friends

Ethel W Thorniley

18653 Schoenherr
Detroit, MI 48205

2-18-88

Dear Mr Knauer:

On the Alaska Maritime National Wildlife Refuge plan, there are some comments I wish to make.

First, thank you for this opportunity to comment. Second, I appreciate all of the work you've done for this project.

My comments are focused on my strong preference for alternative B. The management directions

and environmental consequences (2)
would be best guided by alternative
B. Further this option best
meets the needs to protect fauna,
fish, birdlife and mammals.
I strongly support alternative B.

Thank you.

Paul E Turner, Ph.D.
PO BOX 270
KENAI, AK 99611

24 April 1988

Mr. William Knauer, Regional Director
U.S. Fish & Wildlife Service
1011 E. Tudor Rd.
Anchorage, AK 99503

Dear Mr. Knauer:

I appreciate having been sent a copy of the Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Review for the Alaska Maritime National Wildlife Refuge.

In general I thought the report very well done -- it must have been difficult considering the remoteness and the wide scatter of the refuge.

As usual, I am concerned about a few details: the depletion by commercial fisheries of both marine birds and marine mammals, the resistance of commercial interests to new laws or regulations concerning better gear and better use of it to reduce gill net mortality; I am particularly worried about the long-term effects of "ghost nets" not only on the fish, birds, and marine mammals, but the general pollution effects of these killer tools.

As usual also, I urge you to choose the least invasive alternative for each of these areas: Alternative B -- all additional areas that qualify should be proposed for wilderness designation.

I think it is essential that everywhere man has imposed his presence and there is still left something to protect we should give that something maximum protection. We should emphasize the maintenance of wilderness values, protect existing wildlife habitats and populations, and restore endangered species to their natural levels. Eradication of introduced predators gives me some concern, but for ecological reasons I guess it is necessary. (I have some bias for mammals as compared with birds or fish, but I know that's not justified if I want to call myself a conservationist.) I have a lot of trouble with hunting "and other recreational uses" (unspecified, but usually intrusive on wildlife I suspect). Scientific research (unless it is the lethal method espoused by the Japanese and inflicted on "their" "harvest" of minke whales this year), wildlife and wildland observation, subsistence uses, interpretation and educational use are valuable or necessary.

Please go with Alternative B -- I and many people like me will be very grateful, and so will posterity.

Yours sincerely,

Judith B. Ungermann

Judith B. Ungermann
640 Gentian Rd.
St. Augustine, FL 32085

10181 Curvi St.
Anchorage, AK 99516
28 March 1988

United States Department of the Interior
Fish and Wildlife Service
1011 E. Tudor Rd.
Anchorage, AK 99503
Attention: William W. Knauer

Dear Mr. Knauer:

The Alaska Maritime National Wildlife Refuge is unique, amazing and - to the general public - little known. The map on page 4 of the CCP (Figure 2) which shows a map of the Refuge overlying a map of the lower 48 states, demonstrates the complexity of this single unit of the National Wildlife Refuge system. Under the circumstances, the CCP is to be praised for its coverage of the issues involved, rather than criticized for its necessarily somewhat superficial treatment of individual islands. I would, however, add my voice to those who see that the fact of "diminishing wilderness on a national and global scale" increases the significance of these islands.

Seen in this light, the management scheme should preserve subsistence activities, keeping these areas as a "last frontier," and should attempt to mitigate past impacts by cleaning up WWII toxics and by eliminating introduced species. Traditional subsistence activities are unlikely to "harm the resource." 1

These goals will best be accomplished by Alternative B. I do have one reservation about this alternative, which concerns its provision for mariculture projects. Mariculture is currently under intensive study elsewhere. There is no pressing need to study it in lands set aside as a Wildlife Refuge. Wait for the results of studies in other areas. With this minor reservation, I recommend the adoption of Alternative B.

Sincerely,

Ken Zafren

cc: Senator Murkowski
Senator Stevens
Representative Young

Response to Ken Zafren:

1. Toxic materials from World War II are scheduled for cleanup in a number of refuge locations. Eradication of introduced predators is a major management focus in all management alternatives. Opportunities for continued subsistence use will be preserved in accordance with provisions of the Alaska Lands Act.

Synopsis of public hearing comments requiring response.

1. Karen Jettmar, representing the Wilderness Society, requested clarification of the wilderness acreages in the Bering Sea Unit. The document says 65,202 acres were suitable, but in one alternative 65,020 acres were not recommended. Jettner wondered whether this was a typographical error.

2. In the Gulf of Alaska Unit, 8,395 acres were found suitable for wilderness designation, but in Alternative B only 8,300 were recommended. Karen Jettmar, representing the Wilderness Society, questioned why 95 suitable acres were apparently left out of the wilderness proposal in Alternative B.

3. Steve Cords, representing the U.S. Air Force, requested that the Service correct its terminology to distinquish between Air Force bases and stations.

Responses to public hearing comments:

1. The correct number of suitable acres is 65,202. Of that total, 65,020 acres were not proposed for wilderness in Alternative C.

2. The correct number is 8,395 acres.

3. The terminology has been corrected.

*U.S. GOVERNMENT PRINTING OFFICE: 1988-0-591-003/80001