U.S. Fish & Wildlife Service

Final Comprehensive Conservation Plan and Environmental Impact Statement

Little Pend Oreille National Wildlife Refuge








Volume 1

FINAL

COMPREHENSIVE CONSERVATION PLAN

AND

ENVIRONMENTAL IMPACT STATEMENT

FOR THE

LITTLE PEND OREILLE NATIONAL WILDLIFE REFUGE

April 2000

Prepared by
U.S. Fish and Wildlife Service
Region 1

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Implementation of this Comprehensive Conservation Plan and alternative management actions/programs has been assessed consistent with requirements of the National Environmental Policy Act (42 U.S.C. 4321 et seq.).

FINAL ENVIRONMENTAL IMPACT STATEMENT

Little Pend Oreille National Wildlife Refuge
Comprehensive Conservation Plan (Proposed)
Stevens and Pend Oreille Counties, Washington

Type of Action:	Administrative
Lead Agency:	USDI, Fish and Wildlife Service
Responsible Official:	Anne Badgley, Regional Director
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Abstract: A preferred alternative and four other alternatives are described and compared for the 40,198 acre Little Pend Oreille National Wildlife Refuge. The *five* alternatives are:

Alternative A. This alternative is the no action alternative as required by the National Environmental Policy regulations. Selection of this alternative would mean that there would be no change from past management programs and emphasis.

Alternative B. This alternative places management emphasis on restoration of habitat components such as mature forests and riparian habitats that support declining and rare species of plants and animals. Existing uses and recreational activities will be continued but some may be modified.

Alternative C. This alternative places management emphasis on restoration of habitat. Only priority wildlife-dependent uses identified in the National Wildlife Refuge System Improvement Act of 1997 (Refuge system Improvement Act) will be allowed.

Alternative D. This alternative places a stronger management emphasis on restoration of habitat than Alternative C does. Only priority wildlife-dependent uses identified in the Refuge System Improvement Act will be allowed.

Alternative E. This alternative has been revised based on input received from the public on the DEIS. It places management emphasis on restoration of habitat components along with a mix of existing uses and priority recreation activities. **Alternative E is the agency preferred alternative.**

The Final Environmental Impact Statement (FEIS) includes revisions to the Draft EIS (DEIS). The DEIS was circulated for public review and comments from May through August 1999. Public open house meetings were held on the DEIS in May1999. Changes noted in the Readers Guide in this FEIS indicate substantive revisions to the DEIS text. In addition, written comments received on the DEIS, Service responses to these comments, and a list of FEIS recipients have been incorporated into the FEIS.

Facts About the Little Pend Oreille National Wildlife Refuge

Location: The Refuge is located in Northeastern Washington, southeast of Colville in Stevens County.

Purpose: Little Pend Oreille NWR was established in 1939 . . . as a refuge and breeding ground for migratory birds and other wildlife . . . (Executive Order 8014) and . . . for use as an inviolate sanctuary, or for any other management purpose, for migratory birds. (Migratory Bird Conservation Act).

Acreage: Currently there are 40,198 acres, which equals 86% of the acquisition goal. Refuge inholdings total 9437 acres and consist mainly of industrial timberlands owned by Stimson Lumber and Boise Cascade. Total acreage within the approved boundary is 49,697 acres.

Habitat: Elevations range from 1,800 feet on the western boundary to 5,600 feet on the eastern boundary. The Refuge is bordered on its southern and eastern sides by National Forests (Colville and Kaniksu) with scattered industrial timberland, state lands, and privately-owned small farms, ranches, and subdivisions on the north and west.

Refuge mixed conifer habitats include lowland ponderosa pine, mid-elevation forest dominated by Douglas-fir, western larch, and lodgepole pine, and upper elevation forests of true fir, spruce, hemlock, and western red cedar. The Little Pend Oreille River flows through the northern portion of the Refuge. Eastern and southern boundaries follow the river s watershed divide. Small streams and lakes, marshes, open meadows, and former farm fields create diverse habitats on this forested refuge.

Wildlife: There are diverse montane forest and riparian wildlife communities. One hundred and eighty-six bird species have been recorded. Bald eagles use the Little Pend Oreille River during winter months. State candidate or species of concern occurring on the Refuge include: golden eagle; northern goshawk; flammulated owl; white-headed, pileated, Lewis and black-backed woodpeckers; Vaux swift; pygmy shrew; and Townsend s big-eared bat. Forest passerine (perching) birds are plentiful and include a mixture of eastern and western species. Cavity-dependent birds, such as woodpeckers, nuthatches, and chickadees are abundant.

Lakes and marshes provide spring stopover points for migratory waterfowl. The Refuge provides breeding habitat for ground nesting waterfowl such as Canada geese and mallards, as well as cavity-nesters, including wood duck, common goldeneye, and common and hooded mergansers. Native fish include cutthroat trout, red-sided shiner, and sculpin. Rainbow, brook, and German brown trout, and tench have been introduced. White-tailed deer, mule deer, elk, moose, black bear, cougar, coyote, and bobcat are some of the large mammals living on the Refuge. The presence of fisher, marten, wolverine, and gray wolf is unknown. The potential exists to manage for large species or species which require large tracts of forest habitat.

History: In 1939, most Refuge lands were acquired through the Resettlement Administration which retired marginal farmland. Other lands were either purchased from willing sellers, or acquired through exchange with Washington Department of Natural Resources.

The Washington Department of Fish and Wildlife managed the Refuge through a cooperative agreement from 1965 to 1994. Department management objectives emphasized game species and wildlife-oriented recreation. Habitat management action included timber harvest, prescribed fire, livestock grazing, forage planting, and noxious weed control. The U.S. Fish and Wildlife Service resumed on-site management in 1994.

Readers Guide

This guide discusses the U.S. Fish and Wildlife Service planning process and displays major changes made to the Draft Comprehensive Conservation Plan and Environmental Impact Statement (CCP/EIS) that appear in this Final CCP/EIS. The changes are the result of comments received from federal, state, and local agencies, interest groups and individual members of the public. Also note that the CCP/EIS is divided into two volumes. Volume I contains the Summary and Chapters, and Volume II contains the Appendices.

The U.S. Fish and Wildlife Service planning process for all national wildlife refuges generally involves three levels of planning: 1) the development of a broad Comprehensive Conservation Plan (CCP); 2) the formulation of detailed step-down management plans; and 3) annual work plans and site specific projects. Public involvement and National Environmental Policy Act (NEPA) compliance are continued through all appropriate levels in the process. This Final Environmental Impact Statement provides NEPA compliance for planning documents from all three levels of planning. The three documents include a CCP, a step-down Fire Management Plan, and Forest Management Pilot Projects:

Level 1: Comprehensive Conservation Plan (Comprised of Chapters 1 and 2, the selected alternative from Chapter 3, Appendix C, and Appendix F)

The CCP is a document that provides a conservation vision for a refuge. It describes the desired future condition for fish, wildlife, and plants, and their habitats. The CCP provides direction to refuge programs through long range management goals and objectives. It also determines appropriate and compatible uses including recreational, commercial, and permitted uses. After release of the Final EIS, the final CCP document for the Little Pend Oreille Refuge will be separated from the EIS and will consist of Chapter 1 - Introduction, Chapter 2 - Affected Environment, the preferred alternative from Chapter 3, Appendix C - Implementation, and Appendix F - Compatibility Determinations.

Level 2: Fire Management Plan (Appendix G) - *Public comments were received on the Draft Fire Management Plan together with other comments when the Draft CCP/EIS was circulated May-August 1999. No changes were made from the Draft to the Final Fire Management Plan; therefore it has not been reprinted in this final CCP/EIS. The Final Fire Management Plan is available from the Refuge upon Request.*

Refuge step-down management plans are working documents that provide guidance and identify specific actions for the major refuge programs to fulfill the goals and objectives outlined in the CCP. The Fire Management Plan was written at the same time as the CCP.

Level 3: Forest Management Pilot Projects (Appendix E)

Annual work plans and site specific projects identify specific tasks for specific locations. Three site specific forest management projects are included in Appendix E and received public review and comment. It is anticipated that on-the-ground forest management actions could take place in the winter months following the decision on the CCP/EIS if all compliance requirements are met.

Changes Made to Draft LPO CCP/EIS that Appear in Final Post Public Comment Analysis

This table shows the key changes that were made between the Draft CCP/EIS and this Final CCP/EIS. The page references shown refer to the page numbers in the draft document. Nearly all of these changes were made in response to public comment. Some additional editing changes were made that are not detailed here.

Where Change Originated in *Draft Document*	**Issues Raised During Comment Period**	**Specific Changes Made From Draft to Final**
Fact Sheet; Summary p. S-6 Chapter (Ch.) 2 (p. 2-1) Ch. 3 (p. 3-5)	Editing	Acreage paragraph changed to 40,198 acres total, 9,437 acres of inholdings and 49,697 within the approved boundary.
Summary (p. S-14) Ch. 3 (pp. 3-11, 3-23 and 24 Ch. 4 (p. 4-1) App C (p. C-2)	Forest Habitat Management	These 6 pages have references to the forest management objective. We clarified why we can have a 15,000 acre dry forest management objective with only 7943 acres of dry forest habitat on the refuge. Total acres of dry, moist and cold forest were made consistent throughout document.
Summary (p. S-4 and S- 5) Ch. 3 (pp.3-3 to 3-5)	Snowmobiling	Added snowmobiling on Olson Creek Road to Alternative E.
Ch. 1	Purpose Statement	Retained purpose language from Executive Order 8104.
Ch. 1 (p. 1-5) Ch. 3	Goals	Referenced provisions of Improvement Act to inventory and monitor status and trends of fish, wildlife, and plants; added to Section 1.5 and Ch 3 in monitoring section. Goal 1 was rewritten to read Conserve, enhance..habitats and their associated fish, wildlife and plants, ...native biological diversity...

Where Change Originated in *Draft Document*	Issues Raised During Comment Period	Specific Changes Made From Draft to Final
Ch. 1 (p. 1-2), Map 1	Map	Corrected the Colville National Forest boundary to the south of Refuge.
Ch. 1 (p. 1-3)	Data	Under section 1.4, Planning Process, added description of refuge specific studies conducted in the past 6 years.
Ch. 1 (p. 1-10)	Grazing	Elaborated on initial intent and purpose of Refuge, especially how it relates to uses such as grazing .
Ch. 1	Air Force	Revised Issue summary statement.
Ch. 2 (p. 2-31)	Wildlife	Clarified why particular indicator species were chosen.
Ch. 2 (pp. 2-29 to 2-30).	Wildlife Snowmobiling	Lynx - added status of forage/cover ratios, Lynx Management Zones, Lynx Analysis Units, trends, etc. Added references from Lynx Science Report that points to fragmentation as plausible mechanism for decline of lynx, including facilitating competition from coyotes.
Ch. 2 (p. 2-24)	Interior Columbia Basin Ecosystem Management Project (ICBEMP)	Expanded Kelly-Ringels summary of fish habitat assessment - presented both INFISH and ICBEMP standards for stream conditions.
Ch. 2 (p. 2-7)	Historic Range of Variability (HRV)	Added more background on HRV.
Ch. 2 (p. 2-49) Ch. 3 (pp. 3-13 and 3-39)	Roads	Added State of Washington reference to the road density standards and Knudsen and Naef reference. Also changed road closure dates to Jan 1 - April 14 on p 3-13 and p.3-39.
Ch. 2 (pp. 2-73 to 2-75) Ch. 4 (p. 4-31)	Snowmobiling	Updated current economic condition.
Ch. 2 (pp. 2-52 and 2-53)	Hunting	Added background on predator hunting that is discussed in Comment and Response Appendix. Added current information from traffic counters regarding estimates for hunters.

Where Change Originated in *Draft Document*	Issues Raised During Comment Period	Specific Changes Made From Draft to Final
Ch. 2 (pp. 2-55 to 2-56) Ch. 3 (p. 3-38) App. F (p. F-24) Alts table - separate snowmobiling row from OHVs.	Recreation	Changed off-road vehicles objective: deleted sentence saying : Allow legal ATV use on designated roads only. Changed Ch 2 as necessary to clarify definitions of ORV, ATV, unlicenced etc, and to present the CFR which prohibits off highway vehicles.
Ch. 2 Map 13 (p. 2-57)	Map	Changed map to include more detailed information, including 1999 information, multi-year overlays.
Ch. 2 (Roads section, pp. 2-42 to 2-50)	Snowmobiling	Described snowmobile use of Olson Creek Road.
Ch. 2, Map 10 (p. 2-45)	Editing	Differentiated county roads: all are open. Changed map to have a different line symbol for the county roads and changed the maps legend for open and closed roads.
Ch. 2	Grazing	Described the April 1999 Univ. of Idaho grazing study.
Ch. 2	Air Force	Rewrote description of Air Force use, mapped AF use from 1997-1999, and described landing sites.
Ch. 2 (p. 2-74)	Recreation	Revised Table 2-14 and moved it to Chapter 4 under Recreation programs section.
Ch. 2 (pp. 2-29 and 2-30)	Wildlife	Added information on the recent verification of lynx presence close to the refuge confirmed by hair trapping DNA analysis.
Ch. 2	Fisheries	Fish habitat assessment and maps were tied more closely with grazing text. We also added more information on stream conditions from two studies prepared in 1997 and 1998 and compared stream conditions to several standards in place for stream attributes.
Ch. 2 (p. 2-23)	Streams	Discussed 303(d) listing. Used information from Comment/Response Section (Appendix J).
Ch.2 (pp. 2-13 &15)	Editing	Corrected acres table .
Ch 3. (pp. 3-39 and 3-13)	Roads	Added Starvation Lake access and changed objective to note 9 access points open; changed map for Alt. E.

Where Change Originated in *Draft Document*	Issues Raised During Comment Period	Specific Changes Made From Draft to Final
Ch. 3 (p. 3-31); App. C (pp. C-8 and C-9)	Snowmobiling	Updated monitoring plan to add monitoring of winter active mammals along Olson Creek Road and elsewhere in Refuge.
Ch. 3 (p. 3-38)	Snowmobiling	Clarified off-road vehicle statement, separated snowmobiling and added snowmobile use of Olson Creek Road until an alternate route is developed.
Ch. 3 (pp. 3-12 and 3-29)	Old Fields	Added clarity to objective and added planting of 200 acres of annual or perennial crops as wildlife forage. Alt. Table & Objectives.
Ch. 3 (pp. 3-12 and 3-29)	Noxious weeds and goals and objectives	Revised weed objective and added six new strategies for weed management.
Ch. 3 (pp. 3-13, 3-35, and 3-39)	Hunting	Revised objective to clarify hunt seasons including predator hunting. Added strategies; no hound hunting for anything and no bear baiting.
Ch. 3 (p. 3-24)	Forest Habitat Management	Added explanation about why we are prioritizing dry forest treatments.
Ch. 3 Map 15 (p.3-21)	Snowmobiling	Changed to show that snowmobiles are allowed on Olson Creek road in Alt. E, and that the snowpark is retained in Alt. E.
Ch. 3 (monitoring) Ch. 4,Appendix C	Air Force	Provided information on ground impacts (camping; trails, etc.).
Ch. 3 (p. 3-14) Ch. 3 (p. 3-38) App. C (p. C-19)	Horsecamp	Deleted references to horseback overnights only being allowed in Horse Camp.
Ch. 3 (pp. 3-31 to 32) App. C (pp. C-8 & C-9)	Goals	Included more on monitoring fish and plants (monitor stream fish, do rare plant surveys, etc.).
Ch. 3	Goals	Added scientific references for vegetation and other objectives.
Ch 3		Added law enforcement objective.
Ch. 3 (p.3-39, Alternatives Tables)	Roads/Access	Replaced April 15 or 16 open date to April 14.
Ch. 3 (pp. 3-34 and 35)	Fish objective	Made changes to stocking, gasoline motors, impacts, and gear.
Ch. 3 (p. 3-26)	Streams	Included strategies for monitoring water quality.

Where Change Originated in *Draft Document*	Issues Raised During Comment Period	Specific Changes Made From Draft to Final
Ch. 3 (p. 3-39)	Roads	Open road density objective: specified density by subwatershed, not averaged over whole refuge as draft implied.
Ch. 4	Economics	Recalculated economic effects with new information gathered from additional literature, interviews, snowmobile spending profiles and revised (increased) use estimates.
Ch. 4 (p. 4-37)	HRV	Added more background information on the concept of Historic Range of Variability and the Interior Columbia Basin Ecosystem Management Project. Changed cumulative effects writeup to delete clear trends part.
Ch 4. (p. 4-10)	Snowmobiling and Wildlife	Updated lynx analysis with information from the Lynx Scientific Report, including coyote competition information
Ch. 4	Air Force	Expanded discussion of Air Force training effects.
Ch. 4	Recreation	Updated estimates of recreation visitor days anticipated in future; revised recreation effects based on new estimates.
Ch. 4 (p. 4-29)	Grazing	Expanded discussion of grazing effects. Draft analysis used 4 permittees, this changed to reflect current number, 3.
Ch. 5	Public Involvement	Updated public involvement section.
Appendix B	References	Added additional references based on additional work between draft and final.
App. C (p. C-9)	Streams	Included a water quality monitoring plan to address 303 (d).
Appendix C	Fishing	Added plan to monitor angler impact to wildlife.
App. C (p. C-10)	Noxious weeds	Added inventory and mapping strategy.
App. F (pp. F-2 to F-25)	Snowmobiling Compatibility Determination	Updated impacts analysis. Updated final compatibility decision use of Olson Creek. Clarified that decision could be changed during public use management plan, based on information gathered through monitoring, status of new snowpark, etc.

Where Change Originated in *Draft Document*	Issues Raised During Comment Period	Specific Changes Made From Draft to Final
App. F (p. F-13)	Forest Habitat Management, cut tree marking	Changed paragraph sales shall be exclusively cut tree marked so that we are employing the best marking technique available that fits the prescription.
Appendix F	Air Force	Added Air Force compatibility determination.
Appendix F	Collecting	Rewrote compatibility determination to allow personal use.
Appendix F	Compatibility	Revised horseback compatibility determination.
Appendix I	Mailing List	Updated mailing list with names received during public review of draft.
App. J	Public Comments	Added this new appendix of Public Comments on the Draft EIS/CCP and FWS responses to the comments.
App. K	Weeds	Added Appendix of State-listed noxious weeds for Stevens County.

TABLE OF CONTENTS

List of Tables

Summary

PROPOSED ACTION

The proposed action is to develop and implement a Comprehensive Conservation Plan for the Little Pend Oreille National Wildlife Refuge that best achieves the Refuge s purpose, vision, and goals; contributes to the National Wildlife Refuge System mission; addresses the significant issues and relevant mandates; and is consistent with principles of sound fish and wildlife management.

PURPOSE AND NEED FOR ACTION

Little Pend Oreille National Wildlife Refuge (NWR) is located in northeast Washington. Established in 1939, Little Pend Oreille NWR is one of more than 500 refuges in the National Wildlife Refuge System managed by the U.S. Fish and Wildlife Service (Service). In 1997, the National Wildlife Refuge System Improvement Act (Refuge System Improvement Act) (Public Law 105-57) was passed. The Act requires each national wildlife refuge to have a Comprehensive Conservation Plan (CCP). This document for the Little Pend Oreille Refuge is a combination of a Final CCP and a Final Environmental Impact Statement (FEIS).

The purpose of this Comprehensive Conservation Plan is to develop a vision for the Refuge and provide management guidance for maintenance, restoration, and use of Refuge resources during the next 15 years. Specifically, the CCP will:

- set a long-term vision for the Refuge;
- establish management goals, objectives, and strategies;
- define compatible recreational uses of the Refuge;
- determine the future use of livestock grazing;
- determine future Air Force Survival School training use of the Refuge;
- outline habitat and public use projects that support the goals and objectives;
- identify public entry points into the Refuge;
- describe forest management prescriptions for three areas; and
- adopt a step-down fire management plan.

Overall, there is a need to bring the Refuge in line with the National Wildlife Refuge System mission, goals, objectives, and policies. A Comprehensive Conservation Plan is needed to address significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants and the actions necessary to correct or mitigate such problems. Specifically, these problems at the Refuge include the need to: ensure the biological integrity, diversity and environmental health of Refuge forests; restore degraded stream habitats; evaluate and manage visitor use; and resolve conflicts between the U.S. Air Force use of the Refuge and the Refuges s wildlife purpose. In addition, the Refuge System Improvement Act directs the Service to

provide, to the extent practicable, opportunities for people to experience compatible wildlife-dependent recreation.

Other agencies involved in discussions related to this document include the U.S. Forest Service, National Park Service, U.S. Air Force, Natural Resource Conservation Service, Washington Department of Fish and Wildlife, and Washington Department of Natural Resources.

The Comprehensive Conservation Plan provides a framework for future Refuge management. The analysis associated with implementation of the Plan is addressed at the programmatic level. Projects are not analyzed in detail. For example, additional planning, with consideration of site-specific impacts, will be necessary before facilities are built. An exception to this is the detailed analysis of forest management prescriptions for Starvation Flats, Minnie Flats, and Biarly Flats (Appendix E).

The Refuge System Improvement Act states that wildlife conservation is the priority of National Wildlife Refuge System lands and that the biological integrity, diversity, and environmental health of refuge lands shall be maintained. Each refuge must be managed to fulfill the Refuge System mission and the specific purposes for which it was established. Additionally, the Act identifies six wildlife-dependent recreational uses. These are hunting, fishing, wildlife observation and photography, and environmental education and interpretation. As priority public uses of the Refuge System, these uses will receive enhanced consideration over other uses in planning and management.

Lands within the national wildlife refuge system are different from other, multiple use public lands in that they are closed to all public uses unless specifically and legally opened. No refuge use may be allowed unless it is determined to be compatible. A compatible use is a use that, in the sound professional judgement of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.

Brief History and Purpose of the Refuge

Beginning in 1879, the Refuge was homesteaded, farmed, grazed by livestock, logged and later classified submarginal for homesteading, although much of the Refuge was unaffected.

Executive Order 8104 (May 2, 1939) established the Little Pend Oreille Wildlife Refuge . . . *as a refuge and breeding ground for migratory birds and other wildlife* . . . . Lands added later to the Refuge were acquired under the authority of the Migratory Bird Conservation Act (16 U.S.C.715d) . . . *for use as an inviolate sanctuary, or for any other management purpose, for migratory birds* . . . .

Refuge Vision Statement

Forest habitat management is vital to the future of wildlife conservation in northeastern Washington. As the only mixed-conifer montane forest in the National Wildlife Refuge System, Little Pend Oreille National Wildlife Refuge has a unique role to play in forest habitat management. Its forests, streams, and wetlands are used seasonally by bald eagles and numerous migratory birds for nesting, foraging and migration. It provides critical winter range for deer and habitat for several species of interest including the Canada lynx and flammulated owl.

The Service envisions using this Plan to build on native wildlife habitat diversity as a theme with emphasis on developing late successional forest and restoring riparian habitat - habitats that are increasingly rare in the region. In the next 15 years, Refuge staff will focus management efforts in over-stocked stands of dry forest using thinning and prescribed fire techniques that mimic natural ecological processes, such as wildfire. Degraded streams will be restored to enhance and maintain the natural diversity of the Refuge.

A healthy Refuge environment will provide opportunities for visitors to enjoy wildlife viewing, hunting, and fishing in a natural setting. Interpreting wildlife and the Refuge s unique heritage, as well as improving facilities will enhance the visitors experience while protecting the cultural integrity of the area. To meet these challenges, the U.S. Fish and Wildlife Service will continue to seek partnerships with other agencies, interest groups, landowners, and local communities. These efforts will result in greater protection of wildlife and fish resources throughout northeastern Washington.

Refuge Goals

The following broad goals are proposed for the Little Pend Oreille NWR. They are consistent with Refuge purposes, Refuge System goals, the National Wildlife Refuge System Improvement Act of 1997, Service policy, and international treaties.

Goal 1: ***Conserve, enhance, and restore native forest, riparian, in-stream, and wetland habitats and their associated fish, wildlife, and plants, representative of the native biological diversity of northeastern Washington.***

Goal 2: ***Monitor, protect, and recover special status plants and animals and species of management interest.***

Goal 3: ***Provide opportunities for wildlife-dependent recreation and education to enhance public appreciation, understanding, and enjoyment of Refuge wildlife, fish, habitats, and cultural history.***

ALTERNATIVES

Alternatives**,** developed to comply with the National Environmental Policy Act, provide ways to address and respond to major public issues, management concerns, and opportunities identified during the planning process.

A number of issues were identified during the public scoping process. Alternatives then were developed in response to identified issues. Habitat restoration is a common element in each action alternative. The alternatives are intended to provide a range of uses and access, and respond to the significant issues. Five alternatives are described and evaluated in the draft EIS:

- Alternative A: No Action-Status quo;
- Alternative B: Restoration of Wildlife Habitat with Management of Existing Uses;
- Alternative C: Restoration of Wildlife Habitat emphasizing Priority Uses;
- Alternative D: Ecological Reserve Strategy; and
- Alternative E: Agency Preferred Alternative (Modified form Draft).

The preferred alternative is the alternative that would best achieve the Refuge purpose, vision and goals; contributes to the Refuge System mission; addresses the significant issues; and is consistent with principles of sound fish and wildlife management. **The preferred alternative (Alternative E) with associated objectives, strategies, and projects represents the Comprehensive Conservation Plan for the Little Pend Oreille NWR.**

This section describes the five alternatives. Only Alternative E was revised as a result of public comments on the draft.

ALTERNATIVE A: NO ACTION STATUS QUO

This alternative assumes no change from past management programs and emphases. No changes would be made to current uses, which include Air Force survival training, livestock grazing, hunting, fishing, camping, snowmobiling, and horseback riding. In the past, management for game species was very important and the forest management policy required that all wildfires must be suppressed as quickly as possible.

ALTERNATIVE B: RESTORATION OF WILDLIFE HABITAT AND MANAGEMENT OF EXISTING USES

Alternative B places new management emphasis on the restoration of habitat such as mature dry forest ponderosa pine and riparian habitats that support declining and rare species of plants and animals. Under Alternative B, existing uses and recreation activities will be modified but continued. Recreation activities would include hunting, fishing, wildlife observation, camping, and horseback riding. The annual livestock grazing program would be continued but would have limitations on numbers of animals, locations, and time of year. A major change would be to move grazing out of riparian zones and high-elevation areas. This would require building additional fences to control livestock use. The Air Force survival training program would be continued, however, training intensity would be reduced and helicopter use eliminated except in emergency situations.

ALTERNATIVE C: HABITAT RESTORATION EMPHASIZING PRIORITY REFUGE SYSTEM USES

This alternative would also place management emphasis on mature dry forest ponderosa pine and riparian habitats that support declining and rare species of plants and animals. Priority wildlife-dependent uses identified in the National Wildlife Refuge System Improvement Act of 1997 would be the only activities allowed. These are hunting, fishing, wildlife observation and photography, and environmental education and interpretation activities. Hunting opportunities would be expanded and additional effort would be spent on environmental education activities and interpretation. Other existing recreational activities such as camping, horseback riding, and snowmobiling would be eliminated. No annual livestock grazing program would be included but some limited livestock grazing may occur, in order to meet specific wildlife and habitat objectives. The Air Force survival training program would be discontinued.

ALTERNATIVE D: THE ECOLOGICAL RESERVE ALTERNATIVE

The focus of Alternative D is to manage the Refuge as an ecological reserve. To some, the theme may evoke ideas of passive management such as often occurs in wilderness areas. However, objectives encompassed in Alternative D are more complex than a sole strategy of passive management allows. The key components of the alternative are to promote habitat restoration, especially in the dry forest zone, to restore aquatic conditions to natural states, and to effectively enlarge roadless areas in the eastern Refuge by reducing human intrusions. The alternative would support the priority uses established under the National Wildlife Refuge System Improvement Act of 1997. Hunting of forest predators such as bear and cougar would be eliminated, so as to diminish interference with the natural process of predation. Only no-trace camping would be allowed. Other uses such as horseback riding, livestock grazing, and the Air Force survival training would be eliminated from the Refuge. Four access points to the Refuge would be maintained. Several roads on the eastern half of the Refuge would be blocked or gated to create a large area within the eastern half of the Refuge that would remain essentially free of

human disturbances throughout the year. Inholder access would be managed through a cooperative gating system.

ALTERNATIVE E: AGENCY PREFERRED ALTERNATIVE (MODIFIED FROM DRAFT)

Alternative E originated as a combination of the preliminary Alternatives B and C. The Agency Preferred Alternative E places management emphasis on restoration of habitat components such as mature dry forest and riparian habitats that support declining and rare species of plants and animals. Under Alternative E, a mix of existing uses and priority recreation activities will be managed. A wide range of recreational activities would be supported including hunting, fishing, wildlife observation, camping, horseback riding, photography, and interpretation. Additional hunting seasons would be added. Interpretation, viewing, photography, and environmental education would receive added emphasis. Some recreational uses, such as camping and horseback riding would be restricted in some areas and during some seasons. Camping would be allowed in designated campgrounds April 15 to December 31 and in additional designated sites from October 1 to December 31. Selected campsites would be removed from environmentally sensitive riparian zones. Snowmobiling would be prohibited from all areas of the Refuge except Olson Creek Road. The snowpark would remain. The annual livestock grazing program will be continued at its present level for five additional years. Subsequent livestock grazing may be employed to meet wildlife habitat management objectives. The Air Force survival training program would be phased out over five years.

Features Common to all Alternatives

All alternatives contain some common features. These are presented below to reduce the length and redundancy of the individual alternative descriptions.

- *Refuge Boundary and In-holdings*

  The Refuge boundary remains the same across all alternatives. There is continued interest by the Fish and Wildlife Service to consolidate management of lands within the existing Refuge boundary. This could be done through management, protection, exchange or acquisition of the approximately 9400 acres of in-holdings within the boundary. A significant portion of these in-holdings are industrial timber land including Boise Cascade (approximately 1550 acres) and Stimson Lumber Company (approximately 4530 acres).

- *Other Refuge-Managed Parcels*

  The Little Pend Oreille NWR currently manages two fee properties outside of the approved boundary of the Refuge: the Norris Tract (54.7 acres) near Springdale, Washington and the Cusick track (298 acres) north of Cusick, Washington; and four

Summary of Alternatives Found in the Final CCP/EIS for the Little Pend Oreille National Wildlife Refuge

Program or Issue	Alt. A (Status quo)	Alt. B (Restoration of wildlife habitat and management of existing uses)	Alt. C (Restoration; emphasizing Refuge System Priority uses)	Alt. D (Reserve strategy, reduce human disturbances)	Alt. E (Combined B and C, Agency Preferred)
HABITAT RESTORATION PROGRAMS					
Forest management	Limited forest management. Some salvage activities and precommercial thinning. Limited prescribed fire and total fire suppression.	Restore natural forest structure and composition. Aim for a mosaic of stands to approximate the appropriate Historical Range of Variability (HRV) within each forest group. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Use precommercial and commercial thinning, selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription.	Restore natural forest structure and composition. Aim for a mosaic of stands to approximate the appropriate HRV within each forest group. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Use precommercial and commercial thinning, selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription.	Restore natural forest structure and composition and role of fire, using thinning and prescribed fire. No commercial thinning in unlogged stands. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Employ low impact fire suppression techniques as much as possible. Promote protection of wildlife corridors and buffer zones with neighboring land owners and managers.	Restore natural forest structure and composition. Aim for a mosaic of stands to approximate the appropriate HRV within each forest type. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Use precommercial and commercial thinning, selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription. Promote protection of wildlife corridors and buffer zones with neighboring land owners and managers.
Riparian and stream management	No change; no plantings or restoration.	Repair/improve roads that limit fish passage or cause excessive stream sedimentation; plant and stabilize streambanks. Enact 200-foot setback from water bodies for dispersed camping, commercial thinning, and road construction.	Repair/improve roads that limit fish passage or cause excessive stream sedimentation; plant and stabilize streambanks. Instream flows take priority over diversion flows. Enact 200-foot setback from water bodies for timber removal and road construction.	Breach dams and diversions to restore natural hydrology. Repair or obliterate roads limiting fish passage and/or causing excessive sedimentation; plant and stabilize streambanks. Enact 200-foot setback from water bodies for dispersed camping, commercial thinning, and road construction.	Repair/improve roads that limit fish passage or cause excessive sedimentation; plant and stabilize streambanks. Instream flows take priority over diversion flows. Enact 200-foot setback from water bodies for dispersed camping, commercial thinning, and road construction.

Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Use of old fields and farms	Continue grazing on approximately 430 acres (65%) of the old fields and farms. Allow remaining openings to reforest naturally.	Plant up to 200 upland acres with perennial crops and exclude livestock grazing to provide wildlife forage and viewing opportunities. Allow about 135 acres to revert to native vegetation, using prescribed fire and thinning to enhance natural succession. Maintain remaining upland openings (390 acres) with grazing, mowing, prescribed fire, and other mechanical methods.	Same as Alt. B except that upland meadows would be maintained with prescribed fire, mowing, or other methods, with no annual grazing.	No human created openings would be maintained. Plant or thin trees, shrubs, or native vegetation to enhance natural succession. Control weeds.	Plant up to 200 acres with crops. Upland meadows would be maintained with prescribed fire, mowing, or other methods, with no annual grazing
Noxious Weed Management	Use integrated weed management methods to treat 34 miles of road-side weeds plus 12 acres of non-forest habitats.	Use integrated weed management methods to reduce seed production by annually treating 50 linear miles of road-side weeds plus 250 acres of non-forested habitats and 250 acres of forested habitats. Reduce noxious weed cover on the Refuge by half by the year 2015.	Use integrated weed management methods to reduce seed production by annually treating 50 linear miles of road-side weeds plus 250 acres of non-forested habitats and 250 acres of forested habitats. Reduce noxious weed cover on the Refuge by half by the year 2015.	Use integrated weed management methods to reduce seed production by annually treating 50 linear miles of road-side weeds plus 350 acres of non-forested habitats and 350 acres of forested habitats. Reduce noxious weed cover on the Refuge by half by the year 2015.	Develop an integrated weed management plan. In interim, treat 50 linear miles of road-side weeds plus 250 acres of non-forested habitats and 250 acres of forested habitats.

Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
PUBLIC ACCESS AND RECREATION					
Entrances and roads	No change (12 entrances, 201 miles of total roads, 91 miles of open roads). Open road density in 14 subwatersheds range from 0.2 mi/sq. mi. - 1.9 mi./sq. mi. Close selected roads during breakup.	Eight entrances. Close or obliterate selected roads as outlined in road management criteria. Open road density in 14 subwatersheds not to exceed 1.5 mi./sq. mi. from Apr. 16-Dec. 31 and 0.5 mi./sq. mi. from Jan.1 - Apr.15. Close all but the county-maintained roads from Jan. 1 - Apr.15.	Eight entrances. Close or obliterate selected roads as outlined in road management criteria. Open road density in 14 subwatersheds not to exceed 1.5 mi./sq. mi. from Apr. 16-Dec. 31 and 0.5 mi./sq. mi. from Jan. 1 - Apr. 15. Close all but the county-maintained roads Jan. 1- Apr. 15.	Four entrances. Close or obliterate numerous selected roads. Protect and enlarge effective roadless areas by closing roads to public entry, including Cedar Creek Rd. and Blacktail Mountain Rd. east of Blacktail Bridge. Manage inholder access through cooperative agreements. Open road density in 14 subwatersheds not to exceed 1.0 mi./sq. mi. from Apr. 16-Dec. 31 and 0.5 mi./sq. mi. from Jan. 1 - Apr. 15. Close all but the county-maintained roads Jan. 1- Apr. 15.	Nine entrances. Close or obliterate numerous selected roads as outlined in road management criteria. Open road density in 14 subwatersheds not to exceed 1.5 mi./sq. mi. from Apr. 15-Dec. 31 and 0.5 mi./sq. mi. from Jan. 1 - Apr. 14. Close all but the county-maintained roads Jan. 1- Apr. 14.
Hunting	All state seasons Oct 1 - Dec 31. September seasons northern portion of Refuge only.	All state seasons Oct 1 - Dec 31. September seasons northern portion of Refuge only.	Expand quality hunting opportunities (spring turkey, grouse, and deer/elk bow hunts). Offer hunter education programs.	Allow ungulate, gamebird, and waterfowl hunting. Eliminate predator (bear, cougar, coyote, and bobcat) hunting.	Promote quality hunting experiences and expand hunting opportunities by opening State seasons for spring turkey, grouse, and deer/elk bow hunts. Promoter hunter education programs.
Wildlife Observation, Interpretation, Photography	Minimal programs as staff time allows	Minimal programs as staff time allows	Increase available viewing information and opportunities; offer programs, and events (e.g., summer youth program). Interpret natural and cultural history.	Minimal programs as staff time allows.	Increase available viewing information and opportunities; offer programs, and events (e.g., summer youth program). Interpret natural and cultural history.

Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Fishing	Continue current April - October fishing opportunities. Lakes stocked.	Continue current April - October fishing season. Increase opportunities for natural spawning in lakes. Continue stocking program.	Continue current seasons and increase catch and release fishing on LPO River. Increase opportunities for natural spawning at lakes. Delay fishing opener on lakes until July 1 to minimize disturbance to nesting birds. Continue stocking program.	No stocking. Breach stream diversions and dams to restore natural hydrology.	Continue current April - October fishing season and increase catch and release fishing in LPO River. Increase opportunities for natural spawning in lakes and streams. Continue stocking program.
Camping	Unregulated. Five designated campgrounds & many dispersed sites.	Allowed in designated campgrounds and dispersed sites only between Apr. 15 and Dec. 31. Eliminate dispersed riparian camping.	Eliminated	Primitive (no-trace) camping allowed only. Close off all campgrounds and camps accessible by vehicle.	Allowed in designated campgrounds Apr. 15 - Dec. 31 and designated dispersed sites only between Oct. 1 and Dec. 31. Eliminate dispersed riparian camping.
Horseback Riding	Unregulated	Develop equestrian plan, specifically addressing overnight use (Horse Camp only), trails, feed, and maintenance.	Eliminated	Eliminated	Develop equestrian plan, specifically addressing overnight use, trails, feed and maintenance.
Off-Road Vehicles	ATVs and dirt bikes are not allowed but illegal use occurs.	Eliminate illegal use with law enforcement patrols.	Eliminate illegal use with law enforcement patrols.	Eliminate illegal use with law enforcement patrols.	Eliminate illegal use with public education, signing and law enforcement patrols. Restrict nonprohibited vehicles including mountain bikes, to existing open roads.
Snowmobiling	Snowmobiling allowed only on Olson Creek Rd. and Blacktail Mtn. Rd. (from bridge east).	Eliminate illegal use with law enforcement patrols. Maintain snowpark, but discontinue snowmobiling on Refuge.	Eliminate illegal use with law enforcement patrols. Remove snowpark and discontinue snowmobiling on all Refuge roads and lands.	Eliminate illegal use with law enforcement patrols. Remove snowpark and discontinue snowmobiling on all Refuge roads and lands.	Eliminate illegal use with public education, signing and law enforcement patrols. Continue snowmobile use on Olson Creek road with restrictions. Discontinue snowmobiling on all remaining Refuge lands.

Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
OTHER PROGRAMS					
Livestock grazing	No change; up to 750 AUMs annually; based on coordinated resource management plan developed by Soil Conservation Service in 1978.	Modified annual grazing program conducted outside low-gradient alluvial riparian areas and outside of high elevation areas (e.g. not above 3000'). Exclude livestock from ecologically sensitive areas including wet meadows. Livestock grazing would be concentrated in areas where it may provide a benefit to spring forage for white-tailed deer.	Phase out annual program; use grazing only as habitat management tool to achieve wildlife objectives.	Phase out annual program in five years.	Continue annual program through 2004; beginning 2005, use grazing only to achieve wildlife habitat objectives.
Air Force Survival School	No change. Use concentrated in late summer with an average of 90 personnel/day. Ground and helicopter use.	Reduced training use, allowing only activities not disturbing to wildlife. Eliminate use of helicopters except in emergency situations.	Phased out over five years	Phased out over five years.	Phased out over five years.
Cultural Resources Program	Protect cultural resources in accordance with law and policy.	Protect cultural resources in accordance with law and policy. Implement a proactive program to inventory and evaluate potential cultural resource assets.	Protect cultural resources in accordance with law and policy. Implement a proactive program to inventory and evaluate potential cultural resource assets.	Protect cultural resources in accordance with law and policy.	Protect cultural resources in accordance with law and policy. Implement a proactive program to inventory and evaluate potential cultural resource assets.

conservation easements ranging in size from 10 to 65 acres in Stevens County. All of these properties resulted from Farmer s Home Administration land disposal through loan defaults. Fee title lands are transferred to the Service for management while conservation easements transfer only the rights of easement management and serve to protect wetlands and converted wetlands through restrictions that are perpetual. These tracts will be managed consistently with the management alternative selected for the primary Refuge. In addition, a step-down management plan will be prepared for each of these units. The Kalispel Tribe of Indians has expressed interest in cooperatively managing the Cusick unit which is located close to tribal lands. Partnerships will be considered for the cooperative management of outlying units.

- *Land Protection Strategy Outside Approved Boundary*

  The Service has the ability to protect and acquire key wildlife habitats outside of the approved Refuge boundary. Additional NEPA analysis will be necessary to evaluate the environmental effects of protecting or acquiring lands before they can be added. Land protection methods may include cooperative agreements, conservation easements, fee title acquisition, leases, donations, transfers, and exchanges. Only willing participants would be considered for any of these approaches. Priority for protection will be lands adjacent to the Refuge particularly riparian, wetland, ponderosa pine and high elevation forest (above 4,000 foot elevation) habitats. Medium priority for protection will be lands adjacent to other Service managed properties in Stevens and Pend Oreille Counties and seasonally flooded agricultural lands within the Colville River floodplain.

- *Protection of the Kaniksu Unit, A Separate but Related Action*

  The Service is currently in the process of evaluating the potential acquisition of 747 acres being offered by one landowner northeast of Deer Lake, Washington. This property is referred to as the Kaniksu Unit. Approximately 550 acres of this property are under a perpetual wetland easement administered by the Natural Resource Conservation Service. A separate environmental assessment will be completed if the preliminary project proposal is approved by the Washington Office. If acquired and added to the Refuge, this area would be subject to many of the management recommendations provided by the CCP. A unit plan would be prepared in the future to make management of this area consistent with its purpose, with the CCP, and with other factors unique to its acquisition.

- *Protection of Existing Research Natural Areas (RNA)*

  Two Research Natural Areas (RNAs) on the Refuge will be maintained and protected for their research values. In general passive or natural management will be practiced in the RNAs, including hands-off management of wildfire unless external lands appear threatened. Baird Basin RNA is a 160-acre tract in the North Fork of the Bear Creek watershed, representing three

forest cover types under the Society of American Forester s (SAF) classification system: Larch-Douglas Fir (SAF 212), Ponderosa pine-Larch-Douglas fir (SAF 214) and Lodgepole Pine (SAF 218). Varline Grove RNA is an 80-acre tract representing the Lodgepole Pine cover type (SAF 212).

- *Protection of Roadless Area*

  A 5,520-acre roadless area exists in the southeast corner of the Refuge that may have potential for wilderness designation. All of the alternatives considered in this draft CCP/EIS would be managed in such a manner that the primitive roadless character of this area and associated values are not impaired. The roadless area of the Refuge will be studied further in the step-down management planning process (Habitat and Public Use) to determine if it is suitable as a Wilderness Study Area.

- *Tribal Coordination*

  Common to all alternatives will be increased regular communication with American Indian Tribes who have an interest in the Refuge. The Kalispel Tribe of Indians, the Confederated Tribes of the Colville Reservation, and the Spokane Tribe of Indians are three local tribes the Refuge will work with regarding issues of shared interest.

- *Volunteer Opportunities and Partnerships*

  Volunteer opportunities and partnerships occur in all alternatives. These are recognized as key components of the successful management of public lands and vital to implementation of Refuge programs, plans and projects.

- *Refuge Revenue Sharing Payment*

  Annual payments to Stevens and Pend Oreille Counties will continue at similar historic rates under each alternative. Total payment made to Stevens County in 1997 was $231,804. If in-holding lands are acquired and added to the Refuge then the county payment will increase accordingly.

- *Salvage Harvest by Permit*

  Salvage harvest is allowed on the Refuge with a special use permit only, when wind or other events add excessive, high-risk fuels. This use will continue under all alternatives, where opportunities arise and where salvage could be used to further other forest habitat management objectives.

- *Firewood Cutting by Permit*

  The firewood cutting permit system remains the same under all alternatives**.** Current Refuge policy is to allow cutting between August 1 and November 1. Each permittee is allowed to cut up to two cords of downed wood within 200 feet of a designated road. The number of permits issued, cords allowed, and locations will vary from year to year based on conditions, demand, and need.

- *Maintenance and Updating of Existing Facilities*

  Periodic maintenance and updating of Refuge administrative facilities will be necessary regardless of the alternative selected. Facilities include the Refuge headquarters complex, one government residence and one cabin. Periodic updating of facilities is necessary for safety and accessibility and to support staff and management needs. Recently, the headquarters office was expanded/remodeled to add office space. Funding has been acquired to upgrade the storage building. Funding needs have been identified to upgrade and enlarge the shop and to renovate the Winslow cabin to provide volunteer housing.

- *Protection and Management of Cultural Resources*

  The Service has legal responsibility to consider the effects its actions have on archeological and historic properties. Under all alternatives, the Service will manage cultural resources in accordance with public law and agency policy. To this end, small projects will require a Request for Cultural Resource Compliance form be completed in conformance with the Programmatic Agreement among the U.S. Fish and Wildlife Service Region 1, the Advisory Council on Historic Preservation, and the State of Washington Historic Preservation Officer. Additional consultation, surveys, and clearance will be required when large projects are sponsored by the Refuge or when activities affect properties eligible for the National Register of Historic Places (more than 50 years old).

- *Management of Minor Recreational Uses*

  Certain recreational activities are occasionally pursued on the Refuge. Under all alternatives, any group activity involving more than 25 people will require a Special Use Permit. Dog sledding and search and rescue training will also require Special Use Permits. Incidental collecting of antler, mushrooms, and berries will be allowed. Other recreational activities not specifically addressed in this document (cross country skiing, snowshoeing) will be allowed to continue on Refuge lands unless they are found to conflict with wildlife or habitat objectives.

- *Wildlife Habitat*

  Important habitats for wildlife will be identified, protected, and enhanced including but not limited to suitable snags, downed wood, movement corridors, late successional forest communities, wetlands, and aspen groves.

AFFECTED ENVIRONMENT

Geographic and Ecological Setting

The Little Pend Oreille NWR is located in northeastern Washington, about 70 miles north of Spokane and ranges from about 1,800 to 5,600 feet above sea level.

Within the 1939 Executive Order boundaries of the Refuge are approximately 6500 acres of inholdings. Most of the inholding parcels are owned by Stimson Lumber Company or Boise Cascade, both commercial timber companies.

Two Research Natural Areas have been established within the Refuge. These areas protect natural features and preserve natural processes for scientific purposes; the guiding principle is to prevent unnatural encroachments and activities which directly or indirectly modify ecological processes. There is also a 5,520 acre block of unroaded and largely undisturbed forest in the southeastern corner of the Refuge.

On non-Fish and Wildlife Service managed land surrounding and within the Refuge boundary, there are increasing trends towards road development, forest fragmentation, loss of older aged-forest, recreational use, riparian habitat degradation, and rural residential development.

The Refuge is a mixture of diverse habitats including: riparian, aquatic, fields, and forests types that support stands of Douglas-fir, ponderosa pine, grand fir, cedar, hemlock, western larch, subalpine fir, and aspen. Riparian areas provide some of the Refuges most species rich-habitats.

Landscape Perspective

In order to understand the role of Refuge lands within the ecosystems of this region, it is helpful to consider some natural resources and processes within a larger landscape context. For the purposes of this analysis, the Colville sub-basin, an area measuring some 650,000 acres, was chosen as the scale at which to assess the surrounding ecosystem. The refuge is a 40,198 acre parcel of land which lies within the Colville sub-basin.

Although forest cover types continue to be found over approximately the same total areas as in 1900, dramatic changes in forest structure have occurred over large areas of the Colville River sub-basin. Specifically, old single-strata forest is gone from the watershed completely and old multi-strata forest

covers only about 10% of its former area in the watershed. Young forests, particularly the mid seral types of young multi-strata forest and understory reinitiation forest, cover about 15-18 times their extent in 1900. These changes in forest structure on a sub-basin scale have significant repercussions for wildlife habitat, especially for those species with narrower habitat requirements. At the scale of the entire Interior Columbia Basin, at least eight terrestrial vertebrate species have experienced a loss of greater than 67% of the habitat available to them historically, while an additional 47 terrestrial species have experienced a loss of 33-67% of their historical habitat (Wisdom, et al. 1998). These species include the white-headed woodpecker, the flammulated owl, western bluebird, hoary bat, and many others.

There has been a clear shift in fire regimes throughout the Colville River sub-basin from frequent to infrequent fires. In general, fires regimes have also become more lethal. Specifically, non-lethal, frequent and very frequent fires and mixed, frequent fires have declined, with a corresponding dramatic rise in lethal and infrequent fires. The frequent, non-lethal fires of the past contributed to the maintenance of large trees and open understories typical of single strata ponderosa pine. The loss of frequent and non-lethal fires have led to ever-increasing fuel loads, crowded and over-stocked forest stands and a greater and greater risk of catastrophic (lethal) fire occurrence.

Fish and Wildlife and their Habitat

The Refuge supports a variety of wildlife and fish common to riparian, field, and forest habitats, including approximately 196 species of birds, 58 species of mammals, and 14 reptiles and amphibians. The Refuge also includes parts of all the major forest zones located in Northeast Washington, from the dry forest of ponderosa pine through the moist, mixed conifers, to the cold forest of Engelmann spruce and subalpine fir zone. Not only is the Refuge one of the largest refuges in the state, it is bordered by the Colville National Forest on two sides, essentially magnifying the Refuge s value for wide ranging species of wildlife.

The only federally listed threatened or endangered species known to regularly occur on the Refuge is the bald eagle. Bald eagles are frequently seen along the Little Pend Oreille River, primarily in winter. Habitat also exists for the Canada lynx, a species recently listed as threatened by the U.S. Fish and Wildlife Service. Lynx presence has been confirmed near the Refuge. Migratory birds are of particular interest due to being mentioned in the Executive Order establishing the Refuge. White-tailed deer are a species of local interest and have historically been a focus of management activities at the Refuge.

Many species of waterfowl have been observed on the Refuge. Duck species include mallard, ruddy, redhead, common goldeneye, ringneck, and bufflehead. Wood ducks and green-wing, blue-wing and cinnamon teal are all commonly observed, along with common and hooded mergansers. Canada geese breed on several Refuge lakes and wetlands. Migratory and other birds of interest include the American redstart, northern goshawk, flammulated owl and ruffed grouse.

The Little Pend Oreille River (approximately 10 miles) and the main fork and North Fork of Bear Creek (approximately 15 miles) provide most of the in-stream fish habitat managed on the Refuge. The four trout species that are found are rainbow, cutthroat, brook, and brown trout. Native non-game species observed are redside shiner and shorthead sculpin. Amphibian species known or suspected to occur on the Refuge include tiger salamander, long-toed salamander, western toad, Pacific tree frog, and Columbia spotted frog.

While no Federally listed proposed, threatened or endangered plant species are known to inhabit the Refuge, one Washington State threatened species, adder s-tongue (*Ophioglossum pusillum*), is known to occur at one location. Most Refuge habitats harbor non-native plants. Some of these plants occur incidentally but others, having a tendency to invade and displace native plants, are considered noxious weeds. Weeds that occur on the Refuge include leafy spurge, plumeless thistle, and yellow hawkweed.

Approximately 200 miles of roads currently exist within the Little Pend Oreille National Wildlife Refuge administrative boundary. The majority of these roads are located on Refuge lands; others are situated within inholdings. Approximately half of these roads are infrequently used and would need clearing for vehicle access.

Refuge Recreation and Special Uses

The Refuge estimates use at over 50,000 visitor use days each year. The two most popular recreational activities are fishing and hunting. Several species of big game, small game, predators, and migratory waterfowl are hunted on the Refuge. There is also a growing interest in wildlife viewing. With the exception of the early spring fishing season and the fall deer hunting season, most Refuge camping is not directly associated with other Refuge uses such as hunting, fishing, wildlife observation or photography. Horseback riding, including organized rides, also occurs on the Refuge. Other recreational activities include snowmobiling, mountain biking, cross-country skiing, and dog sledding.

For the past 33 years, the Air Force Survival School has used the Refuge and adjacent lands for survival and evasion training. The training occurs from January through September, with concentrated use in the late summer. The Refuge area has a history of being homesteaded, logged, and farmed. A livestock grazing program has been managed to some degree on the Refuge since its establishment. No prehistoric sites have been located within the Refuge.

ENVIRONMENTAL CONSEQUENCES

In the following discussion, the terms positive , negative , and neutral are used frequently. A positive effect means that the action would be favorable over the short or long term to the resources under consideration. A negative effect means that the action or set of actions would be detrimental over the short or long term to the health or availability of the resource under consideration. A neutral effect means either (a) that there would be no discernable effect, either positive, or negative, on the resources of

concern over the time period indicated; or (b) that positive and negative effects would both occur and in summary cancel each other out. No change in management practices from the present (as in Alternative A) does not imply neutral effects over time. See each resource for the comparison of effects under different altematives.

Effects to Forest Habitats

Coniferous Forests

Ponderosa pine and Douglas-fir (dry site) forest habitats would be actively managed under Alternatives B, C, D, and E using precommercial and commercial thinning, selective harvest, and prescribed fire. Approximately 1,000 acres per year would be treated, with an overall goal of treating approximately 15,000 acres over the 15-year span of this plan. The long-term intent of the treatments under these alternatives is to restore the forest structure and composition to conditions more closely resembling the conditions present in the mid 1880s, just prior to settlement by American pioneers, homesteaders, and miners. Thinning and use of prescribed fire is also intended to promote conditions that would be favorable to reintroduction of a more natural fire disturbance regime over the long-term, thus lessening the likelihood of a catastrophic fire that could wipe out huge areas. Treatments in Alternatives B ,C, and E would begin the process of promoting forest stand development into mature and old stages. These habitats are increasingly scarce at a regional scale (especially the mature ponderosa pine stand types) and have important values to native wildlife.

Alternative D would adopt a slightly more conservative approach than Alternatives B, C, or E. Under Alternative D, forest areas that remain unroaded would not be commercially thinned or salvaged. Low impact techniques for fire suppression would be used across the Refuge as much as possible. Benefits to interior forest dwelling and disturbance sensitive wildlife would likely be higher, at least under the short-term, than under Alternatives B, C, or E.

Alternative A takes a largely passive management approach, proposing a limited amount of activity, mainly salvage and limited thinning and burning. Wildfires would also be actively suppressed. Under this alternative, tree density would remain high and species conversions to shade tolerant types would continue, augmenting problems associated with forest health. This would result in increased fuel loadings, such that over the long-term, these conditions would probably make catastrophic wildfire inevitable, despite fire suppression efforts.

Riparian and Deciduous Forests

Alternatives B, C, D, and E each propose active measures to plant trees and shrubs in devegetated or degraded riparian areas. These alternatives also would eliminate livestock grazing completely (Alternative D) or in riparian areas (Alternative B), or use grazing only as an occasional vegetative management tool (Alternatives C and E). The elimination of annual livestock grazing from riparian areas can dramatically

speed the vegetative recovery of bare and degraded sites. Other active measures to restore aspen pockets (both through use of fire and curtailing of grazing) would also occur under Alternatives B, C, D, and E. Alternatives B, C, D, and E would all reintroduce periodic fire into the landscape which may have positive benefits to aspen.

Some riparian areas on the Refuge are in poor condition due to recreational use. Alternative C, which eliminates all Refuge camping, would go the furthest to aid recovery of riparian areas damaged by camping. Dispersed riparian camping would be prohibited under Alternatives B and E, and Alternative D would likely result in little to no riparian camping. Riparian areas would be protected from road construction and timber harvest by a buffer measuring 200 feet or to the extent of the 100-year floodplain under Alternatives B, C, D, and E.

Compared to the other alternatives, Alternatives C and D restore and develop riparian forests the most, especially the deciduous riparian forests of the alluvial stream areas that have been strongly affected by grazing. Alternative A would not adopt any additional measures to restore or protect riparian areas and would keep grazing and camping at its present level. This alternative would have a continued negative impact to existing and potential riparian forests.

Effects to Other Plants

Noxious Weeds

Noxious weeds, which mainly inhabit roadsides and open fields at the Refuge, would be controlled using integrated weed management under all alternatives. The action alternatives (B, C, D, and E) incorporate direct measures to treat both roadsides and fields. The action alternatives would also attempt to curb the spread of noxious weeds indirectly through controls on grazing and horse use. All of the action alternatives strive to reduce weed infestation beyond Alternative A, which sets no objective for weed elimination. Overall, Alternative D would enact the most aggressive programs against noxious weeds.

Rare Plants

Under Alternatives B, C, and E, all known locations inhabited by rare plants would be monitored on a regular basis. Alternatives A and D include provisions for monitoring *Ophioglossum pusillum* only.

Inventories to find new locations of rare plants are planned under Alternatives B, C, D, and E. These alternatives would better protect Refuge populations of rare plants than Alternative A, because a resource cannot be protected with certainty if its existence is unknown. Protection of known rare plant locations would occur under all alternatives.

Effects to Water Quality and Aquatic Habitats

Water Quality

All alternatives would minimize the construction of new roads. In addition, Alternatives B, C, D, and E each would involve repair of roads that limit fish passage and/or cause sedimentation to aquatic habitats, and the planting and stabilizing of devegetated or unstable streambanks. These measures would result in a reduction of direct sediment input to streams. Alternative A proposes no active measures to limit stream sedimentation except by minimizing new road construction.

Alternative B would eliminate grazing within the riparian zones. Riparian grazing would also effectively be discontinued under Alternatives C and E. Alternative D eliminates grazing altogether. These restrictions would help to diminish soil compaction, streambank erosion, and fecal contamination of Refuge streams. Alternative A would not have these beneficial effects. Ohmart (1996) demonstrated that riparian recovery may be two to four times faster in ungrazed riparian areas than in riparian areas subjected to managed grazing.

Alternatives B, C, D, and E each also propose forest management activities that would possibly involve some soil displacement stemming from yarding, fuels reduction, or road construction. Forest harvest is also known to increase the magnitude and frequency of peak flows, especially in areas subject to rain-on-snow events. These effects are proportional to the number of acres harvested and the percent of canopy removed. Under Alternatives B, C, D, and E, the Refuge would adopt 200-foot buffers along streams where timber harvest and road construction would generally not occur. This rule would help to keep displaced soil from entering Refuge water systems. Some short-term increases in peak flows with resultant potential effects to channel morphology are possible. In sum, Alternatives B, C, D and E would be likely to have a small negative short-term effect on water quality stemming from forest management activities. Over the long-term, water quality should be enhanced as a larger percentage of the Refuge develops into mature structural stages.

Over the short-term, Alternative A would not result in dramatic degradation or improvement of water quality. However, under this alternative, the Refuge has a slightly higher likelihood of experiencing catastrophic wildfire. Wildfire could cause severe loss of vegetation cover and can increase soil surface water repellency for a short period.

No dispersed riparian camping would be allowed under Alternatives B, C, and E. Although this rule could be difficult to enforce in all parts of the Refuge, overall there would likely be an immediate reduction in pollutants and, over time, visible riparian recovery in these former campsites.

Aquatic Habitats

Stream sedimentation, high road densities, loss of in-stream large wood, and loss of pool habitat have been cited as key factors involved in fish species declines in the inland northwest. Alternatives B, C, D, and E would be expected to have positive long-term benefit to aquatic habitats, owing to passive and active measures taken in these alternatives to repair or obliterate eroding roads, replace culverts that block fish passage, restore streambank stability, and increase in-stream structural complexity.

Hydrologic changes at the Refuge would occur under Alternatives C, D, and E. Alternatives C and E would ensure that flows in the original channels of diverted streams take priority over diversion flows. In a low water year, this could result in positive benefits to stream conditions at the expense of the lake habitats. Alternative D goes farther, proposing to restore the natural hydrology altogether on the Refuge by breaching the dams and diversions that were built to establish Bayley and McDowell Lakes and Potter's Pond. The lake beds would likely revert to shallow wetland areas. Eliminating the diversions would mean that more water would remain in the main streams, especially during high water runoff seasons (late spring).

Aquatic habitats would realize an additional positive benefit under Alternatives B, C, D, and E, because grazing would be eliminated or conducted outside riparian areas.

Effects to Air Quality

Known and predictable air quality impacts would result primarily from smoke generated by forestry activities undertaken under Alternatives B, C, D, and E. Temporary impacts to air quality (mainly from particulates) can be expected from the prescribed burning and slash disposal that would occur on up to 1000 acres/year under these alternatives.

The Refuge will follow the smoke mitigation recommendations in the step-down Fire Management Plan. Hence, the impacts from the proposed prescribed fire management program should be of relatively short duration and will mainly affect unpopulated areas of the Colville National Forest, east of the Refuge.

Large volumes of smoke could be released at any time (normally late summer) if a catastrophic wildfire were to occur, exceeding EPA standards for particulates. Wildfire could occur under any of the alternatives, but is more likely under Alternative A. This alternative would allow fuel loading to continue and increase unchecked, whereas the other alternatives include plans to thin and underburn approximately 8,000 acres of dry forest over the life of this plan. Stands receiving this treatment are less likely to ignite or contribute to the spread of large wildfires.

Effects to Selected Fish and Wildlife Evaluation Species

Rather than try to predict the effects to every species or rely on guild analysis, certain fish and wildlife species were selected, based on a variety of criteria, for more detailed analysis. A summary is provided below.

Bald Eagle: It is not known if any of the Refuge lakes are large enough to attract eagles for nesting. As a highly visible species found mainly in association with aquatic habitats, the eagle is more vulnerable than many other species to human disturbance, especially at nest areas (Anthony, et al. 1992).

The level of recreational use that would be expected to continue near the lakes under Alternatives A, B, and E during the nesting season would probably preclude the possibility of eagles establishing a nest on the Refuge. Foraging habitat for bald eagles could improve slightly under Alternatives B, C, and E, primarily due to improved aquatic habitats resulting in healthier fish populations. The delay of the fishing opener at the lakes until July 1 under Alternative C, coupled with the elimination of camping, could improve the chance of nest site establishment at McDowell or Bayley Lake.

Alternatives B, C, D, and E would all eliminate low-level helicopter overflights on the Refuge. This policy would benefit the eagle. Under Alternative D, the eagle could suffer a negative impact due to the loss of the lake habitat, yet since most of their use of the Refuge occurs during winter and along the river, this impact is expected to be small.

Alternative A would be expected to result in a negative impact to bald eagles, due to the continuing degradation of riparian and aquatic habitats, loss of streamside vegetation, absence of active management to promote the development of large nest or roost trees, and the continuation of helicopter overflights by the Air Force within proximity of potential or occupied roost trees.

Canada lynx: This feline predator should benefit primarily from actions that would reduce or eliminate human disturbance and access into its habitats, especially during winter, and from actions that would promote or maintain the specific habitat needs necessary for this species to den and find adequate food (Koehler and Aubrey 1994).

Current disturbance impacts to lynx and their habitat stem primarily from snowmobile use of high elevation areas of the Refuge, including Olson Creek Road, during winter months. Alternative A would continue snowmobiling as it currently exists on the Refuge. Alternative E would allow snowmobilers to pass through the Refuge on Olson Creek Road only.

Impacts of snowmobiles to lynx are mainly indirect, resulting from 1) effects impacting their main food source (snowshoe hares) and from 2) effects benefitting a key competitor (coyotes). These phenomena are explained in the next several paragraphs.

According to Neumann and Merriam (1972) snowmobile use affected snowshoe hare and red fox mobility and distribution in Ontario, mainly within 76 meters of snowmobile trails. Snowshoe hares avoid snowmobile trails while red foxes use them. Snowshoe hares are the primary food of lynx, therefore loss of snowshoe hare habitat areas affects lynx by reducing their food source.

The authors of *The Lynx Science Report* (Ruggiero et al. 1999) feel that the coyote is a potentially formidable competitor with lynx, citing the coyote s wide habitat niche, heavy predation on snowshoe hares, high reproductive rate, great behavioral plasticity, and high tolerance of humans. Coyote population numbers have increased dramatically in many places over the last few decades, (including a 44 times increase in Washington state between 1960-1984), using coyote harvests as an indicator. With several citations, *The Lynx Science Report* substantiates the claim that coyotes access high elevation areas by moving along paths, roads, and even snowshoe hare trails.

The habitat issues highlighted by *The Lynx Science Report* authors and others (openings, snowmobiles, higher road densities, etc.) all exist in the local area and may be combining to pose a problem for lynx. These problems would worsen under Alternative A. Under Alternative E, the Refuge would seek to delineate another snowmobile route, ultimately resulting in no snowmobiling impact on the Refuge. In the interim, snowmobile use would continue Olson Creek Road and the potential negative effects of this activity on lynx will be the same as those of Alternative A. Alternatives B, C, and D would all eliminate snowmobile use on the Refuge and on Olson Creek Road. Although this strategy would require increase law enforcement patrols, it would clearly benefit lynx. Alternatives B, C, D, and E would also provide benefit by implementing road closures on all but the county maintained roads between January 1 and April 14, a critical time for lynx.

Alternatives B, C, D, and E each include forest management actions to promote the development of late successional characteristics on forest lands. To the extent that these actions occur in high elevation lynx habitat, these actions would benefit the lynx, which relies on late successional forests with large downed woody debris to provide denning sites with security and thermal cover for kittens. Under Alternative A, conditions for the lynx would be expected to continue to deteriorate.

Overall, Alternative D would be expected to have the most benefit to lynx, since this alternative limits human access to the Refuge to the greatest extent, avoids roading and harvest in unlogged stands, implements proactive measures to restore forest structures, eliminates Air Force training use, and reduces camping significantly.

Columbia Spotted Frog: Alternatives B, C, D, and E, which include measures to eliminate grazing in riparian areas and measures to restore streamside vegetation, would result in positive benefits for the spotted frog. Alternative D would be likely to have the most positive benefit of the alternatives because it also eliminates fish stocking and restores the natural hydrology of the lakes. Under Alternative A, habitat conditions for the spotted frog would possibly deteriorate and would not improve.

Northern Goshawk: Forest management activities (thinning and prescribed fire) would occur within potential goshawk habitat under alternatives B, C, D, and E. Forest management has the potential to cause short-term deleterious effects to goshawks through removal of canopy closure. Depending upon the prescription, thinning and/or prescribed fire may temporarily reduce canopy closures below levels that support goshawk territories (USFWS 1998). To mitigate disturbance and habitat impacts to goshawks, a

combination of distance buffers and seasonal restrictions would be applied where forest management activities are undertaken near known nest sites under Alternatives B, C, D, and E.

Alternatives B, C, D, and E would all be expected to have (over the long-term) a positive effect on goshawks, since the forest treatments identified in these alternatives would provide for a greater abundance of large trees (and in some areas, multi-storied canopies may develop as a result of thinning and underburning). Over the short-term, there could be some negative impacts to goshawks as forests are thinned.

Alternative A would be expected to have a neutral effect on the goshawk. No proactive measures would be taken to improve nesting opportunities on the Refuge, but foraging habitat would continue to be available.

Ruffed Grouse: Implementing Alternative A includes allow livestock grazing at approximately the current stocking level. Livestock would continue to browse the aspen, retarding both the expansion and development of more desirable multi-aged stands. Alternative A would continue to allow unregulated camping. The majority of these camping sites are in riparian habitats, reducing or eliminating their value as high quality grouse habitat. Under this alternative, grouse populations would be expected to remain stable or gradually decrease.

Alternative B would eliminate grazing in low-gradient alluvial riparian areas. Removing livestock browsing pressure in this area of high aspen density would have a substantial positive effect on the quantity and quality of existing and future grouse habitat. Alternative B would eliminate dispersed camping and restore riparian areas, having a positive affect on the amount and quality of ruffed grouse habitat available.

Alternative D would have effects very similar to Alternatives C and E. All three eliminate livestock grazing and riparian camping, restore natural forest structure through thinning and prescribed fire, and plant and stabilize stream banks. Theses actions would have positive impacts on grouse habitat.

MacGillivray s warbler: The MacGillivray s warbler represents passerine migrants that utilize woodland riparian and aspen habitats. Planting trees and shrubs in riparian areas as proposed in Alternatives B, C, D, and E should have a positive effect by increasing the amount of woody shrub habitat available. Many of these riparian sites are vegetatively degraded due to many years of annual livestock grazing. The elimination of livestock grazing Refuge-wide (Alternative D), or in riparian areas (Alternative B), or only using grazing an occasional vegetation management tool (Alternatives C and E), should have a significant positive impact on habitat quality for MacGillivray s warbler and other wildlife species using riparian sites by speeding the recovery of these degraded areas. The potential decrease in the number of cowbirds infesting the Refuge expected with the decrease or total elimination of cattle grazing proposed under Alternatives B, C, D, and E would likely have little effect on nesting success of MacGillivray s warbler.

Traditional camping sites next to streams have resulted in the loss of riparian vegetation. The total elimination of camping on the Refuge (Alternative C), or the elimination of dispersed recreational camping in riparian areas (Alternatives B and E) should result in the recovery of vegetation in these camping sites. Implementation of Alternative D would likely result in little to no riparian camping, with a similar positive result.

Measures to restore and encourage aspen reproduction, such as prescribed fire, tree planting, and curtailing grazing, would occur under all action alternatives. These actions should also result in positive benefits for this species.

Under Alternatives B, C, D, and E, riparian areas would be protected from road construction and timber harvest by either a 200 foot buffer (or greater, depending on the width of the 100 year flood plain). Adoption of this standard should protect these areas from the pre-commercial and commercial thinning of nearby upland sites proposed under all the action alternatives. This thinning, when combined with the prescribed fire also proposed in the alternatives, should encourage shrub growth, further enhancing habitat quality for this warbler.

Alternative A would not adopt any additional measures to restore or protect riparian areas, nor include the increased use of prescribed fire, while maintaining livestock grazing and camping at present levels. Therefore, this alternative would have a continued negative impact on MacGillivray s warbler.

Common Goldeneye: Alternative D would eliminate much of the lacustrine habitat on the Refuge, by breeching dams and diversions. Under this alternative, goldeneye habitat would be reduced by about 115 acres.

The curtailment or elimination of riparian camping under Alternatives B, C, D, and E would benefit the goldeneye. Camping and other human uses disproportionately impact riparian areas on the Refuge and likely disturb or disrupt nesting or foraging goldeneyes and other species of waterfowl.

Overall, Alternative C would be likely to result in the most positive benefit to the common goldeneye, partly due to camping restrictions and partly because the delay in the fishing opener reduces disturbance to nesting waterfowl. Alternatives A, B, and E are expected to have a negative effect on goldeneye since human disturbances at Refuge lakes would remain at mostly similar levels to those existing currently.

Flammulated owl: An associate of low to mid elevation mature ponderosa pine forests, this insectivorous owl benefits from actions that promote the development of large diameter ponderosa pines (for nesting) and a multilayered and relatively open canopy (for foraging) interspersed with dense thickets (for roosting). Because of the forest restoration efforts planned in low elevation forests under Alternatives B, C, D, and E, these alternatives would have the most positive effect on this species. Alternative A, which does not adopt forest restoration measures, would be expected to have a slightly negative effect on the owl.

Hoary Bat: This species is a foliage-roosting bat closely associated with late successional forests for roosting. As a user of contrasting habitats, the hoary bat represents those species that rely on the simultaneous maintenance of several components of Refuge habitat. This species may realize more benefits from the fields that have been maintained on the Little Pend Oreille than most other native species; yet it would also likely benefit from actions to improve the distribution of riparian forests and actions to promote mature and late successional forests. Alternatives B, C, and E would be expected to positively benefit the species, primarily due to actions promoting late successional characteristics in forested habitats (considered best for roosting), the actions to restore riparian habitats, and the maintenance of some fields as openings.

Alternative D would be expected to have a neutral effect on this species because it enhances roosting habitat and some foraging habitat in riparian areas, but all fields would also be allowed to revert back to forest. Alternative A would also likely have a neutral effect because it maintains fields as foraging habitats but does nothing to promote roosting habitat.

White-tailed Deer: Alternatives B, C, D, and E each propose the reintroduction of low intensity fire in dry forest habitats. Underburning under the right conditions can stimulate sprouting and regeneration of browse species such as ceanothus, thus benefitting the winter range habitats of the white-tailed deer.

Fields remaining from historic patterns of human settlement currently provide rich sources of late winter/early spring forage for deer, with the smallest fields providing forage in close proximity to secure cover. Alternatives B, C, and E each propose maintaining up to 500 acres of this habitat, with grasses maintained through cattle grazing, mowing, or fire (Alternative B) or mowing or prescribed fire (Alternatives C and E). Within the 500 acres, Alternatives B, C, and E would maintain 200 acres with annual or perennial crops that would benefit wintering white-tailed deer.

Alternative A would allow grazing where it occurs presently (65% of the Refuge s open habitats are grazed). Under Alternative A, a greater number of acres would be available in grass forage, but competition between cattle and deer would slightly diminish the quantity and quality of forage available to the deer, and little would be done to slow the spread of noxious weeds. Aggressive integrated interventions to suppress noxious weeds in the fields would be undertaken in Alternatives B, C, D, and E. Alternative B, C, and E all apply management in old fields that would improve deer habitat more than Alternative A. Thirty-five miles of interior fencing, an impediment to wildlife passage that occasionally causes deer mortality, would be removed under Alternatives C, D, and E.

The cumulative effect of practices under Alternative A is a moderate to high level of disturbance. Because of these negative impacts under current management, Alternative A is considered to be poor for deer. Additional deer hunting opportunities could potentially be offered at the Refuge under Alternatives C and E. Though these hunts may increase hunting disturbance somewhat over current levels. The cumulative level of disturbance will be considered when designing seasons.

Alternatives C, D, and E would eliminate all disturbances associated with the Air Force and Alternative B would reduce the level of Air Force disturbance by eliminating wintertime use, limiting the number of Air Force personnel, and curtailing helicopter and off-road vehicle use. Alternatives B, C, E, and especially D, would ensure road density levels remain at or below the standard recommended by Washington Department of Fish and Wildlife. Enacting these closures would significantly reduce disturbance to deer, especially in the winter, when only the three county maintained roads would be open between January and April. This action could also reduce incidental poaching.

Although all of the action alternatives would benefit deer, overall, deer would be best served under Alternatives C and E.

Pileated woodpecker: Alternatives B, C, D, and E would be expected to benefit the pileated woodpecker over the long-term because the forest restoration efforts that are included in these alternatives would be expected to produce a higher density of large trees and snags that these woodpeckers use for feeding, roosting, and nesting. Alternative A would likely have a neutral effect.

Rainbow Trout: Changes in the livestock grazing program proposed under Alternatives B, C, and D would all be expected to have an immediate positive effect on this species. Alternative E would begin to have a positive effect after five years.

Stocking only occurs in the lakes, but a small potential occurs for stocked fish to spill over into streams during high water (Shuhda, pers. comm.). Although it is highly unlikely ceasing stocking would cause the river fish to revert back to the pure and distinct native strains, ceasing stocking would at least have the benefit of not further polluting the gene pool. Strategies under Alternatives B, C, and E would include ceasing stocking of the eastern brook trout, but stocking of coastal rainbow would continue.

The riparian and stream restoration efforts undertaken under Alternatives B, C, and D would also aid the trout. Alternative A would be expected to result in a negative effect on rainbow trout since stream degradation from grazing, camping, and roads would continue. Effects of continued livestock grazing under Alternative E would result in a negative effect on rainbow trout similar to that associated with alternative A. A positive effect should begin in 2005 when livestock grazing is discontinued under alternative E.

Effects to Cultural Resources

Under all alternatives, the cultural resource values of the Little Pend Oreille NWR would be treated according to the regulations of Section 106 of the National Historic Preservation Act (NHPA).

Alternative B would have a neutral to positive effect on cultural resources. Changes in programs that would have a positive effect on cultural resources include maintaining 200 acres of openings, closing off a few entrances and roads, and eliminating off-road vehicles. Changes that could have a negative effect on

cultural resources include forest management techniques that include harvest and thinning and control of wildfires, and revegetating old farm fields. This alternative also includes provisions to enact a proactive cultural resources program, which would be very positive for cultural resources.

Alternative C is similar to Alternative B except for some modifications that make this alternative generally more positive toward cultural resources. Positive changes in programs include the elimination of the Air Force survival school, camping, horseback riding, and off-road vehicles, and closing off roads and entrances. Maintaining 200 acres of openings, developing wildlife viewing in some fields, and developing an interpretive program that includes natural and cultural history are very positive aspects of this alternative. This alternative also includes provisions to enact a proactive cultural resources program, which would be very positive for cultural resources.

Generally, Alternative D has a positive affect on preserving cultural resource values. Limiting access to 4 entrances and closing roads would lessen the opportunity for vandalism of archaeological sites. Elimination of the Air Force survival school, grazing, and horseback riding would lessen the threats to historic sites posed by these activities.

Alternative E includes both positive and negative affects to cultural resources. Phasing out the Air Force Survival School, closing selected roads, and modifying or eliminating the grazing program would be positive steps toward resource protection. Developing interpretive programs would be very beneficial for cultural resources, especially for interpreting the homestead landscape. This alternative also includes provisions to enact a proactive cultural resources program, which would be very positive for cultural resources.

Activities that have a neutral affect on cultural resources are the current fishing strategies, noxious weed management, and camping in designated campgrounds. Repairing roads for fish passage would require compliance with Section 106, but no known sites would be affected.

Effects to Public Access and Recreation Opportunities

Public Access

The Refuge would have more controlled access under all alternatives except Alternative A. Alternatives B and C would maintain an intermediate level of public access with 8 maintained entrances; Alternative D would close all but four entrances. Alternative E would maintain 9 entrances. Seasonal road closures to reduce wintertime disturbance to wildlife would also be implemented under Alternatives B, C, D, and E. The reduced access under Alternatives B, C, and E may have a slight effect on public use, but this effect is expected to be negligible because most Refuge users utilize the eight or nine entrances that would be maintained.

Recreation Opportunities

General: Outdoor recreational use of public lands is on the increase nationwide, and, with the population growth in Stevens County and Spokane, the Little Pend Oreille NWR can probably expect increased visitation in the next ten years, even if an alternative is chosen that limits traditional uses of the Refuge such as camping. Even without any management initiatives, (Alternative A) visitor use at the Refuge would change over the next fifteen years, reflecting national and regional demographic and recreational preference trends. We used historical trends as a basis for predicting future visitor levels under Alternative A.

To a large extent the alternatives are designed to differentially channel human activities on the Refuge; each alternative strikes a different balance between the goal of meeting public demand for wildlife-dependent recreational opportunities and the goal of maintaining and restoring wildlife populations and habitats. Under all action alternatives, many recreational activities would be reigned in or regulated in one form or another.

Hunting: Alternatives C and E could expand Refuge hunting opportunities, specifically offering the state seasons for spring turkey, grouse, and deer and elk bow hunts. Alternative D would restrict Refuge hunting, specifically banning bear, cougar, coyote, and bobcat hunts.

Hunting seasons would remain the same as at present under Alternatives A and B; some restrictions on camping would occur under Alternative B but these would probably negligibly affect hunting opportunities. Game and waterfowl would likely become increasingly difficult to find under Alternative A, due to the combined effects of disturbance from roads, unregulated camping, Air Force use, and lack of habitat management. National and state trends for hunting predict declines over the next fifteen years. The alternatives would be affected by these larger trends, however, total hunting visits on the Refuge would be influenced by the seasons offered and area available for hunting and camping as well.

Alternatives C and E could expand Refuge hunting opportunities, specifically offering the state seasons for spring turkey and grouse, and fall deer and elk bow hunts. By eliminating Air Force use of the Refuge under Alternatives C, D, and E, a larger area could also be made available for hunting during fall seasons. Even with these expanded opportunities, total hunting on the Refuge would likely decline slightly under Alternative E. Under Alternative C, camping restrictions would make hunting a day use only opportunity.

Fishing: Overall, the elimination and strong restrictions on camping under Alternatives C and D would probably result in far fewer visitors fishing at the Refuge under these alternatives. This could increase the quality of fishing, with larger fish in streams. Lake fishing would also decline severely under Alternative D, since the dams maintaining Bayley and McDowell Lakes would be breached, and these areas would revert to seasonally moist wetlands. In addition, stocking would cease. The overall result would be a loss of fishing opportunities.

Alternatives C and E would promote catch and release fishing on the Little Pend Oreille River. Alternatives B, C, and E all seek to increase opportunities for natural spawning at the lakes and streams. Alternatives A, B, and E continue the fishing seasons as they presently exist on the Refuge, while Alternative C would delay the fishing opener on Refuge lakes to favor waterfowl nesting.

Wildlife Viewing, Interpretation, Environmental Education, and Photography: Wildlife observation and photography are two of the fastest growing outdoor recreational activities, both statewide and nationwide. Even without active programs to encourage this activity, all alternatives would see a marked increase in visitation for wildlife observation and photography. It is not known to what extent visitors combine wildlife observation and photography with other activities at the Refuge such as camping, fishing, and hunting. However, people who exclusively come to the Refuge to view and photograph wildlife may be deterred to some extent by hunting, snowmobiling, Air Force overflights, and other noisy, disturbing activities. The Refuge has received comments from visitors to that effect over the years. The opportunities for these non-consumptive activities would therefore increase as these human disturbances decrease.

Overall, Alternative D would probably result in the least disturbance on the Refuge, followed by Alternative C. On the other hand, wintertime road closures under all of the action alternatives would limit vehicular access and thus increase potential viewing opportunities for certain publics. For those willing to walk, snowshoe, or ski, viewing opportunities could be greatly enhanced during this season under Alternatives B, C, E, and especially Alternative D. Alternatives C and E would emphasize visitor education and create both viewing areas and programs.

Snowmobiling: Snowmobile use would not be allowed to continue on the Refuge under Alternatives B, C, and D. In addition, snowmobile traffic on Olson Creek Road, which largely accesses Calispell Peak, would be eliminated under Alternatives B, C, and D, and the snowpark off Highway 20 at Olson (Tacoma) Creek Road would be eliminated under Alternatives C and D. Under Alternative E, snowmobile use would also be prohibited, except that traditional snowmobile ingress and egress (together with associated grooming) along the four miles of Olson Creek Road that cross the Refuge would be permitted at the current level of use. No off-road snowmobile excursions would be allowed. The Refuge would also initiate work with adjacent land managers and recreationists to seek a new snowpark and alternate winter access to Calispell Peak.

Camping: Camping opportunities would be curtailed under Alternatives C, D, and E, and, to some extent, B. Under Alternative C, camping would no longer be allowed. Alternative D would allow primitive (no-trace) camping in areas that vehicles cannot access; all vehicle accessible camps and campgrounds would be closed and restored to a natural condition. Dispersed riparian camping would be stopped under Alternatives B and E; these two alternatives would also permit camping only in certain designated campgrounds and dispersed sites during specific times of year. Alternative A would allow camping to continue in a largely unregulated fashion.

Other recreational activities: Horseback riding would be eliminated under Alternatives C and D. Alternatives B and E could maintain or even increase horseback riding, but it would occur under the auspices of an equestrian plan that would deal with such issues as overnight use, trails, and horse feed. Most other recreational activities (including dog sledding, cross-country skiing, snow sledding, mountain biking, and others) would be allowed to continue as at present under all alternatives until and unless these uses become incompatible with Refuge goals and purposes.

Dirt bikes and unlicensed all-terrain vehicles would be prohibited from operating on the Refuge under all alternatives. Only licenced motorized vehicles would be allowed on designated roads.

Effects Related to Livestock Grazing

Continuation of cattle grazing as currently practiced under Alternative A and for the first five years Alternative E would result in continued negative effects to riparian and deciduous forest, water quality, aquatic habitats, and evaluation species including bald eagles, Columbia spotted frogs, MacGillivray's warbler, deer, rainbow trout, ruffed grouse. In addition, continuation of cattle grazing would be likely to negatively affect the protection of cultural resources, and riverine fishing.

Based on an in-Service 1996 grazing review (USFWS 1997), fisheries habitat surveys of the Little Pend Oreille River and Bear Creek in 1996 and 1997 (Kelly Ringel 1997; Kelly Ringel 1998), and a riparian condition evaluation on 32 valley units of five Refuge streams in 1996 and 1997 (Pyle 1997), the annual cattle grazing program is contributing to a poor condition for Refuge fish and wildlife riparian and stream habitats. Cattle grazing poses risks to wildlife, fish and plants in upland areas as well as riparian areas, through a number of mechanisms. Livestock can compete with wildlife for a common food source, displace wildlife through their presence, facilitate the invasion of pest species, and alter the structure of habitat.

All of the action alternatives would improve the situation for native fish and wildlife at Little Pend Oreille, by reducing or eliminating livestock grazing. Managed, rotational grazing designed to reduce impacts on riparian habitats would occur under Alternative B, and would diminish effects of grazing on Refuge habitats compared to Alternative A. This alternative would require modification of existing allotments and the construction of additional fencing to keep cattle out of alluvial riparian areas. Non-alluvial riparian areas would continue to be available. Recovery of grazed areas currently showing impacts would be faster under Alternatives C and D and those locations in Alternative B where cattle are excluded completely (according to Ohmart 1995, riparian healing occurs two to four times more rapidly under exclusion than when subjected to rotational grazing.) Under Alternative E, recovery of these grazed areas will be delayed five years.

Effects Related to Air Force Survival School

The continuation of the Air Force Survival School training program under Alternative A would result in negative effects to bald eagle, lynx, deer, cultural resources, hunting opportunities, wildlife viewing, photography, interpretation, and environmental education opportunities.

The most significant potential impacts to wildlife are associated with helicopter support of training which involves low-level flights, hovering and landing; use of certain pyrotechnics and simulated weapons, and effects of disturbance from approximately 80 people scattered over one-third of the Refuge.

Air Support of Training

Effects to wildlife: Since no on-site empirical studies have been completed, we relied on several literature reviews undertaken by others to explore the effects of aircraft noise and proximity on wildlife. Bryant (1993) completed an annotated bibliography of the effects of disturbances due to aircraft on fish and wildlife. Bryant s review is the most comprehensive and the most recent and was used as the basis for the analysis presented here.

Of the fifty-three sources Bryant reviewed, thirty-four constituted scientific studies. Of these, about 12 were considered of superior value because they were conducted with large sample sizes and/or were experimental manipulations with controls.

Raptor studies: Both raptor studies showed effects from military training activities and/or low flying aircraft.

Large mammal studies: Eight of the 10 studies considered most reliable in Bryant (1993) showed that large mammals exhibit a variety of stress reactions in response to low level overflights.

Effect of distance and sound level: Distance seems to be a better predictor of response to helicopter overflights than sound level. An inverse relationship existed between the distance from the helicopter to the subject and the rate of response (Watson 1993; Grubb and Bowerman 1997; Delaney et al. 1997).

Stockwell et al. (1990), described height of helicopters flying above the ground as a threshold for mountain sheep.

Type of aircraft and proximity: Of the three types of aircraft evaluated for their effect on nesting raptors (low level jets, light fixed wing aircraft, and helicopters), helicopters appear to cause the greatest disturbance (Grubb et al. 1992; Watson 1993; Grubb and Bowerman 1997).

Habituation: Evidence exists that raptors may become habituated to aircraft disturbance. Indications of this phenomenon were reported in red-tailed hawks (Andersen et al. 1989) and Mexican spotted owls (Delaney et al. 1997). The extent and frequency of this effect are not yet understood.

Effects to people: Aircraft noise also disturbs Refuge visitors who seek quiet and the potential for a wildlife encounter. Campers, bird watchers, horseback riders and hunters have complained about Air Force low-level helicopter flights. Refuge neighbors have also complained about helicopter activity, particularly night flights.

Summary: All the information available describing the effects of helicopter and other aircraft on wildlife pertains to overflights and other in air activities. The relatively longer duration of noise associated with the take-offs, approaches, and landings being conducted in forest openings and fields on the LPO NWR may impose a substantially greater level of disturbance to wildlife using specific landing zones. In summary, Alternatives C, D, and E, which eliminate Air Force Survival School Training at the Refuge, would completely eliminate the risk this activity poses. Alternative B, which eliminates helicopter and explosive use, but maintains most other aspects of the program, would also benefit wildlife.

Ground-based Training Activity

The effect of the ground-based activity is likely similar to other ground-based public use activities, particularly camping, use of off-road vehicles, snowmobiling, and hiking. The Air Force Survival School creates an additive impact to public activities like camping. There are approximately 50 Air Force camps scattered throughout the Refuge. At any one time, the Training School is represented by about 80 plus people, split into two groups, using about twenty-two square miles of the Refuge, but with the majority of use in the core of the Refuge.

USAF Survival School ground activity may be more disturbing to some wildlife than the helicopters. All studies of disturbance to raptors that included an analysis of ground activity disturbance found it to have a greater effect on birds of prey than did aircraft.

The reduction of ground-based disturbances can only benefit Refuge wildlife and habitats. Alternatives C, D, and E, which eliminate Air Force training at the Refuge, would have the most positive benefit to wildlife. Alternative B would continue some negative impact, though it would be less than Alternative A.

Effects to Regional Economy (Stevens County)

Refuge Management Economics

Refuge management would directly generate more jobs and income under Alternatives B, C, and E than under Alternative A. Fewer jobs and income would be generated under Alternative D than under

Alternative A. The same comparative results apply to the total (i.e., direct, indirect, and induced) employment and income effects.

Forest Products Economics

Under Alternative A, 50-250 thousand board feet (MBF) would be harvested annually on the Little Pend Oreille NWR, consistent with recent harvesting levels and patterns. Under Alternatives B, C, and E, 100-1,000 MBF would be harvested annually, mostly through commercial thinnings designed to remove excess small trees from the forest understory. Under Alternative D, 250-500 MBF would be harvested annually.

Employment and income effects under the action altematives would increase relative to Alternative A in proportion to the annual harvest level. Assuming that an average of 150 MBF is harvested annually under Alternative A, it is estimated that Refuge timber sales would account for a total of 0.3 jobs and $20,000 in personal income in the regional forest products industry. Total effects of Alternative A on employment and personal income are estimated at 0.6 jobs and $33,000 per year, respectively. Calculations were based on the assumption that an average of 375 MBF would be harvested annually under Alternative D, and that an average of 550 MBF would be harvested annually under Alternatives B, C, and E. Under the action alternatives, the direct and total economic effects of Refuge timber harvesting would increase in proportion to the harvest level.

Livestock Production Economics

Under Alternative A, forage to support approximately 750 AUMs would continue to be sold to local permittees (there are currently 3 permittees), and it was assumed that this level of forage sales would support the annual sale of 180 calves, for a total sales weight of 108,000 pounds (1,080 hundred weight). Alternative E would continue the annual grazing program a t current stocking levels for five years, with grazing discontinued beginning in 2005.

Under Alternative B, grazing would be restricted to upland forest areas, which provide approximately 300 AUMs during the grazing season. Under Alternatives C and D, livestock grazing would be phased out over the next 5 years, except for incidental grazing (under Alternatives C only) to achieve wildlife objectives. For this analysis, it was assumed that no forage would be sold to permittees under Alternatives C and D.

Under Alternative A, Refuge forage supply would account for an estimated 1.9 jobs and $62,000 in personal income in the range-fed cattle industry, and a total of 3.0 jobs and $96,000 in personal income throughout the regional economy. Under the other alternatives, direct and total employment and income effects of grazing would decline in proportion to the amount of forage sold on the Refuge.

Eliminating Refuge grazing would increase production costs for the affected permittees, and could result in herd reductions for one or more permittees. For example, if no alternative forage sources were

available, permittees could be forced to reduce their herd sizes by the number of head grazed on the Refuge. Under a worst-case scenario, such herd reductions could reduce the size of the permittee s overall operation below the minimum size needed for a cow-calf operation to be viable. In this case, phasing-out of Refuge grazing could result in the closure of one or more local cattle operations, and could lead to a reduction in regional calf sales by more than the approximately 180 head annually produced on the Refuge.

Recreation Economics

Consistent with historical trends, total recreation use on the Refuge is projected to increase over time under the No-Action Alternative, although participation in hunting and horseback riding is projected to decline slightly. Under Alternative B, participation rates would parallel those under Alternative A, except for camping, which would decrease, and snowmobiling, which would be eliminated. Under Alternative C, wildlife observation and organized nature study would increase faster than under Alternative A; hunting and fishing would decline; and camping, snowmobiling, and horseback riding would be eliminated. Under Alternative D, hunting, fishing, and camping would decline, and snowmobiling and horseback riding would be eliminated. Under Alternative E, recreation use would generally increase slightly faster than under Alternative A, except for snowmobiling, which would grow relatively slowly, and camping, which would decline.

Economic effects of recreation were analyzed based on projected Refuge use levels in 2014. Under Alternative A, Refuge recreation use in 2014 would account for an estimated 19.1 jobs and $315,000 in personal income in the directly affected industries (i.e., food stores, service stations, restaurants, miscellaneous retail, and lodging places). Including direct, indirect, and induced effects, recreation use would account for 29.9 jobs and $646,000 in personal income. Recreation-related spending would be lower under all of the action alternatives, along with affected jobs and income. These adverse economic effects would be relatively small under Alternative E, somewhat larger under Alternative B, and larger still under Alternatives C and D.

In addition to employment and personal income, Refuge recreation use results in net economic value to users reflecting the amount they would be willing to pay to visit in excess of the amount they would actually pay. Based on the per-day net economic values discussed in Chapter 2 under Recreation Economics , Refuge use in 2014 would generate $2.6 million in consumer s surplus under Alternative A, approximately $2.4 million under Alternative E, approximately $2.1 million under Alternative B, and approximately $1.0 million under Alternatives C and D.

Air Force Training Economics

Under Alternatives B and E, use of the Refuge by the Air Force Survival School would be reduced. Under Alternatives C and D, it would be phased out over the next 5 years. Because of the small level of regional expenditures related to Air Force training on the Refuge, however, the regional economic impacts of reducing or phasing out this program would be negligible.

Chapter 1: Introduction, Purpose of and Need for Action

1.1 INTRODUCTION

This Final Comprehensive Conservation Plan and Final Environmental Impact Statement (FEIS) for the Little Pend Oreille National Wildlife Refuge combines two documents required by federal laws: a Comprehensive Conservation Plan (CCP) required by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) (Refuge System Improvement Act) and an Environmental Impact Statement (EIS) required by the National Environmental Policy Act of 1969.

The Comprehensive Conservation Plan portion of the document will be used as a tool by the refuge staff and other partners in Refuge management and restoration. The Plan will guide management decisions over the next fifteen years and identify strategies for achieving Refuge goals and objectives. The FEIS portion of the document describes a range of alternatives, including the preferred alternative, for managing the refuge. The integrated document is divided into 6 chapters including: Chapter 1) Introduction, Purpose of and Need for Action; Chapter 2) Affected Environment; Chapter 3) Alternatives, Objectives, and Strategies; Chapter 4) Environmental Consequences; Chapter 5) Consultation and Coordination; and Chapter 6) List of Preparers. Appendices provide supporting information for the final EIS, as well as a step-down fire management plan and project level plans. Appendix C provides project proposals and cost information for the preferred alternative.

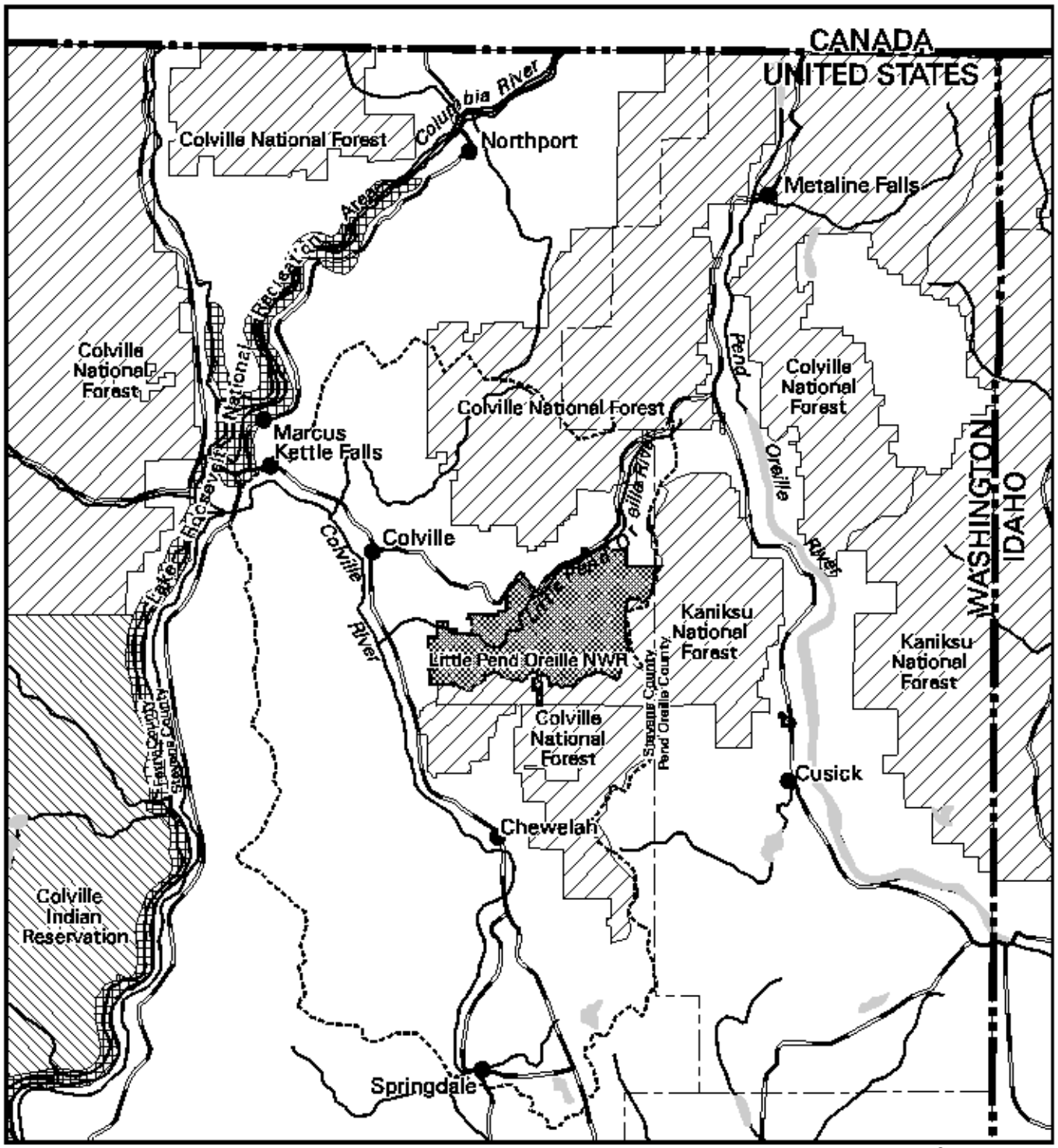
1.2 PROPOSED ACTION

The proposed action is to develop and implement a Comprehensive Conservation Plan for the Little Pend Oreille National Wildlife Refuge that best achieves the unit s purpose, vision and goals; contributes to the Refuge System mission; addresses the significant issues and relevant mandates, and is consistent with principles of sound fish and wildlife management.

1.3 PURPOSE OF AND NEED FOR COMPREHENSIVE CONSERVATION PLAN

Little Pend Oreille National Wildlife Refuge (Map 1), located in northeastern Washington, was established in 1939. It is one of more than 500 refuges in the National Wildlife Refuge System managed by the U.S. Fish and Wildlife Service (Service). Overall, there is a need to bring the Refuge in line with the new National Wildlife Refuge System mission, goals and policies, as described in the National Wildlife Refuge System Improvement Act. A Comprehensive Conservation Plan, required by the Refuge System Improvement Act, is needed to address . . . significant problems that may adversely affect the populations and habitats of fish, wildlife and plants and the actions necessary to correct or mitigate such problems. Specifically, these problems at the Refuge include: ensuring the biological integrity, diversity and environmental

Map 1. Little Pend Oreille NWR, Northeast Washington



health of Refuge forests; the need to restore degraded stream habitats; the need to evaluate and manage visitor use; and the need to resolve conflicts between Air Force use of the Refuge and the Refuges s wildlife purpose. In addition, the Refuge System Improvement Act requires the Service to consider increasing opportunities for people to experience wildlife-dependent recreation. The purpose of this Comprehensive Conservation Plan is to develop a vision for the Refuge and provide management guidance through maintenance, restoration, and use of Refuge resources during the next 15 years. Specifically, the Plan will:

- set a long term vision for the Refuge
- establish management goals, objectives, and strategies
- define compatible recreational uses of the Refuge
- determine appropriate level of use of livestock grazing
- determine Air Force Survival School training use of the Refuge
- outline habitat and public use projects that support the goals and objectives
- identify public entry points into the Refuge
- describe highest priorities for forest habitat management
- adopt a step-down fire management plan
- adopt three step-down forest habitat management project plans

The purpose of the Final Environmental Impact Statement (FEIS) is to describe alternative plans for managing the Little Pend Oreille National Wildlife Refuge. The FEIS shows a range of alternatives considered during the planning process and evaluates the possible environmental effects of the various alternatives on the natural, social, cultural, and economic environment.

The Comprehensive Conservation Plan provides a framework for future Refuge management. The environmental analysis of this plan is addressed at the conceptual planning level and is not a detailed site plan and does not have exact locations for facilities or precise descriptions of programs. An exception to this is the forest habitat management prescriptions for three areas in the dry forest zone: 1) Starvation Flats; 2) Minnie Flats; and 3) Biarly Flats, for which the associated potential environmental impacts are analyzed in more detail.

1.4 PLANNING PROCESS AND FUTURE REVISIONS

The process followed for development of this Comprehensive Conservation Plan was guided by the Refuge Planning Chapter of the Fish and Wildlife Manual (Part 602 FW2.1, November 1996) and evolving policy related to the Refuge System Improvement Act. Key steps included: 1) preplanning; 2) identifying issues and developing vision; 3) gathering information; 4) analyzing resource relationships; 5) developing alternatives and assessing environmental effects; 6) identifying a preferred alternative; 7) publishing the draft plan; 8) documenting public comments on the draft plan; and 9) preparing the final plan. The next step is: 10) securing approval of the Regional Director; and finally, 11) carrying out the plan. While the life-span of the plan is 15 years, periodically the Service will review the plan. The Plan may be amended as necessary at any time under an adaptive management strategy.

Since resuming on-site management in 1994, the Fish and Wildlife Service initiated the following studies of habitats, wildlife, and cultural resources on LPONWR:

- Evaluation of native habitat conditions (Delong, 1996).
- Monitoring Avian Productivity and Survival in a Refuge riparian area along the Little Pend Oreille River to provide long-term demographic data on landbirds, particularly neotropical migrants (Blevins and Cliff, 1999).
- Fish habitat assessment of the Little Pend Oreille River, Bear Creek, and North Fork of Bear Creek to characterize stream and riparian habitats; determine fish species presence, distribution, and size structure and community composition; and examine relationships between fish populations and habitat characteristics (Kelly-Ringel, 1997 and 1999).
- Evaluation of riparian areas to evaluate physical and vegetative features or riparian areas - existing and potential dominant vegetation, community composition, and distribution and age structure of plant communities; and determine riparian resource condition and functional condition (Pyle, 1997).
- Land cover map using the land cover map created by Washington State Gap Analysis Project as a baseline (Cassidy, 1998).
- Hair snag surveys for carnivores in the northeastern portion of Refuge.
- Bird point counts on Starvation Flat.
- Grazing program evaluation to ensure consistency in program management and determine if existing program was meeting draft habitat and wildlife objectives.
- Cultural resources overview to synthesize prehistoric, ethnographic, and historical themes based on archival research (Miss and Renk, 1998).
- Effects of grazing on the structure and composition of riparian vegetation to determine short-term response of riparian pastures to removal of livestock grazing; and compared vegetative condition in grazed and ungrazed riparian pastures (Nielson and Lohman, 1999).

Public involvement was sought throughout the planning process, using meetings, open houses, newsletters, surveys, and other communication tools. Other agencies involved in discussions related to this document included the U.S. Forest Service, National Park Service, U.S. Air Force, Natural Resource Conservation Service, Washington Department of Fish and Wildlife, and Washington Department of Natural Resources. Details of scoping and public involvement are provided in Chapter 5.

The Comprehensive Conservation Plan is one of several plans necessary for Refuge management. The CCP provides guidance in the form of goals, objectives, and strategies for several refuge program areas but may lack some of the specifics needed for implementation. Step-down management plans will be developed for individual programs areas within

approximately five years after CCP completion. All step-down plans require appropriate NEPA compliance. Other step-down plans and their priority order for Little Pend Oreille NWR include:

Step Down Management Plan	Status
• Occupational Safety and Health Plan	Available
• Fire Management Plan	Available
• Public Use Management Plan (PUMP) - hunting - fishing - visitor services and outreach - law enforcement - interpretation and environmental education - other recreational activities	By 2006
• Wilderness and Special Areas Management Plan	With PUMP
• Habitat Management Plan (HMP) - wetland, water, riparian - forest management - integrated pest/weed management	By 2006
• Fish and Wildlife Population Management - inventory and monitoring	With HMP

Project-specific plans, with appropriate NEPA compliance, may be prepared outside of these step-down plans.

1.5 LEGAL AND POLICY GUIDANCE

Refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the designated purpose of the Refuge unit as described in establishing legislation or executive orders, Service laws and policy, and international treaties. Key concepts and guidance of the System are covered in the NWRS Administration Act of 1966, the Refuge Recreation Act of 1962, Title 50 of the Codes of Federal Regulations, the Fish and Wildlife Service Manual, and, most recently, through the National Wildlife Refuge System Improvement Act of 1997.

The Refuge System Improvement Act amends the Refuge System Administration Act of 1966 by including a unifying mission for the Refuge System, a new process for determining compatible uses on refuges, and a requirement that each refuge will be managed under a Comprehensive Conservation Plan. The Refuge System Improvement Act states that wildlife conservation is the

priority of NWRS lands and that the Secretary of the Interior shall ensure that the biological integrity, diversity, and environmental health of refuge lands are maintained. Each refuge must be managed to fulfill the Refuge System mission and the specific purposes for which it was established. The Act requires the Service to monitor the status and trends of fish, wildlife, and plants in each refuge. Additionally, the Act identifies six wildlife-dependent recreational uses. These uses are hunting, fishing, wildlife observation and photography, environmental education and interpretation. As priority public uses of the Refuge System, these uses will receive enhanced consideration over other uses in planning and management.

Lands within the National Wildlife Refuge System are different from other, multiple-use public lands in that they are closed to all public uses unless specifically and legally opened. No refuge use may be allowed unless it is determined to be compatible. A compatible use is a use that, in the sound professional judgement of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge. Sound professional judgement is further defined as a decision that is consistent with principles of fish and wildlife management and administration, available science and resources, and adherence with law.

The Refuge System Improvement Act requires that a Comprehensive Conservation Plan be in place for each refuge by the year 2012 and that the public have an opportunity for active involvement in plan development and revision. It is Service policy that CCPs are developed in an open public process and that the agency is committed to securing public input throughout the process.

1.6 NATIONAL WILDLIFE REFUGE SYSTEM MISSION AND GOALS

The mission of the National Wildlife Refuge System is:

> *To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.* (National Wildlife Refuge System Improvement Act of 1997.)

Starting with the first refuge, Florida s Pelican Island, established in 1903 by President Theodore Roosevelt, the NWRS has grown to more than 92 million acres in size. It includes more than 500 refuges, at least one in every state, and over 3,000 Waterfowl Production Areas. The needs of wildlife and their habitats come first on refuges, in contrast to other public lands managed for multiple uses.

The goals of the National Wildlife Refuge System (Fish and Wildlife Manual Part 602 FW 1.4M from June 1995) are:

Goal 1: To preserve, restore, and enhance in their natural ecosystems all species of animals and plants that are endangered or threatened with becoming endangered;

Goal 2: To perpetuate the migratory bird resource;

Goal 3: To preserve a natural diversity and abundance of fauna and flora on refuge lands; and

Goal 4: To provide an understanding and appreciation of fish and wildlife ecology and man s role in his environment and provide visitors with high quality, safe, wholesome, and enjoyable recreation experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.

1.7 COLUMBIA BASIN ECOREGION GOALS

The Little Pend Oreille is located within the Service administrative boundary of the Columbia Basin Ecoregion and is expected to fulfill ecoregion goals, which are:

Goal 1: *Conservation of Ecosystems*

Prevent species decline, expedite recovery of candidate, threatened and endangered species, and preclude future species listings by conserving and restoring a diversity of native fish, wildlife and plant species and their habitats in the Columbia River Basin.

Goal 2: *Internal Efficiencies and Development*

Develop a motivated, well-trained and diverse work force that responds to the ecosystem s demands for interdisciplinary talents and expertise.

Goal 3: *Public Involvement*

Develop an educated and informed constituency that is proactive in protecting and restoring the ecosystem.

1.8 BRIEF HISTORY OF REFUGE ESTABLISHMENT, ACQUISITION, AND HISTORICAL MANAGEMENT

Beginning in 1879 and continuing until 1931, 188 homestead claims were patented within the Refuge boundaries. For some claims, homesteaders may have been working for logging companies, staking claims, and then turning over the land to the company. Many settlers sold timber off their claims and kept title to the land after they harvested the timber. They established orchards, gardens, and pastures on many cleared claims. When the Depression hit in the 1930s, many homesteaders had already given up and moved from the area. The short growing season, harsh winters, and overgrazed conditions were factors that led to the Resettlement Administration classifying the land as submarginal. In 1935, most of the homesteads were acquired through the Soil Conservation Service as public lands for rehabilitation purposes. The program purchased land outright or traded for parcels in more productive areas.

In 1938 the Biological Survey, which later became the Fish and Wildlife Service, showed interest in establishing a wildlife refuge on 40,000 acres of the resettlement lands. Local cattlemen objected to establishment of a refuge, protesting deer being given precedence over cattle. Cattlemen and Biological Survey officials worked out their differences in a meeting in Colville in 1939. The specifics of their agreement are not available, but newspaper accounts (Colville Examiner, February 11, 1939) report that while cattle would not be excluded, grazing would be limited to the carrying capacity of the land.

Executive Order 8104 (May 2, 1939) established the Little Pend Oreille Wildlife Refuge . . . *as a refuge and breeding ground for migratory birds and other wildlife* . . . . Lands added later to the refuge were acquired under the authority of the Migratory Bird Conservation Act (16 U.S.C.715d) . . . *for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.* On July 27, 1940, Proclamation No. 2416 changed the name to Little Pend Oreille National Wildlife Refuge.

From 1939 until the middle of 1965, the U.S. Fish and Service managed the Refuge. Early management focused on restoring degraded habitat conditions to improve habitat for deer, fur bearing animals, upland game birds, waterfowl, and fish. Considerable effort went into planting a variety of shrubs and grasses to benefit wildlife, managing horse and cattle grazing, and planting crops to feed deer and game birds. Management ignited fires and selectively cut forests to improve deer winter range.

In 1965, the Washington Department of Fish and Wildlife (known then as the Washington Department of Game) assumed management responsibility through a cooperative agreement with the Service. Although the Service provided a budget to manage the Refuge, the State had considerable latitude to manage the area primarily for game species and recreation. The State scheduled most of the Refuge for selective timber harvest on a continual rotation basis to provide the most benefits to wildlife, which included deer, forest grouse, snowshoe hare, bear and game farm pheasants. Most farming ceased in the mid-1980s. From 1986 until 1994, no timber sales were undertaken. Public use increased under state management and the area became known

locally as the Game Range. The state also promoted snowmobiling, camping, and horseback riding.

A land exchange with the Washington Department of Natural Resources in 1967 (Map 2), consolidated state and Refuge ownership. Federal lands on the northeastern part of the Refuge were exchanged for state inholdings on the remainder of the Little Pend Oreille, establishing the present Refuge boundary. The exchange modified the approved Refuge boundary and changed management jurisdiction, however, the original executive order boundary still exists.

Prompted by an intemal audit by the General Accounting Office, the Service decided to resume on-site management at several refuges throughout the country. This led the Service to resume management of the Little Pend Oreille National Wildlife Refuge in 1994.

1.9 REFUGE PURPOSE

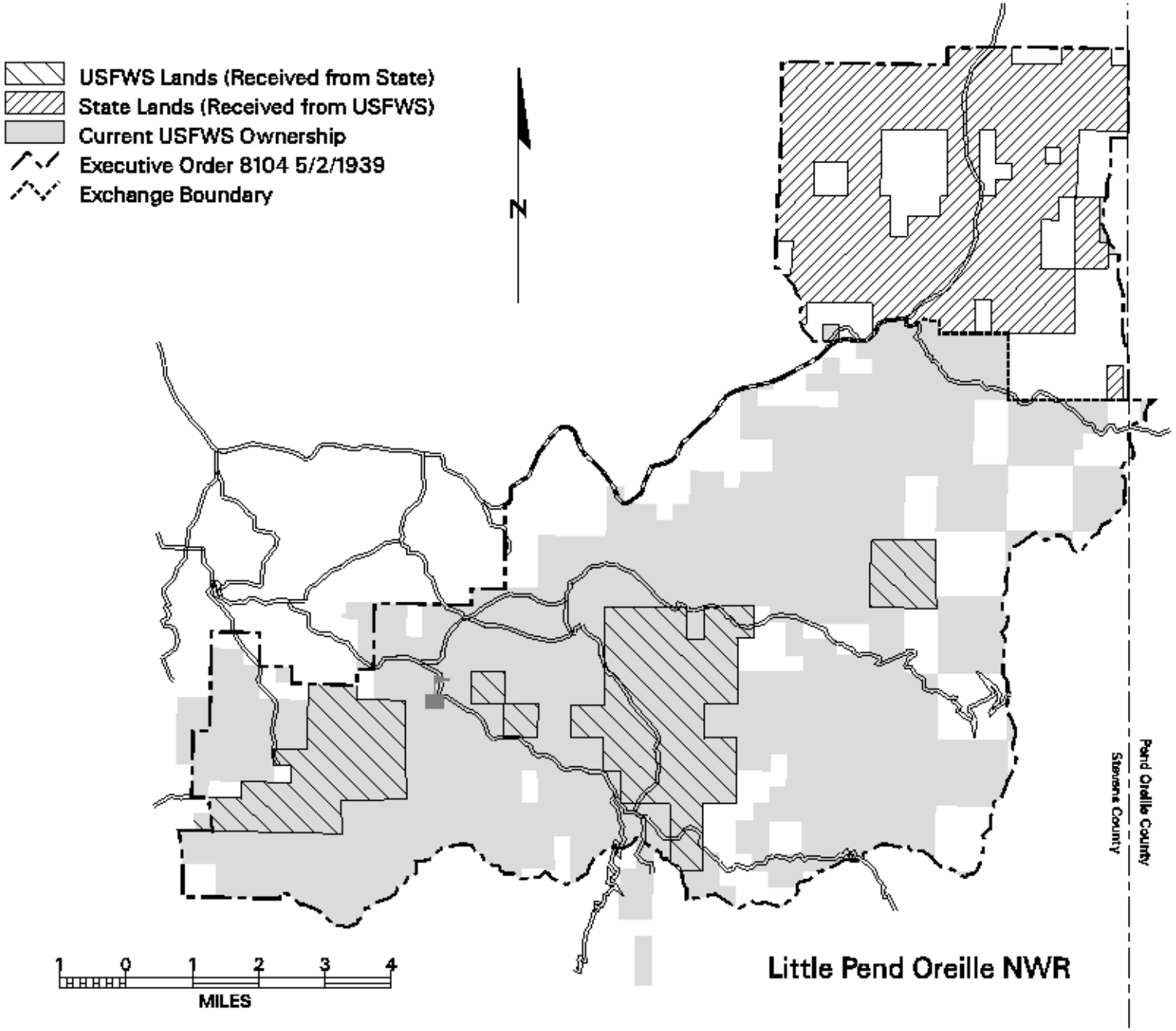
National Wildlife Refuge System lands are acquired under a variety of legislative acts and administrative orders. According to the Refuge System Improvement Act, The terms purposes of the refuge and purposes of each refuge mean the purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit. The Service defines the purposes of national wildlife refuges when a refuge is established or when new land is added to an existing refuge. Service realty files document purposes used to acquire lands or to receive transferred lands.

The two methods used in establishing Little Pend Oreille NWR were executive withdrawal from the public domain (executive order) and acquisition funded through the Migratory Bird Act. Little Pend Oreille National Wildlife Refuge was established *. . . as a refuge and breeding ground for migratory birds and other wildlife . . . .* (Executive Order 8104) and *. . . for use as an inviolate sanctuary for migratory birds.* (Migratory Bird Conservation Act). These purposes form the foundation upon which management decisions are made and goals, objectives, and strategies are developed.

At times, purpose statements define specific uses, including recreation or livestock grazing. Neither recreation nor grazing are included in the purpose statements for this Refuge. Purpose statements often identify the wildlife species or groups of species that receive management emphasis. Since its early history, white-tailed deer and other game species received management emphasis on Little Pend Oreille NWR and thus became the other wildlife referred to in the purposes. Rehabilitation of degraded wildlife habitats and protection of deer winter range were primary goals during early refuge years. While white-tailed deer winter range and ultimately deer populations may benefit from future management approaches, they are only one of many fish and wildlife species now considered important to protect on the Refuge.

Curtain (1993) in his review of the history of the National Wildlife Refuge System, indicates that the original intent of the term inviolate sanctuary is found in the Migratory Bird Conservation

Map 2. Land Exchange with the State of Washington (1967)



Act (first passed in 1918 as the Migratory Bird Treaty Act and amended in 1934 and 1938). This Act originally required that all refuges be inviolate sanctuaries and deemed that refuges primary purposes were as breeding ground and habitat for migratory birds. Migratory bird hunting was prohibited on migratory waterfowl areas by the Act but most other human uses were not addressed. The 1938 amendment to the Act gave refuge managers authority to decide if, when, and how bird hunting would be allowed. After World War II, public demand for opening refuges to recreation increased. The 1949 Duck Stamp Act allowed waterfowl hunting on all refuges, but restricted the percentage of each refuge open to hunting.

A Department of Interior solicitor s opinion memorandum, dated May 19, 1964, describes criteria for determining whether a wildlife refuge is an inviolate sanctuary for migratory birds. All land areas acquired as wildlife refuges for migratory birds with Duck Stamp Funds (Migratory Bird Conservation Funds), are inviolate sanctuaries. . . . only 40% of the area purchased with Migratory Bird dollars may be opened at one time for hunting of migratory game birds or resident species of birds. On Little Pend Oreille NWR, 2,251 acres were purchased with these funds and fall within the inviolate sanctuary provision. These areas include lands and waters surrounding Dailey Lake, McDowell Lake, Bayley Lake and portions of the Little Pend Oreille River and Bear Creek (Little Pend Oreille Wilderness Study Report 1973). To comply with the Migratory Bird Act and its inviolate sanctuary provision, all Refuge streams are closed to duck and dove (migratory game bird) hunting.

The Refuge Recreation Act of 1962 further defined how recreational uses on refuges would be evaluated and firmly established the concept of compatibility. The 1966 Refuge System Administration permitted the use of any area within the system for any purposes, including but not limited to hunting, fishing, public recreation and accommodations, as long as such uses are compatible with the major purposes for which such areas were established. Typically, a refuge is closed to a particular use until it is opened administratively through the Federal Register. Refuge managers must determine compatibility of all public, economic, and military uses proposed or occurring on a refuge. The 1997 Refuge System Improvement Act amended the Refuge Administration Act and further defined priority uses to be the following six wildlife-dependent uses: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Existing compatibility policy is described in the Refuge Manual (5 RM 20). New compatibility policy has been drafted to support provisions of the Refuge System Improvement Act but will not be finalized in regulations until later in 2000. Compatibility determinations for existing and proposed uses for Little Pend Oreille are in Appendix F.

1.10 REFUGE VISION STATEMENT

Forest habitat management is vital to the future of wildlife conservation in northeastern Washington. Little Pend Oreille is unique in its representation of 5 distinct forest zones. Also, as the only mixed-conifer montane forest in the National Wildlife Refuge System, Little Pend Oreille National Wildlife Refuge has an important role to play in forest habitat management. The Refuge s 40,260 acres of forests, streams, and wetlands are used seasonally by bald eagles

and numerous nesting and foraging migratory birds. It provides critical winter range for deer and habitat for several species of interest.

The Refuge envisions using its Comprehensive Conservation Plan to build on native wildlife habitat diversity as a theme with emphasis on developing late successional forest and restoring riparian habitat - habitats that are increasingly rare in the region. In the next 15 years, Refuge staff will focus management efforts in over-stocked stands of dry forest using thinning and prescribed fire techniques that mimic natural ecological processes such as wildfire. Degraded streams will be restored to enhance and maintain the natural diversity of the Refuge.

A healthy Refuge environment will provide opportunities for visitors to enjoy wildlife viewing, hunting, and fishing in a natural setting. Interpreting wildlife and the Refuge s unique heritage, as well as improving facilities will enhance the visitors experience while protecting the cultural integrity of the area. To meet these challenges, the U.S. Fish and Wildlife Service will seek partnerships with other agencies, interest groups, landowners, and local communities. Refuge staff will work with adjacent forest managers to protect local watersheds and wildlife corridors. These efforts will result in greater protection of wildlife and fish resources throughout northeastern Washington.

1.11 REFUGE GOALS

Three broad goals are proposed for the Little Pend Oreille NWR. They are consistent with the Refuge purpose, Ecoregion goals, NWRS goals, the Refuge System Improvement Act of 1997, Service policy, and international treaties.

For each goal, the Refuge developed management principles and guidelines. These statements of assumptions or principles were used to further support the Refuge goals. These principles and guidelines were helpful in developing objectives and strategies, especially for the preferred alternative. They are presented below, following the goals to which they apply.

Goal 1: ***Conserve, enhance and restore native forest, riparian, in-stream, and wetland habitats and their associated fish, wildlife and plants, representative of the native biological diversity of northeastern Washington.***

- Healthy, high quality habitats are key to healthy fish and wildlife populations.

- Native conditions that existed during the mid-1800's provide a reference point for comparison with existing conditions. The assumption is that at this point in time ecological processes were operating at a natural frequency and intensity and were not influenced as much by human disturbances (land clearing, fire suppression, etc.) as they are today.

- Restoration of native conditions is a desired direction for management but may not always be achieved in the short term because soils or other environmental factors may be altered so they no longer support native species.

- Active and passive management approaches will be used to restore and maintain native conditions.

- Forest habitat management goals and objectives will take longer than the life of this plan (15 years) to achieve.

- Native assemblages of fish and wildlife are best maintained and restored by aiming to provide native habitat diversity typical of the ecoregion prior to European settlement.

Goal 2: ***Monitor, protect, and recover special status plants and animals and species of management interest.***

- Wildlife populations will be managed primarily through habitat management.

- The needs of fish and wildlife have priority over public uses of the Refuge.

Goal 3: ***Provide opportunities for wildlife-dependent recreation and education to enhance public appreciation, understanding, and enjoyment of Refuge wildlife, fish, habitats, and cultural history.***

- Wildlife-dependent recreational activities, as identified in the Refuge System Improvement Act of 1997, will be given enhanced consideration over other uses. These activities are hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

- Some existing artificial habitats (e.g., ponds and lakes) are desirable because they provide benefits to native wildlife, help offset overall wetland losses, and offer increased wildlife-dependent recreational opportunities.

1.12 PLANNING ISSUES AND OPPORTUNITIES

In considering the key issues facing the Refuge under the Comprehensive Conservation Plan, staff solicited comments from the public, a plan working group consisting of primary stakeholders, other federal and state agencies, and other Fish and Wildlife Service employees. A mailing list of approximately 900 persons and organizations is maintained at the Refuge and was used to distribute planning updates and public meeting announcements. A summary of public

involvement efforts is presented in Chapter 5. Under the National Environmental Policy Act (NEPA), federal agencies may identify numerous issues. However, only those that are considered significant are allowed to drive the formulation of alternatives. Based on the scoping efforts undertaken, the following significant issues were identified for the Little Pend Oreille NWR:

Issue 1. Protection and restoration of habitat values for native wildlife, fish, and plants

Little Pend Oreille is one of the largest National Wildlife Refuge in Washington state and is also the only one with a mixed conifer forest. The Refuge extends from low alluvial bottomlands once covered in rich riparian forest to peaks 5,600 feet in height. With this elevational diversity, the Little Pend Oreille contains a complete set of Northeast Washington s diverse forest vegetation zones.

Protected under the conservation mandates of the National Wildlife Refuge System, these habitats are highly valuable to native species. Prior to establishment of the Refuge, old growth ponderosa pine was logged and, in some places, forests were converted completely to fields, particularly in riparian areas. Wetlands were flooded and streams diverted. Natural fire was suppressed and exotic species became established. Focus on game management resulted in non-native species introductions while the needs of native non-game wildlife were accorded low priority. People made use of the Refuge for a variety of non-wildlife-dependent activities.

Rising public concern over dwindling fish stocks and diminished habitats available for native wildlife have spurred recent federal commitments to practice "ecosystem management". National wildlife refuges are enjoined to protect and restore habitat for wildlife. The Refuge System Improvement Act states that wildlife-dependent uses take precedence over other non-wildlife-dependent uses.

Issue Summary: In light of the laws and the current state of the resources, what kinds of management actions should be undertaken to protect and restore native habitats? Should the Refuge practice active management to benefit wildlife, including forest thinning, prescribed fire, stream restoration, weed control, and road closures?

Issue 2. Providing compatible public recreation opportunities

National and local interest in outdoor recreation has been steadily increasing. Longtime users of the Refuge include people who hunt, fish, camp, and horseback ride. Others come to ride mountain bikes, snowmobile, or watch wildlife. Sometimes, different recreational uses can be in conflict with each other, as well as compromising the Refuge s primary goal of wildlife conservation. Yet the recently enacted Refuge System Improvement Act for the nation s wildlife refuges emphasized that six wildlife-dependent recreational uses should be maintained or encouraged, if they do not threaten wildlife conservation goals. These six priority public uses are hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

Issue Summary: What recreational activities are appropriate at Little Pend Oreille Refuge? If appropriate, what guidelines are needed to assure that these activities are compatible with restoration and maintenance of Refuge biological integrity and diversity?

Issue 3. Cattle grazing on riparian and upland allotments

Sixteen allotments for cattle grazing, held by three permittees, are designated across the Refuge. The allotments currently support up to 750 Animal Unit Months (one AUMs is equivalent to one cow/calf pair), although in the past, permits granted grazing privileges for up to 1,100 AUMs. The designated allotments cover the entire Refuge but in practice, most cattle grazing occurs in the alluvial riparian zone, meadows, former farm fields, and low-elevation forest. While grazing provides some benefits to deer by encouraging early spring growth and improving the palatability of grasses and other plants, there are some significant negative effects. Aquatic and riparian concerns include stream bank erosion, fecal contamination of Refuge aquatic habitats, and browse-induced inhibition of tree and shrub growth in riparian zones. Other problems associated with grazing include soil compaction, competition with native ungulates for desirable forage and cover areas, suppression of aspen, and conflicts with recreational uses. Degraded areas need time to recover. If existing uses are modified, there could be negative economic repercussions to current permittees.

Issue Summary: What methods and intensity of livestock grazing is compatible with the Refuge purpose and goals?

Issue 4. Air Force Survival School Training

The U.S. Air Force uses the Refuge annually for survival training. Use is concentrated in late summer, when an average of about 82 Air Force personnel may be on the Refuge at any given time. They use the central portion of the Refuge; the same areas where other Refuge uses are focused. These training activities provide survival skill instruction. The air crews and survival instructor trainees learn how to get food from the land, build shelters and fires, orient, and evade capture. Students direct helicopters to navigation points to assist in rescue exercises. To assure greater safety for their personnel, the Air Force requested and received a public hunting closure from the Washington Department of Fish and Wildlife when the State managed Refuge lands. The closure, which remained in place after the Service resumed management, runs from January through August on all the Refuge and until September on the south part of the Refuge.

The program presents several concerns with regard to the Refuge purpose and goals. Foremost among these is the possible disturbance to wildlife, especially from helicopters, simulated explosives, numerous people on the ground, and all-terrain vehicles. Other concerns include habitat impacts at camps, the disturbance to other visitors, and the loss of public hunting opportunity due to a closure enacted for troop safety. If the Air Force s use of the Refuge is discontinued, the program would likely be moved to another area. In the meantime, there could be disruption of activities that contribute to the national defense.

Issue Summary: What level of use by the Air Force Survival School is compatible with Refuge purposes and goals?

Issue 5. Role of Little Pend Oreille NWR in the Regional Economy

In July 1998, the Refuge held a public open house in Colville to present preliminary alternatives to the public. At that meeting, local community members expressed concern about how Refuge management changes would affect the economy. Refuge programs currently create some economic benefit, directly as expenditures and/or payments, and indirectly as support to local industries (for example the recreation and livestock industries). Till now, no analysis had been available to estimate the economic benefit that the Refuge currently provides, and there was only a vague idea of how management proposals under any of the alternatives would change the economic outputs and benefits to local industries. Average per capita income in Stevens County is nearly the lowest of all counties in the state. The community members requested that a more detailed economic analysis be completed before adoption of the Comprehensive Conservation Plan.

Issue Summary: What is the current economic benefit provided by the Refuge and what would be the economic effect of programmatic changes under the CCP?

Chapter 2: Affected Environment

2.1 PHYSICAL ENVIRONMENT

Geographic and Topographic Setting

Little Pend Oreille NWR is located in northeastern Washington, about 70 miles north of Spokane, the state s second largest city. Colville, the Stevens County seat, is about 10 miles northwest, while the town of Chewelah is about 15 miles south.

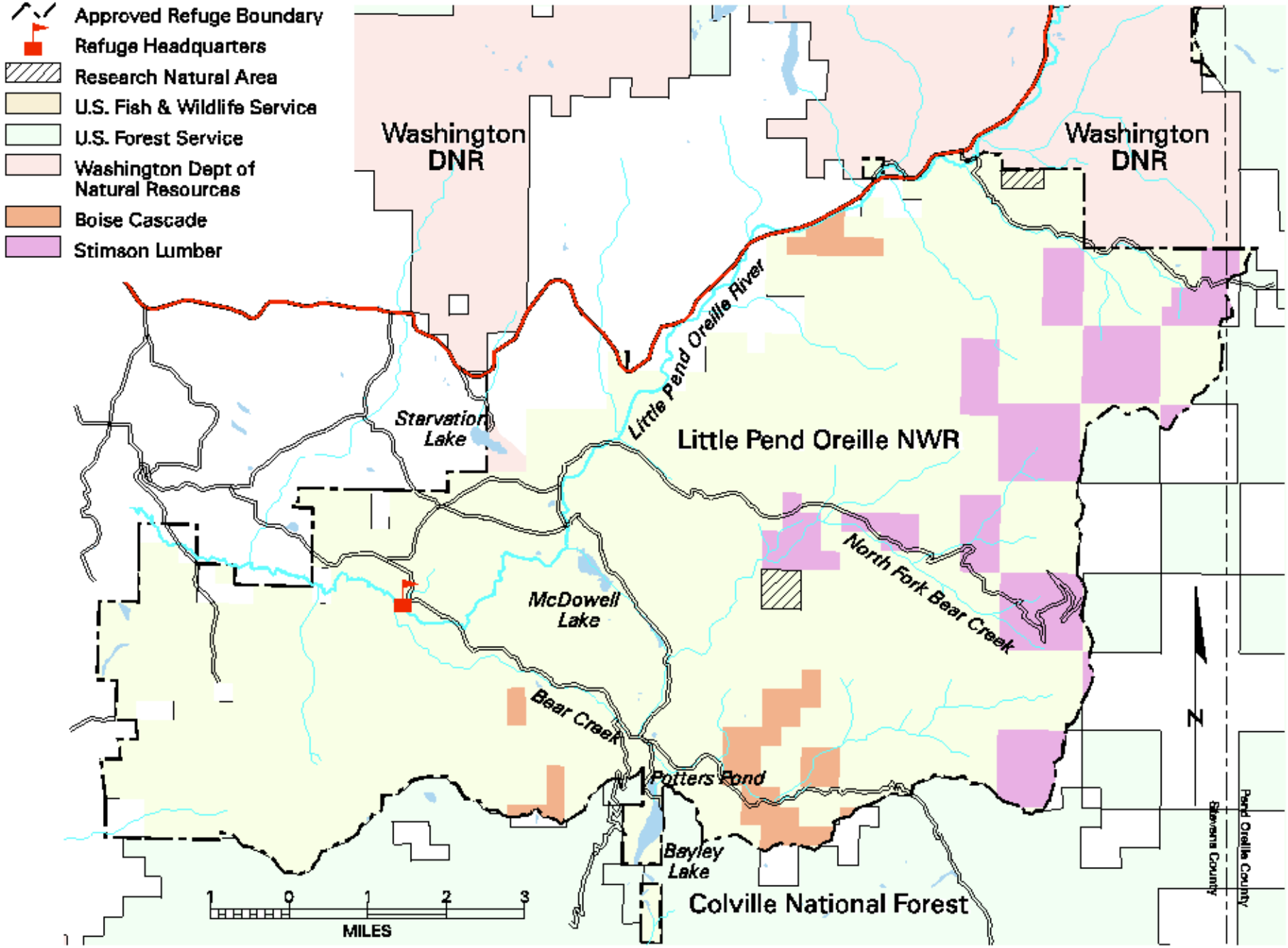
The Refuge lies within the Okanogan Highlands Physiographic Province (Franklin and Dyrness 1973) of northeastern Washington, and is within the Columbia River Basin Ecosystem (which includes those lands inside the United States east of the Cascade Crest in Washington and Oregon). The Okanogan Highlands Province extends from the Okanogan River to the Idaho border.

The Refuge landscape was shaped by events occurring during the Pleistocene epoch (two million -11,000 years) when continental ice sheets from Canada excavated and molded valleys and glaciers scoured lakes and shaped mountains. The Refuge lies on the western edge of the Selkirk Mountains, whose topography influences the climate and plant communities of the area. Refuge elevations range from 1,800' on the west to 5,600' at Olson Peak on the eastern boundary. Most of the Refuge is underlain by sandy loam soils which are derived from deep glacial drift. Westerly winds prevail, bringing warm air from the Pacific Ocean which moderates year-round temperatures. Some weather patterns are influenced by inland continental air masses from the south and north. The Refuge receives between 15-25" of precipitation per year in the valleys with up to 40" at higher altitudes. Temperatures range from the upper 40s to middle 80s F in summer and between 10 and 32 F in winter.

Regional Land Setting, Land Use Trends

Within the 1939 Executive Order (E.O. 8104) boundaries of the Refuge are approximately 9,400 acres of inholdings. Most of the inholding parcels surrounded by Refuge lands are owned by Stimson Lumber Company (4,500 acres) or Boise Cascade (1,600 acres), both commercial timber companies. Map 3 shows Refuge features and surrounding land ownership. The Refuge surrounds two other privately owned tracts, totaling 120 acres. The City of Colville owns approximately 250 acres within the north-central Executive Order boundaries. Most of the other inholdings border the Executive Order boundary and are owned by diverse owners, most with less than 200 acres.

Map 3. Refuge Features and Surrounding Ownership



Within the Refuge boundaries, most of the commercially-owned timber lands were clear cut within the last 20 years, before the Washington State Forest Practices Act of 1988. Large blocks of land, sometimes whole sections (640 acres), were clear cut. Timber prices have been at record high levels in the recent past, encouraging many adjacent private landowners to log their property.

On the southern and eastern boundaries, the land is primarily managed or owned by the Colville and Kaniksu National Forests, and Boise Cascade and Stimson Lumber Company. The Washington Department of Natural Resources manages two large blocks of land north of the Refuge, the Narcisse and Little Pend Oreille blocks. They manage these State-owned lands primarily for the long-term economic benefit of the local schools (i.e., revenue from timber production and livestock forage). Secondarily, when not in conflict with this primary purpose, state lands may be managed for watershed, wildlife habitat, open space, and recreation. Washington Department of Natural Resources manages two public campgrounds on the northern edge of the Refuge - Starvation Lake and Flodelle Creek campgrounds, and oversees a recreational trail system used primarily by off-road vehicles. More than 75 miles of recreational trails located east of the Refuge were jointly planned by Washington Department of Natural Resources and the National Forest. The area northeast of the Refuge is also part of a lynx management unit.

National forest lands are managed for multiple resources and uses including recreation, wildlife and fish, range, timber, watershed, forage, minerals, and wilderness. In 1996, the Colville National Forest Supervisor decided to implement the Addy-Chewelah Project, which includes harvest of 54 million board feet of timber on 13,550 acres within the 47,158 acre area which is bordered by the Refuge on the north. This action also involves construction of approximately 62 miles of new roads, 2,590 acres of noncommercial thinning, and 8,842 acres of prescribed fire. Most of the Forest Service land bordering the Refuge on the east and south is managed for timber and forage production objectives, with fewer bordering acres managed for scenic values, winter range, recreation, and old growth.

Regardless of ownership, there is an increasing trend in road development, forest fragmentation, loss of older-aged forests, recreational use, riparian habitat degradation, and rural residential development on lands surrounding the Refuge. Growth within Stevens County is affecting privately owned land near the western and northern Refuge boundaries. Within the last three years, new homes and subdivisions next to the Refuge boundary have been added near five Refuge access points (Narcisse Creek Road, Buffalo Wilson Road, Miller Road, Bear Creek Road, and Slide Creek Road). New short and long plat developments have also been planned along Highway 20 on the northern Refuge border. Rural residential developments increase the potential for habitat fragmentation, wildlife/people conflicts, pest management problems, risk associated with using prescribed fire, and needs for law enforcement. Development close to Refuge lands may increase market pressure on smaller private landowners to sell their lands for more development. Real estate market values are usually higher for property adjacent to public land.

Air and Water Quality

The Refuge and surrounding lands currently meet federal air quality standards for the six criteria pollutants : particulates; nitrogen oxides; sulfur dioxides; lead; ozone; and carbon monoxide. The closest nonattainment area is located in and around the city of Spokane. The only Class I area (areas where air quality standards are stricter because of outstanding visual resources) in eastern Washington State is in the wilderness area of the Okanagan National Forest. Hundreds of other airborne chemicals may be toxic or hazardous, but are not subject to ambient standards under state or federal law.

Current and potential air quality concerns at the Refuge revolve primarily around wood smoke generated from prescribed fire. Wood smoke contains gases and particulate matter that have been demonstrated to be hazards to human health, including more than 130 known carcinogenic substances such as formaldehyde, methane, carbon monoxide, and benzene. These pollutants may be hazardous to local residents, especially those individuals with existing breathing problems, and to firefighters, who may endure extreme exposure for weeks at a time. The potential for air pollution problems is exacerbated by the extreme levels of fuel loading that have accumulated in forests of the northwest from 60 years of fire exclusion policies.

Water quality is measured by various factors including turbidity, fecal coliform counts, and temperature, as well as physical parameters such as peak flows and channel characteristics. Water quality strategies are determined in part by the "designated uses" for main rivers. The waters of the Little Pend Oreille NWR largely flow into the Colville River, which has designated uses of aquatic life, fish consumption, and primary contact recreation-swimming (EPA website). Much of the Colville River is considered water quality impaired by the Environmental Protection Agency (Quigley and Arbelbide, 1997).

The Washington Department of Ecology is required under section 303(d) of the Federal Clean Water Act to submit to the U.S. Environmental Protection Agency a list of water bodies that fall short of state surface water standards and are not expected to improve within the next two years. The Little Pend Oreille River has been added to the most recent (1998) 303(d) list due to high fecal coliform bacteria levels detected in 1994 near its confluence with the Colville River. This bacteria is found in sewage and animal waste, and can enter streams through failing septic systems and some agricultural practices.

The LPO NWR manages lands along about 9.9 miles (29%) of the Little Pend Oreille River s 36 mile length. Since no data is available documenting the quality of the water as it enters and leaves the refuge, it is currently impossible to quantify the amount refuge activities are contributing to the fecal coliform load. Private residences and agricultural practices both upstream and downstream of the Refuge may also contribute to the water quality problem.

Special Status Lands

Research Natural Areas

Two Research Natural Areas (RNAs) have been established within the Refuge. These areas protect natural features and preserve natural processes for scientific purposes; the guiding principle is to prevent unnatural encroachments and activities which directly or indirectly modify ecological processes.

> **Baird Basin RNA** was established in 1959, and exemplifies typical northeastern Washington ponderosa pine, Douglas-fir, and grand fir forest stands along ridge tops and north and south slopes. The 160-acre RNA is located in the northwest portion of section 10, T. 34 N., R. 41 E., Willamette meridian, at 48° 30' N. latitude, 117°40' W. longitude.
>
> **Varline Grove/Flodelle Creek RNA** includes 80 acres of mature larch and Douglas-fir, Engelmann spruce, subalpine fir, and lodgepole pine located in the northwestern part of SE SW 1/4 section 7, T35N, R42E, 48°32' N latitude, 117°34' W longitude.

Wilderness Suitability

The Wilderness Act of 1964 stimulated a great deal of interest in the possibility of designating a portion of the Refuge under this initiative. In the early 1970s, a study was undertaken to determine the suitability for the Refuge as wilderness. After lengthy research, public hearings, letter campaigns, and much discussion, it was determined that the Refuge did not fit the designation and was rejected in 1974. It was rejected because the State issued permits for haying, grazing, timber sales, and other uses. Also, there were plans to cut trees in the roadless areas. Subsequent cutting and road building did take place in portions of the 1974 roadless area. Despite this lack of technical classification, there remains a 5,520 acre block of roadless and largely undisturbed forest in the southeastern corner of the Refuge. This area requires special consideration in future step-down management plans.

Other Refuge Managed Parcels

The Little Pend Oreille NWR administers two disjunct properties outside the administrative boundary of the Refuge. Both parcels became federal property when the previous owners defaulted on Farmer s Home Administration loans. Because both parcels contained valuable wildlife habitats, management of these lands was transferred to the U.S. Fish and Wildlife Service and are administered by the Refuge.

The first parcel is the 54.7 acre Norris Tract located about 1 mile west of Springdale, Washington. The majority of this parcel is a shallow water wooded wetland composed of emergent wetland plants including sedges, cattails, rushes and, canary grass, as well as shrubs such as red osier dogwood alder, water birch, and willows. The remainder of the tract was

cleared and farmed. This area forms the headwater of Swamp Creek, which flows south from the parcel. It is also ditched and partially drains to the north into Sheep Creek. The parcel is fenced to exclude livestock. Wildlife observed here include white-tailed deer, song sparrow, common snipe, and several species of waterfowl.

The 254-acre Cusick tract is located within the 100-year flood plain of the Pend Oreille River about 3 miles north of Cusick, Washington. About 75% of the property was formerly farmed for timothy hay production. The remaining property is forested with aspen, lodgepole pine, dogwood, hawthorn, water birch and other shrubs. In addition to timothy grass, other herbaceous species growing on the property include Oregon grape, yarrow, reed canary grass, hawkweed and knapweed. The trees are currently unmerchantable. There are several small wetlands on the property.

Fingers of Trimble Creek extend onto the parcel and contain water year-round in most years. The south half of the parcel s lower elevation and clay soils allow it to hold water briefly after rains and during spring runoff. However, this area has been ditched and drained in the past. The northeast and east portions of the property are bounded by county maintained dikes designed to keep the Pend Oreille River out of the flood prone Cusick Flats area. The parcel is fenced to exclude livestock. Wildlife commonly observed on the area includes several species of ducks, Canada geese, snipe, savannah sparrow, meadowlark, white-tailed deer and coyote

2.2 REFUGE HABITATS

The purpose of this section is to broadly describe the existing environment and known or suspected trends.

This information will be used to:

- Show specific changes from historical to current times within the planning area;
- Establish a starting point for data collection that will be a major part of operational responsibilities for Refuge staff after the plan is complete; and
- Lay the foundation for understanding and evaluating the alternatives discussed later in this document.

Landscape Perspective

Background

Forests and streams similar in composition and condition to those found at the Refuge extend over vast areas of eastern Washington, eastern Oregon, western Montana, and Idaho. In order to understand the role of Refuge lands within the ecosystems of this region, it is helpful to consider

some natural resources and processes within a larger landscape context. The Little Pend Oreille National Wildlife Refuge is not an island. Its waters drain into the Colville River, which ultimately flows into the Columbia River. Its borders connect to other public forested lands managed by the U.S. Forest Service and the Washington State Department of Natural Resources, as well as to forested lands owned privately. The habitats on Refuge owned lands continue to be influenced by processes which operate at a larger scale, such as fire, species migrations, and climate. In addition, most species found on the Refuge range over much larger portions of the Western states. It is a biological principle that the maintenance of viable populations (especially of larger, wide-ranging animals) is positively correlated with the degree to which habitat areas are large and well connected. A realistic assessment of Refuge resources incorporates an analysis of the condition of the surrounding habitat. This is the function of this portion of the CCP/EIS. With this knowledge in hand, the Refuge can better understand the kind of contribution it can and should make to the larger ecosystem.

In this analysis, we rely on an approach of comparing current conditions over a large area with historic or natural conditions. This method incorporates the concept of natural variability, or more specifically, the Historic Range of Natural Variability. The natural variability approach relies on two intertwined premises: (1) that past conditions and processes provide context and guidance for managing ecological systems today, and (2) that disturbance-driven spatial and temporal variability is a vital attribute of Western forested ecological systems (Landres et al. 1999).

Referencing and managing for the Historic Range of Natural Variability (HRV) has gained increasing acceptance from resource scientists and managers over the last decade. Essentially, the idea is based in the observation that conditions existing in America at the time of European settlement are now dramatically altered and that this alteration has had significant repercussions for species habitats and ecosystem health. The concept recognizes that, before European settlement, any one part of the landscape was continually undergoing a process of dynamic change. However, overall the landscape and its processes could be characterized as falling within a certain set of natural ranges that generally were consistent over the 2000-year time period proceeding European settlement (Quigley and Arbelbide 1997). The HRV is useful as a benchmark for assessing or monitoring the effects of land management relative to the departure from historic conditions.

The concept of HRV does have some detractors, who feel that the model does not adequately encompass dramatic continental changes such as the glacial period, or that the influence of native Americans is not taken sufficiently into consideration. Moreover, there is little likelihood that American society would gladly embrace the set of social changes that a true return to the HRV across a regional landscape would require. However, numerous scientists and managers feel that applying this concept on publicly owned lands with a mission of species conservation is wholly appropriate and probably the best way to manage for the suite of species that inhabit these lands over the long term. Current direction for National Forests in Oregon and Washington east of the

Cascades includes the direction to apply HRV analysis to watersheds before initiating timber sales (USDA 1995).

Analysis

Taking the Interior Columbia Basin (the portion of the western states draining into the Columbia River east of the Cascade range) as a whole, it is known that significant changes have taken place in forest ecosystems (Quigley and Haynes 1996; USDA and USDI 1997). The scientists who authored the summary reports and Environmental Impact Statements for the Interior Columbia Basin Ecosystem Management Project (ICBEMP) found several key changes in forest ecosystems, including:

- Interior ponderosa pine has decreased across its range with significant decreases in old, single-story structure. The primary transitions were to an interior Douglas-fir and grand fir/white fir association.

- There has been a loss of the large tree component (live and dead) within roaded and harvested areas. This decrease affects terrestrial wildlife species that are closely associated with these old forest structures.

- Generally, mid-seral forest structures have increased in dry and moist forest groups, with a loss of large scattered and residual shade-intolerant trees and an increase in the density of smaller shade-tolerant trees.

- There has been an increase in fragmentation and a loss of connectivity within and between blocks of late-seral stage, old forests, especially in lower elevation areas and riparian areas. This has isolated some animal habitats and populations and reduced the ability of populations to move across the landscape, resulting in a long-term loss of genetic interchange.

- There has been an increase in access for humans which has decreased the availability of areas with low human activities.

- At the scale of the entire Interior Columbia Basin, at least eight terrestrial vertebrate species have experienced a loss of greater than 67% of the habitat available to them historically, while an additional 47 terrestrial species have experienced a loss of 33-67% of their historical habitat (Wisdom et al. 2000). These species include the white-headed woodpecker, the flammulated owl, Western bluebird, hoary bat, and many others.

It s instructive to look at yet another scale, the scale of the sub-basin, to see if the trends identified for the Interior Columbia basin hold true in the more immediate vicinity of the refuge.

This sort of analysis is consistent with the watershed analysis approach that has been widely used in the Northwest for the last seven-eight years. For the purposes of this analysis, the Colville sub-basin, an area measuring some 650,000 acres, was chosen as the scale at which to assess the surrounding ecosystem.

The Refuge is a 40,198 acre parcel of land which lies within the Colville sub-basin. An analysis of vegetation structures throughout the Colville sub-basin shows they generally follow the trend identified above for the entire interior basin. Vegetation structures within this sub-basin have been significantly altered since the late 1800s. Table 2-1 compares the current extent of different vegetation structural stages with their historic extent (circa 1900), within the Colville sub-basin. The analysis is based on current and historic vegetation data compiled for the ICBEMP effort and publicly available with the spatial data sets on their web site (www.icbemp.gov). Vegetation data was generalized to the square kilometer. Structural stages are defined within the glossary (Appendix A). Note that these historical conditions at the end of the 1800s do not necessarily represent a true depiction of HRV, which is more accurately a *range* of historic conditions. HRV for each potential vegetation type and structural type was simulated (in Quigley and Arbelbide, 1997) by developing a pre-European American settlement succession and disturbance model and simulating change over a 100- or 400-year period from the historical vegetation map. The results from that analysis (for the Northern Glaciated Mountains ERU; see specifically Vol. II, pages 602-610) are similar in trends and magnitude to the results presented here more specifically for the Colville sub-basin.

Table 2-1 shows that although forest cover types continue to be found over approximately the same total areas as in 1900, dramatic changes in forest structure have occurred over large areas of the sub-basin (See Map 4). Specifically, old single-strata forest is gone from the sub-basin completely and old multi-strata forest covers only about 10% of its former area in the sub-basin. And young forests, particularly the mid seral types of young multi-strata forest and understory reinitiation forest cover about 15-18 times their extent in 1900. In addition, the sizes of forest similar forest units was distinctly smaller in the past than it is now. This is revealed in the more fragmented or checkerboard appearance of the historic vegetation map (Map 4). The greater continuity of forest habitat types now is likely due to the transformation of the role of fire and the kind of fire regimes that occur now as compared to historically.

These changes in forest structure on a sub-basin scale have significant repercussions for wildlife habitat, especially for those species with narrower habitat requirements.

Two key processes that have contributed to the change in forest structure on this scale are logging, which until recently focused primarily on removal of high-value large diameter trees, and fire suppression. Table 2-2 demonstrates the modification of fire regimes throughout the Colville sub-basin for the same time period.

Table 2-1. Changes in Vegetative Structure within the Colville sub-basin, circa 1900-present

VEGETATION STAND STRUCTURE	Seral Stage	Approx. Current Acres (1991)	Current Percent of Sub-basin (1991)	Approx. Historic Acres (~1900)	Historic Percent of Sub-basin (~1900)	Absolute Percent Change in Landscape (Current % minus historic %)	Approximate Ratio of Current Extent to Historic Extent in Landscape (Current acres divided by historic acres)
Forest Habitat Types							
Stand Initiation Forest	early	24341	4%	68817	11%	**-7%**	**1:3**
Stem Exclusion Closed Canopy Forest	mid	126158	20%	170011	26%	**-6%**	**3:4**
Stem Exclusion Open Canopy Forest	mid	40447	6%	19672	3%	**3%**	**2:1**
Young Multi-strata Forest	mid	99104	15%	3459	1%	**14%**	**29:1**
Understory Reinitiation Forest	mid	239454	37%	11003	2%	**35%**	**22:1**
Old Single-strata Forest	late	0	0%	138643	21%	**-21%**	**1:139,000**
Old Multi-strata Forest	late	15283	2%	135868	21%	**-19%**	**1:9**
Old Multi-strata Woodland		94	0%	0	0%	**0%**	**94:1**
Subtotal: Forest Habitat Types			84%		85%	**-1%**	**1:1**
Non - Forested Habitat Types							
Closed Herbland		37410	6%	13752	2%	**4%**	**3:1**
Open Herbland		247	0%	0	0%	**0%**	**247:1**
Agricultural		47947	7%	0	0%	**7%**	**48,000:1**
Open Low Shrub		12560	2%	17050	3%	**-1%**	**3:4**
Closed Mid Shrub		494	0%	66256	10%	**-10%**	**1:100**
Water		1483	0%	1483	0%	**0%**	**1:1**
Urban		988	0%	0	0%	**0%**	**1000:1**
Subtotal: Non-Forested Habitat Types			15%		15%	**0%**	**0**
Total Area		**646011**	**100%**	**646011**	**100**		

Map 4. Historic and Current Vegetation Structural Stages in the Colville Sub-basin

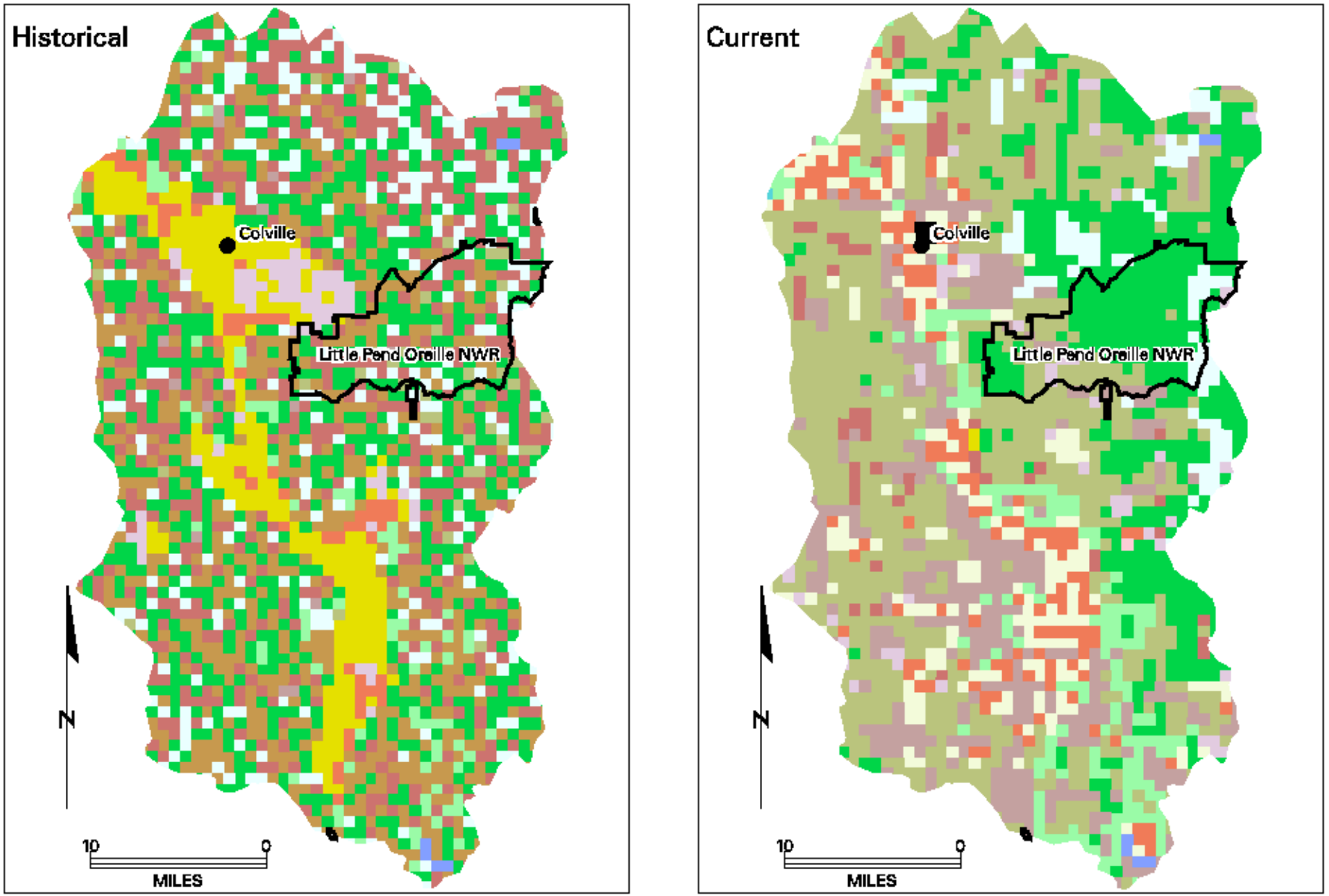


Table 2-2. Changes in Fire Regimes throughout the Colville sub-basin, circa 1900 - present

FIRE REGIME	Current Acres (1991)	Current Percent	Historic Acres (~1900)	Historic Percent	Absolute Change	Approximate Ratio of Current to Historic
Lethal / frequent	6905	1%	83512	13%	-12%	1:13
Lethal / infrequent	299256	46%	2224	0%	46%	134:1
Lethal / very infrequent	99172	15%	29322	5%	11%	3:1
Mixed / frequent	247	0%	202524	31%	-31%	1:82
Mixed / infrequent	71559	11%	1218	0%	11%	59:1
Non-lethal / very frequent	0	0%	253653	39%	-39%	1:254,000
Non-lethal / frequent	0	0%	36346	6%	-6%	1:36,000
Non-lethal / infrequent	166417	26%	35791	6%	20%	5:1
Rarely / n.a.	2455	0%	1423	0%	0%	2:1
Total	646011	100%	646011	100%		

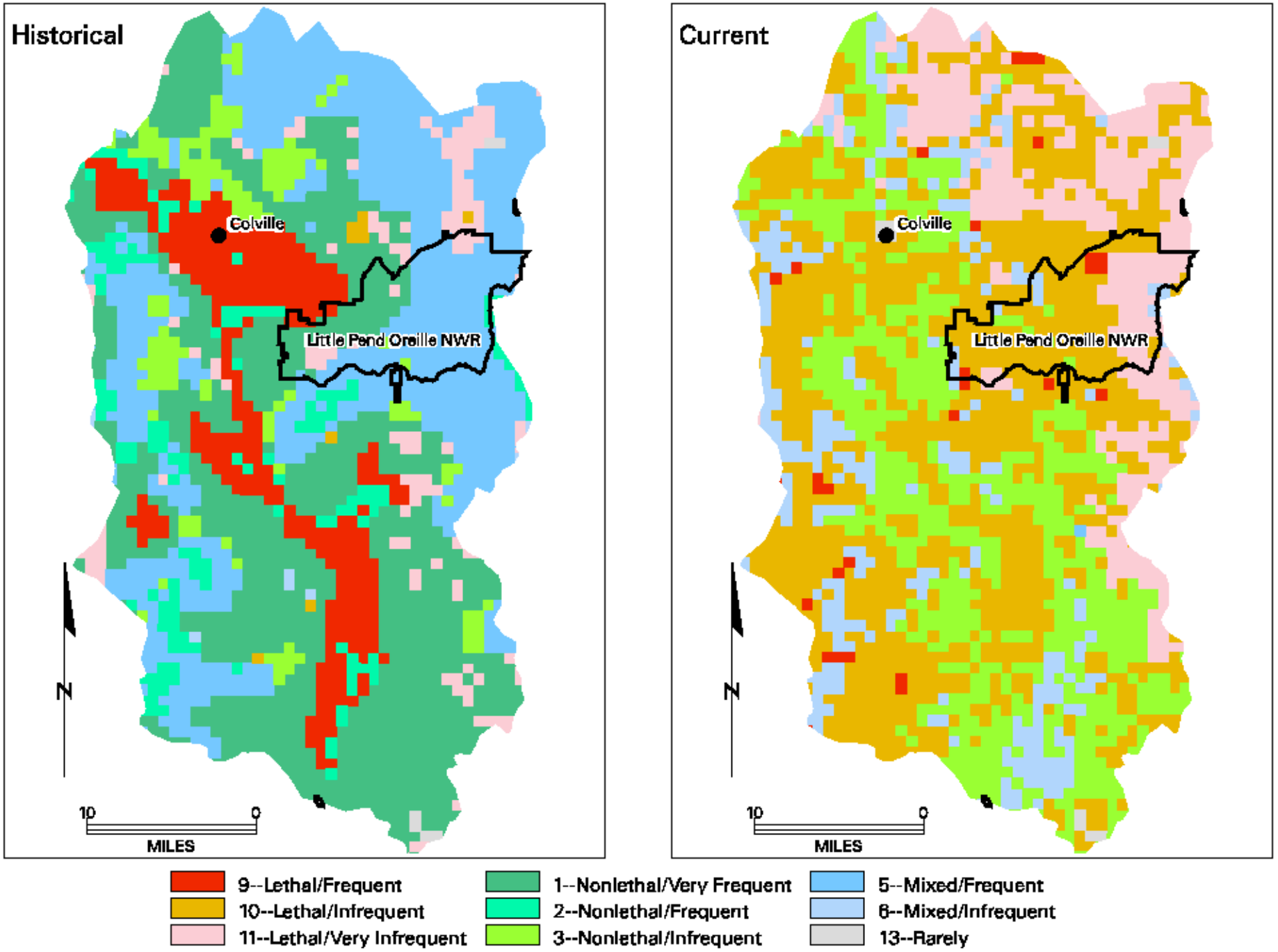
Map 5 and Table 2-2 demonstrate that there has been a clear shift in fire regimes throughout the sub-basin from frequent to infrequent fires. In general, fires regimes have also become more lethal. Specifically, non-lethal, frequent and very frequent fires and mixed, frequent fires have declined, with a corresponding dramatic rise in lethal and infrequent fires. The frequent, non-lethal fires of the past contributed to the maintenance of large trees and open understories typical of a vegetative habitat structures such as single strata ponderosa pine. The loss of frequent and non-lethal fires have led to ever-increasing fuel loads, crowded and over-stocked forest stands and a greater and greater risk of catastrophic (lethal) fire occurrence.

The ICBEMP Science Integration Team looked at the variety of processes and conditions occurring across the landscape and resolved to integrate these into an overall measure, called ecological integrity . Ecological integrity was defined as encompassing: a) the maintenance of evolutionary and ecological processes; b) the maintenance of functions and processes dependent on multiple ecological domains and evolutionary time frames; and c) the maintenance of viable populations of native and desired non-native species.

Overall, the Colville sub-basin was characterized as being of low forest, aquatic, hydrologic, and composite ecological integrity (Quigley et al. 1996). The scientists identified the following primary opportunities to address these risks to integrity:

- Restoration of forest structures
- Maintenance of scattered aquatic strongholds that exist
- Reduction of the risk of fire, insect and disease.

Map 5. Historic and Current Fire Regimes within the Colville Sub-basin



Historical Condition of Refuge Upland Forest Habitats

Old photographs, survey notes and existing remnant stands indicate that much of the Refuge was characterized by extensive stands of large, old growth ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*) and western larch (*Larix laricina*) prior to settlement and exploitation. Impressive stands of western red cedar , western hemlock and other mixed conifer stands were also present. Records indicate that logging has occurred on the Refuge since its inception with a primary objective of improving wildlife habitat, but also for sanitation and salvage. Letters in the refuge files indicate that the cedar poles cut on the refuge were so desirable that they were specifically requested by buyers from the mid-West.

Refuge Upland Forests - Current Condition

Overview

Currently, most of the forest land is in second and third growth mixed stands with a tendency toward a higher numbers of stems per acre and a greater percentage of shade tolerant species than naturally occurred here. This can be directly attributed to past timber harvest practices and aggressive fire suppression. The southeastern corner of the Refuge contains an extensive roadless area with an old growth timber component.

The Refuge is well represented by a variety of forest types from low elevation ponderosa pine on its western edge which gradually becomes higher elevation mixed stands of Douglas-fir, grand fir, lodgepole, western white pine, western larch, western red-cedar, western hemlock, Engelmann spruce and sub-alpine fir and as one progresses from the west to east. Also present are hardwood species such as mountain alder, Sitka alder, willow, black cottonwood, Douglas maple and white and water birch.

The Refuge s forests can be grouped into the three broad potential vegetative groups described in Quigley and Arbelbide (1997): dry, moist and cold forests. Each vegetative group consists of several potential vegetation types. For example, those potential vegetative types making up the dry forest potential vegetative group that occur on the Refuge are: dry Douglas-fir with ponderosa pine, dry Douglas-fir without ponderosa pine, and interior ponderosa pine. Map 6 shows the distribution of forest types on the refuge, together with the approximate delineations of selected wildlife habitats of importance. While these broad potential vegetative groups do not always completely describe the forestland vegetation found on the Refuge, these potential vegetation groups are useful in categorizing the forest types found on the Refuge. Some animals are associated with only certain forest groups. For example, wintering deer use the dry and moist forest types, while the Canada lynx lives primarily in the cold forest types.

Table 2-3. Acres and Percentage of Habitat by Forest Type on the Refuge

HABITAT ZONE DESCRIPTION	ACRES	PERCENT	REPRESENTATIVE SPECIES
Moist Forest	29,687	74	Douglas-fir, Grand fir, Western hemlock
Dry Forest	7,943	20	Ponderosa pine, Douglas-fir, Grand fir
Cold Forest	2,095	5	Sub-alpine fir, Englemann spruce, Douglas-fir
Openings, outcrops, lakes	473	1	Various
Total	**40,198**	**100**	

Figure 2.1 shows a graphical cross-section of Refuge forest types. Specific forest groups are discussed below.

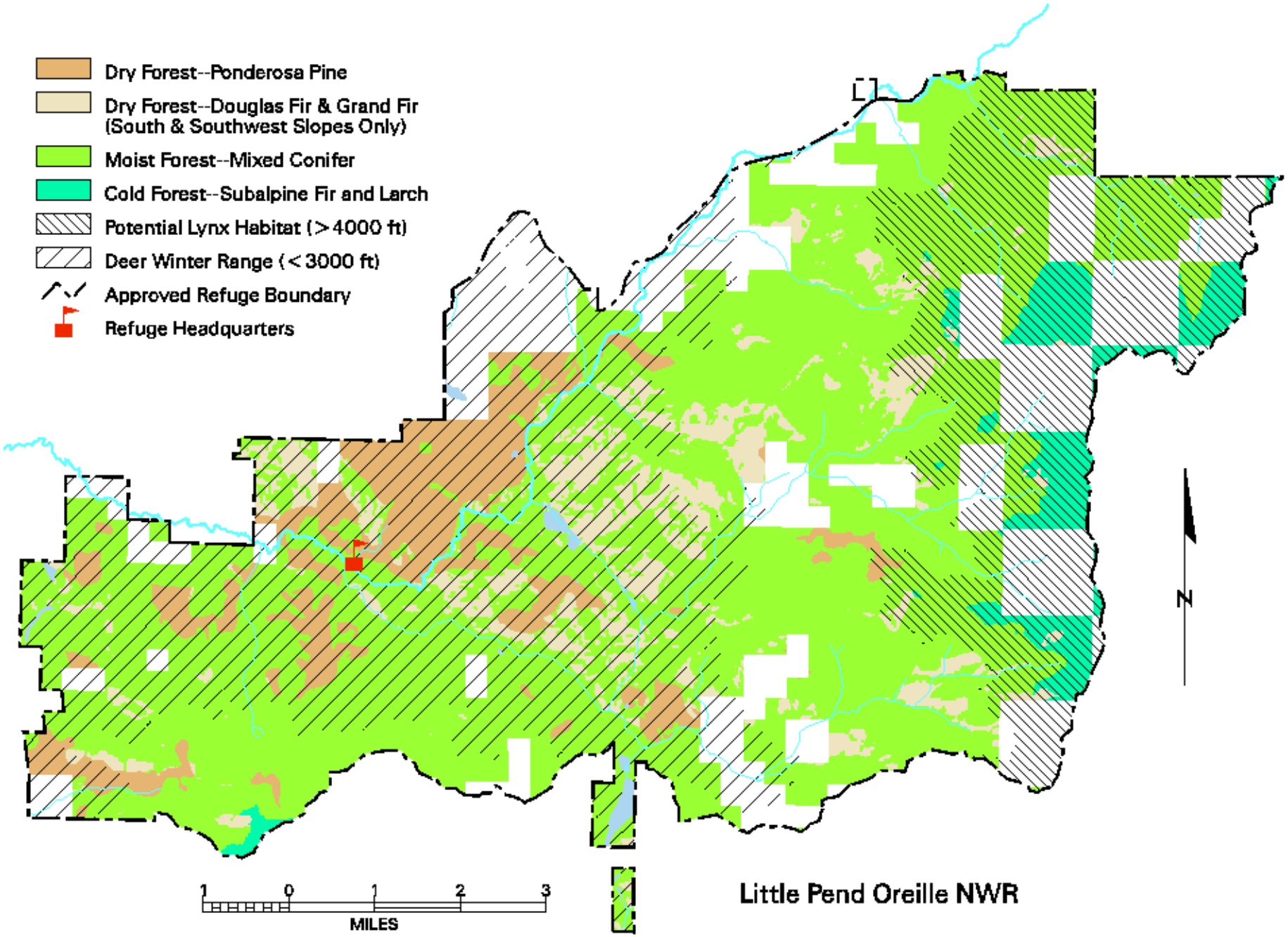
Dry Forest Vegetation Group

The dry forests, dominated by ponderosa pine and dry Douglas-fir growing on south or southwest facing slopes, covers about 7,943 acres or 20% of the Refuge. These species can survive the harsh, dry conditions and the frequent fire disturbance typical of low elevation, arid areas. This zone is characterized by frequent (5-50 years), low intensity fire (Agee 1993). Deciduous trees and shrubs are primarily limited to understory plants and riparian species. A typical or natural dry forest landscape would be dominated by ponderosa pine stands. These stands would be of mixed age, but individual stands would generally be uniform, with single-aged, widely-spaced trees. Grasses or woody shrubs would dominate the understory, depending on the recent fire history. These stands can be quite long-lived and productive, once established, but tend to regenerate slowly because of the short fire interval and dry conditions. Where factors such as aspect, slope, soils and moisture allow, dry sites can be dominated by Douglas-fir and grand fir. These species are more susceptible to fire until they become large and mature.

This description illustrates the importance of fire disturbance to this forest system. However, human activities have affected both the disturbance cycle and the process of succession in these dry sites. Patterns of plant species succession have been altered by harvesting selected, mature trees, allowing cattle grazing on the grasses and shrubs, and suppressing fire. As a result, there are more dense stands, less woody shrubs, and a gradual increase in shade-tolerant species such as Douglas-fir and grand fir. The clumpy nature of single story, mature stands that was prevalent in the past is not as obvious now. These structural changes affect how well the area supports wildlife. For example, available winter forage or browse for deer may limit the size of the population. There are likely other effects on small mammals and forest birds that have not been explained.

The effects of past forest management, particularly fire exclusion, is a major issue discussed in Quigley and Arbelbide (1997). In some cases, (see Table 2-2) fire may be less frequent now than

Map 6. Distribution of Forest Types and Selected Wildlife Habitats



Little Pend Oreille

National Wildlife Refuge - Major habitats and wildlife typical of the refuge

5800′
5600′
5400′
5200′
5000′
4800′
4600′
4400′
4200′
4000′
3800′
3600′
3400′
3200′
3000′
2800′
2600′
2400′
2200′
2000′

Old Fields
Perennial grass and weeds attract white-tailed deer, pocket gophers, Columbian ground squirrels, and many birds.

Lakes, Wetlands & Wet Meadows
Comprised of alder, willow and pondweed this habitat is frequented by bufflehead, common goldeneye, heron, osprey, hooded merganser, king fisher, bald eagle, rainbow and brook trout, amphibians, and beaver.

Ponderosa Pine Forests
These forest often have a well developed understory of serviceberry, snowberry, ceanothus and pine grass. Wildlife includes white-headed woodpecker, flammulated owl, pygmy nuthatch, silver-haired bat, and yellow-pine chipmunk. This habitat is a wintering area for white-tailed deer.

Mixed Conifer Mid Elevation Forests
Common trees are Douglas fir, grand fir, Western red cedar and larch. You may see brown creeper, winter wren, pileated woodpecker, Williamson's sap sucker, Vaux's swift, black bear, pygmy shrew, and bats.

Little Pend Oreille River

Alluvial Riparian & Instream Habitat
Vegetation includes deciduous shrubs and trees, sedges, and grasses. Wildlife includes native and introduced trout, amphibians, bats, riparian-dependent birds, and deer.

Black Tail Mt. Road

Upland Deciduous Habitat
Pockets of aspen, alder, and willow are occasionally found. This habitat supports orange-crowned warbler, Wilson's warbler, and other migratory birds.

High Elevation Conifer Forests
Subalpine fir, Engelmann spruce, lodgepole pine, and Douglas fir dominate this habitat. Marten, elk, and moose may occur in this area. Historically a habitat for lynx.

Olson Peak

North Fork Bear Creek

McDowell Lake

Dry Forest | **Moist Forest** | **Cold Forest**

■ Dry Forest

The lowest elevation areas at Little Pend Oreille NWR are dominated by "dry forests". These forests are comprised of trees that can withstand hotter, drier conditions and frequent fire. The ponderosa pine and Douglas-fir are found in this zone. Both species develop thick bark as they grow, which protects the largest trees from fire damage. Because of fire suppression at LPO, many young trees have sprouted and grown, causing the dry forests to become overcrowded and susceptible to disease.

■ Moist Forest

Douglas-fir, grand fir and many other tree species are found in the "moist forests" which cover the mid elevations at LPO. This zone receives more precipitation and can support denser forests. Under natural conditions, these forests also burn, but generally at longer intervals than the dry forests. These forests are also more vulnerable to lethal crown fires than the dry forests. Today at LPO, these forests show the effects of fire suppression and fragmentation by past logging.

■ Cold Forest

Covering the highest ridges at LPO are "cold forests", represented mainly by subalpine fir and Engelmann spruce. Growth is slow in these zones and nutrients may be limiting. Standing dead and downed trees may persist for a long time because cool temperatures slow decomposition. The fire cycle in this zone is variable and difficult to predict. These forests at LPO are relatively undisturbed.

it was historically, but the chance of a lethal or complete stand-replacement fire may be much greater. Also, as mentioned above, there is a regional trend towards reduced range of shade-intolerant species, such as ponderosa pine and encroachment by tolerant species such as grand fir. This trend is also evident in Refuge forest stands and sub-basins.

Moist Forest Vegetation Group

The moist forests of the Refuge are dominated by Douglas-fir, grand fir, western red cedar, and western hemlock. Other tree species include lodgepole pine, western white pine, western larch, and Engelmann spruce. The composition and structure within this vegetation group can vary greatly, making it hard to summarize. At lower elevations, near the dry forest transition, the forests may be dominated by Douglas-fir. Cedar and hemlock would be mostly limited to cooler, wetter sites, such as riparian zones, or micro-sites strongly influenced by northern aspect and flatter slopes. This forest group dominates the area with its estimated 29,687 acres comprising about 74% of the Refuge s forest cover.

Low intensity, non-lethal ground fires occur on the averaged every 13 to 26 years. High intensity crown fires, which are commonly stand-replacement or lethal fires, may have occurred every 20 to 150 years. Fires, where some areas burn very hot with severe effects and others burn cooler with little effect, may have occurred every 20 to 300 years. Variations in moisture, climate, soil productivity, and number of tree species, combined with a complex fire regime, result in a diverse range of vegetative conditions. The successional pathway of any given site is therefore difficult to predict. From a landscape perspective, a healthy, moist forest can be generally described as primarily closed canopy, with a diversity of trees, herbs, and shrubs. The complex fire regime would result in a variety of stand structures, including old growth single layer canopies and multi-storied stands. A great degree of other structural features, such as large snags and downed woody debris, would be prevalent.

Because of its longer fire interval, the effects of fire suppression and exclusion are not as obvious in the moist forest zones of the Refuge as in the dry forest zone. However, overstocking and conversion to more shade tolerant species is evident. Consequently, the risk of lethal fire at the Little Pend Oreille NWR is presently greater than in the past. Logging in moist forest habitats has also had a lasting effect similar to that in the dry forest areas. A high degree of fragmentation is evident from aerial photos, which show the effects of clear cuts in Refuge inholdings and associated management roads.

In general, the rich habitat diversity found in this zone supports a wide range of wildlife species. More information is needed to document wildlife use and the effects of past management.

Cold Forest Vegetation Group

The cold forest zone defines the upper elevational limit for tree survival. Rates of tree growth are generally slow in comparison to the lower elevation moist forest. Nutrients are generally

limited and the maintenance of downed and dead wood is important to these sites. Disturbance from fire is variable, ranging in intervals from 100 to 300 years, and the intensity and extent of fires is highly dependent upon the landform, topography, fuel type, and weather conditions. Because of the extreme conditions at high elevations, blowdowns are also an important natural disturbance process (DeLong 1996).

At the Little Pend Oreille NWR, the cold forest zone has been nominally set at greater than 4500'. This habitat zone comprises only about 5% (2,095 acres) of the forest habitat found on the Refuge, occurring primarily on the extreme southern and eastern borders of the Refuge. Like the moist forest zone, the effects of fire suppression are evident, but not as marked as in dry sites. In the absence of disturbance, these forests are dominated by subalpine fir and Engelmann spruce. Other species that are relatively common in seral communities are western larch, Douglas-fir, western hemlock, lodgepole pine, western white pine, and grand fir.

Except for inholdings and scattered homestead activities, most high elevation areas on the Refuge are relatively undisturbed. Some areas have been roaded, grazed, and selectively logged but not to the degree found in the other forest zones.

Quaking aspen occurs in the more hydric sites across all three of the forest vegetation groups. Many aspen stands on the Refuge tend to be mature and even-aged, with regeneration conspicuously retarded or absent. Vegetative reproduction via suckering is the primary way these stands are enlarged and perpetuated. For vigorous sucker reproduction to occur, strong light and heat must reach the forest floor; shading from competing conifers reduces this needed sunlight. This may be a significant factor on the Refuge, especially in the dry forest zone where fire suppression has allowed conifers to encroach into sites previously dominated by the more fire-adapted aspen. In addition to fire suppression, annual browsing of aspen suckers by wildlife and domestic livestock suppresses the parent tree s efforts to clone, ultimately resulting in the development of decadent, non-sustaining stands.

Riparian Habitats

Named for the Little Pend Oreille River which flows through its northern expanse, the Refuge also contains the entire Bear Creek sub-watershed, as well as most of the Cedar Creek and Olson Creek sub-watersheds within its boundaries. Most of the southern and eastern Refuge boundaries are formed by the watershed divide. All Refuge tributaries flow into the Little Pend Oreille River and hence into the Colville River, except Slide Creek and Moran Creek which flow directly into the Colville River. The Colville River ultimately flows into the Columbia River near Kettle Falls. Riparian areas are lands adjacent to perennial or intermittent bodies of water such as streams, springs, or lakes where vegetation is strongly influenced by the presence of water. Riparian areas also are usually the transition zone between aquatic and upland sites.

Riparian areas are the Refuge s most dynamic areas from an ecological perspective, but create many challenges for land managers. Riparian zones are of great interest due to their intrinsic

value as wildlife habitat. Because much of the western U.S. is arid, riparian zones provide the moisture and nutrients to support a greater variety of vegetation than upland areas, in turn supporting a greater diversity of wildlife. The riparian areas, especially in the dry forest vegetation zone, provide some of the Refuge s most species-rich habitats. For example, many neotropical migratory bird species (NTMB) use riparian zones exclusively for nesting and foraging. From a regional standpoint, Quigley and Arbelbide (1997) found that riparian vegetation is used by more neotropical migratory birds (64% of all 132 NTMB species) than any other habitat. Riparian areas are also disproportionately important for a number of other wildlife species, including frogs, snakes, bats, voles, grouse, and deer.

Aquatic Habitats, including Rivers, Streams, Wetlands, Lakes, and Ponds

Wetlands and deepwater habitats on the Refuge include artificial lakes, natural wetlands, ponds, springs, and both perennial and intermittent streams. Map 7 displays Refuge aquatic habitat.

Wetlands are defined as areas soaked by surface or groundwater frequently enough to support vegetation that requires saturated soil conditions for growth and reproduction. Deepwater habitats are defined as permanently water covered lands where the water is often deep, such as streams and lakes.

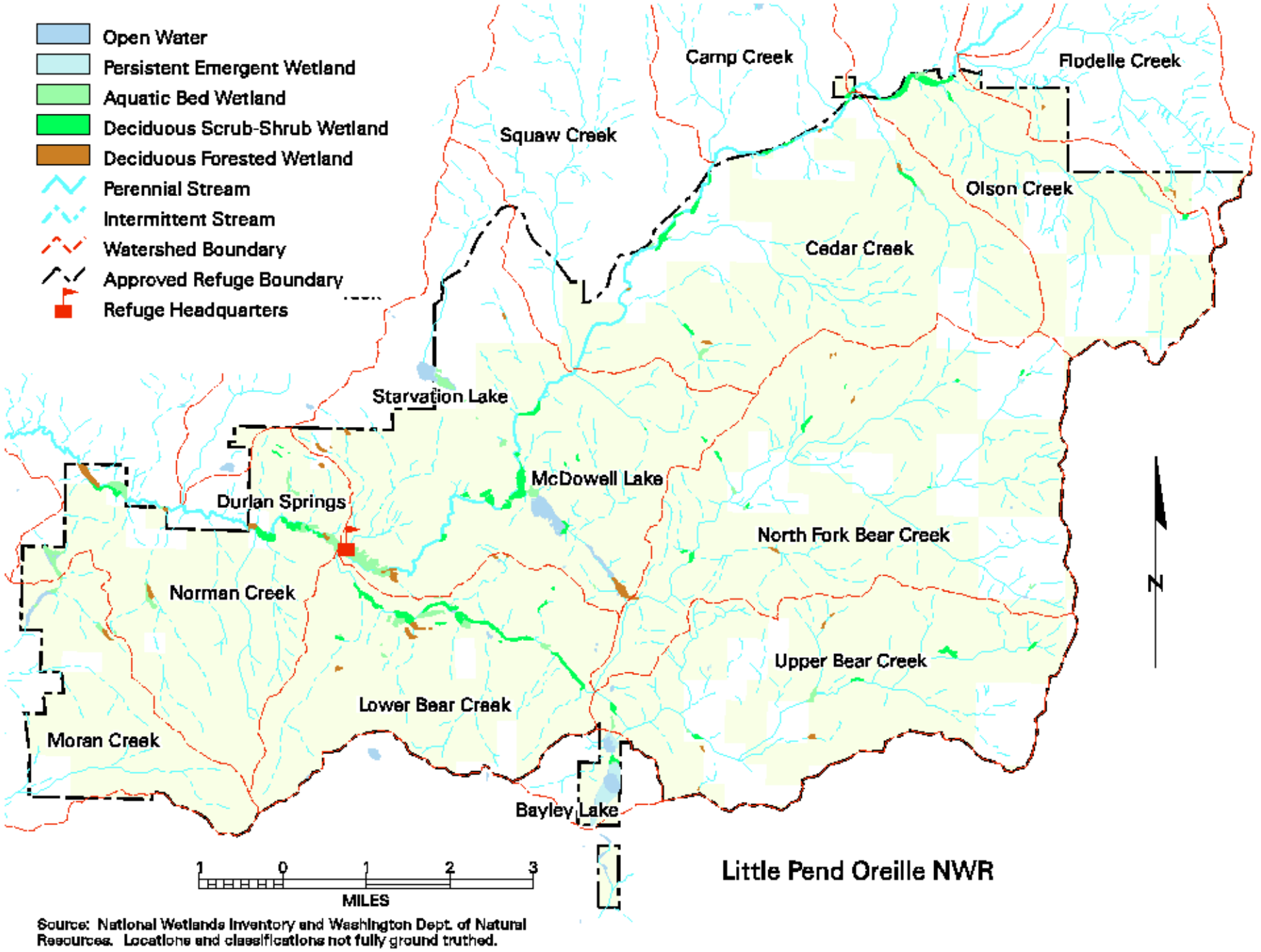
Occurrence and classification of wetlands and deep water habitats, including ponds, marshes, streams and lakes, on the Little Pend Oreille NWR was determined using the U.S. Department of Interior, Fish and Wildlife Service National Wetlands Inventory maps. These documents were prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands and deepwater habitats were identified in the photographs based on vegetation, visible hydrology, and geography using a system described in Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979). This analysis was accomplished using aerial photos taken in August 1983, and reflect the conditions during that specific year and season. An inherent margin of error always exists with the use of aerial photographs. Additionally, small wetlands and those obscured by dense forest cover may not have been identified on these maps.

Wetlands and deepwater habitats occurring on the Refuge fall into 3 broad system definitions: palustrine (ponds, marshes, bogs, swamps and fens), lacustrine (both deep and shallow lakes), and riverine (rivers, streams, and creeks).

Palustrine Systems

One hundred ninety five palustrine wetlands were identified on the Little Pend Oreille Refuge by the National Wetlands Inventory. Wetlands occurring on private lands within the administrative boundary of the Refuge were not included. Palustrine wetlands were classified by either their water regime or by the vegetation they support. The following tables summarize the number of wetlands based on each of these two methods of classification.

Map 7. Aquatic Habitats and Subwatersheds



Source: National Wetlands Inventory and Washington Dept. of Natural Resources. Locations and classifications not fully ground truthed.

Table 2-4. Number and percent of palustrine wetlands as classified by water regime occurring on the Little Pend Oreille National Wildlife Refuge.

Wetlands Water Regime	Number of palustrine wetlands	Percent of total
Seasonally flooded	138	71
Permanently flooded	21	11
Saturated Soils	16	8
Semi-permanently flooded	14	7
Temporarily flooded	6	3
TOTAL	195	100

Table 2-5. Number and percent of palustrine wetlands as classified by dominant vegetation occurring on the Little Pend Oreille National Wildlife Refuge.

Dominant Vegetation Type	Number of palustrine wetlands	Percent of total
Persistent emergent	65	33
Deciduous scrub-shrub	62	32
Deciduous forested	44	23
Open water, no vegetation	17	9
Aquatic rooted	2	1
Miscellaneous	5	2
Total	195	100

Eight wetlands (4%) were identified as being modified to some degree by beavers. One appeared to have been ditched. Dailey, Pierce, Winslow and Long Lakes are all classified as palustrine wetlands. None of these lakes supports a recreational fishery.

Potter s Pond is the largest palustrine wetland on the Refuge and the only one with a recreational fishery. It is a man-made pond with an earthen fill dike completed in 1959 as waterfowl nesting habitat. The pond averages 15 acres but can range from 1.5 to 24 surface acres. It is fed by the same diversion that feeds Bayley Lake and is connected to the lake by an artificial channel. The Pond s maximum depth is about 9 feet. Broods of Canada geese, mallards, ruddy ducks, ring-necked ducks, mergansers, and goldeneyes are commonly seen on the pond as well as pied-billed

grebes, American coots, great blue heron and osprey. Shoreline shrubs provide nesting and foraging habitat for several song bird species. The pond is currently stocked with rainbow trout.

Lacustrine Wetlands

Bailey and McDowell Lakes are the only lacustrine wetlands on the Refuge. Both lakes consist of permanently flooded main basins of open water, with shallower portions containing a mix of floating vegetation dominated by pondweed.

Prior to 1973, McDowell Lake was a 33-acre beaver pond during high water years. Located on an intermittent tributary to the Little Pend Oreille River, it would nearly dry up in some years. In 1972 Washington Department of Fish and Wildlife (then known as the Washington Department of Game) built an earthen fill dam on the lake outlet, raising the water level about 10 feet, increasing the surface area to about 48 acres and creating a maximum depth of 20 feet. Water was diverted from the North Fork of Bear Creek to fill the lake using a stop log weir. To maintain the lake and comply with water rights provisions, Washington Department of Game recommended a flow of 2 cubic feet per second (cfs) be diverted to feed the lake and 3 cfs be maintained below the diversion in the stream. Pond mills were installed to provide winter circulation and prevent winter-kill. Trapping has been used in the past to control tench, an undesirable exotic fish intentionally or accidently introduced into the lake. The lake is currently stocked most years by the Department with rainbow trout. Some brown trout remain from previous stockings.

Tench were either intentionally or accidently introduced to McDowell Lake. As the populations of these fish increase, they degrade the habitat for the more desirable trout. The State has tried different methods to remove or control the tench population, including rehabilitating the lake by draining it, poisoning all the remaining fish and restocking the lake with trout. These attempts have met with limited success with the tench population persisting. Current management consists of a joint effort between the State and the Refuge to trap and remove tench from the lake on an annual or biennial basis. This method, while not a permanent solution, does show promise.

Bayley Lake, formerly known as Cliff Lake, was enlarged by a rock and cement dam at its southern end in the 1920s. A private fish hatchery was built at the southeastern end of the lake by Mr. Bayley. Water was diverted from Bear Creek for the hatchery water supply and to fill the lake. A sink-hole near the dam resulted in a leak in the lake, causing problems at the hatchery. To fix this leak, clay was piled on the ice near the sink hole, filling the hole in the spring when the ice melted. Bayley sold his property to the Fish and Wildlife Service in 1940. The lake continues to leak, presenting the challenge of maintaining lake water levels. Bayley Lake surface acres vary from 18 to 72 acres. Despite unstable water levels, or perhaps because of them, the lake is rich in aquatic invertebrates which supply a hearty diet to stocked rainbow trout which have been known to reach the seven pound class. The lake also contains eastern brook and brown trout.

Riverine Wetlands

The river and streams found on the Refuge can be divided into two main classifications: perennial and intermittent. Perennial streams are those that flow year around. Included in this classification is the Little Pend Oreille River, of which about 9.9 miles flow through Refuge lands. Bear Creek and the North Fork Bear Creek account for about 14.6 miles of perennial stream while other smaller perennial streams such as Cedar, Norman, and Olson Creeks, as well as several smaller unnamed tributaries, account for another 25.9 miles. Perennial streams are very likely under counted by the National Wetlands Inventory. Pyle (pers. comm.) estimated that as many as 50% of the streams classified as intermittent may in fact be perennial.

Both the Little Pend Oreille River and Bear Creek display two distinct stream forms within the Refuge. Approximately 3 miles of the Little Pend Oreille River and 5 miles of Bear Creek flow through wide, flat valleys with well developed alluvial flood plains. The water moves considerably more slowly in these reaches than in the higher gradient reaches of the stream, and the stream bottom is mostly gravel or sand with occasional patches of rocks or cobbles.

The remaining portions of these streams are higher gradient, meaning the water flows faster through narrower channels with little flood plain development. The stream bottom in these reaches is mostly rock, cobbles, or gravel with occasional patches of sand.

The second main class of riverine systems on the Refuge are the intermittent streams; creeks that flow only part of the year. When the water is not flowing, it may remain in isolated pools or surface water may be absent. Intermittent streams are defined as having surface water present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season. There are about 33 miles of intermittent streams on the Refuge.

Riparian and Stream Conditions

Riparian areas are also important to humans. Some riparian areas on the Refuge have been cleared to create open fields for agriculture. They are important areas for livestock grazing because of productive soils and abundant water. Water has been diverted from streams for many purposes, including irrigation and lake development. Many Refuge roads were built in river bottoms or parallel to streams. Camping is concentrated near Refuge creeks and the Little Pend Oreille River. All these activities have had negative effects on the function of riparian systems within the Refuge.

In conjunction with the planning process, the Fish and Wildlife Service conducted assessments of riparian and in-stream fish habitat conditions. A riparian condition survey was conducted on the Service-owned portions of the Little Pend Oreille River, Bear Creek and North Fork of Bear Creek using survey and classification procedures described by the USDI Fish and Wildlife Service and the USDI Bureau of Land Management (Pyle 1997). Valley units were delineated and visited. Riparian resource condition and functional condition were determined based on a

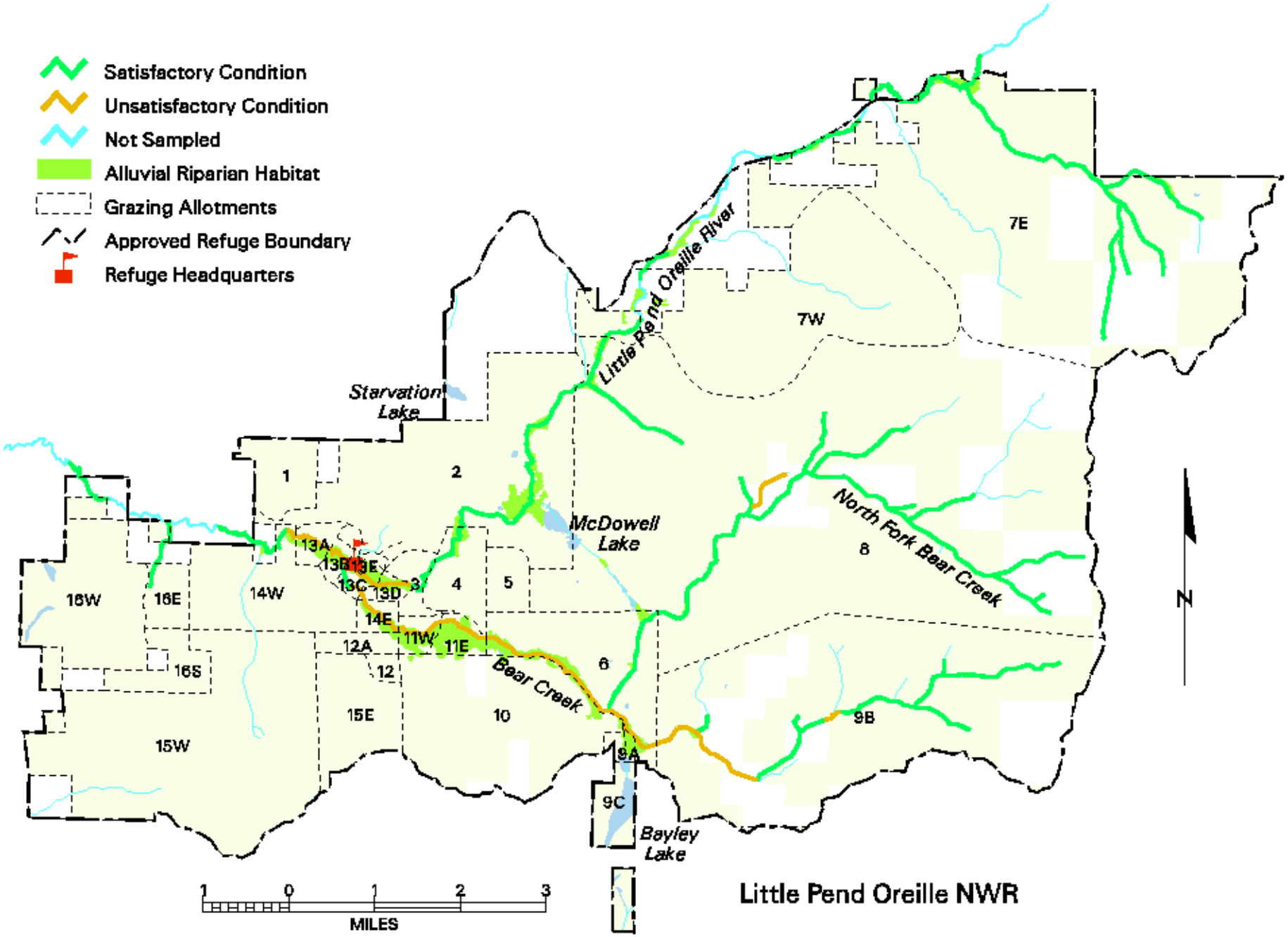
thorough examination of site characteristics and classified as being in either in proper functioning condition or functioning at risk.

Approximately 5 of the 8.5 miles of Bear Creek surveyed were classified as being in unsatisfactory condition. Of the approximately 7.5 miles of the Little Pend Oreille River surveyed, about 2 miles were classified as being in unsatisfactory condition. These unsatisfactory areas were mostly in the alluvial, low gradient troughs that comprise more than 50% of the total riparian habitat occurring on the Refuge. This type of riparian habitat also receives the majority of the livestock grazing activity occurring on the Refuge. Attributes of these riparian areas in unsatisfactory condition included excessive stream bank erosion, increased channel entrenchment, lowered water tables, reduced extent of active flood plain, and a diminished composition of the hydric riparian species expected to occur in a fully functional riparian system (Pyle 1997). Map 8 illustrates the results of that survey, areas of alluvial riparian habitat and the boundaries of the livestock grazing units (not all units are currently grazed).

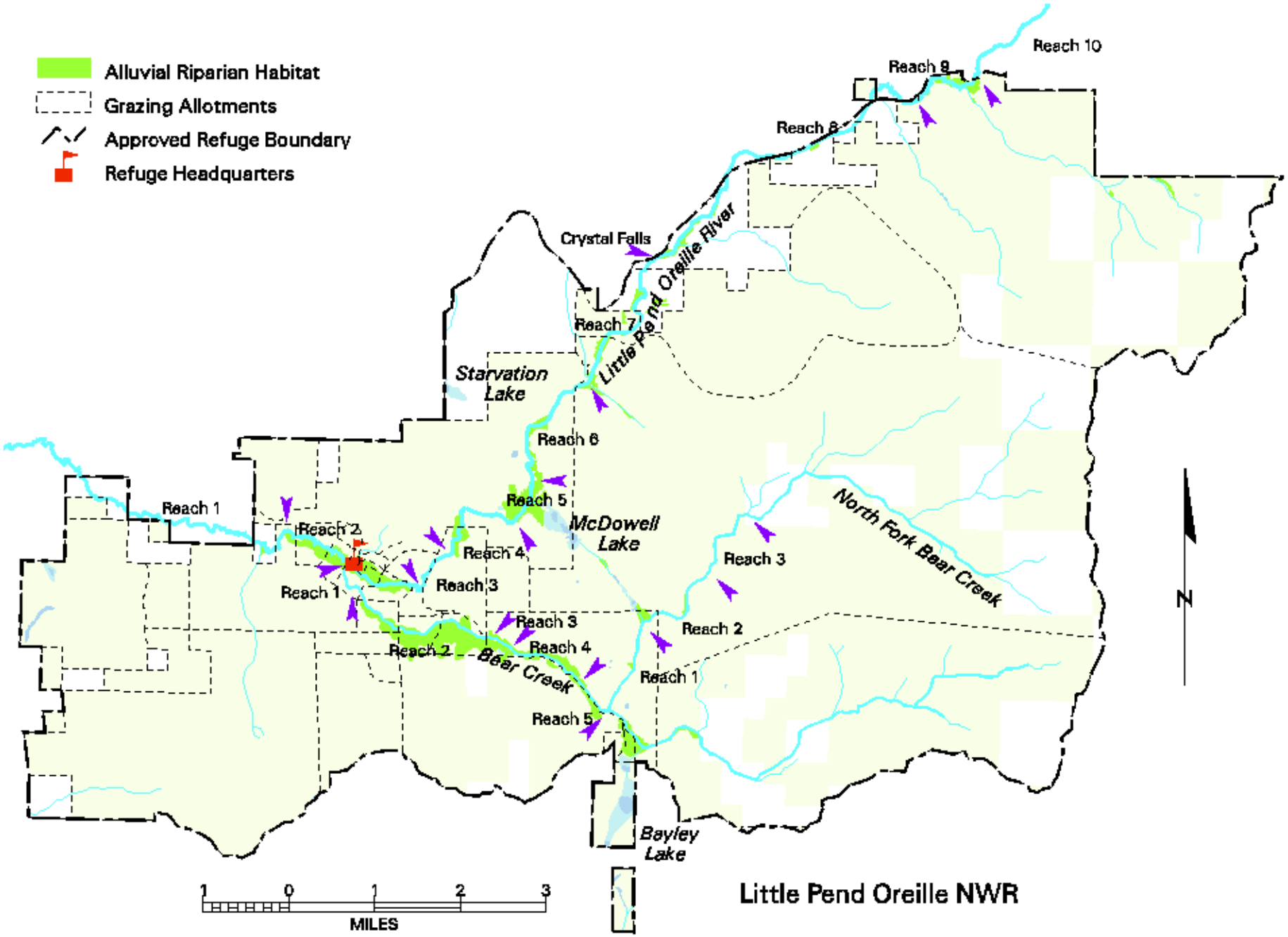
Fish habitat assessments of the Little Pend Oreille River and Bear Creek were conducted in 1996 and 1997, respectively (Kelly Ringel 1998; Kelly Ringel 1999). The rivers were divided into reaches (a relatively homogeneous section of stream that contains attributes of common character) based on landform characteristics such as valley form, valley floor width, side slope angles, estimated stream length, and other watershed characteristics. The Little Pend Oreille project involved a survey of six reaches along about 9.5 miles of the river starting at the Refuge s western boundary and culminating below Crystal Falls. Reaches 2 and 7 were further subdivided when measuring fine sediment. The Bear Creek survey was completed with five reaches designated along 5.2 miles of the creek, from the confluence with the Little Pend Oreille River upstream to the confluence with the North Fork of Bear Creek. Two reaches along the North Fork of Bear Creek (reach 1 and 2) were also comprehensively surveyed. These reaches are illustrated on Map 9.

Data for the fish habitat assessments were gathered following a modified Hankin-Reeves (1988) stream survey method (USDA 1996). This method was chosen because it identifies and measures key stream characteristics that have been identified as the most critical for defining existing watershed conditions (USDA 1996). These characteristics include: pool frequency, quality, and proportion; amount of woody debris; proportion of fine sediment; bank erosion; entrenchment; sinuosity; width/depth ratio; riparian vegetation species, seral stage, and amount of stream shading; and water temperature. The method meets assumptions for standard statistical analysis, and results are comparable to repeated surveys and surveys of other streams where the same method has been employed.

Map 8. Riparian Condition Survey



Map 9. Fish Habitat Assessment on LPO River, Bear Creek and North Fork of Bear Creek



The inventory information can also be used to answer many common management questions such as how the stream condition compares to criteria and guidelines that define quality habitat. As part of these studies, stream conditions were compared to criteria and guidelines from the Inland Native Fish Strategy (INFISH), which is current direction for Forest Service and BLM lands located east of the Cascade Crest (USDA 1995), and the ICBEMP standards that were established in the original preferred alternative for the Eastside EIS released in May 1997 (USDA and USDI, 1997). (The Eastside EIS alternatives are currently under revision and this standard is presented here only for informational purposes.) Kelly-Ringel also compared stream conditions to standards in the Bull Trout Matrix (USDI, 1998), which was developed to assist in conferencing when the bull trout was proposed for listing. However, since bull trout are thought not to ever have inhabited the Refuge, those standards are not included in the summaries presented here. Stream condition standards are shown in Table 2-6, and the actual inventoried values on Refuge streams presented with a comparison to the standards in Table 2-7.

The results of the fish habitat surveys (Table 2-7) highlight certain trends indicating the general condition of Refuge aquatic habitats. Water temperatures measured during the survey are not directly comparable to the standards since they were not taken continuously over at least 7 days. However, 4 of 6 reaches on the LPO River exceeded the maximum recommend temperature of <59°F for adult fish holding habitat. All reaches of the surveyed streams exceeded the maximum temperature (<49° F) for spawning and rearing habitat. Water temperatures are influenced by local climate, snow runoff, and the amount of solar warming of the stream. Lack of overhead cover increases water temperature by solar warming. Alteration of riparian vegetation has occurred in the past through logging and channelization, and continues in the present mainly through herbivory by both native and domestic animals. These measurements indicate a need to more closely monitor temperatures in all reaches to determine if suggested standards are being exceeded.

The low percentage of stable banks along reach 2 of the LPO River appeared to be associated with cattle grazing. Cows were present along the stream and there were many areas where their hooves had sheared off the banks. Because of the erosion, banks have down-cut, increasing the entrenchment of the stream and increasing width/depth ratio. Nonnative reed canary grass was present throughout this reach. This plant is not as deeply rooted as some native grasses, alders, and willows, thus not as good at stabilizing banks. Reed canary grass tends to establish where native vegetation is disturbed.

Sediment was high in reach 2 and 6 of the LPO River, and in all but reach 2 of the North Fork of Bear Creek. The large percentage of fine substrate is in part a reflection of both local soils, which contain a high percentage of granitic sands, and low stream gradients. There are numerous roads in the watershed. Roads contribute more sediment to steams than any other land management activity (Lee et al. 1997). Other sources of sediment input include livestock grazing, timber harvest and fire. These activities can cause loss of native vegetation, changes in hydrology, and bank instability; all which contribute to sediment input.

Table 2-6. Summary of Standards for Stream Conditions

Water Temperature (degrees Fahrenheit, measured as 7-day moving average of daily maximum temperature)	
INFISH:	< 59 ° F within adult holding habitat < 48 ° F within spawning and rearing habitats
ICBEMP:	<64 ° F
Pools per Mile (varies by wetted width)	
INFISH:	47 per mile for streams 25-49 feet wide (LPO River) 96 per mile for streams 10-19 feet wide (Bear & N.Fk. Bear Creek)
ICBEMP	same as INFISH
Bank Stability (percent linear bank non-eroding)	
INFISH:	> 80%
ICBEMP	N/A
Sediment (percent fine particles in stream bed)	
INFISH:	N/A
ICBEMP	<20% fines < 6.4 mm in spawning areas or <30% cobble embeddedness in rearing habitat
Large Woody Debris	
INFISH:	> 20 pieces per mile. Each piece must be at >12 inches diameter and > 35 foot length to be counted.
ICBEMP	Same as INFISH

Notes: ICBEMP standards presented here refer to the standards presented in the draft Eastside Assessment (Alternative 4; USDA and USDI, 1997). They were current as of the time of the survey but are presently undergoing revision. They are referenced here for informational purposes only.

Table 2-7. Stream Conditions in the Little Pend Oreille River, Bear Creek and North Fork of Bear Creek As Compared to Standards

	Little Pend Oreille River						Bear Creek				North Fork of Bear Creek	
Habitat Parameter	**Reach Number (See Map 9)**											
	2	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**4**	**5**	**1**	**2**
Water Temperature *	68	65	66	57	54	62	57	55	55	59	54	56
met INFISH adult holding habitat?	No	No	No	✔	✔	No	✔	✔	✔	✔	✔	✔
met INFISH spawning/rearing?	No	No	No	No	No	No	No	No	No	No	Np	No
met ICBEMP?	No	No	No	✔	✔	✔	✔	✔	✔	✔	✔	✔
Pools per mile	35	23	25	33	24	28	36	59	11	23	26	45
met INFISH / ICBEMP?	No	No	No	No	No	No	No	No	No	No	No	No
Bank Stability	66	93	89	85	98	99	99	95	99	100	100	100
met INFISH?	No	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Sediment in Riffles (percent sand, silt, and clay < 2 mm)	2a: 45 2b: 26	8	8	19	31	7a: 11 7b: 22	23	25	79	37	57	14
Met ICBEMP?	No	✔	✔	✔	No	✔ 7a	No	No	No	No	No	✔
Large Woody Debris	1	14	32	9	192	33	71	7	32	128	29	131
Met INFISH / ICBEMP?	No	No	✔	No	✔	✔	✔	No	✔	✔	✔	✔

indicates that the reach met the specified standard.

* Water Temperature measurements were not performed all summer, nor were 7 day moving averages completed on all reaches. The numbers presented were measured in July and may represent only a one day high temperature.

Reaches 2, 3 and 5 along the LPO River, and reach 2 on Bear Creek did not meet the suggested standard for large wood debris. Wood is important for the formation of pools, retention of sediment and particulate matter, hiding cover for fish, dissipation of stream energy which reduces bank erosion, and carbon and nutrient source for stream insects (Maser and Sedell 1994).

There is evidence in some reaches that large trees had been removed from the riparian areas in the past. Replacement of these large trees will take time.

None of the reaches met the suggested standard for pools per mile. However, the percentage of the stream area consisting of pools was high in several reaches. This relatively low pool frequency is probably not a concern but merely a reflection of the stream morphology.

The dominant seral stage within 100 feet of the stream was also noted along each reach. While not included in the INFISH and ICBEMP standards, this parameter is an indication of past land uses as well as the reach s potential to improve parameters such as amount of large woody debris in the stream in the future. With the exception of reach 7 of the Little Pend Oreille River, the dominant seral stages found along both that river and both forks of Bear Creek were shrub-seedling (1.0 - 4.6 d.b.h.) and small trees (9.0 - 20.9 d.b.h.). Activities such as land clearing and grazing has prevented trees from growing to more advanced seral stages. There was also evidence in some reaches that large trees have been harvested in riparian areas, decreasing the number of trees now present

Both of Kelly-Ringel s reports (1997, 1998) and Pyle s report (1997) indicated that portions of the Little Pend Oreille River, Bear Creek and North Fork Bear Creek, particularly the lower gradient flood plain or alluvial areas, have been compromised or degraded from past use and management. These alluvial valleys are among the most important habitats within the Refuge. Frequent floods of various extent have, over time, formed diverse habitat in these valleys featuring sandbars, off-channel sloughs and wetlands, and a wide range of plant species, all of which are important to wildlife. However, these initial studies indicate that in some sections in the alluvial valley, streams are widening, becoming more shallow, the banks are unstable, there is a lowering of the water table, and there is insufficient stream-side vegetation to provide shading. Stream-side vegetation is also an important source of nutrients, providing downed wood to the stream and helping stabilize the stream bank. Because of the wildlife implications, the degradation and restoration of these lower valleys is an important issue for the Refuge.

Old Fields

When the Fish and Wildlife Service began managing the Refuge in 1939, it included approximately 500 acres that homesteaders and former land owners had actively farmed and another 500 acres that produced grass hay or were used as livestock pastures. The Refuge continued a farming program in many of these fields or allowed permittees to graze cattle and horses in them. These farmed fields ranged in size from 1 to 92 acres and were scattered through the west side of the Refuge. Most crops were wildlife food oriented such as sweet clover, winter wheat, rye, oats, barley, alfalfa, and vetch targeted for deer and other species. Former Refuge staff felt these food plots helped reduce heavy use of browse by deer. Most cultivated fields were replanted every five years. Other fields were maintained in perennial grasses, mainly timothy, orchard grass, red top, blue bunch wheat grass, Kentucky bluegrass and crested wheat

grass. Sharecroppers removed much of the hay grown on the refuge, but a portion was stored or left in the field for supplemental deer feeding.

Of the 443 acres of agricultural land on the refuge in 1965, when the Washington Department of Fish and Wildlife (WDFW) began managing the refuge, 313 acres were still tillable. Forest succession was reclaiming the remaining 130 acres with pine and Douglas-fir. WDFW records show an average of 100 acres per year being farmed in the 1970s. Many of these fields, which ranged in size from 10 to 92 acres, were maintained in crops until 1989, when the State decided to phase out their annual cropping of tillable land for budgetary reasons. By 1988, 494 acres of perennial grass fields remained. These consisted of 9 parcels, each ranging from 4 to 62 acres. WDFW recommended converting these grassland acres to crested wheat grass. WDFW reports maintain that irrigation was necessary to make these fields productive and that they would need new expensive equipment to maintain the farm program. They began planting many of these fields to small burnet, a perennial evergreen forb, and in 1988, had almost 100 acres in this plant. Currently most of these old fields and pastures have been invaded by undesirable weeds like St. John s wort and knapweed. Small burnet, a very desirable plant for big game and birds, has become increasingly rare.

A recent analysis of Refuge aerial photos revealed 58 openings or meadows greater than 1 acre in size that can be classified as old fields. Totaling 631 acres, they ranging in size from 1 acre to greater than 60 acres, with an average size of 11 acres. They include large bottomland alluvial meadows along the Little Pend Oreille River as well as the small remnants of old homestead fields surrounded by forest. Many of these old fields or meadows are shrinking as trees invade along their edges. Several also contain the remnants of fruit orchards planted by homesteaders. Several of these meadows are either moist or wet soil types, especially, but not limited to, the ones along the low gradient portions of Bear Creek and the Little Pend Oreille River. Other, more upland fields, contain well drained soils.

Vegetation on these fields range from thick stands of redtop, timothy, or orchard grass to dense infestations of exotic weeds including St. John s wort and knapweed. Most of these meadows are included in livestock grazing allotments. Two small fields near the southwestern corner of the refuge, totaling about 30 acres, are under a special-use permit to a neighboring land owner. These fields are planted to alfalfa, and the permittee is allowed one cutting of hay each year. No other agricultural cultivation has occurred on the refuge since 1989.

2.3 WILDLIFE, FISH, AND RARE PLANTS

The Little Pend Oreille National Wildlife Refuge encompasses habitat for the vast majority of wildlife species inhabiting northeastern Washington. The Refuge includes parts of all the major forest zones in northeastern Wasington, from the dry forest of the ponderosa pines through the moist, mixed conifers, to the cold forest of Engelmann spruce and subalpine fir zone. Not only is the LPO NWR one of the largest refuges in the state, it s bordered by the Colville National Forest on two sides, effectively magnifying its value for wide ranging wildlife species.

The Refuge is home to a wide variety of terrestrial vertebrates. The Washington State Gap Analysis Program (WAGAP) is part of a national program that identifies conservation priorities and gaps in the protection of biological diversity at a landscape scale by mapping land cover, modeling vertebrate distributions, and overlaying land cover and vertebrate distributions with land management type. In 1998, this procedure was applied to all 22 national wildlife refuges in Washington. The results of that analysis for the Little Pend Oreille NWR are shown in the following table.

Table 2-8. Wildlife species predicted by Washington GAP project to be present on Little Pend Oreille National Wildlife Refuge.

Taxonomic Group	Number of species found in Washington	Number of species predicted for LPO NWR	Percent of WA species predicted for LPO NWR
Amphibians	24	6	25
Reptiles	21	8	38
Mammals	111	58	52
Birds	240	196	82

Given the wide diversity of species found on the Refuge, a discussion of all endemic species would be impractical. However, some important wildlife-habitat relationships will be discussed because of their apparent significance for management or because of the attention they have received during the planning process. Migratory birds are of particular interest due to being mentioned in the Executive Order establishing the Refuge. Proposed, threatened and endangered species, Comprehensive Conservation Plan evaluation species and other selected wildlife and fish species will be highlighted. More complete treatments of wildlife-habitat interactions will be detailed in subsequent habitat management plans after completion of the Plan. A complete list of wildlife species known or predicted to inhabit at the Refuge is included in Appendix H.

Rare or Declining Species

Federally Proposed, Threatened or Endangered Species

The only federally listed threatened and/or endangered species known to regularly occur on the LPO is the bald eagle. Bald eagles are frequently seen along the Little Pend Oreille River in winter time. These overwintering birds are foraging in the open water along the river as well as scavenging winter-killed deer on the nearby deer winter range.

Both adult and sub-adults were observed on several occasions during the spring and summer of 1998 perching and flying around Bayley Lake. There are no known nesting sites on or near the

LPO NWR. These eagles are likely birds that have not established breeding territories and are utilizing the lakes as foraging habitat.

Peregrine falcons historically nested in this portion of Washington, and a peregrine falcon was reported near the cliffs along Bayley Lake as late as 1995. However, no known falcon eyries are currently active on the refuge, and sightings are very rare.

Although the Little Pend Oreille NWR is within the historic range of both gray wolf and grizzly bear, the refuge is outside of the designated recovery areas for these species. A grizzly was illegally killed approximately 12 miles north of the refuge in 1997. Another confirmed grizzly sighting occurred near the town of Deer Park, about 40 miles south of the Refuge , in 1996 (Wisneiski 1998). Possible gray wolf sightings have been reported at Bayley Lake as recently as November, 1998. Obviously it s possible that individuals of these species may occasionally pass through portions of the refuge.

Ute ladies tresses (*Spiranthes diluvialis*) is a perennial orchid currently listed as threatened under the Endangered Species Act. It occurs in relatively low elevation riparian, spring and lakeside wetland meadows. First described as a species in 1984, it has been found in Colorado, Utah, Nevada, Wyoming and Montana. The discovery of this species in Okanogan County in 1997 opens the door to its possible existence in other parts of eastern Washington. A vascular plant inventory conducted on the Refuge in 1995 and 1996 failed to detect the plant (Wood 1997). No surveys focusing on this species have since been conducted on the refuge. This plant seems to require alkaline or high pH soils. While there are several areas such as wet meadows and seeps with moisture conditions suitable for the plant, recent soil analyses indicate the Refuge soils tend to be acidic. Therefore, the potential for Ute ladies tresses to exist on the Refuge is likely quite low.

Canada lynx has recently been listed by the U.S. Fish and Wildlife Service as threatened under the Endangered Species Act. Several old records indicate lynx were present on the refuge earlier in this century, including a specimen stored in the Smithsonian that was collected by a government trapper near the eastern end of the refuge in 1940. Tracks have been reported in the same general area within the last 2 years. DNA analysis of hair collected about 1.5 miles north of the Refuge s northeastern boundary confirmed the presence of lynx in that area in September, 1998.

The high elevations found along the eastern portion of the refuge provide some potential habitat for Canada lynx populations. Sightings are rare in the region probably due to the lynx s elusive nature and because it frequents the region only sporadically. The areas surrounding the Refuge contain a mix of habitat patches that are favored by the lynx, including late successional coniferous forest providing denning habitat and young, dense stands of lodgepole pine that support their primary prey species, snowshoe hare. Habitat for lynx on the refuge proper is probably limited due to the relative lack of dense stands of young lodge pole, and a limited amount of area above 4500 feet elevation.

The eastern portion of the Refuge falls within one of six Lynx Management Zones delineated by the DNR. Known as the Pend Oreille Lynx Management Zone, this LMZ extends from the Canadian border to a few miles south of the refuge, and includes the site of the 1998 lynx detection. According to WADNR (1996), the southern half of this narrow and constricted LMZ has been subject to much habitat alteration. Only the northern portion is now thought to be contiguous enough to support lynx. The estimated lynx population in this zone is 10-15 animals. The state further delineated smaller Lynx Analysis Units (LAUs) within each LMZ. LAUs average 32 square miles in size and are considered generally large enough to encompass the median home range reported for lynx in north central Washington. On its eastern border, the Refuge incorporates a portion of LAU 18.

Forage cover ratios are thought to be important for lynx population maintenance because of the lynx s extreme dependence on snowshoe hares as prey. The hares themselves are highly linked with early-mid successional stages, which provide an abundance of small diameter woody browse at or near ground level. The WA DNR report placed a high significance on forage habitat availability and built their conservation plan largely around this concept. The Pend Oreille LMZ overall has 5% forage and the state recommends a minimum of 20% per LAU or LMZ. The LAU that the Refuge incorporates (LAU 18) has the highest forage ratio (8%) of the six LAUS in this LMZ.

The DNR report goes on to say that this LMZ probably currently lacks the forage habitat needed to sustain a population of lynx, but that the situation should be improving relatively soon since about 16% of the LMZ is in young forest that will soon develop into foraging habitat. Moreover, if vegetation management proceeds on DNR land in the way described in a model included with the DNR plan, forage will rapidly increase in the second decade; meet or exceed the 20% level recommendation for the majority of the next eight decades; and will reach levels as high as 28% during that time frame.

Factors impacting lynx besides the quantity of foraging habitat were noted by the state in the 1996 DNR report. The report acknowledged that the total land base available for lynx in the state is shrinking and fragmenting due to human development and resource extraction activities. The report also recognized that disturbance by snowmobiles may reduce the quality of habitat available for lynx, which may therefore be reflected in the area s potential to support lynx. High quality denning habitat is limited. Finally, the state acknowledges that LAU 18 (that partially intersects the Refuge) is highly accessible by road and recommends future road closures. (WADNR 1996).

The authors of the Lynx Science Report (Ruggiero et al. 1999) feel that the coyote is a potentially formidable competitor with lynx, citing the coyote s wide habitat niche, heavy predation on snowshoe hares, high reproductive rate, great behavioral plasticity, and high tolerance of humans. Coyote population numbers have increased dramatically in many places over the last few decades, (including a 44X multiplication in Washington state between 1960-1984), using coyote harvests as an indicator (Novak, et al. 1987)

Other species of special interest, including state endangered, threatened, and candidate species, U.S. Fish and Wildlife Service species of special concern and U.S. Forest Service designated sensitive species, are listed in Appendix H.

USFWS Nongame Bird Species of Management Concern

The Fish and Wildlife Conservation Act, 1980, requires that the Service identify all migratory nongame birds that, without additional conservation action, are likely to become candidates for listing under the Endangered Species Act of 1973. Additionally, the Act further underscores the need to develop actions to assure the conservation of these species with the underlying philosophy that an ounce of prevention is worth a pound of cure. Species of Management Concern (SMC) known to regularly occur on the Refuge include the: Rufous hummingbird, olive-sided flycatcher, hermit warbler, and Vaux s swift.

Partners in Flight Landbirds Program Conservation Priorities

The interagency Partners in Flight Conservation Program recently completed an assessment of the status and conservation needs of birds inhabiting all types of upland habitats. This assessment included consideration of population trends, habitat trends, and threats on breeding and wintering grounds. National, regional, and more local conservation priorities were determined. These species represent conservation priorities for the Service, and other PIF partners including the Washington State Department of Wildlife, the USFS, and other governmental and private partners. Multi-agency PIF conservation strategies are currently under development which will guide management activities at the local and regional scale. In addition to the SMC species listed above, other species of high PIF conservation priority which occur on the Refuge include the: willow flycatcher, MacGillivray s s warbler, white-headed woodpecker, flammulated owl, and pygmy nuthatch. Appendix H lists all birds which occur on the Refuge and identifies those ranked as high conservation priorities by PIF at the local and regional scale.

Rare Plants

During the summers of 1995 and 1996, a vascular plant survey was conducted on the western portions of the Colville National Forest, including the Little Pend Oreille National Wildlife Refuge. While no Federally listed proposed, threatened or endangered plant species were found, a Washington State threatened species, adder s-tongue (*Ophioglossum pusillum*), was found on the Refuge (Wood 1997). Previously unknown from the eastern portion of Washington, a healthy population of several hundred plants was discovered in a wet meadow.

Management of this colony currently consists of excluding both livestock grazing and vehicular traffic from this meadow. The population is monitored annually to detect any changes in the colony s size or shape.

Evaluation Species

Twelve vertebrate species were chosen to represent several important habitat types found on the Little Pend Oreille NWR. While not necessarily representing the complete spectrum of biodiversity inhabiting the Refuge, these evaluation species provide insight into how the various alternatives will affect the major habitats found here.

Several criteria were used in species selection. First, they needed to represent species using the major habitat types occurring on the refuge, including lakes, streams, forests and open fields. Forest types were further defined as dry, moist or cold with emphasis placed on the mature ages. Unique forest habitats that would be impacted by the alternatives, such as aspen stands, low elevation ungulate winter range and riparian areas, were also a focus. When possible, special status species, species of management interest or species identified by Wisdom et al. (2000) as having experienced severe losses in habitat were selected. Finally, an effort was made to include a variety of taxon in the list.

These evaluation species were used only to assess the broad impacts of this comprehensive conservation plan. They are not management indicator species since they will not be used to monitor and evaluate the success of any future management programs. After the Comprehensive Conservation Plan is finalized and adopted, a site-specific habitat management plan will be developed. That step-down plan will include specific methods for evaluating the success of the planned projects and programs.

Birds

Information on Refuge bird life comes from several different sources. Early Refuge narratives provide some survey records as well as anecdotal information about birds observed by Refuge workers. Records kept by the Washington Department of Fish and Wildlife from 1965 through 1994, also contain some useful information. Most information has been collected since 1994, through breeding bird surveys, point counts, waterfowl breeding pair and brood surveys, mist netting for an avian productivity and survival monitoring project, and by incidental observations by Refuge staff.

Based on WAGAP analysis projections, the Little Pend Oreille NWR supports at least 123 native breeding bird species. Bird observations by Refuge staff indicate this is likely an underestimate. The high number of breeding birds found on the Refuge is due primarily to the Little Pend Oreille s encompassing five of the forest zones found in northeast Washington.. Additionally, the Refuge provides habitat for several breeding species more typical of the eastern North American or boreal forest north of the state that only enter into Washington in the northeastern portion of the state (e.g., the northern water thrush and American redstart). The Refuge also supplies a major part of the protected range in Washington for red-necked grebe, black tern, bank swallow, and gray catbird.

Table 2-9. Species used to evaluate the effects of the proposed alternatives on important wildlife habitats.

Species	Habitat	Special Status	Taxa	Cavity Users (Y=yes)
Bald eagle	lakes, streams, and forests bordering aquatic zone	FT, ST	Bird	
Northern Goshawk	mature moist forest	FC, SC, SMC, ICBEMP	Bird	
MacGillivray s warbler	riparian woodland / shrubs	PIF	Bird	
Common Goldeneye	lakes, bordering riparian forest	---	Bird	Y
Flammulated Owl	mature dry forest	SC, PIF, ICBEMP	Bird	Y
Pileated Woodpecker	mature moist forest	SC, ICBEMP	Bird	Y
Ruffed Grouse	aspen forest	----	Bird	
Hoary Bat	open areas, mature forest, riparian areas	ICBEMP	Mammal	Y
Canada lynx	cold forest	FP, ST	Mammal	
White-tailed Deer	all areas (low elevation forest for winter range)	-----	Mammal	
Columbia Spotted Frog	slow moving streams, wetlands	FC, SC	Amphibian	
Rainbow Trout	lakes, streams	----	Fish	

Notes: Special Status codes are defined as follows: FT - Federally listed threatened species; FP - Species proposed for federal listing; ST - State listed threatened species; SC - State listed candidate species; SMC - Species of management concern; ICBEMP - Species that have lost 67% or more of their historic habitat area in ERU 7, within which Little Pend Oreille Refuge is situated; PIF - Bird species identified by the Partners in Flight program as being of extremely or moderately high conservation concern.

Waterfowl/Water Associated Birds

Many species of waterfowl and water associated birds have been observed on Refuge lakes and wetlands during waterfowl breeding pair and waterfowl brood surveys. Duck species commonly seen include: mallard; ruddy duck; redhead; common goldeneye; ring-neck duck; bufflehead; wood ducks; green-wing, blue-wing and cinnamon teal; and common and hooded mergansers. Canada geese also breed on several Refuge lakes and wetlands as do red-necked grebes. Harlequin ducks have been observed along portions of the Little Pend Oreille River within the Refuge boundaries but no nest activity has been detected. American dippers are also sighted along this river. American coots are quite common on all Refuge wetlands, along with passerine species such as red-winged and yellow-headed blackbirds. A small great blue heron rookery existed on the Refuge until 1996 when it was destroyed by a windstorm. Although herons are commonly seen on the Refuge, no new nesting colony has been found. A pair of ospreys are commonly observed foraging in Bayley and McDowell Lakes as well as other areas of the Refuge. These birds probably represent a breeding pair, however a nest has not been located. Bald eagles are commonly seen in the winter along the Little Pend Oreille River.

The creation of Bayley and McDowell Lakes and Potter s Pond converted portions of these shallow wetlands into permanent deep water habitats. This conversion reduced the amount of shallow water wetland available on the Refuge, but produced much more deep water habitat than was naturally available on the area. These three lakes all continue to have a shallow water component, albeit drastically reduced from what was available before they were impounded. This increase in deepwater habitat complements the existing shallow water habitat remaining on these sites as well as that found on other Refuge wetlands such as Dailey and Long Lakes.

The potential major threat to Refuge waterfowl and other wetland bird productivity is on these deeper lakes. The disturbance caused by the high number of anglers using these lakes during spring and early summer may be reducing breeding success or displacing nesting pairs. Whether this use is having a significant negative impact on wetland bird production has not yet been determined.

Riparian Birds

Mist netting in wooded riparian habitat along the Little Pend Oreille River has yielded a list of species breeding in those areas of the Refuge. Species captured in these nets include those identified in Table 2-10.

The primary threats on the Refuge to riparian breeding species stems from habitat degradation caused by past and present livestock grazing, agricultural practices, and recreational use.

Table 2-10. Birds captured in mistnets within wooded riparian habitat at the Refuge.

American redstart	Townsend s warbler	winter wren
northern waterthrush	common yellowthroat	dark-eyed junco
Swainson s thrush	Hammond s flycatcher	western tanager
warbling vireo	dusky flycatcher	pine siskin
solitary vireo	willow flycatcher	red crossbill
American robin	least flycatcher	golden-crowned kinglet
orange-crowned warbler	song sparrow	black-capped chickadee
yellow warbler	chipping sparrow	brown creeper
MacGillivray s warbler	cedar waxwing	ruffed grouse
Wilson s warbler	red-nap sapsucker	common snipe
Audubon s warbler	hairy woodpecker	Townsend s solitaire
red-breasted nuthatch		

Dry Forest Birds

The low elevation ponderosa pine dominated dry forest provides habitat for several species of birds, some found nowhere else on the Refuge. Birds use all structural forms of dry forest, from young stands and brushy openings, to old forests, including dead trees and downed logs. The presence of riparian vegetation along permanent and seasonal waterways within the dry forest brings in several additional bird species. Many species of woodpeckers use dead trees in this forest type for nesting. Their excavations also provide nesting cavities for several bird and mammal species that cannot excavate their own. Large raptors, including owls, hawks and eagles, hunt for food in openings or the open stands of trees found in the dry forest type. This is also the portion of the Refuge that supports the majority of the introduced wild turkey population.

Much of our information comes from point counts done in preparation for vegetational treatments in these areas, and through casual observations by Refuge personnel. Species commonly observed during the point counts on these areas include chipping sparrow, dark-eyed junco, hairy woodpecker, white-breasted and red-breasted nuthatch, spotted towhee, Hammond s flycatcher, mountain and black-capped chickadee and yellow-rumped warbler. Many of these species are not limited to dry forest habitats and are found in several habitats and elevations

throughout the Refuge. However, white-headed woodpeckers do prefer these dry ponderosa pine sites and are often observed foraging in these areas.

Another species expected to be occupying this area in preference to other Refuge habitat is the flammulated owl. A juvenile flammulated owl was sighted in this area of the Refuge in 1997, indicating the species is nesting in the vicinity. However, until nocturnal owl surveys are performed, the relative density and species composition of owls in this area cannot be accurately determined.

Human activities, such as timber harvest and fire suppression, have greatly altered the vegetative structure of this forest type. Removal of large trees has reduced the number of sites available to snag dependant species. Fire suppression has also reduced the number of trees available to become snags, as well as causing overstocking of stands by young conifers, and reducing the density and diversity of shrubs. These factors are the main threats to bird habitat in the dry forest type.

Moist Forest Birds

Very little specific information exists about specific bird populations and species diversity of the moist forest type on the Refuge since little survey work has been conducted there. Based primarily on information contained in the Interior Columbia Basin Ecosystem Management Project (ICBEMP) Eastside Draft Environmental Impact Statement (USDA Forest Service 1997) the multiple canopy layers found in moist forests are expected to provide a wide variety of bird habitat. Species typical of the moist forest type that are found on the Refuge include northern goshawk and pileated woodpecker.

Small and scattered aspen stands also provide diversity in moist forests. These are very important nesting and feeding habitat for several species of birds such as the red-naped sapsucker, western tanager and Swainson s thrush.

On the Little Pend Oreille, past timber harvest has resulted in a shortage of large, mature to old growth trees needed for the single layer canopy they provide, as well as a source of large snags and downed logs. Fire suppression has drastically reduced the occurrence of young stands that result from this and other forms of disturbance. Finally, lack of disturbance, coupled with livestock browsing on the limited number of aspen spouts, has hampered aspen regeneration, threatening some of these aspen stands to die out.

Cold Forest Birds

Very little data is available describing bird species composition or populations on the cold forest portions of the Little Pend Oreille. No systematic bird survey has been done on this part of the Refuge to date; what information exists comes from incidental observations by Refuge personnel.

Although many bird species use both moist and cold forest types, fewer birds use cold forests. This is due to lower diversity in tree species, fewer insects and a shorter growing season. Red-tailed hawks and great-horned owls forage on the voles and squirrels that inhabit these areas. Although still rare, boreal and great grey owls have moved down from Canada into cold forests. Snags are important for hairy, black-backed, and three-toed woodpeckers.

The cold forest areas are the only places where spruce grouse have been documented on the Refuge. Blue and ruffed grouse also inhabit these areas, with blue grouse using them specifically for wintering habitat.

Ruffed grouse is a common game bird on the Refuge. It inhabits a wide variety of habitats including ponderosa pine, mixed conifer, and riparian areas. Aspen is a very important component of grouse habitat used for both feeding and breeding (Thomas 1979, Cade and Sousa 1985).

Deciduous woody stems are very important component of hiding cover for grouse, allowing grouse to see approaching predators. Throughout their range grouse prefer drumming display sites that are surrounded by moderately dense woody stems (Cade and Sousa 1985). Mid-seral aspen stands provide optimum vertical cover from fall through spring and suitable snow conditions for snow-burrow roosting during winter (Gullion and Svoboda 1972 *in* Cade and Sousa 1984). Conifers can also provide necessary cover, however, densities of ruffed grouse in conifer dominated covers tend to be lower than in aspen dominated habitats.

Burning can improve grouse habitat by maintaining an interspersion of young through mature successional stages of forest (Sharp 1970 *in* Cade and Sousa 1984). Grazing by livestock can adversely affect brood habitat (Robertson 1976; Stauffer 1983 *in* Cade and Sousa 1984).

Most aspen stands on the Refuge are decadent, with little evidence of active regeneration. Overshading by conifers resulting from suppression of fire and other disturbances have inhibited the sprouting and subsequent expansion of the existing aspen copses. In addition, browsing by domestic livestock on the limited aspen suckers has also impaired the development of multi-aged and structurally diverse aspen stands. While the existing mature aspen trees do provide some winter food for grouse, the lack of sprouts and saplings needed for fall to spring cover, as well as a source of recruitment for mature trees, limits the potential value of these stands as ruffed grouse habitat. Fire suppression has also allowed large numbers of lodgepole pine and ponderosa pine seedlings to become established in stands historically dominated by mature ponderosa pine. This degrades these areas as grouse habitat by increasing the bird s susceptibility to predation, as well as discouraging the establishment of the more desirable aspens and deciduous woody shrubs.

Declining populations have been documented in some species that use cold forests such as northern goshawk, Vaux s swift, pileated woodpecker, and Hammond s flycatcher; and in species using riparian habitat in cold forests such as MacGillivray s warbler and the song sparrow .

The loss of old stands and large trees and snags, whether through natural or human caused disturbance, is probably the greatest threat to the cold forest areas found on this Refuge.

Mammals

Due to its undeveloped setting and the large number of vegetation zones it covers, the Little Pend Oreille NWR is predicted to have 52 native mammal species (Cassidy et al. 1998).

The Refuge is well known in the state and the region as an important wintering area for white-tailed deer herds. Deer migrate down the Little Pend Oreille River valley and from surrounding higher elevation habitat to winter on the Refuge to take advantage of the milder microclimate found on the lower elevation, ponderosa pine dominated areas.

The Fish and Wildlife Service has very limited information on the population, age structure, and harvest rate for white-tailed deer. Refuge staff have recently instituted several seasonal deer counts to monitoring the area s deer population. Information is now being collected on the age and sex of harvested deer. Until better information can be gathered and analyzed, best estimates have the winter deer population on the Refuge being 3 to 4 times higher than the summer population. Officials from Washington State Department of Fish and Wildlife maintain that winter habitat is an important limiting factor on the deer population in northeastern Washington, making the Refuge critical to the overall population of white-tailed deer in this area. Residential development of private lands adjacent to the Refuge s western boundary is increasing, reducing the amount and value of this land as deer winter range. The continuing loss of critical seasonal habitat increases the importance of the remaining winter range protected within the boundaries of the Refuge.

In 1941, the Service began planting bitterbrush, serviceberry, chokecherry, rose, and dogwood throughout the portion of the Refuge used by white-tailed deer for winter range. The 1951 Fish and Wildlife Service Annual Narrative reported that hay and salt were placed on the higher range to slow deer migration and minimize use of these rehabilitated areas and reduce crop depredations on neighboring farms.

Other ungulates using the Refuge are mule deer, elk, and moose. Mule deer are native to the area, and exist in relatively low numbers in the higher elevations of the Refuge. Suitable habitat, such as higher elevation natural meadows, is relatively limited on the Refuge. The resident population seems to be following the downward trend observed in this species throughout northeastern Washington. Their relative scarcity makes estimating the Refuge population very difficult. There were no reports of mule deer harvested from the Refuge during the 1997 hunting season

Moose began to appear in the Selkirk Mountains in the early 1950s, having expanded their range southward from British Columbia. Their population has increased rapidly with moose now found throughout northeastern Washington (Zender pers.comm.). Moose are seen occasionally on the Refuge throughout the year; no population estimate is available at this time. Since the

population continues to increase in this region, moose are expected to become more common on the Refuge in the future.

Elk are probably not native to this portion of Washington. Several releases were attempted earlier in the century, but it was not until the elk were transplanted in the Pend Oreille Valley in the late 1960s that success was realized (Zender pers. comm.). These elk expanded their range westward into other areas of suitable habitat adjacent to the Refuge. While occasional sightings, tracks, and other sign are reported on the Refuge, elk are not using the Refuge on a regular basis. The Washington Department of Fish and Wildlife are concerned that elk using the traditional white-tailed deer winter range may consume a significant amount of forage, reducing the quality of the area as deer range. Elk have not increased their use of the Refuge over the last several years. However, an improvement in habitat quality or other management action, combined with an increase in the elk population, may result in more elk inhabiting the Refuge.

Black bears, cougars, coyotes, and bobcats all inhabit the Refuge. Estimating the population size of any these large predators is very difficult, and no dependable estimates currently exist for this area. However, the number of sightings by local residents seems to be increasing. Populations of these species on the Refuge are probably stable.

Other wide ranging forest carnivores, such as the wolverine, marten, and fisher, could potentially use the Refuge. A dead fisher, originally released in Montana, was found about 2 miles east of the Refuge boundary in 1994. Survey work conducted by the Washington Department of Fish and Wildlife in 1996, on areas directly adjoining the Refuge, failed to detect any fishers (Zender pers. comm.). While some suitable habitat may be available on the Refuge for this species, it is unlikely that any fishers currently inhabit the area.

Wolverine inhabit northeastern Washington, with occasional sightings reported to the State s Department of Fish and Wildlife. There are no records of wolverines on the Refuge, but since these animals have been recorded using home ranges between 38 and 350 square miles, it is always possible a wolverine may spend some time on the Refuge.

Historically, American marten were common throughout northeastern Washington. Due to habitat loss and harvest pressure, marten are now uncommon in this area (Zender pers. comm.). A reintroduction effort was attempted by the State in 1989, releasing 12 marten in the Olson Creek area along the eastern side of the Refuge. None of these animals were observed again and their fate is unknown. Subsequent track surveys and photographic surveillance sites have found a few marten using the Little Pend Oreille Lakes area about 6 miles north of the Refuge boundary. No marten have been recorded on the Refuge. Several areas of the Refuge contain probable habitat for marten, and surveys to detect this species are planned.

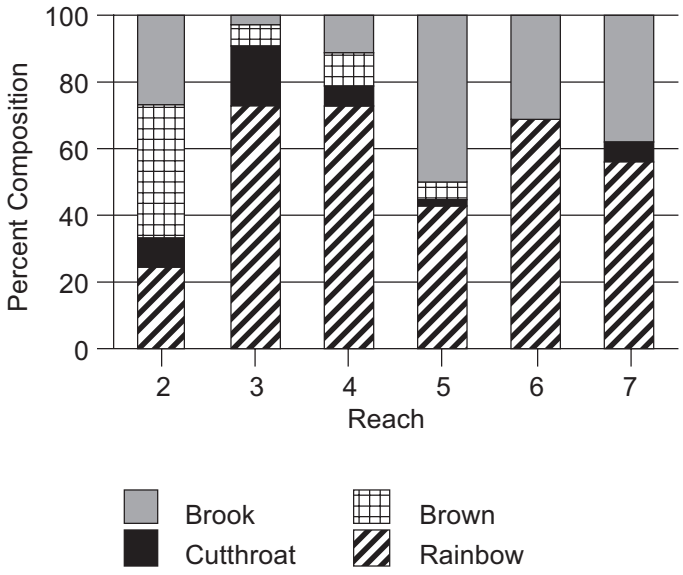
The Refuge supports some small mammals that occur only in the northeastern part of the state, such as the pygmy shrew and the red-tailed chipmunk. Small mammal trapping in the dry forest area of the Refuge resulted in the capture of yellow pine chipmunk, red squirrel, northern flying squirrel, long-tailed vole, and deer mouse.

Columbian ground squirrels and pocket gophers still inhabit the Refuge, although records indicate they were much more common at one time. According to Refuge records, as many as 5,000 acres were poisoned in the 1940s and 1950s to control these rodents.

Aquatic species - Fish

The Little Pend Oreille River (9.9 miles) and the main fork and North Fork of Bear Creek (14.6 miles) provide most of the in-stream fish habitat managed on the Refuge. A fish habitat assessment was conducted in 1996, on the portions of the Little Pend Oreille River that are managed by the Fish and Wildlife Service (Kelly Ringel 1998). The assessment found four trout species present: rainbow; cutthroat; brook; and brown. Rainbow and cutthroat trout are native species, though the genetics of both species have been significantly modified by interbreeding with stocked fish. Brook trout were introduced from the eastern United States and brown trout are native to Europe. Native non-game species observed were redside shiner and shorthead sculpin. There may be other species of sculpin present that were not detected. Yellow perch, a non-native species, was detected above Crystal Falls. Although not found during this study, a largemouth bass was caught by an angler near the Refuge headquarters in 1997 (Cline pers. com.). Figure 2-2 displays the fish distribution patterns found by Kelly Ringel s study for the Little Pend Oreille River. Stream reaches are illustrated on Map 9.

Figure 2-2 Fish Distribution by Species in the Little Pend Oreille River.



The assessment found that brown trout were the most prevalent species in the lower reaches of the river where the water was warmer, the flow slower, and more pools existed. They were present in small numbers in the middle reaches and absent from the upper reaches. Densities of brook trout were lowest in the lower reaches, more abundant in the middle reaches, and the only trout species found in the upper most reach on the Refuge. Rainbow trout were at their lowest density in the lowest reach, and were at relatively high densities in all the other reaches except the upper most reaches where they were absent. Cutthroat trout were widespread but in low densities. Their densities did increase in the higher gradient portions of the river.

Interior redband rainbow trout and westslope cutthroat trout are the strains native to this region. Coastal rainbow trout are the non-native (to this region) strain used for stocking in area streams and lakes. Most cutthroat trout stocked into this drainage are from westslope populations (Vail pers. comm.). However, non-native coastal rainbow trout have been used extensively for stocking in this portion of the state, with records of stocking in the Little Pend Oreille River and Bear Creek going back to the 1940's. The last record of fish stocking in Bear Creek dates from 1953, while the last record of fish stocking in the Little Pend Oreille River dates from 1950. Yet the repercussions of stocking can be seen today. Genetic analysis of 25 trout collected from the Little Pend Oreille River showed that the population are introgressed coastal rainbow trout, interior redband rainbow trout and cutthroat trout - which essentially means that there are no native fish left (Proebstel 1998). The majority of fish display characteristics of all three to varying degrees. About 75-80% resemble rainbows with most tending toward the coastal rainbow appearance versus the interior rainbow look. Only about 20-25% resemble westslope cutthroat. None of the specimens were found to be pure cutthroat trout.

Stocking is technically barred by Service policy, but continues on many refuges today. Fish stocking does continue at the Refuge presently, but only in the three man-made lakes. These lakes would not be expected to allow passage of fish into Refuge streams except during high water.

Figures 2-3 and 2-4 illustrates how the distribution of fish species in the North Fork and main stem of Bear Creek was dominated by eastern brook trout, with rainbow a distant second and only a few brown and cutthroat trout identified (Kelly Ringel 1997). The introgession of interior redband rainbow, coastal rainbow and westslope cutthroat found in the Little Pend Oreille River would be expected to also occur in these fish. While no redfin shiners or sculpins were observed they are likely to be present.

The non-native trout present were all the result of deliberate plantings. However, the yellow perch and largemouth bass were likely the result of unauthorized introductions in the Little Pend Oreille Lakes chain, the headwaters for the Little Pend Oreille River.

The size distribution throughout Refuge streams is skewed towards small fish, with approximately 75 percent of the fish less than 6 inches in length, and nearly half of those less than 3 inches in length. Less than 1% of the fish sampled were >15 inches. The size distribution

Figure 2-3. Fish Distribution by Species in the North Fork of Bear Creek.

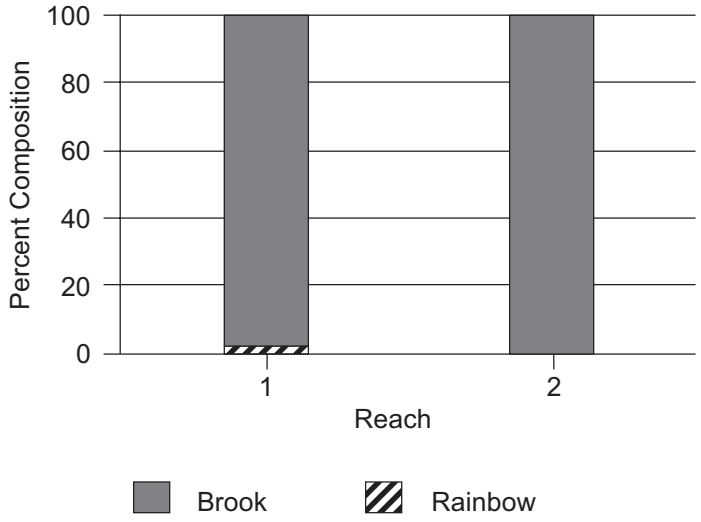
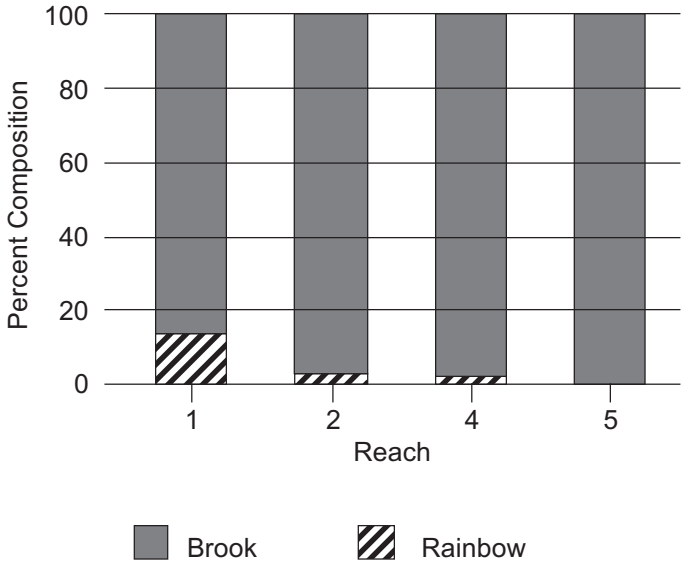


Figure 2-4. Fish Distribution by Species in Bear Creek.



of fish is typical for a small, cold water stream such as the Little Pend Oreille River that is managed under general regulations for recreational fishing (Vail pers. comm.).

The Refuge is within the historical range of the bull trout. Fisheries biologists within the Service Ecological Services division believe that bull trout never inhabited the Little Pend Oreille River or any of its tributaries. There are no historical records of the species within this drainage and the reason appears to be due to the physical barrier at Meyers Falls (located downstream on the Colville River).

Amphibians and Reptiles

Limited inventory work has been conducted on Refuge for amphibians and reptiles. Amphibian distribution is tied to water or moist habitat conditions, necessary for egg laying. Amphibian species known or suspected of occurring on the Refuge include tiger salamander, long-toed salamander, western toad, Pacific tree frog, and Columbia spotted frog.

Climate and terrain influence reptile distribution, and most are limited to open areas and lowland habitats. Reptile species known or suspected of being present on the Refuge include painted turtle, northern alligator lizard, western skink, rubber boa, racer, gopher snake, western terrestrial garter snake, common garter snake, and western rattlesnake.

***I*nvertebrates**

Despite their enormous importance, in terms of biomass and key ecological functions, little information exists for Refuge invertebrates. Endemic forest insects such as various woodborers and bark beetles are known to be present. However, specific information on insect species composition, density and distribution is lacking.

Undesirable Plants

Most Refuge habitats harbor non-native plants. Some of these plants occur incidentally but others having a tendency to invade and displace native plants are considered noxious weeds. Noxious weeds are defined by state law as any plant which, when established, is highly destructive, competitive, or difficult to control by chemical or cultural practices. These weeds are one of the most serious threats to wildlife habitats in the western United States.

The federal, state and county agencies maintain weed lists specifying the control requirements for several classes of weeds. Early detection, prevention, and eradication of newly invading noxious weeds is the goal of weed control efforts. Appendix K lists the state designated noxious weeds occurring in Stevens County. At this time there are no known occurrences of Class A weeds on the Refuge. Several Class B, Class B Designates and Class C weeds inhabit the Refuge, including orange hawkweed, yellow hawkweed, diffuse knapweed, spotted knapweed and leafy spurge. There are no known federally listed noxious weeds on the Refuge.

The Refuge strives to meet State law requirements to control all Class B-designate and many Class B and C weeds. Most existing Refuge weed control occurs along major roadways and in areas of concentrated public use. Chemical, biological, and mechanical methods are used, with most reliance on non-chemical methods because the Fish and Wildlife Service restricts the use of chemicals and encourages mechanical and biological control methods.

2.4 PUBLIC USE STATUS AND TRENDS

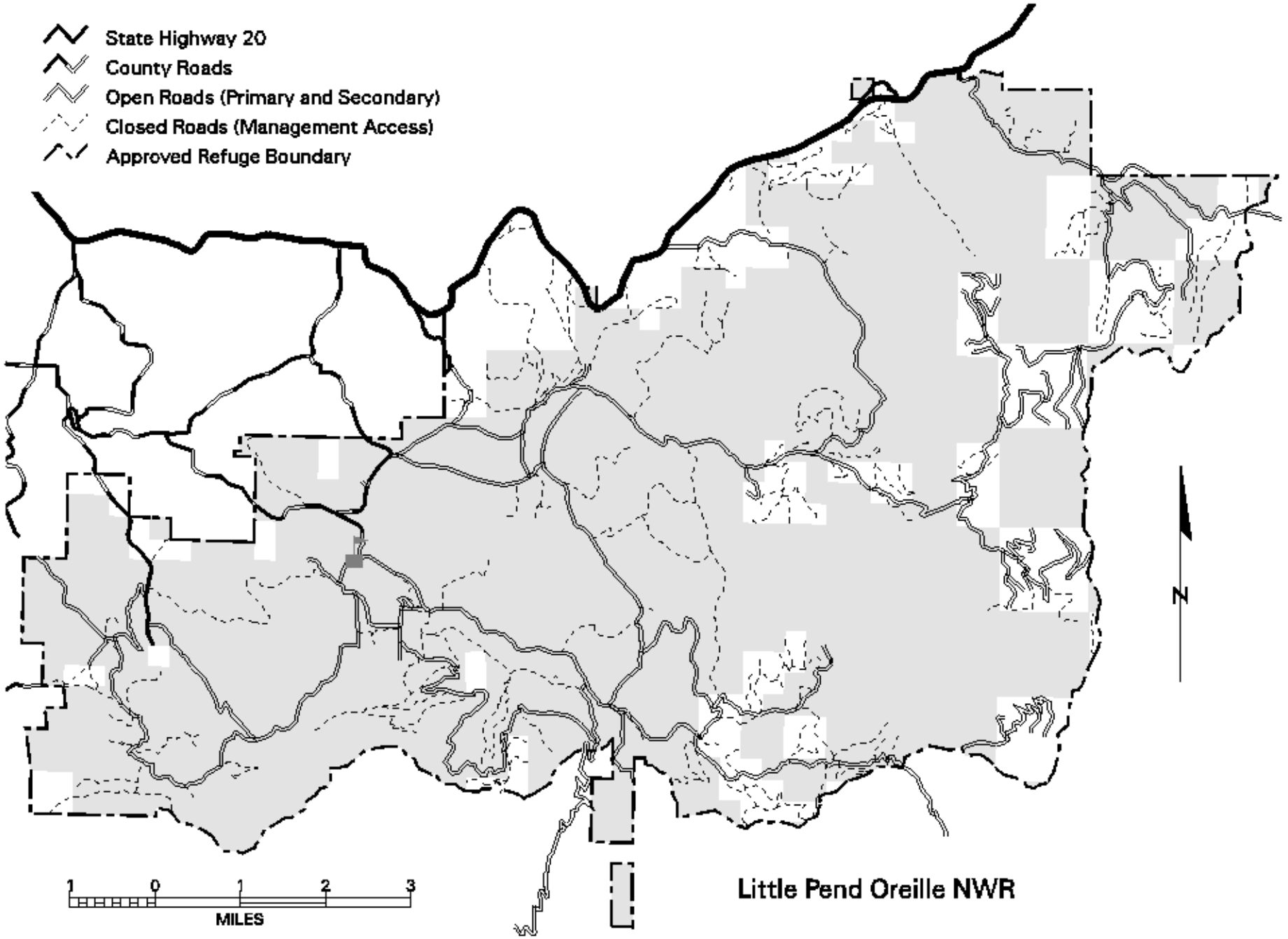
Refuge Access

Approximately 200 miles of roads currently exist within the LPO administrative boundary. The majority of roads (130 miles) are located on refuge lands. However, due to the large amount of private land within the refuge s administrative boundary, about 70 miles of roads within the refuge are not managed by the FWS. All roads were classified into five different categories based on maintenance responsibilities and uses:

State Highway	State maintained, paved highway. The only road in this category is State Highway 20.
County Roads	County maintained gravel surface roads. Three exist on the refuge: Bear Creek Road (county maintenance terminates at refuge headquarters), Narcisse Creek Road, and Buffalo-Wilson Road.
Primary Roads	Main refuge arterials, surfaces with a combination of gravel and native materials, maintained by the Refuge or the land owner. These roads provide the majority of public access to the refuge and its main recreational sites. Blacktail Mountain road is an example.
Secondary Roads	Open, single land roads with mostly a native surface road bed maintained by the land owner or the Refuge. These roads access the more remote portions of the refuge, and are open to vehicular traffic. An example is Cedar Creek Road.
Management Access Roads	Closed to all motorized vehicular access except for administrative purposes, and are seldom maintained. The Schumaker Meadow Road is an example of a management access road. This category also includes roads that are not maintained and are impassable to vehicles.

Map 10 displays all Refuge roads, showing those that are generally open to public access, weather permitting, and those that are closed to public access year round. Vehicles operating on Refuge roads must be street legal and have mufflers, license plates, registration, and be in proper operating condition. Vehicles must remain on established roads.

Map 10. Open and Closed Roads



The following table displays the mileage of each class of road that occurs on the Refuge by landowner.

Table 2-11. Miles of roads by ownership within the Refuge.

Owner	Road Class	Miles
U.S. Fish and Wildlife Service	State Highway	0.4
	County Roads	4.7
	Primary Roads	26.0
	Secondary Roads	33.9
	Management Access Roads	65.6
	All	130.6
Wa. Dept. Natural Resources	County Roads	0.15
	Management Access Roads	0.75
	All	0.9
Boise Cascade	Primary Roads	0.8
	Secondary Roads	1.9
	Management Access Roads	13.1
	All	15.8
Stimson Lumber	Primary Roads	5.7
	Secondary Roads	16.9
	Management Access Roads	16.7
	All	39.3
Other Inholdings	County Roads	1.3
	Management Access Roads	13.6
	All	14.9
Total within refuge boundary		201.5

Through an agreement between the U.S. Fish and Wildlife Service, Washington Game Commission, and Stimson Lumber Company (originally Burlington Northern), that company has a perpetual use agreement allowing them to use Blacktail Mountain Road and Olson Creek Road to access and manage their company timber lands, as well as to use these roads to access land outside the Refuge boundary. Boise Cascade Corporation does not have a similar agreement, and negotiates use of refuge roads for their management activities on a case-by-case basis.

The density of roads, measured in miles of road per square mile of land area, affects many other refuge resources. For example, roads and their associated drainage systems alter water flow. This can result in increased stream sediment which may adversely impact riparian and aquatic habitats (Knutson and Naef 1997). For this reason, the density of roads within the refuge, both those directly managed by the FWS and those on private inholdings, can have a significant impact on refuge resources. Map 11 displays the average open road densities found within the official Refuge Boundary, by subwatershed.

Road density was analyzed by major subwatersheds found on the refuge. There are several advantages to using this method of analysis. A road density value calculated across the entire refuge may be skewed due to a greater number of road miles in a small concentrated area, outweighing the low road density in another portion of the refuge. Hydrologic units also provide a more realistic basis for analyzing the effects of a road system on stream and riparian habitats, and also better fits the natural pattern of wildlife movements.

Table 2-12 contains an analysis of the current road density within the approved administrative boundary of the refuge including private and Washington DNR lands (All Owners) as well as those lands administered by the U.S. Fish and Wildlife Service (FWS). For this analysis only, roads classified as State Highways were not analyzed, because the only such road, Highway 20, does not traverse the refuge.

Roads also have a direct influence on wildlife both because they remove habitat in proportion to the area they occupy (Perry and Overly 1977), and because roads provide human access to areas. This can result in increased disturbance and potential poaching of wildlife. Some wildlife, such as wintering deer, are negatively affected by the increased stress resulting from disturbance during this critical periods (Knutson and Naef 1997). Several species avoid roads and roadside areas, thereby reducing available habitat. This impact, depending on the type of road, its location and level of use, can negative influence use of adjoining habitat up to 0.5 mile away (Thomas 1979). Finally, roads act as a barrier to the movement of some animals (e.g. small mammals, amphibians, black bear) because of their sensitivity to disturbed areas, limited mobility, or because of an increased susceptibility to predation, road kill, or poaching while crossing open roads (Knutson and Naef 1997).

Map 11. Open Road Density by Subwatersheds

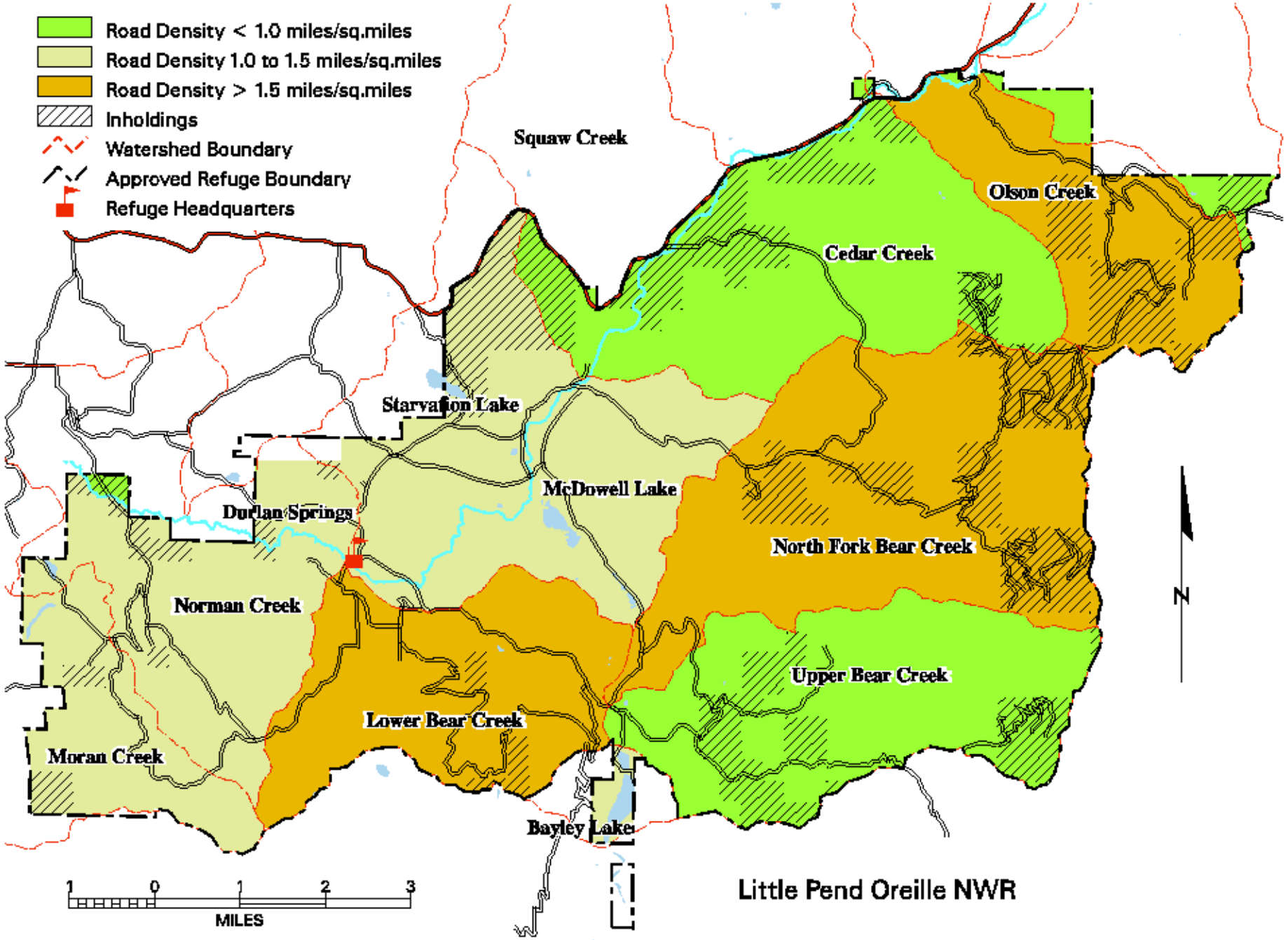


Table 2-12. Current mileage and density of all roads by subwatershed on the Little Pend Oreille National Wildlife Refuge.

Subwatershed	Area FWS (mi^2)	Roads FWS (mi)	Road Density (mi/mi^2)	Area All Owners (mi^2)	Roads All Owners (mi)	Road Density (mi/mi^2)
Norman Creek	6.2	8.7	1.4	7.2	10.8	1.5
Durlan Springs	1.1	2.6	2.4	1.2	2.6	2.2
Starvation Lake	3.9	11.5	2.9	5.5	15.5	2.8
McDowell Lake	6.2	13.5	2.2	6.1	13.5	2.2
Squaw Creek	0.3	1.4	4.7	0.9	4.0	4.4
Cedar Creek	8.6	9.3	1.1	11.0	20.2	1.8
Olson Creek	4.2	11.1	2.6	6.3	20.4	3.2
Lower Bear Cr.	7.9	28.8	3.6	8.3	30.5	3.7
Upper Bear Cr.	7.8	15.0	1.9	10.2	29.2	2.9
N. Fk. Bear Cr.	10.7	15.7	1.5	14.4	39.6	2.7
Moran Creek	3.9	10.0	2.6	4.2	11.3	2.7
Bayley Lake	0.5	0.6	1.2	0.5	0.6	1.2

While roads impact big game habitat quality all year around, this effect is most acute on big game winter range. The whole refuge should be considered summer range for big game. However, several of the subwatersheds, primarily those below approximately 3000 feet elevation, also provide important white-tailed deer winter range. Tables 2-13 and 2-14 illustrate the current open road density on both summer and winter range by subwatershed. For the purposes of this analysis, all Management Access Roads were considered effectively closed to vehicular traffic.

Open road densities on summer and winter ranges are useful for evaluating the current value of habitat for big game and other wildlife as well as indicate areas of the refuge that would benefit from a reduction in the amount of open roads available to public vehicular use. The Washington Department of Fish and Wildlife recommends that open road density on elk summer range not exceed 1.5 mi/mi^2. Since they do not specify an open road density on white-tailed deer summer range, the refuge will adopt the elk summer range recommendation throughout the refuge. The Department does recommend that road densities not exceed 0.5 mi/mi^2 on white-tailed deer winter range (Rodrick and Milner 1991). This standard will be applied to the entire refuge in

winter to reduce disturbance to not only to white-tailed deer but to other wildlife that may be susceptible to vehicular disturbance.

Table 2-13. Current open road density by subwatershed on LPO NWR white-tailed deer winter range.

Subwatershed	Area FWS (SqMi)	Road FWS (Mi)	Road Density (Mi/SqMi)	Area All Owners (SqMi)	Road All Owners (Mi)	Road Density (Mi/SqMi)
Norman Creek	6.0	6.9	1.1	6.5	7.7	1.2
Durlan Springs	1.1	1.7	1.5	1.2	1.7	1.4
Starvation Lake	3.9	7.4	1.9	5.5	7.8	1.4
McDowell Lake	6.2	6.3	1.0	6.2	6.3	1.0
Squaw Creek	0.3	0.5	2.1	0.9	0.5	0.6
Lower Bear Cr.	7.9	14.8	1.9	8.3	14.9	1.8
Moran Creek	3.9	4.2	1.1	4.2	4.2	1.0

Table 2-14. Current open road density by subwatershed on LPO NWR white-tailed deer summer range.

Subwatershed	Area FWS (SqMi)	Road FWS (Mi)	Road Density (Mi/SqMi)	Area All Owners (SqMi)	Road All Owners (Mi)	Road Density (Mi/SqMi)
Cedar Creek	8.6	0.8	0.1	11.0	3.4	0.3
Olson Creek	4.3	6.8	1.6	6.3	10.2	1.6
Upper Bear Cr.	7.8	6.5	0.8	10.2	9.0	0.9
N. Fk .Bear Cr.	10.7	7.7	0.7	14.4	23.8	1.7
Bayley Lake	0.5	0.6	1.3	0.5	0.6	1.3

Recreation Program and Activities

Traffic counters were installed at several refuge entrances in 1999, yielding a visitation estimate of approximately 51,000 visitor use days. The size of the Refuge, number of entrance points, and diverse activities make estimating visitor use difficult. The two most popular recreational activities are fishing and hunting. Fishing and hunting plans were written for the Little Pend Oreille National Wildlife Refuge in 1989. Map 12 illustrates the main recreational activities on the Little Pend Oreille Refuge.

Fishing

Currently, fishing in Potter s Pond, McDowell Lake, and Bayley Lake begins on the last Saturday in April and continues through October. All Federal and State fishing regulations, seasons, creel limits, and license requirements apply.

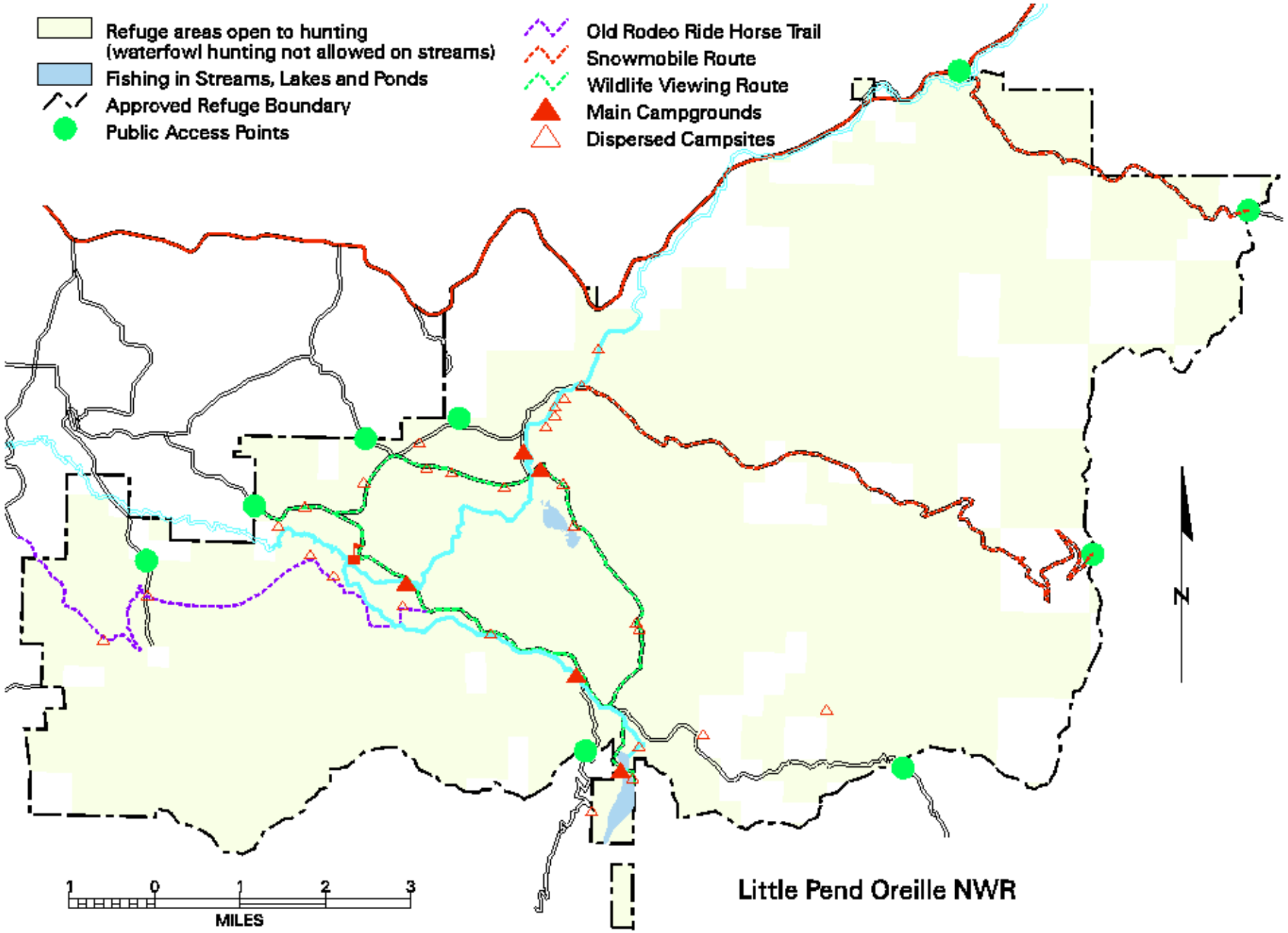
Potter s Pond attracts bait anglers and is frequented by families and seniors. The Refuge built a wheelchair accessible fishing dock in 1996 that provides a popular spot for anglers of all abilities. Statewide rules and creel limits allowed a catch of five trout in 1998. Potter s Pond is stocked by the State with catchable size rainbow trout. While it is a small lake, it is a very productive, growing large fish. Bank fishing is the most popular method of fishing on Potter s Pond but small motor boats are also used. A stream closed to all fishing connects Potter s Pond to Bayley Lake.

Bayley Lake is managed as a quality fishery, allowing only fly fishing with barbless hooks and no motorized boats. A one-fish limit (14" minimum) is allowed from opening day through July 4. Between July 5 and the end of the season, fishing in Bayley is catch and release only. Bayley is one of the most popular lakes with fly-fishing anglers. One author described Bayley as the most productive lake in the state as it can grow fish up to seven pounds. Bayley Lake has many devotees in the Spokane-area fly-fishing community.

Bayley Lake is stocked annually by the Washington Department of Fish and Wildlife with catchable size trout; usually rainbow trout with occasional brook trout stockings. The connecting stream between Potter s Pond and Bayley Lake has been modified to enhance spawning habitat, with limited brook and rainbow trout spawning occurring.

McDowell Lake is managed as a catch and release fly-fishing only lake and is popular with many of the same anglers who fish Bayley Lake. This lake is also typically stocked by the State. Use of motors is prohibited and access to the lake is either through a 1/3 mile trail or down a steep bank. Most McDowell Lake and Bayley Lake anglers use belly boats or catarafts, with some canoes and rowboats.

Map 12. Recreational Uses



The Little Pend Oreille River, other Refuge streams, and beaver ponds are open to fishing from June 1 through October 31. Statewide rules apply in all Refuge streams. Many anglers fly fish along the Little Pend Oreille and may catch rainbow, cutthroat, brook, or brown trout. Fishing near Cottonwood, Little Pend Oreille River, and Horse Camps is popular with Refuge campers

Peak lake fishing periods are from opening weekend through the early part of June. All Refuge lakes are fairly shallow and fish get sluggish during warmer weather. The small size of Refuge lakes - between 15 and 75 acres - limits the numbers of anglers in any given period. Depending on the year, there is often another smaller peak use period from late September through October when lake water cools and fish are more active. River fishing activity is distributed throughout the open season. The Refuge provided an estimated 8,325 fishing use-days during 1999.

Hunting

Several species of big game, small game, predators, and migratory waterfowl are hunted on the Refuge. All Federal and State hunting regulations, seasons, bag limits, and license requirements apply, with certain minor additional restrictions. The Refuge is closed to all hunting, pursuit, and use of firearms from January 1 through August 31. Northern portions of the Refuge open for hunting on September 1, while southern portions open on October 1. Both portions close to hunting on December 31. These closures protect the Air Force Survival School participants during their training. There are no-shooting zones within 1/4 mile of Refuge headquarters and established campgrounds. Hunting of ducks and geese is prohibited along Refuge streams. In 1999, the Little Pend Oreille NWR provided an estimated 14,900 visitor use days for all types of hunting.

Northeastern Washington is known for its white-tailed deer hunting and the Refuge is a popular deer hunting destination. There are hunting seasons for muzzle loaders, archery, and modern firearms, which when combined with special permits and seasons provide numerous white-tailed deer hunting opportunities on the Refuge from September 1 through September 30 and October 17 through December 15. Antlerless and other special permits are also available.

The peak periods for white-tailed deer hunting on the Refuge are the last 10 days of the modern firearm season. As many as 100 hunting camps may be occupied on the Refuge at this time, with other visiting hunters staying in area motels. Following the high winter mortality of 1996 and 1997, estimated by Washington Department of Fish and Wildlife biologists at approximately 40%, the 1997 white-tailed deer hunting seasons offered mixed results. Even with a forecast of below average deer numbers, the Refuge was host to many hunters from central and western Washington who were visiting the Refuge for the first time.

Starting in 1997, Refuge personnel collected antler size data and incisor teeth from as many deer harvested on the Refuge as possible. A combined total of 38 hunter harvested white-tailed deer were sampled on the Refuge in 1997 and 1998. The average age of all deer harvested was 3.5 years. Twenty-eight were bucks with an average age of 2.5 years. The ten females sampled average 4.5 years of age. Age for all deer sampled ranged from ½ to 9 ½ years of age.

Forest grouse hunting is very popular on the Refuge. Beginning in 1997, hunters were asked to deposit one wing from each harvested grouse into wing barrels placed at each Refuge entrance. The average number of wings collected on the Refuge over the last 3 hunting seasons has been 117 ruffed grouse, 5 blue grouse and 5 spruce grouse.

The Refuge supports a healthy population of wild turkeys. The Washington Department of Fish and Wildlife conducts a spring wild turkey season in this part of the state; however, turkey hunting is currently not available on the Refuge due the firearms closure associated with the Air Force survival school training program. Washington Department of Fish and Wildlife biologists feel the Refuge flock could support a spring hunting season (Zender pers. comm.).

Hunting pressure on elk, moose, and mule deer is relatively light due to the low numbers of these species currently inhabiting the Refuge.

For the purpose of the CCP we define predators to include carnivores such as mountain lions and bobcats as well as more omnivorous animals like black bear and coyote. Mountain lions and bears are defined by Washington Department of Fish and Wildlife (WDFW) as big game animals requiring a species specific hunting license to harvest within designated hunting seasons. Bobcat and coyote are considered both small game and furbearers and therefore can be harvested by both hunting and trapping. Bobcat has a restricted season, while coyotes can be harvested year around on lands open to hunting and trapping. Other, smaller predators like weasels, mink and marten are classified as furbearers and protected by the Refuge s restriction on trapping . There is no hunting or trapping season on Canada lynx in Washington.

The most recent population estimates for these species in eastern Washington is 1 bear/ 3.1 square miles (WDFW 1996). Using this ratio the black bear population on the Refuge is estimated to be about 20 bears. Using WDFW s estimator of 1.5 - 2.5 cougars per 20 square miles, the refuge would contain about 5 - 8 mountain lions (WDFW 1997). These estimates are likely conservative for both species, and populations of both black bears and mountain lions are increasing in the state. No estimates were made of coyote and bobcat, but bobcat are definitely present, and based on casual sightings, coyotes are abundant.

When hound hunting was legal up to 3 cougars and as many bears were harvested on the refuge annually, as well as an occasional bobcat (Weatherman pers. comm.). Since this ban was enacted in 1997, no cougars or bears have been reported taken from the Refuge. Currently, the state hunting season on cougars runs from August 1 through March 15. Bear season in eastern Washington was open August 1 through November 7 in 1999. However, these seasons are curtailed on the Refuge due to its special closures. With the restrictions on hunting with hounds or bait, most predator harvest is opportunistic, that is, a harvest opportunity arises for a properly licensed hunter while pursuing other game. There is also a small number of hunters using predator calling as a method to hunt these animals; most of this activity is targeted at coyotes

Special permits are required for commercial guiding of hunters on the Refuge and to date, only one request for a permit has been made. Currently there are no permitted guides or outfitters operating on the Refuge.

Wildlife Viewing

There is a growing interest in wildlife viewing on the Refuge. This may be due to an increasing trend in wildlife viewing nationally as well as the result of highway signs guiding visitors to the Refuge. The Refuge is described in the Washington Wildlife Viewing Guide and several state birding guides. Some interest is generated through the national wildlife Refuge web site. Many birders contact the Refuge office for information about species and where to bird watch. The number of people who visit the Refuge to view wildlife is unknown but many users who visit primarily for other reasons (camping, fishing etc.) also enjoy seeing wildlife.

Camping

Camping has a long history on the Refuge with at least three of the five campgrounds pre-dating the official establishment of the Refuge. River Camp and Cottonwood Camp were logging camps, known as Camp #1 and Camp # 2, respectively. Horse Camp was originally used during the logging era by teamsters for their draft horses. Besides these designated camps, there are many dispersed camps sites that have a tradition of use. With the exception of the early spring fishing season and the fall deer hunting season, most Refuge camping is not directly associated with other Refuge uses such as hunting, fishing, wildlife observation or photography. Peak holiday weekends include Memorial Day, Independence Day and Labor Day. Campers spent approximately 15,000 visitor use days on the Refuge in 1999. Campgrounds are primitive, with pit toilets and some fire rings. There is a seven-day camping limit on the Refuge. Special use permits are required for any group over 25 people.

During the 1997 deer hunting seasons, there were 47 dispersed camps on the Refuge. There are at least 10 more dispersed sites used intermittently throughout the year. The unrestricted nature of camping on the Refuge creates several management problems. Some dispersed camps are in riparian areas and in or near other important fish and wildlife habitats. Refuge users are gradually expanding two Refuge campgrounds. Camping with horses is growing in popularity and creating camps conditions undesirable to other Refuge users. Campers are damaging many live trees. Since camping within the Refuge is free, it is a popular camping destination during busy, holiday weekends. While many Refuge campers also enjoy fishing and wildlife viewing, some Refuge visitors use the campgrounds as sites for family gatherings and drinking parties. Also, some homeless campers try to move in to these campgrounds for extended periods of time.

Horseback riding

The first Washington Department of Game area manager created and maintained several miles of horseback riding trails within the Refuge. There are several organized back country horsemen s

groups in the area as well as many local riders not affiliated with organized groups who ride within the Refuge regularly. These riders continue to maintain some of these trails, but also ride cross-country in flat, low-elevation areas. There has been a traditional ride within the Refuge associated with the Arden Old Timers Rodeo in mid-May with approximately 135 riders as well as several smaller organized group rides. Groups with over 15 horses require a special use permit. An estimated 1,800 visitor use days were spent by horseback riders on the Refuge in 1999.

Riders use lower elevation areas beginning in April and continue to ride until snowfall. The peak use is in May and June when higher country trails are still snowed in. While most riders are conscientious, some cut fences, ride cross-country when the ground is too wet, and do not clean up after their horses at trail heads and in Refuge campgrounds. The unrestricted nature of this horse use has created some problems that the backcountry horse users are interested in helping to solve through education.

Within the last year, two parties have inquired about providing a concession for day-rides and overnight rides within the Refuge. These requests will be considered during development of the public use plan for the Refuge.

Snowmobiling

Refuge snowmobile use expanded during state management, with an estimated 50 miles of roads open to snowmobile use in 1974, and establishment of a Sno-park parking area on Refuge land on Olson Creek Road adjacent to Highway 20. A map published by the Washington State Parks and Recreation Commission in 1994 shows Olson Creek Road as a regularly groomed snowmobile trail with a Sno-park. The most recent Colville National Forest Travel Map does not indicate any designated snowmobile trails on the Refuge, including Olson Creek Road. However, this map designates that part of the Refuge north of Blacktail Mountain Road (which includes Olson Creek Road) as permitting snowmobiles on existing open roads from December 1 though February 28, with the exception of Blacktail Mountain, Trilby Creek and Schumaker Meadows roads being closed year-round. This travel map also indicates the portion of the Refuge south of the Blacktail Mountain Road being closed to snowmobiling year-round.

Since the USFWS resumed management, approximately 15 miles of refuge roads have remained open to snowmobile use. The main use is on Olson Creek Road which provides access to Calispell Peak, a popular snowmobile destination. The Colville National Forest grooms this trail. A portion of Blacktail Mountain Road east of the bridge over the Little Pend Oreille River is also open to snowmobiles. Snowmobile use is restricted along Blacktail Mountain Road west of that bridge to protect wintering deer. Snowmobiling is currently prohibited on the remainder of the Refuge.

Until recently, monitoring snowmobile use has been difficult. Vehicle counters were installed in 1999/2000 and the new estimate is 7,000 snowmobiles using the Olson Creek Road trail in 1999/2000. The vehicle capacity of the snowpark is approximately 6-10 vehicles with trailers.

Other recreation

There is a demand for several other recreational activities on the Refuge including trapping, mountain bike riding, cross country skiing, dog sledding, search and rescue training, hiking, jogging, and scouting. These and other similar uses need to be evaluated to determine their impacts and compatibility with the Refuge s priority uses.

Mountain bikes may be used on maintained roads only. This is a use that is still minor but may be growing in popularity. Peak months for this activity are June through September.

Cross-country skiing and snowshoeing uses are dependent on the quality and quantity of Refuge snows. Since snowmobilers use the higher country, their use limits skier and snowshoe use since these activities conflict. Most skiing and snowshoeing occurs on the deer winter range, which may present problems if this use grows.

Within the last two years, dog sledders have discovered the Refuge. Refuge restrictions on snowmobiling make it attractive since dogs and snowmobiles generally do not mix well. An area musher who wanted to use a snowmobile to groom runs for sledding requested a special use permit. While this use is relatively minor, new dog sledding clubs are forming in and around Spokane. One Refuge neighbor has a dog team and uses the Refuge year-round to train sled dogs.

These uses, along with other minor uses such as picnicking and jogging, account for about 650 visitor use days per year. Scouts and two search and rescue groups are active on the Refuge. These groups combined yield an estimated 500 visitor use days.

Recreational trapping requires a special use permit and has been limited to one permit during the past four years. Refuge records show only a few trappers setting traps on the Refuge in the last 20 years. Muskrat, beaver, mink, coyote, and bobcat were some of the species trapped during previous years. The future of trapping will depend on evolving national Refuge policy and the population status of trapped animals. Trapping has potential as a future population management tool in certain situations.

Illegal public uses

There are several illegal uses that Refuge staff try to prevent. Having only a seasonal law enforcement officer restricts effectiveness in eliminating illegal uses. Illegal uses, besides fishing and hunting violations, include off-road vehicle use, illegal firewood cutting, and underage drinking parties. . Special use permits are required for any group of more than 25 people or 15 horses.

Some information available to the public concerning motorized vehicle use on the Refuge other than snowmobiles is inaccurate. The Colville National Forest Travel Map indicates motorized wheeled vehicles including off-road vehicles are permitted to operate on existing open roads

throughout the Refuge. Exceptions are Blacktail Mountain, Bear Creek, Rymer Ridge and Starvation Flat Roads where they are prohibited from February 1 through April 15, and a segment of Rookery Road which is restricted from November 30 through July 15.

However, vehicles operating on national wildlife refuges must comply with 50 CFR 27.31, which described general provisions regarding vehicles. This regulation specifies that vehicles must bear a valid state issued license plate. Since only vehicles designed and registered for on-highway use are issued license plates, the regulation prohibits vehicles designed exclusively for off-road travel like 3-, 4-, and 6-wheel ATVs and some motorcycles from legally operating on the Refuge. All vehicles must also remain on established roads.

2.5 OTHER REFUGE USES

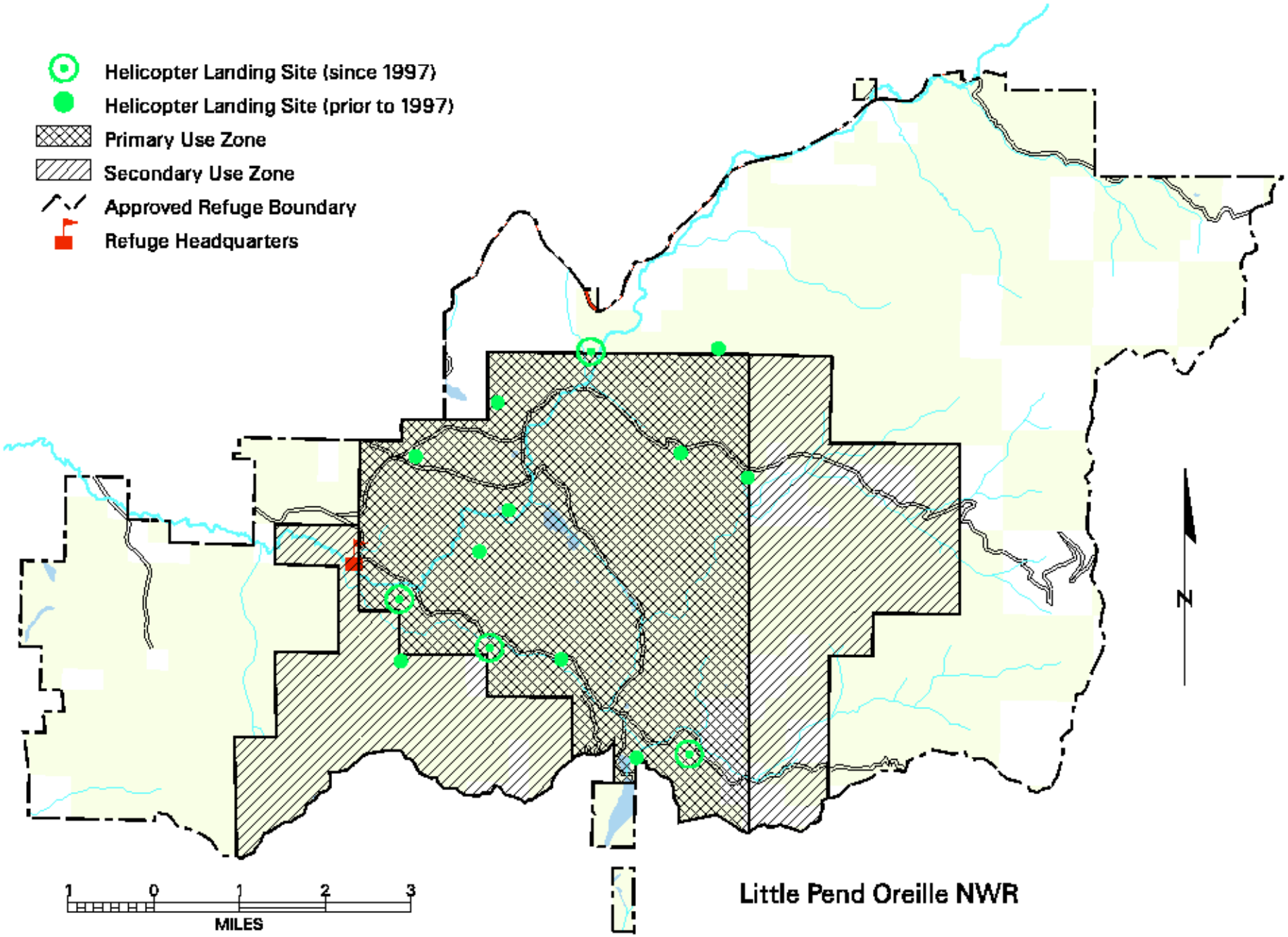
Air Force Training Activities

For the past 33 years, the Air Force Survival School has used the Refuge and adjacent national forest lands for survival and evasion training. Since 1995, the Fish and Wildlife Service has authorized this activity through an annual special use permit. The training occurs from January through September, with most use occurring in the late summer. During the training season, between 60 and 115 Air Force personnel or an average of 82 personnel, may be on the Refuge at any given time. In 1995, 779 Air Force personnel used the Refuge for a total of 81 days. In more recent years they have reduced the number of days of training per year on the Refuge. In 1999, 734 personnel used the Refuge for 54 days.

No public hunting or firearms discharge is allowed on any part of the Refuge from January through August, with this ban continuing through September on the southern portion of the area. This hunting closure was secured through the Washington Department of Fish and Wildlife during the Cold War years to accommodate the Air Force use. The Air Force indicates that it may be liberalized to allow a spring turkey hunt and other primitive weapon hunts.

Air Force trainees are dispersed throughout the central portion of the Refuge, over approximately 22 square miles. They use specific locations repeatedly throughout their training period. The resources they use include trees for shelter, bedding and firewood, and wildlife such as small mammals, mussels, fish, snakes, grouse, and deer when they are learning food procurement techniques. Camps are established to support the program and helicopters are used extensively at times during rescue training. Map 13 illustrates the areas of concentrated Air Force use between 1997 and 1999. The helicopter landing sites shown on the map are existing forest openings. Additional description of this use is found in the compatibility determination in Appendix F.

Map 13. Air Force Survival School Use, 1997 to 1999



Livestock Grazing

Livestock have been grazed on the area that would eventually become the Little Pend Oreille NWR since before the area was officially homesteaded beginning around the turn of the century. Most homesteaders cared for at least some livestock, including cattle , horses, mules, sheep, goats and pigs. When the Refuge was being established in the late 1930's, many local cattlemen voiced concerns about the new Refuge lands continuing to be available for livestock grazing.

A livestock grazing program of some type has been managed to some degree on the Refuge since its establishment. When the Washington Department of Game assumed management in 1965, they continued to administer a grazing program. That program was maintained after the U.S. Fish and Wildlife Service resumed management of the area and continues to today.

In 1978, the Little Pend Oreille Wildlife and Recreation Area (as it was then called) entered into a Coordinated Resources Management Plan (CRMP) process with the Soil Conservation Service (now the Natural Resources Conservation Service). An initial inventory of resources was begun in 1981, and completed in 1983. The goal of this inventory was to provide an up-to-date forage resource evaluation for the area manager to base forage management decisions. In 1985, a Coordinated Resource Management Plan was adopted that determined the maximum number of animal unit months (AUMs) for each grazing unit as they existed then based on the forage type available and the accessibility of the unit to livestock. It should be noted that inventoried AUMs represent the estimated total amount of forage available for all herbivores, *both* domestic livestock and wildlife, while retaining adequate residual vegetation to maintain plant health.

This original plan was slightly modified in 1990, to reflect the reorganization of some of the grazing units. The following table illustrates the available AUMs as inventoried in 1985 and the leased number of AUMs allocated to the 3 permittees. Grazing unit numbers correspond to areas shown on Maps 8 and 9.

From 1990 until 1996, the AUMs made available to or utilized by permittees gradually decreased until approximately 750 - 800 AUMs were allotted to grazing permittees on the Refuge during a grazing season running from June 1 through September 30. These herds were mostly cow/calf pairs, with some bulls. Pastures included both upland coniferous forest and large portions of the alluvial riparian flood plain along both Bear Creek and the Little Pend Oreille River. Several horses were allowed to graze in portions of the Little Pend Oreille River riparian zone from about October through May from 1983 through 1994. In 1997, the number of AUMs allotted on the Refuge was reduced to 350 AUMS when one permittee sold most of their herd. According to the grazing plan, cattle are to be removed from units when the stubble height of grass is reduced to 6 inches. This treatment was selected because theoretically, such relatively light grazing should not result in cattle browsing on shrubs that provide important forage for wintering deer.

Table 2-15. Little Pend Oreille NWR grazing units based on 1985 summary of unit size and inventoried AUMs. Leased AUMs based on 1990 WDFW grazing plan adjustments based on 1985 CRMP.

Grazing Unit	Approx. Acres	Inventoried. AUMs	Leased AUMS	Grazing History
1	440	88	50	Rotational grazing[1]
2	5,060	1,170	0	Not grazed since before 1950.
3	587	101	0	Not grazed since 1990.
4	28	9	5	Combined with 5 and 6. Rotational grazing.[2]
5	97	37	21	
6	1,477	219	123	
7w	2,914	87	49	Rotational grazing.
7e	5,828	99	0	On-off permit with Wa. DNR permittee.
8	8,742	186	105	Rotational grazing.
9a	32	19	11	Rotational grazing.
9b	5,226	178	100	Mixed ownership with Boise Cascade. Rotational grazing.
10	1,720	112	52	Mixed ownership with Boise Cascade. Rotational grazing
11e	173	87	41	Rotational grazing.
11w	172	169	79	Rotational grazing.
12	50	35	17	Rotational grazing.
13 a	173	70	39	Rotational grazing.
13b,c	206	293	0	Not grazed since 1995.
13d	33	15	8	Not grazed since 1997.
13e	18	--	--	Holding and sorting area.
14e	33	22	19	Rotational grazing.
14w	1,460	55	48	Rotational grazing.
15e	680	15	8	Rotational grazing.
15w	4,480	145	126	Rotational grazing.
16e	240	75	65	Rotational grazing.
16w	1,440	102	89	Rotational grazing.
16s	280	20	17	Rotational grazing.
Total		3408	1072	

[1] Refers to grazing a unit only part of the grazing season, then rotating livestock to another grazing unit.
[2] Previously separate units, fences separating units 4, 5 and 6 were removed by 1990.

For the purposes of discussing grazing systems on the Refuge, the landscape can be divided into two broad but distinct habitat types; alluvial riparian valleys and the forested uplands.

About 6 miles of Bear Creek and about 2 miles of the Little Pend Oreille River occurring on the Refuge are low gradient streams flowing through relatively broad alluvial valleys formed from the material deposited by the streams. Seven grazing units include portions of each of these valleys, totaling about 338 acres of alluvial valley that are now grazed or have been grazed units 1996. These valleys have been radically modified by logging, farming, grazing, and fire suppression. Presently Kentucky bluegrass and reed canary grass are the most conspicuous grass species. Alder is the dominant woody species along the edges of the streams. Most stands of alder appears to be even age with little regeneration observed. Willow species are scarce. There are some scattered mature cottonwoods and aspen, but very little sprouting is evident. Although these alluvial riparian pastures only constitute <1% of the Refuge s total land base, they provide the highest quality forage available to livestock and therefore are used by cattle far out of proportion to their availability.

With the exception of the Starvation Flat area, the remainder of the upland portion of the Refuge is divided into grazing units. However, due to a lack of forage, steep terrain and other factors, livestock tend to concentrate on the lower elevation areas. Trespass grazing currently occurs on majority of the private inholdings owned by Boise Cascade and Stimson Lumber Company since very few fences excluding cattle from these areas have been built. In contrast to the alluvial riparian pastures, upland allotments are very large with most encompassing at least several square miles. Grazed forested areas range in elevation from 2,000 to 5,200 feet with the predominant tree species being ponderosa pine, Douglas-fir, larch, lodge pole pine, western red cedar and western hemlock. Most of the upland grazing occurs in overstocked ponderosa pine and Douglas-fir stands with suppressed understory vegetation. Aspen inclusions and deciduous browse such as evergreen ceanothus, serviceberry, and snowberry are generally depressed. Most existing browse is decadent and the more palatable species often over-browsed. The existing densely treed forest appears to be a consequence of fire suppression, selective logging, and livestock grazing.

In addition to the Little Pend Oreille River, these upland areas are dissected by numerous other small perennial streams. Due to their gradient, the riparian zone associated with them is quite narrow. Unlike the lower elevation, low gradient alluvial riparian areas, livestock impacts to these riparian zones does not appear to be significantly greater than that observed on the surrounding upland areas.

In 1996 a grazing review was performed on the LPO NWR, one of several conducted on refuges throughout the USFWS Pacific Northwest Region (USFWS 1997). Its purpose was to determine if the annual livestock grazing program was supporting Refuge purposes and wildlife habitat objectives. Reviewers evaluated the effects of the existing grazing program in a variety of refuge habitats including riparian, forest openings, low elevation ponderosa pine forest, and middle elevation mixed conifer. The review included resource management professionals from the U.S. Fish and Wildlife Service, U.S. Forest Service, Natural Resource Conservation Service, and

Washington Department of Fish and Wildlife. Several negative impacts to wildlife habitat attributable to livestock grazing were noted. At the conclusion of the review, the team was unable to identify any significant positive benefit for habitat or wildlife associated with the grazing program.

In 1998 a study was conducted by the University of Idaho examining the effects of livestock grazing on the structure and composition of riparian vegetation within selected pastures on the Refuge. (Nielson and Lohman 1999). The objective was to document the early effects (1-2 years) of livestock exclusion on the structure and composition of streamside vegetation. They did this by comparing plant communities in grazed and ungrazed pastures at both the beginning and end of the grazing season. Overall, the investigators found little difference in the pastures grazed that season versus pastures rested for 1-2 years. This was not unexpected since significant changes in structure and composition of riparian vegetation following removal of grazing for periods less than 4 years have yet to be reported. They stated it may require several more years for clear, easily interpreted patterns to develop. The quantitative data collected will provide valuable baseline information useful for comparing changes in riparian vegetation resulting from various future management regimes.

2.6 ADMINISTRATIVE FACILITIES

The Little Pend Oreille NWR maintains two administrative sites within the Refuge. The main headquarters compound is located on Bear Creek Road. This complex contains the Refuge office, one government quarters residence, a maintenance garage and vehicle storage shed, a storage barn, and a fuels storage building. The second administrative site is Winslow Cabin, located off Blacktail Mountain Road. This building dates tot he early part of the twentieth century and is currently being updated.

2.7 CULTURAL RESOURCES

Prehistoric and Historic Use

Use of the area within the boundaries of the Little Pend Oreille NWR by Native American Indians is not well documented. In fact, no prehistoric sites have been located within the Refuge itself. This may seem unusual because of the dense population centers located on the Columbia and Pend Oreille Rivers. Evidence from ethnographic and archaeological sources suggest that native groups congregated along the major rivers to harvest salmon and trade.

Based on information gathered in the nineteenth century, the Kalispel Indians lived along the eastern boundaries of the Pend Oreille range, around Lake Pend Oreille, Calispell Lake, and along the Pend Oreille River. A population center for the Kalispel was also in the Chewelah area, south of the Refuge. The Colville Indians inhabited the area from Kettle Falls on the Columbia River, south to the Colville Valley, but did not penetrate the mountainous region east of Colville (Ray 1936). The Spokane Indians were centered around the falls at Spokane.

Fur traders noticed the abundant fur bearing resources of northeastern Washington in the 1820s. David Thompson built Spokane House and the Hudson s Bay Company established Fort Colville, in 1825, to attract the steady trade of the Natives. Fort Colville was located approximately 25 miles west of the Refuge. A trail from this fort connected the Pend Oreille River valley with the Colville River valley. The trail was along the Little Pend Oreille River that borders the Refuge. A path used by the Kalispel reportedly traversed the Tacoma Creek and Olson Creek drainages (Ellis and Lindeman 1982:35).

Settlement along the Columbia and Colville Rivers began in the 1850s. The influx of settlers required the U. S. Army to establish a new Fort Colville in 1859, and it became the hub of a community that by 1880 was re-named Colville.

By the late-1870s and early 1880s, people were beginning to move into the interior valleys, searching for property to homestead, ahead of the General Land Office surveyors. These squatters cleared land, built cabins, and established roads and trails through the thickly forested terrain of the Little Pend Oreille River valley. A homesteading boom ensued at the turn of the century, and 83 claims were patented between 1901 and 1910. By 1930, more than 180 claims had been patented within the boundaries of the Refuge (Bureau Of Land Management Records).

Settlement by homesteaders led to a second economic boom in the area-- logging. In some instances, the homesteaders may have been actually working for the lumber companies, staking claims, then turning over the land to the logging company. For other settlers, selling the timber off of the claim provided much need cash and cleared space for orchards, gardens, and pasture.

Rail lines established into northeastern Washington in the 1890s created a ready market for timber. The Winslow Logging Company built a standard gauge spur line from their mill in Orin up the Little Pend Oreille River. The Winslow company built many miles of track, established several camps, and logged the ponderosa pine stands until a fire in 1938 destroyed their mill and business. The railroad line required several engineering feats to overcome rugged terrain and steep river canyons. The Winslow Bridge, a 125 ft suspension bridge, was moved from Spokane in 1917, to provide a sturdy crossing for a deep chasm on the Little Pend Oreille River. Although now collapsed, the bridge is unique in its design and is listed on the National Register of Historic Places. Other bridges or trestles constructed by Winslow Logging Company are more typically log crib design. Remnants of the log crib trestles are still found on the Refuge.

When the Depression of the 1930s hit the Colville area, many homesteaders gave up and moved from the area. The land was fertile, but the seasons were too short and the winters too harsh to maintain productive gardens. In the mid-1930s the Federal Government began a program to purchase tracts from homesteaders who were located in submarginal lands. The program purchased land claims outright or traded parcels for land in a more productive area. After the land returned to Federal ownership it was divided among the federal agencies now known as the Forest Service, Bureau of Land Management, and Fish and Wildlife Service. The Little Pend Oreille National Wildlife Refuge was established in 1939 by Executive Order.

Cultural resources identified on the Refuge are related to the historical developments. With more than 180 individual homesteads patented, the cleared fields, cabin remnants, orchard trees, and place names such as Pierce Lake, Lenhart Meadows, and McDowell Lake are associated with homesteaders. Logging has also been an important activity within the Refuge boundary. The Winslow Logging Company railroad line, bridges, and camps are reminders of this short-lived boom period in the Little Pend Oreille forest.

Status of Cultural Resource Inventories

Beginning in 1982, cultural resources surveys have been conducted on the Refuge in order to fulfill the requirements of the National Historic Preservation Act (NHPA). Approximately 3,100 acres, or less than 10 percent of the entire 40,198 acre Refuge have been surveyed. The surveys have been conducted for timber sales, a land exchange, Potter s pond, and a stratified sample to gather information for the Comprehensive Conservation Plan. Several special studies have also been conducted including a historic bridge survey and a mine contamination study.

Additional surveys are required when new projects are sponsored by the Refuge such as road construction, prescribed fire, timber harvest or thinning, facilities remodeling, new construction, and any other activity that has the potential to affect historic properties. For instance, the management of the open homestead meadows and orchards will require coordination with the NHPA, because the meadows are the remnant landscape features of an important historical event in the Little Pend Oreille area, homesteading.

Presented in Table 2-16 are the sites inventoried to date, the name of the project and report reference, a brief description of the resource, and its level of significance based on the National Register of Historic Places criteria.

Table 2-16. Cultural Resources Recorded on the Little Pend Oreille NWR.

Site Number	Project/Author	Cultural Resource Type	National Register of Historic Places
LPO-513	Addy Mtn. T.S. (McComb:1984)	Features associated Y.P. Bouma homestead.	Not eligible
LPO-PS #1		Roadside dump, recent.	Not determined
LPO- 514		A.E. Baughman Homestead, 1901-1920	Not eligible
A-2	Eastern Wash. Survey (Morgan:1991)	Can dump, 200+, hole-in-top and sanitary cans	Not eligible
A-1		Wooden sled --used for logging	Not eligible
	Starvation Flat TS, (Burnside: 1996)	Can dump	Not eligible

Site Number	Project/Author	Cultural Resource Type	National Register of Historic Places
		Can dump	Not eligible
RR-1		Winslow RR grade	Not determined
RR-2		Winslow RR grade	Not determined
1401-2 45-ST-237H	Timber Sale (J.D. Jones:1979)	Louis E. Nofs Mine, 1920s-1930s	Not determined
1	Burlington-Northern Land Exchange (Ellis & Lindeman:1982)	Alma Jacobson Homestead.	Not eligible
2		B.J. Carney/Louis Strauss Lumber Camp.	Not eligible
3		Alphonse Snook Cabin. Moved to Colville, Stevens Historical Society Museum	Not eligible
4		Callaghan Barn	Not eligible
5		Historic Roadside dump	Not eligible
45-ST-321H	Transportation Survey (Soderberg: 1980)	Winslow Railroad Bridge The Winslow Bridge is an example of a timber deck Howe truss bridge, moved from Spokane to site on Little Pend Oreille River in 1917 by Winslow Lumber Company.	Eligible, listed 1982, collapsed 1991.
1401-11	Bayley Lake Cabin (Osborn:1983)	Bayley Lake Cabin, 1937-1983.	Not eligible
	Stratified Sample Survey (Speulda & Kaehler:1997)	Varline Homestead Log Cabin	Not determined
		T. Hard Homestead site/ Winslow Camp/ LPO Quarters	Not determined
		Christianson Ranch	Eligible
		Furst Cabin	Not eligible
		Carlson Homestead Barn	Not determined
		LPO Office	Not eligible

Cultural Resources Potential Conflicts

The lack of identified prehistoric archaeological sites in the Refuge area may be more the result of heavy vegetation and the limited acres actually surveyed. After all, people have been documented in the northwest for at least 10,000 years, and several very early sites are located along the Columbia River. It is likely that during the very long period of occupation along the Columbia River, people also traveled throughout the interior drainages. Travel routes usually conform to natural corridors, such as major ridges or rivers. Resources exploited by the Native Americans included upland game animals, plants, fish, birds, and lithic raw material sources. The Little Pend Oreille River Valley and the Bear Creek drainage may have been a connecting route between two high population areas and served as a secondary resource extraction area during times of crisis.

As observed by Renk and Miss (1998) Sites on the Refuge could be expected to reflect the regional trends of increasing population using land use strategies that shift through time from forager to collector and then are modified by Euroamerican introduction of the horse and catastrophic disease. These changes are indicated in the archaeological record not only by frequency and age of sites, but by site characteristics which reflect the size, mobility, and purpose of the group which created them.

The potential for conflicts between cultural resources and the objectives implemented on the Refuge may intensify as new discoveries re-define our understanding of Native American use of the Bear Creek watershed. An obviously sensitive topic is the legacy of homesteaders on the Little Pend Oreille NWR. More than 180 homestead tracts were patented on the Refuge between 1891 and 1931. Each of these parcels are potentially archaeological sites and many still contain landscape features such as cleared meadows, orchards, fences, and even cabins. Developing a systematic method for assessing the research potential, testing the model, and retrieving information would be an important first step to interpreting this important period.

Elements of the twentieth century industrial development surrounding the Refuge includes agriculture, logging, railroading, and mining. Only a handful of mines have been recorded on the Refuge, and none of them have been assessed for their significance to the National Register of Historic Places. Evidence of logging is primarily associated with the railroad lines, trestles, bridges, camps, and large stumps that remain on the landscape. The Winslow Logging Company was very influential in the area and the railroad line and camp may be useful for interpreting this economic activity to the public. Research, mapping the lines, and identifying logging-related features, camps, and sites should be considered for future projects.

When predicting potential conflicts and forming management decisions, it is important to understanding that there is the potential for new discoveries of Native American use, and that the homestead parcels and railroad features are important pieces of the twentieth century history of the Refuge. What follows is an abbreviated list of a few of the sources of potential conflict.

- *Recreational* use of campgrounds, trails, boat docks, river and stream-side fishing, and picnicking can affect cultural resources. Areas currently being used for Refuge sponsored recreational activities, which have not been surveyed, should be considered a high priority for completing the identification, evaluation, and protection according to the NHPA.

- *Timber harvest or commercial thinning*, along with any road improvements, log landings, skid trails, new roads, or increased access to an area, is considered an undertaking that must follow Section 106 regulations of the NHPA.

- *Timber Harvest by Private Corporations*: Inholdings that are harvested by private corporations that require a special use permit for using Refuge roads to haul logs is considered an undertaking.

- *Fire management and prescribed burns* are usually performed on large blocks of acreage. Conducting a cultural resources survey that implements a stratified sample would be an excellent method of meeting the Section 106 compliance issues for this type of undertaking, while gathering important information about cultural resources.

- *Restoration projects* including stream side improvements, ditches, dikes, water control structures, re-vegetation, and recontouring projects require review by the Cultural Resources Team in order to define how compliance with Section 106 will be handled.

- *Air Force Training s special use permit* needs to be monitored. Training exercises that include activities such as detonating explosive devices, or other ground disturbing activities are consider undertakings. Areas that receive intense use require a cultural resources survey prior to issuing the permit.

- *Grazing* is an issue that is difficult to ascertain as to whether cultural resources are affected. However, in the case of the Christianson Ranch, cattle entry into the buildings is causing harm to the structures. This situations requires immediate attention.

- *Facilities maintenance and new construction* projects should be reviewed by the Cultural Resources Team, so that compliance with Section 110 and 106 are assured and any conflicts with cultural resources identified. For example, buildings that are 50 years old need to be considered for their historic potential. Protection, maintenance, and re-use of historic buildings is strongly advocated by the NHPA.

2.8 ECONOMIC SETTING

Economic Region

More than 99% of Little Pend Oreille NWR s 40,198 acres is in central-eastern Stevens County, Washington; approximately 21 acres are in adjacent Pend Oreille County. A recent study (Reyna 1998) compiled socioeconomic data on 543 communities in the Interior Columbia Basin, including six communities in Stevens County. These communities are Chewelah, Colville, Kettle Falls, Marcus, Northport, and Springdale. This study classified communities as isolated if they were located at least 50 miles from the nearest city with a population exceeding 20,000, and at least 35 miles from the nearest city with a population of 9,000-20,000. Five of the six Stevens County communities analyzed in the study were classified as isolated because of their distance from cities; Springdale is associated with the Spokane metropolitan area. Two of the communities (Colville and Chewelah) are within 15 miles of the Refuge.

Industrial diversity, commuting patterns, and spending patterns are commonly used by economists to delineate economic regions. Stevens County has a relatively diverse economy, including business establishments in 43 different two-digit standard industrial classifications (U.S. Dept. Of Commerce 1998). While highly rural, Stevens County has the fifth highest concentrations of employment and income in the manufacturing sector among the state s 39 counties (McGinnis et al. 1997).

Although the number of Stevens County residents who commute to jobs in other counties (primarily in Spokane County) is increasing, a large majority of workers who reside in the county also work there. For example, income earned outside of Stevens County by county residents increased by 30% between 1987 and 1996, but such income accounted for only 17% of total earnings by Stevens County residents in 1996 (U.S. Bureau of Economic Analysis 1998). Conversely, few nonresidents commute to Stevens County. Although most Stevens County residents sometimes travel to metropolitan areas to purchase durable goods (e.g., cars and major appliances) or specialty items not available in the county, most staples are purchased in the county. Based on the county s industrial diversity and its relative self-containment with regard to commuting and purchasing, Stevens County was assumed to comprise the economic region for this EIS.

Tourism is a small but important component of the Stevens County economy. Because tourism is not a recognized Standard Industrial Classification (SIC) category, data on tourism-related employment and income are limited. Two SIC sectors closely tied to tourism, however, are hotels and other lodging places and amusement and recreation services . According to Washington State Employment Security Department data, these two categories accounted for 3.8% of the total Stevens County employment among workers covered by workers compensation insurance in 1998. This proportion exceeds the statewide share of covered employment accounted for by these two sectors (2.8%), which indicates that tourism is relatively at least as important to Stevens County as it is to the statewide economy. However, lumber and wood

products manufacturing, which accounts for 10.4% of total covered employment, remains the county s most important source of employment and income.

The most popular forms of recreation that attract tourists to Stevens County are dispersed activities including hunting, fishing, boating, hiking, and snowmobiling, which take place primarily on federal lands including the Colville National Forest and the Little Pend Oreille NWR. In addition to the county s many campgrounds and picnic areas, its developed recreation sites include a new downhill ski area. The number of tourists visiting the county appears to be increasing, consistent with statewide trends.

Modeling of Economic Effects

The economic effects of the management alternatives for Little Pend Oreille NWR were estimated for this DEIS using IMPLAN, a regional input-output modeling system developed by the USDA Forest Service (Minnesota IMPLAN Group 1994).

Population, Employment, and Income

Population

The population of Stevens County was 38,567 in 1996. It declined over the 1950s and 1960s, grew relatively rapidly during the 1970s, grew very slowly during the 1980s, and has again grown rapidly in the 1990s (McGinnis et al. 1997). Between 1987 and 1996, the county s population grew by 27% (U.S. Bureau of Economic Analysis 1998), substantially faster than that of the state as a whole, with most of the growth occurring in the southern portion of the county. Much of the growth is accounted for by relocations of retirees and households with workers who commute to Spokane. Local communities are small, safe, and clean and have good schools, high-quality health care, and an affordable cost of living. The relatively pristine environment and a strong sense of place make the county attractive to growing families and retirees.

In 1996, 75% of the population lived in the unincorporated portion of the county (Washington State Employment Security Department 1997); in 1990, 60% of the population was classified as rural (McGinnis et al. 1997). The population is sparsely distributed over the land. Population density in the county is only 18% of the national average. The county seat and largest town in the county is Colville, with a 1992 population of 4,440. Only two other towns (Chewelah and Kettle Falls) have population exceeding 1,000. The population is 93% white, with nearly all the remaining population Native American. (McGinnis et al. 1997.)

Employment

The Stevens County economy is dependent on the timber industry, agriculture, manufacturing, mining, trade, and services. Its largest industries are logging, wood and paper products manufacturing, mining, and metal refining.

In 1990, the Stevens County work force included approximately 12,800 people (U.S. Bureau of Economic Analysis 1998). Of these, occupation was determined for 11,583 people (McGinnis et al. 1997). Among workers covered by unemployment insurance, the principal employment sectors in 1996 were government (2,408 workers), services (2,302 workers), manufacturing (1,937 workers), and retail trade (1,563 workers); these sectors accounted for 87% of all covered employment in the county (U.S. Bureau of Economic Analysis 1998). Half the workers in the manufacturing sector are employed in the lumber and wood products subsector, which includes logging contractors and sawmill employees. An estimated 9.2% of the work force (more than 1,000 workers) was employed in the farming, forestry, and fishing sector in 1990 (McGinnis et al. 1997). Forestry employment consists mainly of private-sector foresters and forest technicians. Fishing accounts for virtually no employment in Stevens County. Most of the workers in farming are excluded from covered-employment statistics because they are self- or family-employed; many of them also are employed part time or seasonally (Walsh pers. comm.).

Between 1987 and 1996, the Stevens County unemployment rate averaged 9.8%. Although this rate exceeded the statewide and national unemployment rates, it was substantially lower than in adjacent Ferry and Pend Oreille Counties (Washington State Employment Security Department 1997).

Income

Average per-capita income in Stevens County was $16,062 in 1996, which was lower than the per-capita income in all but two of Washington s 39 counties. (All values are expressed in 1997 dollars in this analysis.) The key components of personal income in Stevens County in 1996 were nonfarm earnings (50.0%); transfer payments (25.8%); dividends, interest, and rent (17.1%); and farm income (1.1%) (U.S. Bureau of Economic Analysis 1998). In 1993, transfer payments consisted primarily of retirement payments (47.3%), medical payments (28.1%), income maintenance (10.1%), and unemployment compensation (8.9%) (McGinnis et al. 1997). As a share of total personal income, transfer payments are substantially higher for Stevens County than for Washington as a whole, while nonfarm earnings are substantially lower for the county than for the state (McGinnis et al. 1997).

Among the industrial sectors, mining provided the highest average annual earnings per worker ($36,435) in 1996. Mining was followed by manufacturing ($33,227), transportation and public utilities ($29,478), government ($25,025), and construction ($24,406). In all other sectors, average annual earnings were less than $19,000 (U.S. Bureau of Economic Analysis 1998.)

Refuge Management Economics

The existing Refuge staff consists of eight permanent and seven to nine seasonal employees, who account for an annual payroll (including salaries and benefits) of $361,250.

In addition to providing salaries and benefits, the Refuge purchased goods and services totaling $548,482 in 1998, approximately 11% of which was spent in Stevens County. Some of these

expenditures (e.g., for flood damage restoration and maintenance management system projects) were one-time costs not expected to be repeated. The baseline nonsalary costs of Refuge management were estimated at $160,482 per year. Approximately 85% of these purchases would involve wildlife- and habitat-related projects, with the remaining 15% involving public use-related projects.

Because of the way industries interact in an economy, a change in the activity of one industry affects activity levels in several other industries. For example, if the Refuge s budget increases, additional revenue will flow to Refuge employees and to the businesses in the region from which the Refuge purchases goods and services. The effects of a change in the Refuge budget on employment and personal income in the federal government sector are referred to as the direct economic effects. Changes in employment and income related to the resulting increased spending by other businesses in the region are referred to as indirect effects. Changes in employment and income related to the resulting increased spending by households in the region are referred to as induced effects. The total economic effect of a change in activity in one industry is the sum of the direct, indirect, and induced effects.

Each million dollars in nonmilitary government spending in the county results in an estimated total of 31.7 jobs and $1.3 million in personal income in the region, including direct, indirect, and induced effects (Minnesota IMPLAN Group 1994).

National wildlife refuges contribute funds to local counties through two revenue sharing programs, one that applies to Refuge lands reserved from the public domain, and one that applies to lands purchased in fee title. Nearly all Little Pend Oreille NWR lands were acquired in fee title. For fee lands, the federal government typically pays the counties up to 0.75% of the appraised value of the land each year out of the Refuge Revenue Sharing Fund. In 1996, for example, the federal government paid Stevens and Pend Oreille Counties a total of $253,944, which represented 72% of the maximum amount authorized. Because the amount of money paid to these counties is based on the appraised value of the Refuge lands, it would not vary among the planning alternatives.

Forest Products Economics

Approximately 71% of Stevens County s land base (or 1.2 million acres) is timberland. Of this timberland, 505,000 acres is in nonindustrial private ownership, with ownership of the remaining timberland divided among the federal government (250,000 acres), the forest industry (206,000 acres), state government (162,000 acres), and Native American tribes (94,000 acres) (McGinnis et al. 1997).

Between 1984 and 1994, the county s annual timber harvest increased from roughly 100 million board feet to more than 200 million board feet, with nearly all of the increase coming from private forests (McGinnis et al. 1997). The volume of timber harvested annually on the Refuge has ranged from 100 thousand board feet (MBF) to 250 MBF over the past 30 years, with an average harvest level of approximately 175 MBF.

For this analysis, the value of timber sold on the Refuge was estimated based on historical stumpage prices for all species of trees sold on national forests in eastern Washington (Warren 1998). Between 1991 and 1997, the annual average stumpage price in eastern Washington national forests ranged from $78 to $249 per MBF, with an average price for the 7-year period of $127 per MBF.

In addition to stumpage revenues, value is added at the logging and sawmilling stages of production, and this adds value to the regional economy. Logging contractors and sawmills accounted for 10% of the employment and 14% of the earned income in the county in 1996 (U.S. Bureau of Economic Analysis 1998). Nearly all timber harvested on the Refuge is harvested by local logging contractors, who then haul the logs to sawmills for processing into lumber. Three sawmills are located within 25 miles of Little Pend Oreille NWR. These mills purchase most of the timber harvested on the Refuge. Nearly all economic activity resulting from harvesting, hauling, and primary processing of Refuge timber contributes to the regional economy. Each million dollars in regional timber sales results in an estimated total of 17.1 jobs and $589,000 in personal income in the region, including direct, indirect, and induced effects (Minnesota IMPLAN Group 1994).

The all-grades weighted-average price of ponderosa pine and hemlock-fir lumber sold by sawmills in the Inland Region (including eastern Washington and Oregon, Idaho, and Montana) during 1991-1997 ranged from $451 to $638 per MBF, with an average of $543 per MBF (Warren 1998). Based on an average stumpage price of $127 per MBF, the combined value added at the logging and sawmilling stages was estimated at $416 per MBF.

Livestock Production Economics

Livestock production accounted for $16.3 million in sales (56% of all farm product sales) in Stevens County in 1992. Private pasture and rangeland accounted for 107,715 acres in the county. Of the 1,054 farms and ranches in the county, only 22 held public grazing permits, down from 36 in 1987. (McGinnis et al. 1997.) Pastures on Little Pend Oreille NWR are currently leased for cattle grazing to three local ranching families. Until 1997, 750-800 animal unit months (AUMs) on the Refuge were allotted to 4 grazing permittees; in 1997, the number of allotted AUMs was reduced to 350, when one permittee sold most of her herd. (An AUM is the average amount of forage consumed by one cow/calf pair in a month.) A 1985 Coordinated Resource Management Plan prepared by the U.S. Soil Conservation Service shows grazing units throughout most (36,640 acres) of the Refuge. In reality, most grazing normally occurs on approximately 6,000 acres of the Refuge, including forested uplands and the alluvial plains of the Little Pend Oreille River and Bear Creek, from June 1 through September 30.

The price of forage on national wildlife refuges is set by a formula specified by the U.S. Fish and Wildlife Service Manual. Between 1993 and 1997, the average price of forage on the Refuge was $7.03 per AUM (in 1997 dollars). This price is substantially higher than the $1.35 per AUM currently charged by the Colville National Forest (Ridlington pers. comm.). National forest grazing fees are set by a different formula specified by Congress.

Private rangeland forage is typically more expensive than federal rangeland forage; such forage has sold locally in the $10-$12 range in recent years (Kroiss pers. comm.). Nonrangeland forage sources (e.g., improved pastures or imported hay) are usually even more expensive per AUM than private rangeland forage.

Most cattle production in the Colville area consists of cow-calf operations, in which a full breeding herd is maintained year round, with calves produced and sold annually. Refuge permittees usually sell their calves at auction in Spokane (Cada and Larson pers. comms.). The average market price for calves sold in Washington over the 1988-1997 period was $97 per hundred pounds (Hammel pers. comm.).

Subsequent value added to these livestock (e.g., through feedlot fattening, finishing, and slaughtering) occurs outside the Stevens County economy. Nonetheless, Refuge permittees purchase locally much of the supplies, equipment, and services used in their operations. Each million dollars in range-fed cattle sales results in an estimated total of 29.4 jobs and $961,000 in personal income in the county, including direct, indirect, and induced effects (Minnesota IMPLAN Group 1994). Based on these rates, baseline livestock grazing at Little Pend Oreille NWR results in a total of 3.1 jobs and $98,000 in annual personal income in the county.

Recreation Economics

Estimated total recreation use of Little Pend Oreille NWR ranged from 17,000 to 25,000 visitor days during 1994-1997. In 1999, the Refuge installed a traffic counter device and use in 1999 was more accurately estimated at approximately 51,000 visitor days (see Table 4-1). Participation in big-game hunting, fishing, and wildlife observation accounted for the largest shares of the total use. For this analysis, Refuge visitors who reside in Stevens County or Spokane County were considered to be residents because these visitors are unlikely to purchase lodging in Stevens County. Other visitors were considered to be nonresidents. Refuge use was divided between residents and nonresidents based on the judgment of the Refuge manager. As shown in Table 2-17, a large majority of Refuge visitors are residents, regardless of the main activities they pursue. Big-game hunting (primarily for white-tailed deer) attracts a relatively large proportion of visitors from other regions (primarily central and western Washington), and fishing (primarily fly fishing) attracts a large share of visitors from Spokane County. Unlike visits at some wildlife Refuges located along major highways, few visits to Little Pend Oreille NWR are brief stops made en route to other destinations; nearly all visitors use the Refuge as the primary destination for their day s recreation activities. Refuge visitors spend an average of at least 6 hours per visit.

Unlike forest products and livestock production, there is no single industry that includes most recreation activity. A recent analysis of recreation on national wildlife Refuges (Laughland and Caudill 1997) allocated recreation spending to four general categories (lodging, food/drink, transportation, and other), which in turn represented 18 separate industrial sectors. Estimated daily recreation expenditures by visitors to national wildlife Refuges in Washington are shown in Table 2-18. Refuge visitation accounted for an estimated $1.36 million in recreation-related

expenditures in Stevens County in 1999. Based on an allocation of recreation spending among industries similar to that used by Laughland and Caudill (1997), each million dollars spent on Refuge recreation in Stevens County is currently estimated to result in a total of approximately 22 jobs and $476,000 in personal income in the county, including direct, indirect, and induced effects (Minnesota IMPLAN Group 1994).

Surveys indicate that recreationists often are willing to spend more for recreation opportunities than they actually pay (Laughland and Caudill 1997). This difference is called consumer s surplus and represents a net economic value for recreation consumers. Essentially, it means that the surplus money stays in people s pockets, for them to spend as they like, rather than being spent on the recreational activity. The recreational activity is enjoyed, but at a cost less than what people are willing to pay. Average net economic value per person per day was estimated at $75 for big-game hunting, $36 for fishing, and $34 for wildlife viewing in Washington (Waddington et al. 1994). Based on these rates, recreation use at Little Pend Oreille NWR was estimated to generate approximately $2.4 million in net economic value in 1999.

Table 2-17. Distribution of Refuge Visitor by Region of Origin

Recreation Activity	Resident		Nonresident
	Stevens County	Spokane County	
Big-game hunting	34	33	33
Upland game hunting	80	15	5
Fishing	30	55	15
Snowmobiling	65[1]	25	10
Other	55	32	13

Source: Refuge manager
[1]Includes some day users from Pend Oreille County

Table 2-18. Recreation Expenditures per Person per Day (Expressed in 1997 $)

Sector	Big-Game Hunting		Upland Game Hunting		Fishing		Snowmobiling		Other	
	Resident	Non-resident	Resident	Non-resident	Resident	Non-resident	Resident	Non-resident	Resident	Non-resident
Lodging	0	2.27	0	2.50	0	9.89	0	35.83	0	10.87
Food/ Drink	11.19	27.30	9.50	28.00	10.38	28.69	11.20	30.60	9.58	18.50
Trans-portation	11.42	22.78	9.87	16.16	7.52	27.03	17.08	6.40	8.11	23.50
Other	0.10	0.38	1.53	0	1.40	2.14	0	12.53	0.23	2.17
Total	22.71	52.73	20.90	46.66	19.30	67.75	28.28	85.36	17.92	55.04

Sources: Laughland and Caudill 1977, Sylvester and Nesary 1994

Air Force Training Economics

The U.S. Air Force uses the Refuge to conduct survival training. Nearly all expenditures related to this training occur outside Stevens County. Exceptions include occasional truck refueling and restaurant meals for instructors. Such purchases total an estimated $1,500 per year (Steele pers. comm.).

Chapter 3: Alternatives, Objectives, and Strategies

3.1 FORMULATION OF ALTERNATIVES

In this FEIS, an alternative is one of several options for managing the Little Pend Oreille NWR over the next 15 years. Each alternative is a combination of wildlife and public use management prescriptions applied in specific amounts and locations in order to achieve the Refuge Purpose, goals, and vision. Alternatives, developed to comply with NEPA, provide different ways to address and respond to major public issues, management concerns, and opportunities identified during the planning process.

Major issues, activities, and management concerns were evaluated and addressed for each alternative. A technique was used which identified a potential range of options from maximum to minimum for each major issue such as grazing, Air Force use, and recreational activities. Evaluation of the compatibility of activities and activity levels was integrated into the alternatives process. A theme approach was then applied to consolidate similar options and prescriptions into preliminary alternatives.

Preliminary Alternatives

Five preliminary alternatives were designed and presented to the public in a Planning Update (Issue 4) and in two public open house meetings, one in Colville on July 29, 1998, and the other in Spokane on July 30, 1998. The five preliminary alternatives included:

- No change from past management (Preliminary Alternative A);
- Restoration of wildlife habitat and management of existing uses (Preliminary Alternative B);
- Restoration while emphasizing priority uses. This theme maximized the consistency between the Little Pend Oreille and the Refuge System Improvement Act, promoting the six priority recreation activities and eliminating or restricting most other recreational uses (Preliminary Alternative C);
- A conservation reserve strategy maximizing wildlife needs and further reducing human impacts/disturbance to wildlife and habitats (Preliminary Alternative D); and
- A caretaker approach minimizing active management programs and activities (Preliminary Alternative E).

Comments received from the open houses, mailed responses, and internal agency review were used to refine the range of alternatives. The Caretaker Alternative (Preliminary Alternative E),

was eliminated from further analysis and the new Alternative E combined the elements of Alternatives B and C.

Public reviewers of the preliminary alternatives also requested a more in-depth analysis of each alternative in the areas of economics and roads. An economist was hired to assist with the identification of costs and economic comparison of the alternatives. In addition, a more detailed road analysis was completed based on subwatershed units for the Refuge.

The Service released the Draft Environmental Impact Statement for the CCP to the public on May 5, 1999. Public open house meetings were held on May 12, 1999 in Colville and on May 13, 1999 in Spokane (See Chapter 5 for further details). The comment period was extended twice and closed August 31, 1999. Over 300 comments were received and evaluated (See Appendix J). Alternative E, the preferred alternative, has been revised as a result of public input.

The preferred alternative is the alternative that would best achieve the Refuge purpose, vision and goals; contributes to the Refuge system mission; addresses the significant issues; and is consistent with principles of sound fish and wildlife management. *Revised Alternative E (see description below) is the Service s preferred alternative.* The preferred alternative with associated objectives, strategies and projects, found in Appendix C, is the final CCP for the Little Pend Oreille NWR. No sooner than 30 days after this Final EIS is released to the public, the Service will issue a Record of Decision and repackage the Preferred Alternative into a stand-alone CCP document.

Compatibility

The National Wildlife Refuge System Improvement Act of 1997 states that no refuge use may be allowed unless it is first determined to be compatible. A compatible use is defined as one which, in the sound professional judgement of the Director, will not materially interfere with or detract from the fulfilment of the mission of the system or the purposes of the Refuge. Sound professional judgement is further defined as a decision that is consistent with principles of fish and wildlife management and administration; available science and resources; and adherence with law.

Final compatibility evaluations are included in Appendix F for the key activities and uses identified in Alternative E. The compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility. The preferred alternative incorporates the stipulations to insure compatibility for each use.

3.2 ALTERNATIVES SUMMARY

Description of Alternatives

This section describes five alternatives:

Alternative A: No Action-Status quo,
Alternative B: Restoration of Wildlife Habitat with Management of Existing Uses;
Alternative C: Restoration of Wildlife Habitat emphasizing Priority Uses;
Alternative D: Ecological Reserve Strategy; and
Alternative E: Agency Preferred Alternative

ALTERNATIVE A: NO ACTION STATUS QUO

This Alternative assumes no change from past management programs and is considered the base from which to compare the other alternatives. No changes would be made to the major current uses, which include Air Force survival training, livestock grazing, hunting, fishing, camping, snowmobiling, and horseback riding. In the past, management for game species has been very important and the Service fire management policy requires that all wildfires must be suppressed as quickly as possible. A detailed description of the existing programs and uses contained in this Alternative is found in the Affected Environment Chapter 2.

ALTERNATIVE B: RESTORATION OF WILDLIFE HABITAT AND MANAGEMENT OF EXISTING USES

Alternative B places new management emphasis on the restoration of habitat such as mature dry forest and riparian habitats that support declining and rare species of plants and animals. Under Alternative B, existing uses and recreation activities would be modified but continued. Recreation activities would include hunting, fishing, wildlife observation, camping, and horseback riding. The annual livestock grazing program would be continued but would have strict limitations on numbers of animals, locations, and time of year. A major change would be to move grazing out of riparian zones and high-elevation areas. This would require the building of additional fences to control livestock use. The Air Force survival training program would be continued, however, training intensity would be reduced and helicopter use eliminated except in emergency situations.

ALTERNATIVE C: HABITAT RESTORATION EMPHASIZING PRIORITY USES

This Alternative would also place management emphasis on mature dry forest and riparian habitats that support declining and rare species of plants and animals. Priority wildlife-dependent uses identified in the National Wildlife Refuge System Improvement Act of 1997 would be emphasized and in some cases expanded. These include hunting, fishing, wildlife observation, photography, environmental education and interpretation activities. Hunting opportunities would be expanded and additional effort would be spent on environmental

education activities and interpretation. Other existing recreational activities such as camping, horseback riding, and snowmobiling would be eliminated. No annual livestock grazing program would be included but some limited livestock grazing may occur, in order to meet specific wildlife and habitat objectives. The Air Force survival training program would be discontinued.

ALTERNATIVE D: THE ECOLOGICAL RESERVE ALTERNATIVE

The focus of Alternative D is to manage the Refuge as an ecological reserve, following some of the ideas of Noss and Cooperrider (1994). To some, the theme may evoke ideas of passive management such as often occurs in wilderness areas. However, objectives encompassed in Alternative D are more complex than a sole strategy of passive management allows. The key components of the Alternative are to promote habitat restoration, especially in the dry forest zone, to restore aquatic conditions to natural states, and to effectively enlarge roadless areas in the eastern Refuge by reducing human intrusions.

Like Alternatives C, D, and E, this Alternative promotes restoration of forest habitats, especially within the dry forest type, using thinning and burning techniques. However, commercial thinning would be specifically excluded from areas that have never been logged, and low impact fire suppression techniques would be chosen whenever possible. Low impact techniques would include containment with hand lines as opposed to bulldozed lines, etc. Restoration of other natural systems and features would also occur, including the removal of artificial dikes, drainage features, fences, and several roads. Partnerships would be developed with surrounding land managers and landowners to create wildlife corridors and buffer zones for the Refuge core reserve and to promote habitat unfragmented by artificial openings and roads at the landscape scale.

The Alternative would support the priority uses established under the National Wildlife Refuge System Improvement Act of 1997. Hunting and stream fishing would become the primary recreational activities. Wildlife observation, photography, environmental education and interpretation activities would be allowed. Hunting of forest predators such as bear, cougar, and bobcat would be eliminated, so as to diminish interference with the natural process of predation. Only no-trace camping would be allowed. Other uses such as horseback riding, livestock grazing and the Air Force survival training would be eliminated from the Refuge.

The Alternative emphasizes reducing vehicular based human disturbances to wildlife and habitat, centered around the roadless areas in the eastern half of the Refuge. Only four public access points to the Refuge would be maintained; others that are now available would be blocked or gated. Blacktail Mountain road would be gated on the eastern end of the Refuge as well as at the Blacktail Bridge throughout the year. Cedar Creek Road would also be closed to public entry. These closures would create a large area within the eastern half of the Refuge (the core reserve) that would remain essentially free of human disturbances throughout the year. Inholders access would be managed through a cooperative gating system.

ALTERNATIVE E: AGENCY PREFERRED ALTERNATIVE (MODIFIED FROM DRAFT)

Alternative E originated as a combination of the preliminary Alternatives B and C. The Agency Preferred Alternative E places management emphasis on restoration of habitat components such as mature dry forest and riparian habitats that support declining and rare species of plants and animals. Under Alternative E, a mix of existing uses and priority recreation activities will be managed. A wide range of recreational activities would be supported including hunting, fishing, wildlife observation, camping, horseback riding, photography, and interpretation. Additional hunting seasons would be added. Interpretation, viewing, photography, and environmental education would receive added emphasis. Some recreational uses, such as camping and horseback riding would be restricted in some areas and during some seasons. Camping would be allowed in designated campgrounds April 15 to December 31 and in additional designated sites from October 1 to December 31. Selected campsites would be removed from environmentally sensitive riparian zones. Snowmobiling would be prohibited from all areas of the Refuge except Olson Creek Road. The annual livestock grazing program would be continued at its present level for five years, or through the 2004 grazing season; beginning 2005, use grazing only to achieve wildlife habitat objective. The Air Force survival training program would be phased out over five years.

Features Common to all Alternatives

All alternatives contain some common features. These are presented below to reduce the length and redundancy of the individual Alternative descriptions.

- *Refuge Boundary and In-holdings*

  The Refuge boundary remains the same across all alternatives. There is continued interest by the Fish and Wildlife Service to consolidate management of lands within the existing Refuge boundary. This could be done through management, protection, easements, exchange or acquisition of the approximately 9400 acres of in-holdings within the boundary. A significant portion of these in-holdings are industrial timber land including Boise Cascade (approximately 1550 acres) and Stimson Lumber Company (approximately 4530 acres).

- *Other Refuge-Managed Parcels*

  The Little Pend Oreille NWR currently manages two fee properties outside of the approved boundary of the Refuge: the Norris Tract (54.7 acres) near Springdale, Washington and the Cusick track (298 acres) north of Cusick, Washington; and four conservation easements ranging in size from 10 to 65 acres in Stevens County. All of these properties resulted from Farmer s Home Administration land disposal through loan defaults. Fee title lands are transferred to the Service for management while conservation

easements transfer only the rights of easement management and serve to protect wetlands and converted wetlands through restrictions that are perpetual. These tracts will be managed consistently with the management alternative selected for the primary Refuge. In addition, a step-down management plan will be prepared for each of these units. The Kalispel Tribe of Indians has expressed interest in cooperatively managing the Cusick unit which is located close to Tribal lands. Partnerships will be considered for the cooperative management of outlying units.

- *Land Protection Strategy Outside Approved Boundary*

  The Service has the ability to protect and acquire key wildlife habitats outside of the approved Refuge boundary. Additional NEPA analysis will be necessary to evaluate the environmental effects of protecting or acquiring lands before they can be added. Land protection methods may include cooperative agreements, conservation easements, fee title acquisition, leases, donations, transfers, and exchanges. Only willing participants would be considered for any of these approaches. Priority for protection will be lands adjacent to the Refuge, particularly riparian, wetland, ponderosa pine, and high elevation forest (above 4,000 foot elevation) habitats. Medium priority for protection will be lands adjacent to other Service managed properties in Stevens and Pend Oreille Counties and seasonally flooded agricultural lands within the Colville River floodplain.

- *Protection of the Kaniksu Unit, A Separate but Related Action*

  The Service is currently in the process of evaluating the potential acquisition of 747 acres being offered by one landowner northeast of Deer Lake, Washington. This property is referred to as the Kaniksu Unit. Approximately 550 acres of this property are under a perpetual wetland easement administered by the Natural Resource Conservation Service. A separate environmental assessment will be completed if the preliminary project proposal is approved by the Washington Office. If acquired and added to the Refuge, this area would be subject to many of the management recommendations provided by the CCP. A unit plan would be prepared in the future to make management of this area consistent with its purpose, with the CCP, and with other factors unique to its acquisition.

- *Protection of Existing Research Natural Areas (RNA)*

  Two Research Natural Areas (RNAs) on the Refuge will be maintained and protected for their research values. In general "passive" or natural management will be practiced in the RNAs, including "hands-off" management of wildfire unless external lands appear threatened. Baird Basin RNA is a 160-acre tract in the North Fork of the Bear Creek watershed, representing three forest cover types under the Society of American Foresters classification system: Larch-Douglas Fir (SAF 212), Ponderosa pine-Larch-Douglas fir (SAF 214) and Lodgepole Pine (SAF 218). Varline Grove RNA is an 80-acre tract representing the Lodgepole Pine cover type (SAF 212).

- *Protection of Roadless Area*

  A 5,520-acre roadless area exists in the southeast corner of the Refuge that may have potential for wilderness designation. All of the alternatives considered in this final CCP/EIS would be managed in such a manner that the primitive roadless character of this area and associated values are not impaired. The roadless area of the Refuge will be studied further concurrent with development of the step-down Habitat Management Plan and the Public Use Management Plan to determine if it is suitable as a Wilderness Study Area.

- *Tribal Coordination*

  Common to all alternatives will be increased regular communication with American Indian Tribes who have an interest in the Refuge. The Kalispel Tribe of Indians, the Confederated Tribes of the Colville Reservation, and the Spokane Tribe of Indians are three local tribes the Refuge will work with regarding issues of shared interest.

- *Volunteer Opportunities and Partnerships*

  Volunteer opportunities and partnerships occur in all alternatives. These are recognized as key components of the successful management of public lands and vital to implementation of Refuge programs, plans, and projects.

- *Refuge Revenue Sharing Payment*

  Annual payments to Stevens and Pend Oreille Counties will continue at similar historic rates under each alternative. Total payment made to Stevens County in 1997 was $231,804. If in-holding lands are acquired and added to the Refuge, then the county payment will increase accordingly.

- *Salvage Harvest by Permit*

  Salvage harvest is allowed on the Refuge with a special use permit only, when wind or other events add excessive, high-risk fuels. This use will continue under all alternatives, where opportunities arise and where salvage could be used to further other forest habitat management objectives.

- *Firewood Cutting by Permit*

  The firewood cutting permit system remains the same under all alternatives. Current Refuge policy is to allow cutting between August 1 and November 1. Each permittee is allowed to cut up to two cords of downed wood within 200 feet of a designated road. The

number of permits issued, cords allowed, and locations will vary from year to year based on conditions, demand, and need.

- *Maintenance and Updating of Existing Facilities*

  Periodic maintenance and updating of Refuge administrative facilities will be necessary regardless of the alternative selected. Facilities include the Refuge headquarters complex, one government residence, and one cabin. Periodic updating of facilities is necessary for safety and accessibility and to support staff and management needs. Currently, the headquarters office is being expanded/remodeled to add office space. Funding has been acquired to upgrade the storage building. Funding needs have been identified to upgrade and enlarge the shop and to renovate the Winslow cabin to provide volunteer housing.

- *Protection and Management of Cultural Resources*

  The Service has legal responsibility to consider the effects its actions have on archeological and historic properties. Under all alternatives, the Service will manage cultural resources in accordance with public law and agency policy. To this end, small projects will require a Request for Cultural Resource Compliance form be completed in conformance with the Programmatic Agreement among the U.S. Fish and Wildlife Service Region 1, the Advisory Council on Historic Preservation, and the State of Washington Historic Preservation Officer. Additional consultation, surveys, and clearance will be required when large projects are sponsored by the Refuge or when activities will affect properties eligible for the National Register of Historic Places (more than 50 years old).

- *Management of Minor Recreational Uses*

  Certain recreational activities are occasionally pursued on the Refuge. Under all alternatives, any group activity involving more than 25 people will require a Special Use Permit. Dog sledding and search and rescue will also require Special Use Permits or Memorandums of Understanding. Other recreational activities not specifically addressed in this document (cross country skiing, snowshoeing) will be allowed to continue on Refuge lands unless they are found to conflict with wildlife or habitat objectives.

- *Wildlife Habitat*

  Important habitats for wildlife will be identified, protected, and enhanced, including but not limited to suitable snags, downed wood, movement corridors, late successional forest communities, wetlands, and aspen groves.

Alternatives Considered But not Developed in Detail

Caretaker Strategy

Under the caretaker strategy, Refuge management would be minimized, public use opportunities reduced and staffing would be kept to a minimum. With custodial management, only those actions mandated by policy or regulation, such as fire suppression and noxious weed control would be undertaken. This preliminary alternative was presented to the public in the July 1998 Planning Update. Very little public response or interest was expressed. The caretaker alternative would not resolve resource issues or accomplish Refuge goals and objectives. Forest health would continue to decline with increasing risk for catastrophic loss of forest habitats from wildfire, insects, and disease.

Non-Commercial Harvest/Thinning

Under this alternative only non-commercial methods would be used to conduct the forest management practices in the Refuge. Non-commercial methods would include firewood permit sales to individuals and pre-commercial thinning and non-commercial thinning by staff or by contracts. This option was rejected for the following reasons:

The non-commercial techniques would take place over an extended period of time. It is unlikely that thinning treatments on the approximate 250 acre units could be accomplished within one "season". A short time frame is necessary so areas can be burned as a unit. A unit must be uniform in terms of its fuel loading, arrangement, size and relative moisture content. This can best be achieved if the slash cures uniformly after the stems are removed.

The demand for green ponderosa pine trees as firewood is relatively low and it is unlikely that enough interest would be generated in this type of scheme to accomplish the desired habitat outcome in a reasonable time frame. Past experience with this type of thinning has yielded poor results.

Overall wildlife disturbance would be extended under this alternative since the methods employed to manipulate the habitat would be far less efficient then harvesting commercially. Soil erosion, compaction and drainage impacts would also be magnified under this alternative. Numerous firewood permittees and thinning contractors would entail the use of vehicles intended for maintained roads rather then specialized for timber harvest. In general, vehicles not designed for use in the forest do much more damage then low ground pressure logging equipment properly used. Winter harvest, a desired season, would be nearly precluded under this alternative since average snow depths in the area would make the area inaccessible to vehicles.

Grazing Alternative Submitted by Permittees and NRCS

Local individuals interested in grazing on the Refuge submitted a grazing alternative for the CCP. This alternative was not included and evaluated in the EIS, however their alternative did provide elements that were incorporated into the grazing option contained in Alternative B. The most significant difference between their alternative and Alternative B is grazing in the alluvial riparian valleys. The permittees alternative proposed grazing to enhance wildlife habitat and improve conditions along Refuge streams. Based upon the current assessment of riparian and stream habitats, restoration is a critical need for up to 7 miles of alluvial riparian habitat. Alternative B allows grazing that enhances wildlife habitat but specifically excludes grazing from the alluvial riparian zones.

Table 3-1 Summary of Alternatives

Program or Issue	Alt. A (Status quo)	Alt. B (Restoration of wildlife habitat and management of existing uses)	Alt. C (Restoration; emphasizing Refuge System Priority uses)	Alt. D (Reserve strategy, reduce human disturbances)	Alt. E (Combined B and C, Agency Preferred)
HABITAT RESTORATION PROGRAMS					
Forest management	Limited forest management. Some salvage activities and precommercial thinning. Limited prescribed fire and total fire suppression.	Restore natural forest structure and composition. Aim for a mosaic of stands to approximate the appropriate Historical Range of Variability (HRV) within each forest group. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Use precommercial and commercial thinning, selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription.	Restore natural forest structure and composition. Aim for a mosaic of stands to approximate the appropriate HRV within each forest group. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Use precommercial and commercial thinning, selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription.	Restore natural forest structure and composition and role of fire, using thinning and prescribed fire. No commercial thinning in unlogged stands. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Employ low impact fire suppression techniques as much as possible. Promote protection of wildlife corridors and buffer zones with neighboring land owners and managers.	Restore natural forest structure and composition. Aim for a mosaic of stands to approximate the appropriate HRV within each forest type. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Use precommercial and commercial thinning, selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription. Promote protection of wildlife corridors and buffer zones with neighboring land owners and managers.
Riparian and stream management	No change; no plantings or restoration.	Repair/improve roads that limit fish passage or cause excessive stream sedimentation; plant and stabilize streambanks. Enact 200-foot setback from water bodies for dispersed camping, commercial thinning, and road construction.	Repair/improve roads that limit fish passage or cause excessive stream sedimentation; plant and stabilize streambanks. Instream flows take priority over diversion flows. Enact 200-foot setback from water bodies for timber removal and road construction.	Breach dams and diversions to restore natural hydrology. Repair or obliterate roads limiting fish passage and/or causing excessive sedimentation; plant and stabilize streambanks. Enact 200-foot setback from water bodies for dispersed camping, commercial thinning, and road construction.	Repair/improve roads that limit fish passage or cause excessive sedimentation; plant and stabilize streambanks. Instream flows take priority over diversion flows. Enact 200-foot setback from water bodies for dispersed camping, commercial thinning, and road construction.

Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Use of old fields and farms	Continue grazing on approximately 430 acres (65%) of the old fields and farms. Allow remaining openings to reforest naturally.	Plant up to 200 upland acres with perennial crops and exclude livestock grazing to provide wildlife forage and viewing opportunities. Allow about 135 acres to revert to native vegetation, using prescribed fire and thinning to enhance natural succession. Maintain remaining upland openings (390 acres) with grazing, mowing, prescribed fire, and other mechanical methods.	Same as Alt. B except that upland meadows would be maintained with prescribed fire, mowing, or other methods, with no annual grazing.	No human created openings would be maintained. Plant or thin trees, shrubs, or native vegetation to enhance natural succession. Control weeds.	Plant up to 200 acres with crops. Upland meadows would be maintained with prescribed fire, mowing, or other methods, with no annual grazing
Noxious Weed Management	Use integrated weed management methods to treat 34 miles of road-side weeds plus 12 acres of non-forest habitats.	Use integrated weed management methods to reduce seed production by annually treating 50 linear miles of road-side weeds plus 250 acres of non-forested habitats and 250 acres of forested habitats. Reduce noxious weed cover on the Refuge by half by the year 2015.	Use integrated weed management methods to reduce seed production by annually treating 50 linear miles of road-side weeds plus 250 acres of non-forested habitats and 250 acres of forested habitats. Reduce noxious weed cover on the Refuge by half by the year 2015.	Use integrated weed management methods to reduce seed production by annually treating 50 linear miles of road-side weeds plus 350 acres of non-forested habitats and 350 acres of forested habitats. Reduce noxious weed cover on the Refuge by half by the year 2015.	Develop an integrated weed management plan. In interim, treat 50 linear miles of road-side weeds plus 250 acres of non-forested habitats and 250 acres of forested habitats.

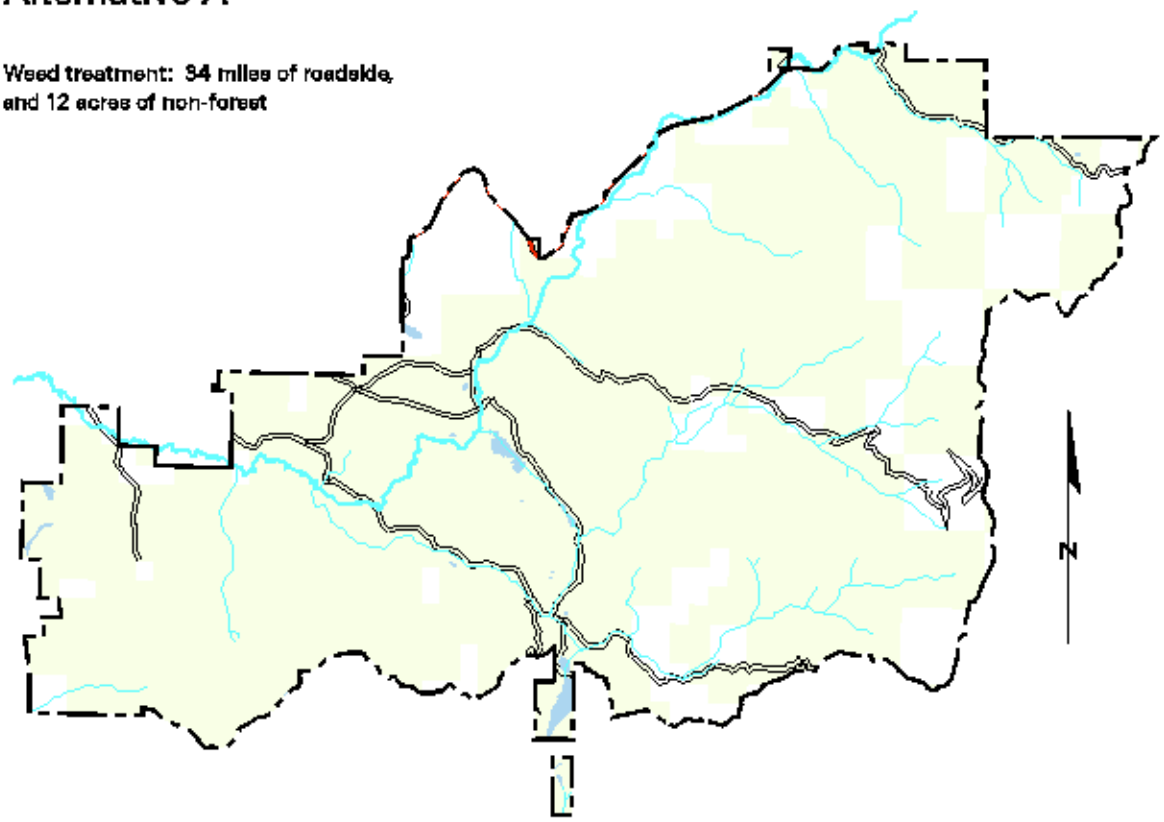
Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
PUBLIC ACCESS AND RECREATION					
Entrances and roads	No change (12 entrances, 201 miles of total roads, 91 miles of open roads). Open road density in 14 subwatersheds range from 0.2 mi/sq. mi. - 1.9 mi./sq. mi. Close selected roads during breakup.	Eight entrances. Close or obliterate selected roads as outlined in road management criteria. Open road density in 14 subwatersheds not to exceed 1.5 mi./sq. mi. from Apr. 16-Dec. 31 and 0.5 mi./sq. mi. from Jan.1 - Apr.15. Close all but the county-maintained roads from Jan. 1 - Apr.15.	Eight entrances. Close or obliterate selected roads as outlined in road management criteria. Open road density in 14 subwatersheds not to exceed 1.5 mi./sq. mi. from Apr. 16-Dec. 31 and 0.5 mi./sq. mi. from Jan. 1 - Apr. 15. Close all but the county-maintained roads Jan. 1- Apr. 15.	Four entrances. Close or obliterate numerous selected roads. Protect and enlarge effective roadless areas by closing roads to public entry, including Cedar Creek Rd. and Blacktail Mountain Rd. east of Blacktail Bridge. Manage inholder access through cooperative agreements. Open road density in 14 subwatersheds not to exceed 1.0 mi./sq. mi. from Apr. 16-Dec. 31 and 0.5 mi./sq. mi. from Jan. 1 - Apr. 15. Close all but the county-maintained roads Jan. 1- Apr. 15.	Nine entrances. Close or obliterate numerous selected roads as outlined in road management criteria. Open road density in 14 subwatersheds not to exceed 1.5 mi./sq. mi. from Apr. 15-Dec. 31 and 0.5 mi./sq. mi. from Jan. 1 - Apr. 14. Close all but the county-maintained roads Jan. 1- Apr. 14.
Hunting	All state seasons Oct 1 - Dec 31. September seasons northern portion of Refuge only.	All state seasons Oct 1 - Dec 31. September seasons northern portion of Refuge only.	Expand quality hunting opportunities (spring turkey, grouse, and deer/elk bow hunts). Offer hunter education programs.	Allow ungulate, gamebird, and waterfowl hunting. Eliminate predator (bear, cougar, coyote, and bobcat) hunting.	Promote quality hunting experiences and expand hunting opportunities by opening State seasons for spring turkey, grouse, and deer/elk bow hunts. Promoter hunter education programs.
Wildlife Observation, Interpretation, Photography	Minimal programs as staff time allows	Minimal programs as staff time allows	Increase available viewing information and opportunities; offer programs, and events (e.g., summer youth program). Interpret natural and cultural history.	Minimal programs as staff time allows.	Increase available viewing information and opportunities; offer programs, and events (e.g., summer youth program). Interpret natural and cultural history.

Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Fishing	Continue current April - October fishing opportunities. Lakes stocked.	Continue current April - October fishing season. Increase opportunities for natural spawning in lakes. Continue stocking program.	Continue current seasons and increase catch and release fishing on LPO River. Increase opportunities for natural spawning at lakes. Delay fishing opener on lakes until July 1 to minimize disturbance to nesting birds. Continue stocking program.	No stocking. Breach stream diversions and dams to restore natural hydrology.	Continue current April - October fishing season and increase catch and release fishing in LPO River. Increase opportunities for natural spawning in lakes and streams. Continue stocking program.
Camping	Unregulated. Five designated campgrounds & many dispersed sites.	Allowed in designated campgrounds and dispersed sites only between Apr. 15 and Dec. 31. Eliminate dispersed riparian camping.	Eliminated	Primitive (no-trace) camping allowed only. Close off all campgrounds and camps accessible by vehicle.	Allowed in designated campgrounds Apr. 15 - Dec. 31 and designated dispersed sites only between Oct. 1 and Dec. 31. Eliminate dispersed riparian camping.
Horseback Riding	Unregulated	Develop equestrian plan, specifically addressing overnight use (Horse Camp only), trails, feed, and maintenance.	Eliminated	Eliminated	Develop equestrian plan, specifically addressing overnight use, trails, feed and maintenance.
Off-Road Vehicles	ATVs and dirt bikes are not allowed but illegal use occurs.	Eliminate illegal use with law enforcement patrols.	Eliminate illegal use with law enforcement patrols.	Eliminate illegal use with law enforcement patrols.	Eliminate illegal use with public education, signing and law enforcement patrols. Restrict nonprohibited vehicles including mountain bikes, to existing open roads.
Snowmobiling	Snowmobiling allowed only on Olson Creek Rd. and Blacktail Mtn. Rd. (from bridge east).	Eliminate illegal use with law enforcement patrols. Maintain snowpark, but discontinue snowmobiling on Refuge.	Eliminate illegal use with law enforcement patrols. Remove snowpark and discontinue snowmobiling on all Refuge roads and lands.	Eliminate illegal use with law enforcement patrols. Remove snowpark and discontinue snowmobiling on all Refuge roads and lands.	Eliminate illegal use with public education, signing and law enforcement patrols. Continue snowmobile use on Olson Creek road with restrictions. Discontinue snowmobiling on all remaining Refuge lands.

Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
OTHER PROGRAMS					
Livestock grazing	No change; up to 750 AUMs annually; based on coordinated resource management plan developed by Soil Conservation Service in 1978.	Modified annual grazing program conducted outside low-gradient alluvial riparian areas and outside of high elevation areas (e.g. not above 3000'). Exclude livestock from ecologically sensitive areas including wet meadows. Livestock grazing would be concentrated in areas where it may provide a benefit to spring forage for white-tailed deer.	Phase out annual program; use grazing only as habitat management tool to achieve wildlife objectives.	Phase out annual program in five years.	Continue annual program through 2004; beginning 2005, use grazing only to achieve wildlife habitat objectives.
Air Force Survival School	No change. Use concentrated in late summer with an average of 90 personnel/day. Ground and helicopter use.	Reduced training use, allowing only activities not disturbing to wildlife. Eliminate use of helicopters except in emergency situations.	Phased out over five years	Phased out over five years.	Phased out over five years.
Cultural Resources Program	Protect cultural resources in accordance with law and policy.	Protect cultural resources in accordance with law and policy. Implement a proactive program to inventory and evaluate potential cultural resource assets.	Protect cultural resources in accordance with law and policy. Implement a proactive program to inventory and evaluate potential cultural resource assets.	Protect cultural resources in accordance with law and policy.	Protect cultural resources in accordance with law and policy. Implement a proactive program to inventory and evaluate potential cultural resource assets.

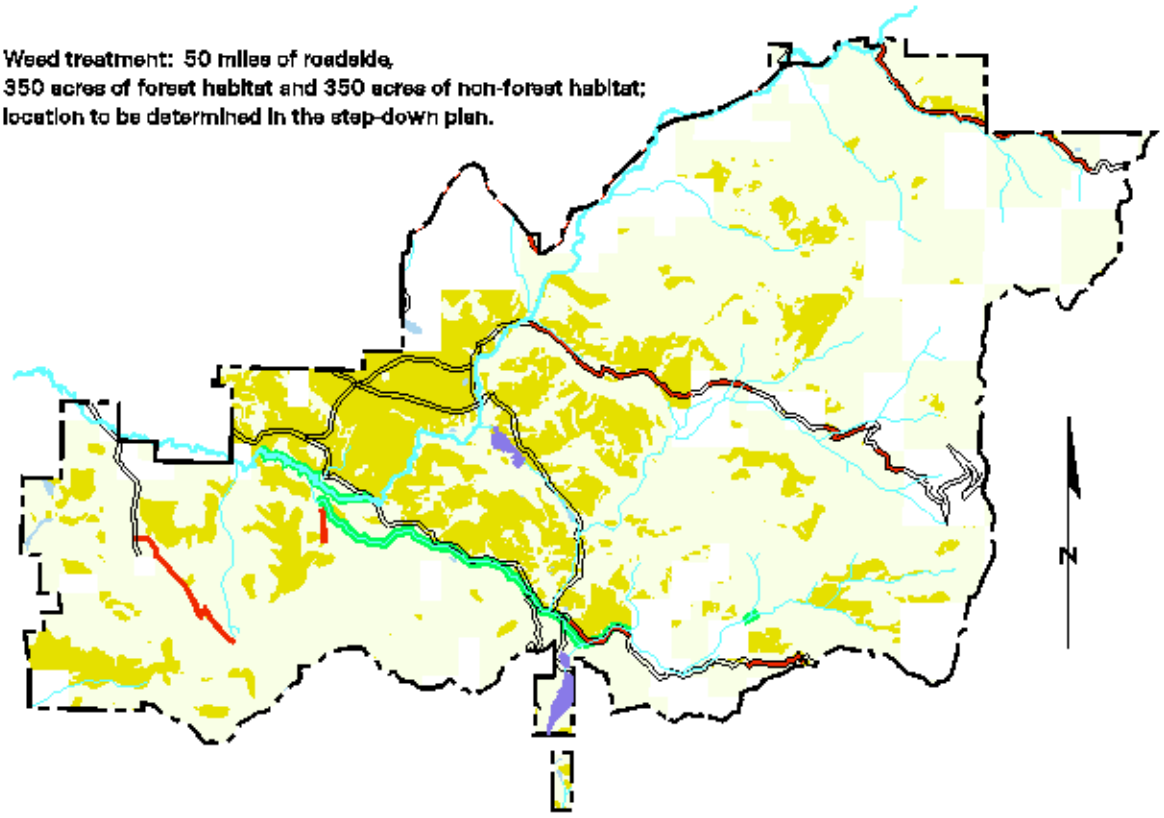
Alternative A

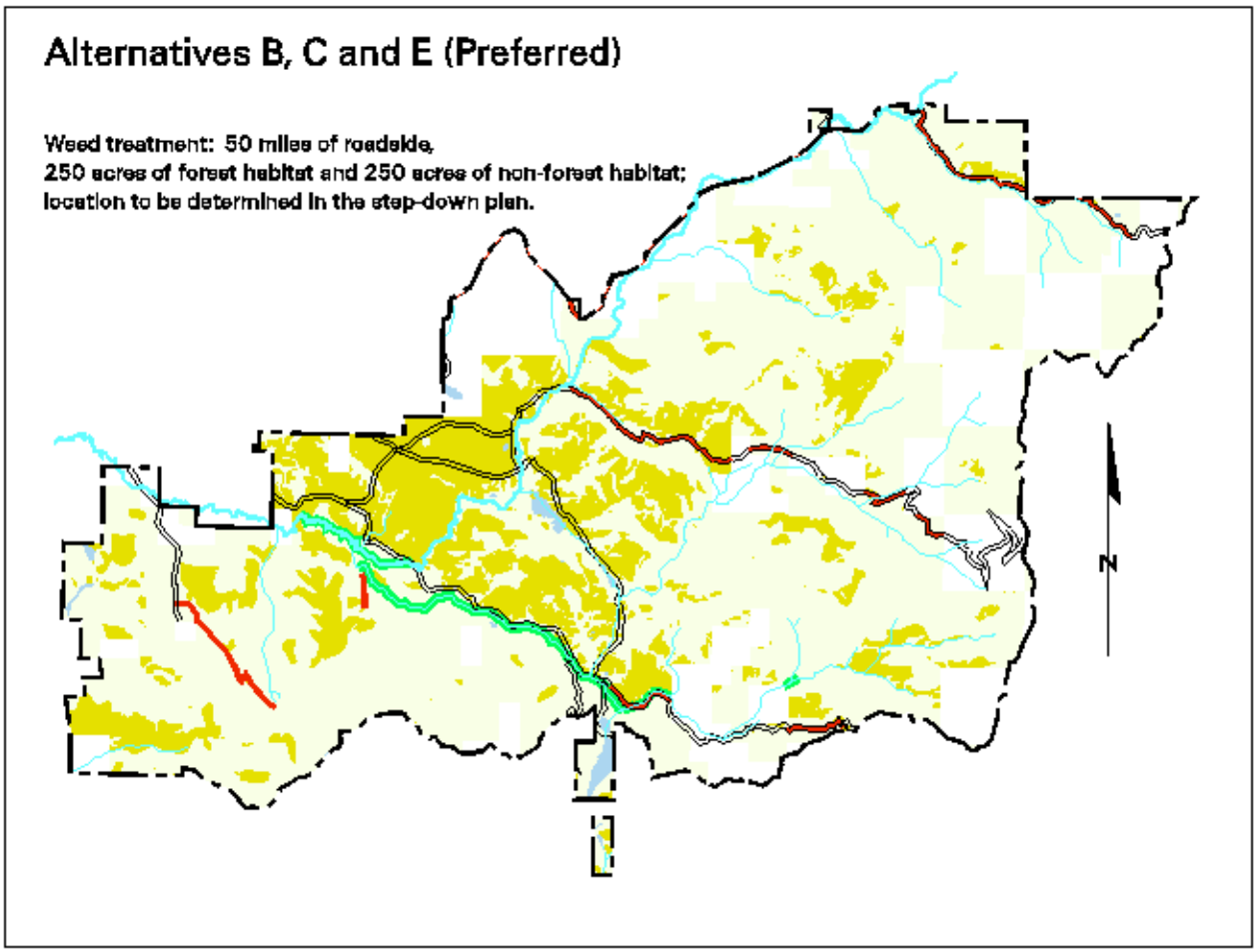
Weed treatment: 34 miles of roadside,
and 12 acres of non-forest



Alternative D

Weed treatment: 50 miles of roadside,
350 acres of forest habitat and 350 acres of non-forest habitat;
location to be determined in the step-down plan.



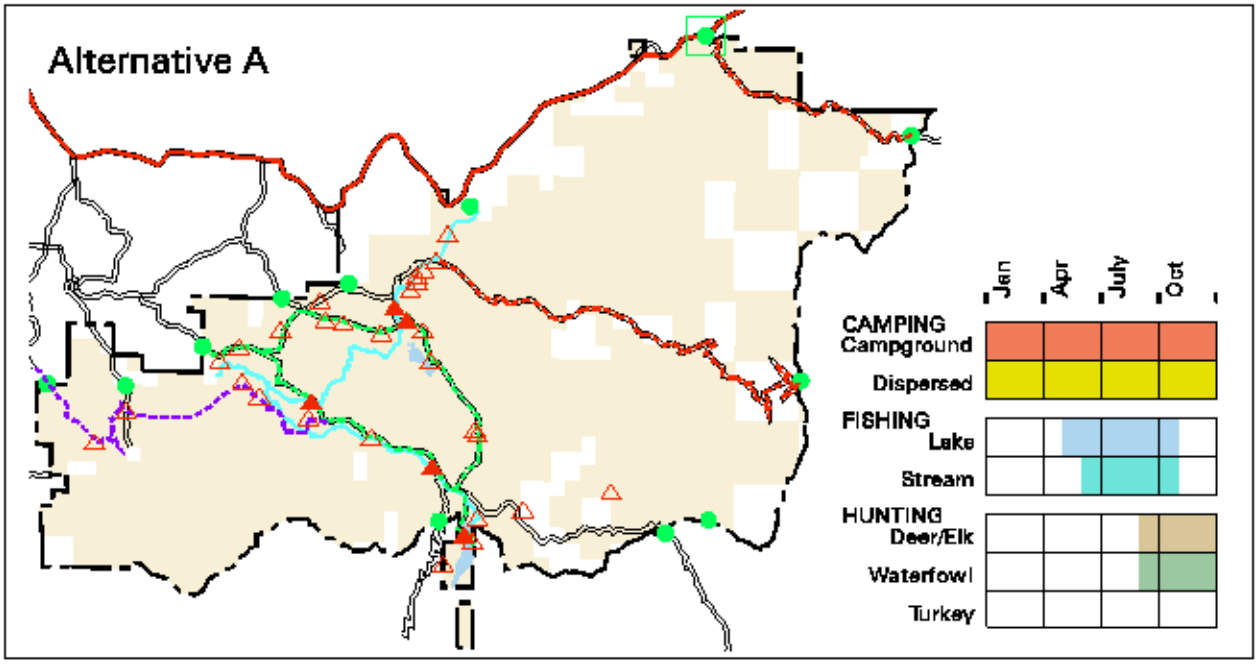


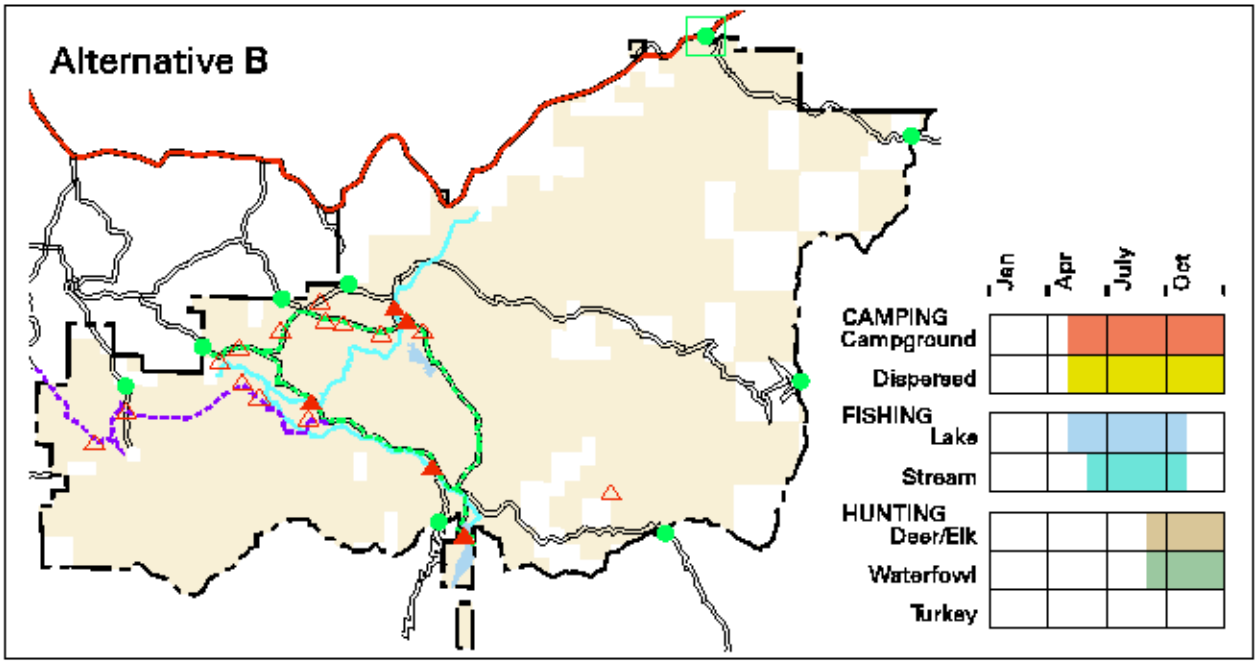
Map 14. Restoration Actions (Alternatives A - E)

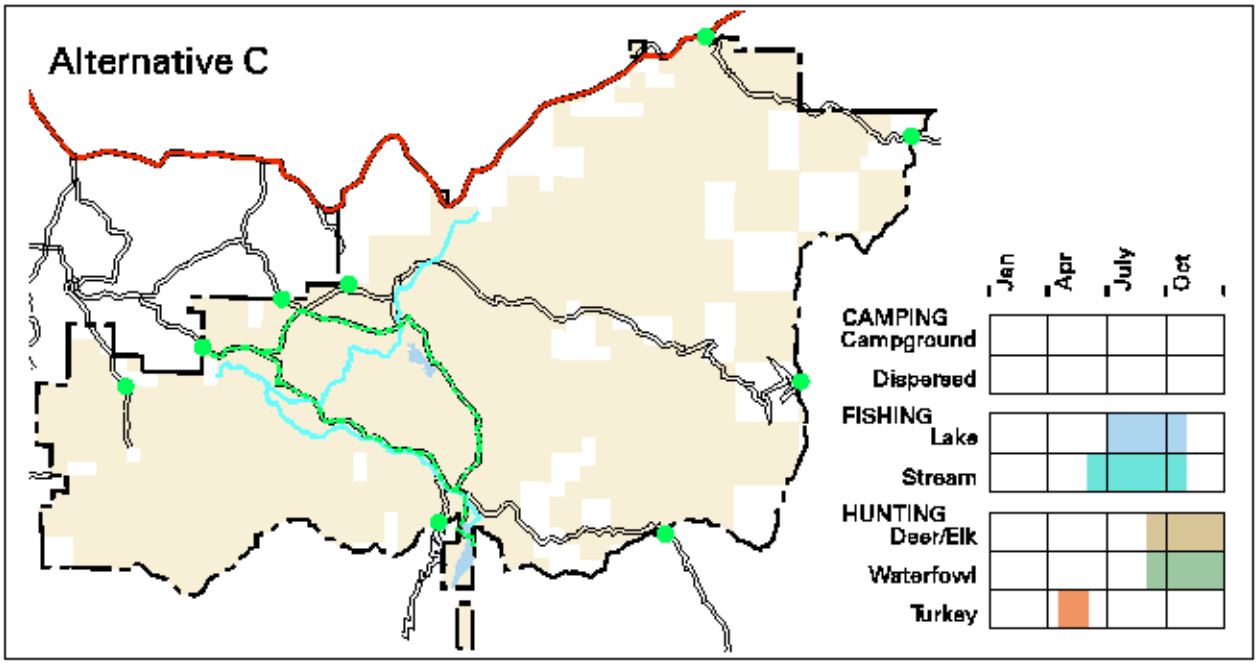
Little Pend Oreille National Wildlife Refuge

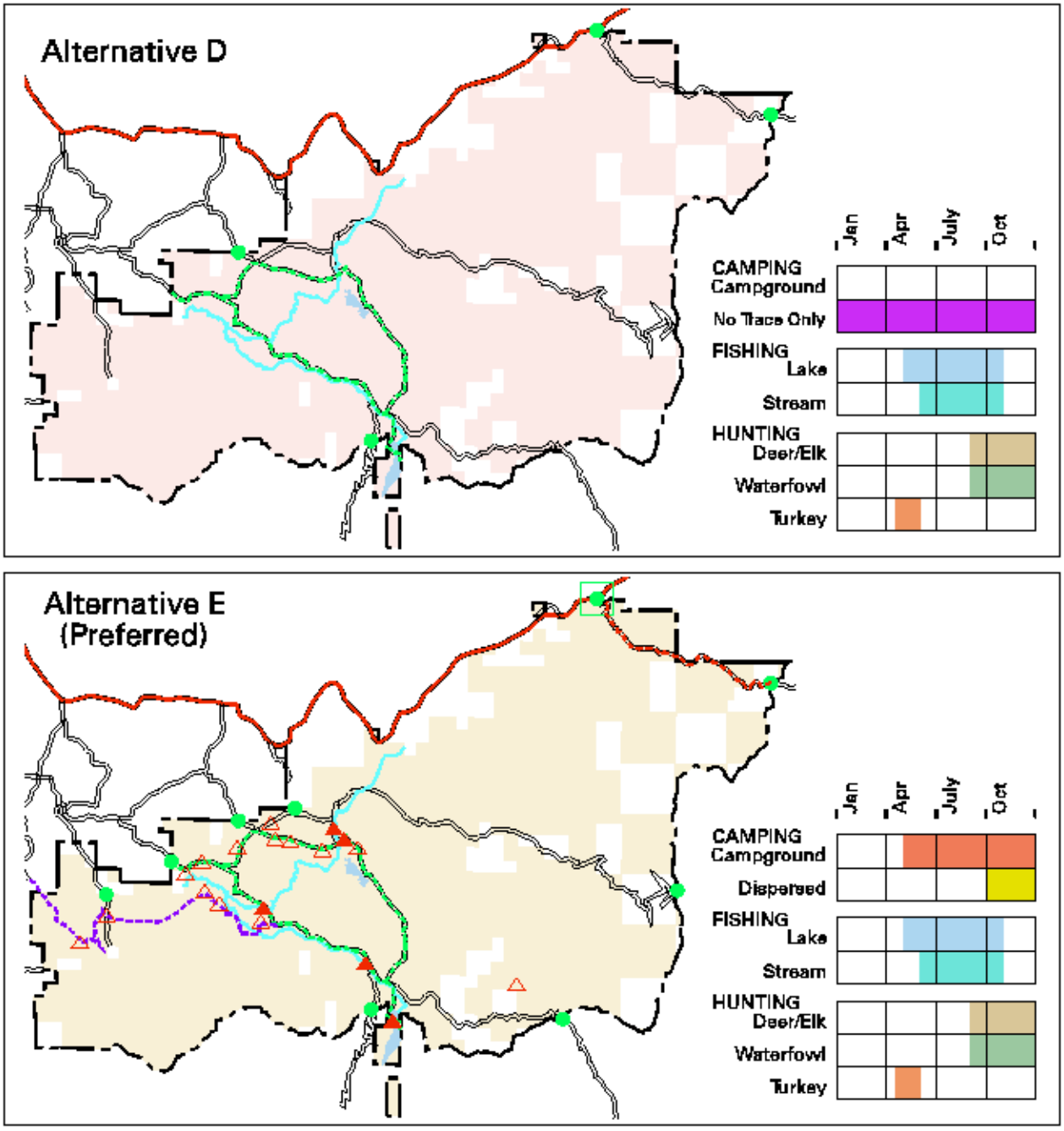
- Priority Areas for Forest Thinning and/or Prescribed Fire
- Priority Areas for Aquatic and Streambank Restoration
- Priority Areas for Road Repair
- Dam breach would return lakes to marshes (Alt. D)
- Lakes, Streams and Marshes

1 0 1 2 3 4
MILES


Alternative A
Jan
Apr
July
Oct
CAMPING
Campground
Dispersed
FISHING
Lake
Stream
HUNTING
Deer/Elk
Waterfowl
Turkey


Alternative B
Jan
Apr
July
Oct
CAMPING
Campground
Dispersed
FISHING
Lake
Stream
HUNTING
Deer/Elk
Waterfowl
Turkey


Alternative C
Jan
Apr
July
Oct
CAMPING
Campground
Dispersed
FISHING
Lake
Stream
HUNTING
Deer/Elk
Waterfowl
Turkey

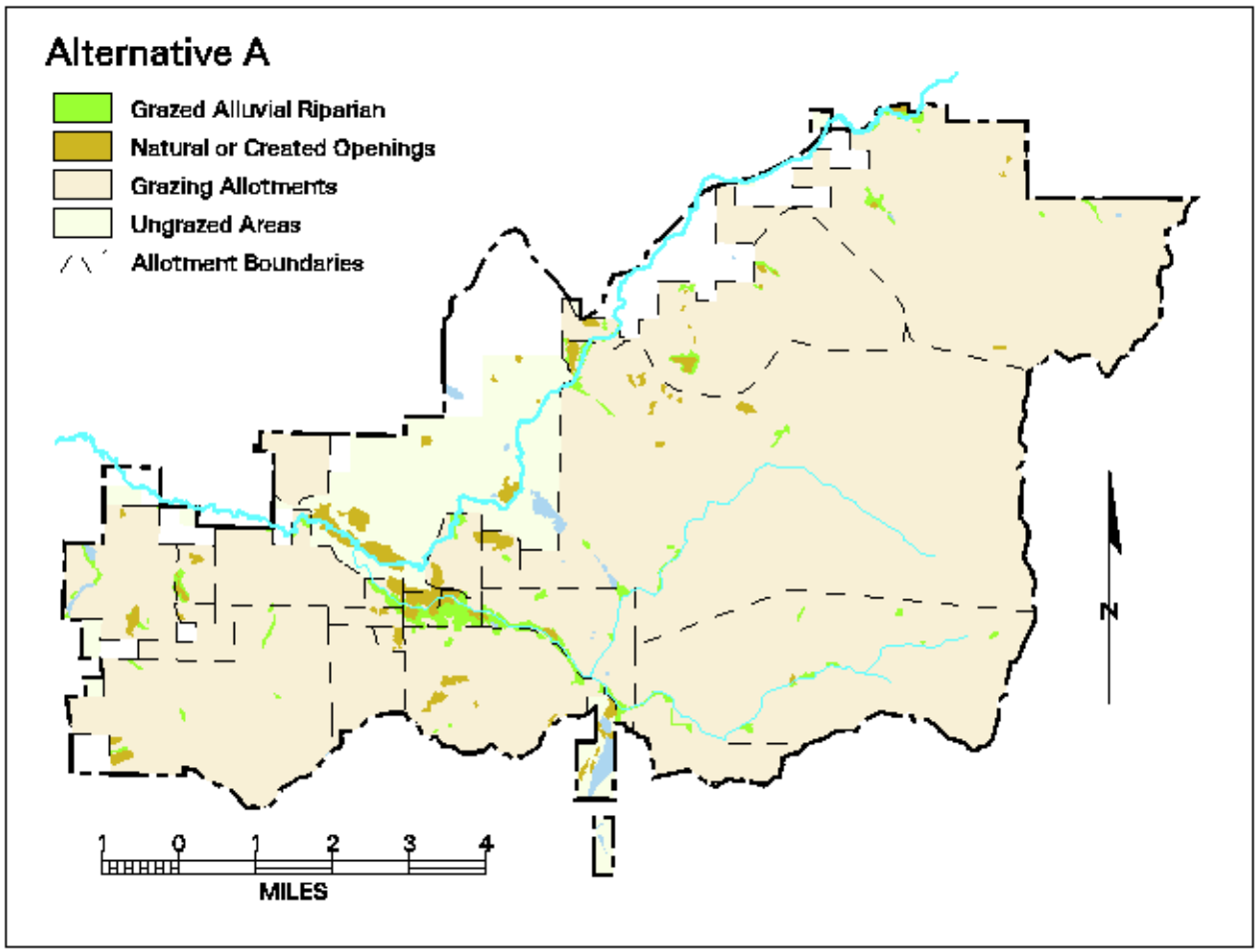


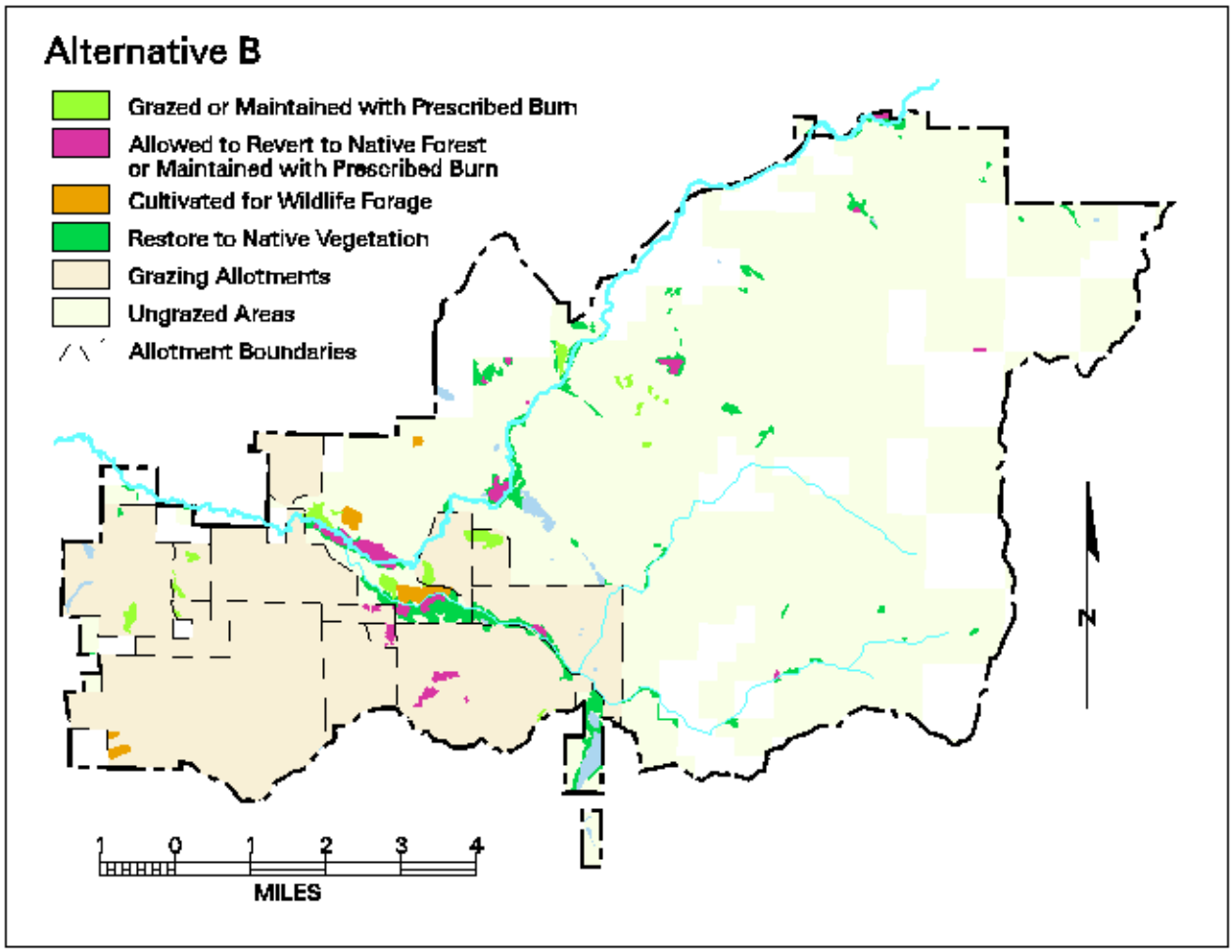
Map 15. Recreational Uses (Alternatives A - E)
Little Pend Oreille National Wildlife Refuge

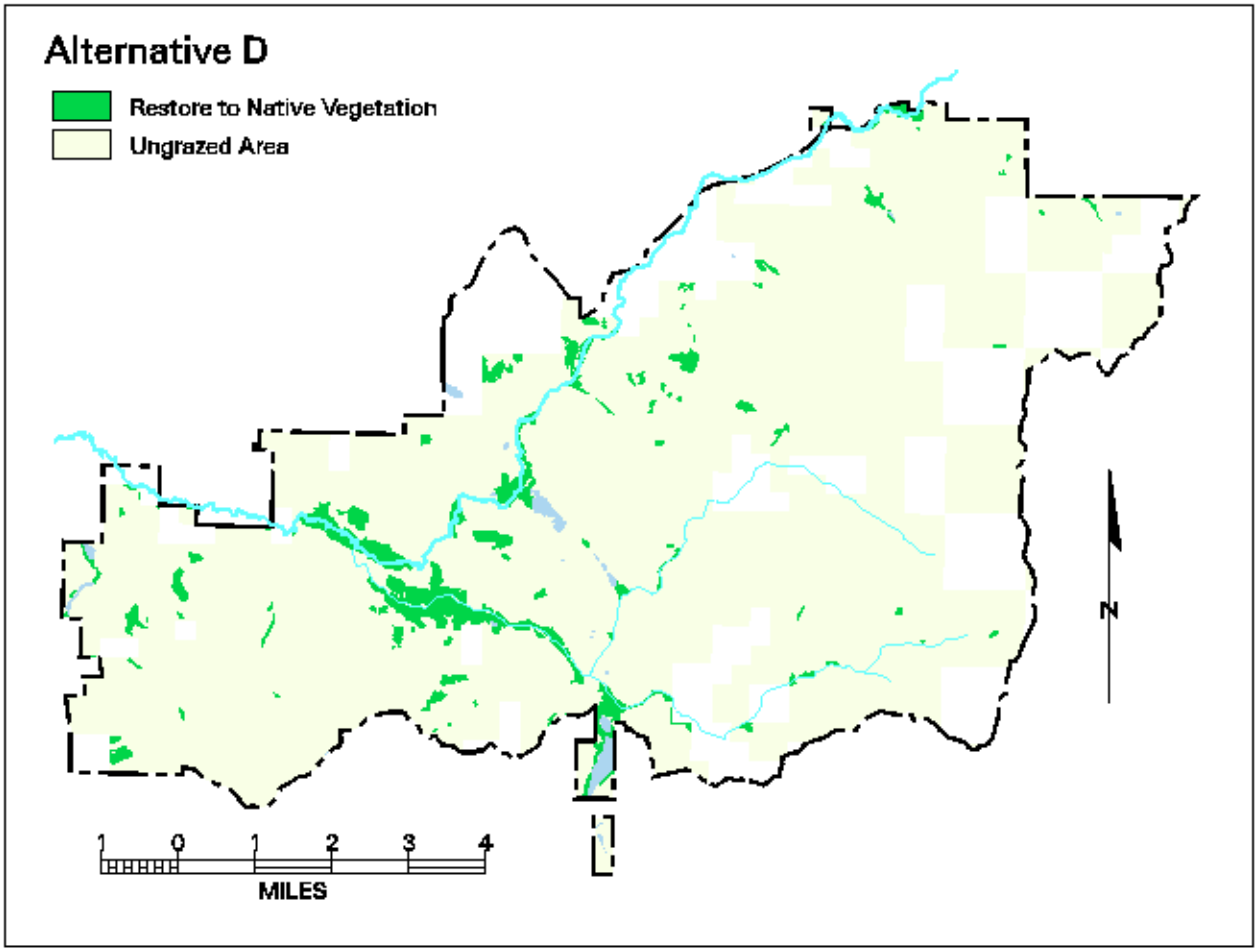
- Refuge areas open to Hunting (waterfowl hunting not allowed on streams)
- Refuge areas closed to Predator Hunting
- Fishing in Streams, Lakes and Ponds
- Old Rodeo Ride Horse Trail
- Snowmobile Route
- Wildlife Viewing Route
- Main Campgrounds
- Dispersed Campsites
- Public Access Points
- Snow Park

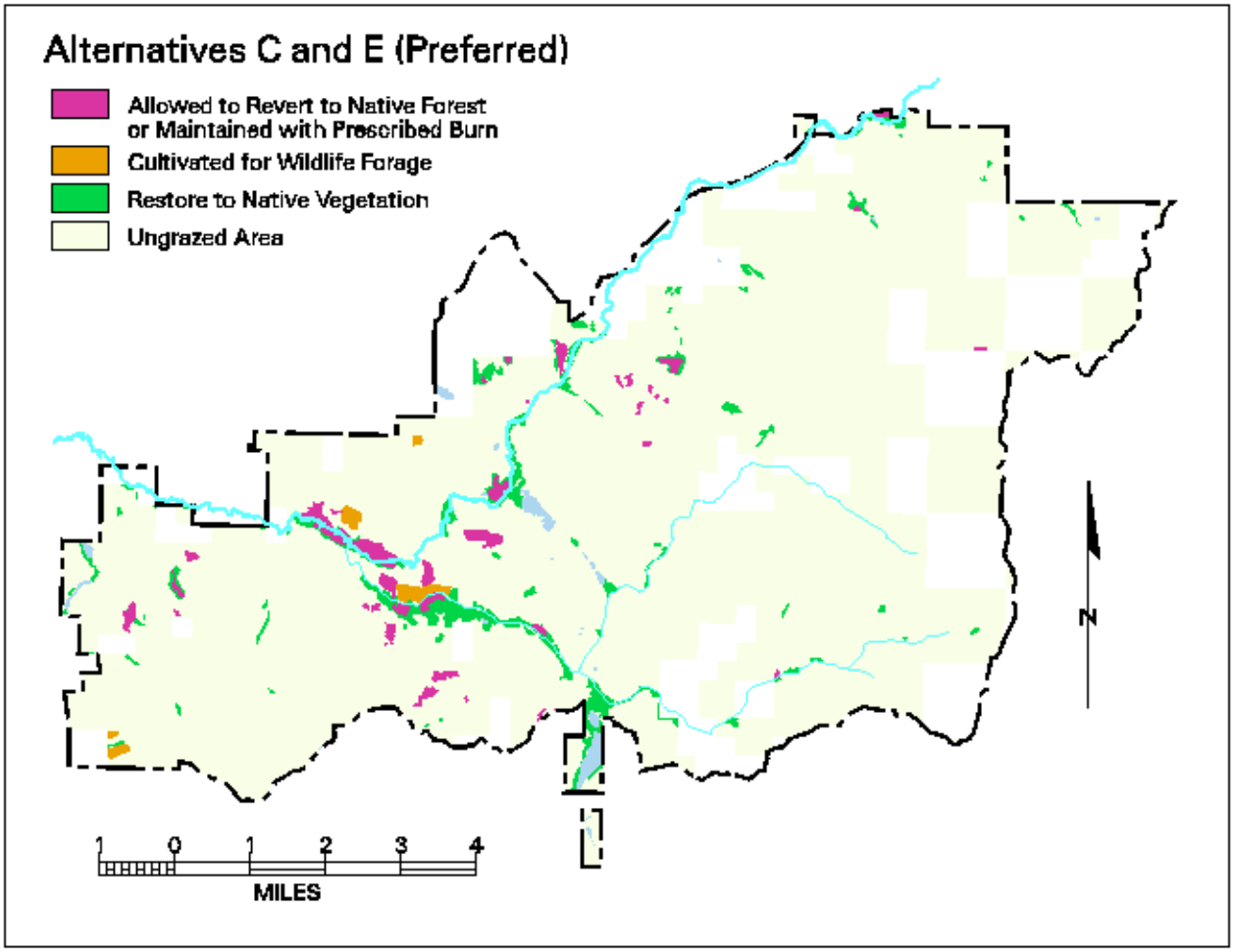
N

1 0 1 2 3 4
MILES


Alternative A
Grazed Alluvial Riparian
Natural or Created Openings
Grazing Allotments
Ungrazed Areas
Allotment Boundaries
N
1 0 1 2 3 4
MILES


Alternative B
Grazed or Maintained with Prescribed Burn
Allowed to Revert to Native Forest
or Maintained with Prescribed Burn
Cultivated for Wildlife Forage
Restore to Native Vegetation
Grazing Allotments
Ungrazed Areas
Allotment Boundaries
N
1 0 1 2 3 4
MILES





Map 16. Grazing and Fields Management (Alternatives A - E)
Little Pend Oreille National Wildlife Refuge

3.3 DETAILED DESCRIPTION OF ALTERNATIVES AND RELATIONSHIP TO GOALS, OBJECTIVES, AND STRATEGIES

Central to the concept of the CCP is the development of Refuge goals. In addition, as part of the CCP, each refuge is expected to set objectives and devise strategies that will work in concert to help achieve the goals. Goals are broad statements of the desired future condition for refuge resources. Objectives are, where possible, quantified statements of a standard to be achieved or work to be accomplished. Strategies are specific actions, tools or techniques that contribute toward accomplishment of the objective. Little Pend Oreille NWR goals, as presented in Chapter 1, are:

Goal 1: **Conserve, enhance, and restore native forest, riparian, in-stream, and wetland habitats and their associated fish, wildlife, and plants, representative of the native biological diversity of northeastern Washington.**

Goal 2: **Monitor, protect, and recover special status plants and animals and species of management interest.**

Goal 3: **Provide opportunities for wildlife-dependent recreation and education to enhance public appreciation, understanding, and enjoyment of Refuge wildlife, fish, habitats, and cultural history.**

Some of the current alternatives *emphasize* one goal over another, thus objectives and strategies differ somewhat among alternatives. This section describes and compares the objectives and strategies of each of the action alternatives (Alternatives B, C, D, and E) under the main programs operated by the Refuge. The main Refuge programs are:

- Habitat Management, including:
  - Forest Management,
  - Watershed Management,
  - Riparian and Stream Restoration, and
  - Management of Forest Openings, Old Fields and Meadows;
- Fish, Wildlife, and Plants Populations Management;
- Recreational Use and Access; and
- Other programs, including
  - Cultural Resources Management,
  - Grazing program, and
  - Air Force Survival School

Each of these programs is described by objectives (which may differ under each alternative).

Except where otherwise noted, all objectives would have a 15 year time frame for completion. It should be pointed out that the desired future habitat condition (for instance, restoration of large trees in dry forest stands) will not be fully achieved in 15 years. The Refuge will measure success partly by the extent to which Refuge habitat conditions are moving towards the desired state and/or including the desired natural processes.

Habitat Restoration Program: Alternatives and Relationship to Goals, Objectives, and Strategies *(contributes to Goals 1 and 2)*

The key objectives and strategies that would be associated with restoration actions under each alternative are detailed below, by main subprograms.

Forest Habitat Management Objectives and Strategies:

Alternatives B, C, and D, and E

Under Alternatives B, C, D, and E, most of the active forest manipulation in the next 15 years would be concentrated in the dry forest zone of the Refuge. A major management emphasis would be restoration of ponderosa pine habitat and associated plant communities in the dry forest zone as identified in the Map 3 of this final CCP/EIS. In order to achieve the Refuge s first goal to conserve, enhance and restore native forest lands, management activities would focus on enhancing and increasing mature, single story ponderosa pine habitat.

Restoration actions would benefit a wide range of species (see Chapter 4) .

Dry Forest Stand Structure Objectives:

- ***Restore mature stand structure and fire ecosystem role in dry forest stands*** on up to 1000 acres per year (or until 90% is under regular fire management). Strive to create open stands dominated by scattered mature pine and larch trees to provide diverse natural habitat for wildlife and to reduce the risk of fire and disease.

- ***Over the long term (100-200 years) aim for a mosaic of stands of different age and structural classes at approximately the same seral distributions as occurred historically (HRV)*** within the dry forest zone: ~15 % early seral, ~35 % mid seral, and ~50% old single or old multi-layer (Quigley and Arbelbide, 1997, Vol. II, pp 602-610).

Understory Shrub Objective:

- ***Increase the percent shrub understory cover in mid and late seral stands***; increase shrub crown cover less than five feet in height to 40% or more (applies to forests below 3500 feet).

Strategies undertaken to achieve these objectives would include conducting pre-commercial and commercial thinning, as well as selective harvest on up to 15,000 acres in the dry forest zone to prepare stands for the introduction of prescribed fire. Timber thinning would be conducted "from below (taking the smaller and less vigorous trees) in order to favor the healthiest and most vigorous dominants, primarily ponderosa pine, which have the greatest potential to reach maturity. Many mature trees exhibiting defects would be left standing for wildlife use. Unless they are safety hazards, all snags would be left standing and additional snags created where needed. In areas where large woody debris is lacking on the forest floor, trees may be dropped for wildlife cover.

Specifically, projects would occur in the pilot project areas known as Starvation Flats, Minnie Flats and Biarly Flats. (See Appendix E for detailed prescriptions for these three projects).

Excess fuels would be removed or concentrated in stands where needed. Fire would be reintroduced in a controlled manner by applying prescribed burns under the guidance of the Fire Management Plan.

Construction of new roads would be minimized (some improvements to existing roads and trails may be required). Where commercial thinning would occur, opening new areas for log landings would be avoided, instead forwarding logs to openings along the existing network of roads and fields. Using feller buncher type equipment where appropriate would avoid the need for an elaborate road or yarding system. Harvest times would be scheduled during the fall through early winter period to minimize ground disturbance.

Moist and Cold Forest Objectives:

- ***Protect, restore, and maintain the biological integrity and connectivity of the higher elevation forest habitat zones.***

- ***Over the long term (100-200 years) aim for a mosaic of stands of different age and structural classes at approximately the same seral distributions as occurred historically (HRV)*** within the moist and cold forest zones: ~25 % early seral, ~40 % mid seral, and ~35% old single or old multi-layer (Quigley and Arbelbide, 1997, Vol. II, pp 602-610).

.

The moist and cold forest zones of the Refuge would be lower priorities for active restoration. However, management actions, including thinning and burning could occur in the moist and cold

zones depending on identified needs, such as controlling disease, controlling noxious weeds, or enhancing habitat for special status species such as the lynx. Forest distribution, composition and seral status would also be mapped.

Strategy Unique to Alternative D: This Alternative would specifically avoid commercial logging in any previously unlogged stands.

Landscape Objectives and Strategies

Alternatives D and E

Landscape Connectivity Objective:	•	***Maintain or establish mature forest connectivity on a landscape scale with adjoining agencies and landowners***

In keeping with this objective, the Refuge would seek to develop partnerships and cooperative agreements to maintain buffers for the Refuge. Buffer zones would be designed to support Refuge purposes and goals in forest management prescriptions and employ, where necessary, alternative thinning techniques so as to require fewer roads and trails than the other alternatives.

Aquatic Habitat Management Objectives and Strategies:

Aquatic habitat on the Refuge is affected by the watershed condition, riparian zone uses, and the aquatic condition. All of the action alternatives emphasize improvement of aquatic habitat conditions, and would employ a variety of strategies to achieve this goal. The three interrelated components of aquatic habitat management include watershed management, riparian restoration, and aquatic restoration (includes in-stream, lakes and wetlands actions). Objectives and strategies for these three components would differ slightly across alternatives, primarily in the in-stream restoration component.

1. Watershed Management

Fifteen subwatersheds encompass the Refuge and surrounding lands, all contributing runoff to the Little Pend Oreille River, which then feeds into the Colville River downstream of Refuge lands. Twelve of the Little Pend Oreille River subwatersheds are on lands controlled by the Refuge. Maintaining and improving the habitat quality in the Little Pend Oreille River will require management programs, on and off-Refuge, conducted in a cooperative spirit with other agencies and landowners.

Alternatives B, C, D, and E

Watershed Partnership Objective:

- ***Restore and maintain the health of the Little Pend Oreille River in partnership with the Stevens County Conservation District and various landowners***

Watershed Health Objective:

- ***Reduce the effect of roads upon water quality and bank stability.***

To achieve these objectives, the Refuge would work to identify watershed and stream restoration projects contributing to the objective. The Refuge would cooperate to locate funding sources to support projects on private lands, and would work with fishery interest groups on fish habitat improvement projects.

In order to reduce road impacts upon water quality, new road construction would be minimized and roads causing significant stream erosion would be repaired or obliterated. The Refuge would also seek to identify and replace stream culverts that block fish movement or do not have adequate capacity for 100-year flood events.

The Refuge would implement a water quality monitoring program (associated with 303 (d) listing) to assess the physical, chemical and biological quality of the Little Pend Oreille River and its tributaries within the Refuge. The Refuge will participate with the Washington Department of Ecology and Stevens County Conservation District in developing a Total Maximum Daily Load (TMDL) or Water Cleanup Plan for the Colville River Watershed.

2. Riparian Restoration

Alternatives B, C, D, and E

Alluvial Riparian Restoration Objectives:

- ***Restore 7 miles of unsatisfactory alluvial riparian habitat*** along Little Pend Oreille River and Bear Creek, by the year 2015. Re-establish native vegetation and strive to achieve the following characteristics:

  1. a minimum of 80% stable banks with deep-rooted streambank vegetation (INFISH Standard);
  2. a regular source of large woody debris within 25 feet of the stream banks (available at least every 150 feet of stream length);
  3. a natural mixture of riparian vegetation seral stages including a recruitment source for large trees;

4. productive (non-weedy) wildlife habitat/native cover in artificial openings

- ***Restore mixed-deciduous riparian forest*** to their natural distribution within the Refuge and restore the native composition of trees, shrubs, sedges, rushes, grasses, and forbs within these plant communities.

The strategies to achieve these objectives would include a variety of methods. A significant change would eliminate cattle grazing in riparian areas to allow for optimum growth of riparian vegetation. A strong revegetation program would be undertaken, with plantings of native deciduous and coniferous trees and shrubs. All revegetated sites would be monitored. The Refuge would also seek to determine the influence of deer on deciduous riparian shrubs and trees by establishing 2-3 deer exclosures in the flood plain of the lower Little Pend Oreille River. Noxious weed problems affecting the riparian zone would be addressed with integrated weed management techniques (see more under noxious weed objective). Sites for riparian restoration would be prioritized, with areas of bank erosion or areas dominated by reed canarygrass receiving high consideration.

Riparian Protection Objective:

- ***Protect and maintain riparian habitats from loss of vegetation and soil integrity throughout Refuge.***

Sediment input to aquatic habitats and water quality degradation on the Refuge would be curbed by a new policy requiring 200 foot setbacks (or a buffer to the extent of the 100-year floodplain) from the edges of all streams, lakes, and wetlands for camping, commercial thinning, road construction, and any other practices causing detrimental changes in water quality, temperature, sediment deposit, or vegetation removal.

3. Aquatic Restoration

Alternatives B, C, and E

Existing dams and diversions would be maintained under these alternatives. The key objectives for aquatic restoration under Alternatives B, C, and E would be to :

Stream Habitat Objectives:	•	***Improve stream habitat conditions*** for native fish and other aquatic wildlife, specifically aiming to meet or exceed the standards set for stream habitat components in the federal Inland Native Fish Strategy (INFISH) including: pool frequency, water temperature, large woody debris, bank stability, lower bank angle, and width/depth ratio (USDA, 1995). Adopt newer standard when one is approved.
Flow objective: (Alternatives C and E only)	•	***Ensure that flows in the original channels of diverted steams take priority over diversion flows.***
Marsh Maintenance Objective:	•	***Maintain or restore at least 100 acres of permanently flooded emergent marsh habitat,*** to benefit certain wading birds, ducks, and amphibians.

Instream restoration projects would include any projects to restore natural channel form or deal with bank erosion issues that cannot simply be replanted. Site specific restoration plans would be developed for each of these sites with input from restoration experts. These types of restoration projects would emphasize natural hydrology, bioengineering techniques, and habitat for native salmonid and riparian bird species. Major earth disturbing projects would be evaluated for additional NEPA or other compliance requirements. Diking, water control structures, beaver introductions and/or vegetation control would be considered as tools to increase or maintain marsh habitat.

Alternative D

Alternative D includes the instream and wetlands restoration objectives described for Alternatives B, C, and E, but includes a modified lakes objective. (This essentially makes the flow objective moot for this Alternative).

Flow Objective:	•	***Return all aquatic habitats to natural condition,*** flow levels, and morphology.

Under Alternative D, the natural hydrology of the Refuge would be restored to the maximum extent possible. This alternative differs from Alternatives B, C and E in that all aquatic habitats would be returned to their natural condition including the three Refuge fishing lakes. Diversion ditches and dams constructed to create the lakes or drain wetlands would be removed and the lakes and streams, and wetlands would revert back to original historic levels and flows.

Management of Forest Openings, Old Fields, and Meadows

As discussed in Chapter 2, the forest openings, old fields, and meadows present special problems for the Refuge. Many are endowed with historical significance owing to their origin as homesteads during the pioneer period. However, the openings tend to harbor persistent populations of noxious weeds and natural succession back to forest is inhibited in many places by cattle grazing. Yet the openings also provide grassy areas used by deer as well as presenting an opportunity for wildlife viewing.

Alternatives B and C

Noxious Weed Objective:

- ***Reduce weed seed production from noxious weeds.*** Treat 50 roadside miles, 250 acres of openings, and 250 acres of forested habitat each year. Reduce the amount of noxious weed cover on the Refuge by half by the year 2015.

Fields Management Objectives:

- ***Maintain approximately 80% of the fields as openings*** to provide a diversity of habitat structure, grass and herb forage for herbivores, enhanced wildlife viewing opportunities, and to maintain certain cultural resources.

The Refuge would employ integrated weed management methods (see definition in Glossary, Appendix A) to reduce noxious weed infestation under these alternatives. Treatment should occur before seed production gets underway. Annual treatments as well as targeted monitoring would be necessary to assure that the Refuge is making progress towards the objective of ridding the Refuge of half of the extent of noxious weeds by the year 2015.

Future management of openings would emphasize maintenance of grass and herbaceous cover on the majority of these openings. However, the strategies to achieve this would differ by alternative. Alternative C would employ cultivation and prescribed fire as primary tools but would exclude grazing except in certain circumstances. Alternative B would also employ cultivation and prescribed fire but would include grazing in many areas (outside of ecologically sensitive areas) as part of the grazing program.

Strategies to protect the cultural resources within these fields would include an inventory and evaluation of fields, orchards, and homesteads to identify those that are especially significant or interpretable. In addition, the Refuge would develop a cadre of volunteers to collect information and conduct interviews concerning the Refuge homesteads.

Alternative D

Noxious Weed Objective:

- ***Reduce weed seed production from noxious weeds.*** Treat 50 roadside miles, 350 acres of openings, and 350 acres of forested habitat each year. Reduce the amount of noxious weed cover on the Refuge by half by the year 2015.

Fields Management Objective:

- ***Allow all created fields to return to native vegetation condition.***

The Refuge would employ integrated weed management methods (see definition in Glossary, Appendix A) to reduce noxious weed infestation under this alternative. Openings would be largely left alone to revert to native condition; for the most part forest rehabilitation would be accomplished with passive methods. Trees will naturally establish themselves and will be allowed to grow and thrive. Under certain circumstances, trees would be planted in the openings and/or thinned to accelerate growth or succession.

Alternative E

Noxious Weed Objective:

- ***Develop an Integrated Weed Management Plan*** that addresses treatment methods, inventory and monitoring for existing noxious weeds, and minimizes new weed introductions and conditions that favor weed establishment and spread. Until establishment of this Plan, treat any Class A and B-designate weeds or new invaders with most effective treatment and contain the spread of existing noxious weeds. Treat approximately 50 roadside miles, 250 acres of old field openings, and 250 acres of forest openings annually.

Fields Management Objective:

- ***Maintain approximately 500 acres of fields as openings to provide a diversity of habitat*** structure, grass and forage for wildlife, for enhanced wildlife viewing opportunities, and to maintain certain cultural resources.

Future management of openings would emphasize maintenance of grass and herbaceous cover on approximately 300 acres. Up to 200 acres would be planted with annual or perennial crops as wildlife forage. Management strategies to achieve this objective include cultivation, prescribed fire, and mowing as primary tools. Prescribed grazing could be used in certain circumstances.

Strategies to protect the cultural resources within these fields would include an inventory and evaluation of fields, orchards, and homesteads to identify those that are especially significant or

interpretable. In addition, the Refuge would develop a cadre of volunteers to collect information and conduct interviews concerning the Refuge homesteads.

Strategies for the management of noxious weeds, as adapted from Draft Colville National Forest Weed prevention guidelines, (1999), include:

- Inventory and map noxious weed occurrence for Classes A, B-designates, B and C, as specified by Washington State and Stevens County, by subwatershed.
- Control weed seed production and spread of all Class A and B-designates, and some Class B and C weeds along travel corridors (roads and trails), areas with high public use, and along Refuge boundaries.
- Educate staff and Refuge visitors and neighbors about weed problems and prevention methods.
- Incorporate weed prevention measures in all projects that include ground disturbance and in administration of special use permits.
- Revegetate disturbed areas from natural and human-caused disturbance (prescribed and wildland fire lines, road maintenance, skid trails, etc.).
- Monitor treated, disturbed, and revegetated areas for effectiveness of treatments. Adjust treatments accordingly.

Fish, Wildlife, and Plant Populations Management Program: Alternatives and Relationship to Goals, Objectives, and Strategies *(contributes to Goal 2)*

Alternatives B, C, D and E

In cooperation with Washington Department of Fish and Wildlife and the Ecological Services branch of the U.S. Fish and Wildlife Service, the Refuge will emphasize conservation and recovery of native species under all action alternatives. Populations will be primarily affected by the habitat conditions available on the Refuge, thus the key methods to manage populations will remain in the habitat management program. However, some more direct population management tools, such as reintroductions of endangered species may be used where appropriate.

Native Species Conservation Objective:

- ***Emphasize conservation and recovery of native species, with emphasis on special status species and species of management interest.***

Conservation and recovery of native bird communities within priority forest types and riparian zones would be a priority. Conservation actions would focus on restoration and enhancement of habitat conditions to support healthy populations of forest and riparian birds communities with an emphasis on those species with Endangered Species Act status, Nongame Bird Species of Management Concern, and Partners In Flight priority species in the habitats of interest. Key locations (e.g. breeding areas) of special status plants and animals would be maintained and protected under all alternatives by the best known available methods.

Management of traditional native game species will remain important, especially management of white-tailed deer and trout. However, introduced species will be passively managed, with no active measures undertaken to ensure their conservation. On the other hand, the Refuge will not actively manage against them unless their populations are conflicting with native species.

Non-native undesirable species such as noxious weeds and tench, a non-native introduced fish species, will be controlled and eliminated if possible. Tench live in McDowell Lake and associated wetlands and contributes to lake turbidity and algal blooms. The Refuge will work cooperatively with the State and other interested groups in controlling these undesirable species through trapping, use of rotenone, or using other methods. The most effective method having minimal impact on native fish and wildlife will be favored.

Only targeted control of predators or burrowing rodents would be practiced as necessary to protect trust species, public health, or Refuge facilities, while meeting Refuge habitat, wildlife, and public use objectives.

The Refuge would manage for wild trout in streams and evaluate the potential to stock native fish and improve spawning potential in lakes. Other population management actions will center on gathering population trend information, and to the extent possible, associated habitat condition information.

Wildlife and Fish Monitoring Objective:

- ***Build and maintain a professional wildlife inventory and monitoring program***. Conduct monitoring guided by scientific and statistical principles to confidently determine baseline populations, trends, and habitat associations for key Refuge species.

The National Wildlife Refuge System Improvement Act requires the Service to monitor the status and trends of fish, wildlife, and plants in each refuge. To achieve this, the Refuge would initiate a species inventory (presence/absence) for plant, aquatic, and terrestrial vertebrate species by the year 2000.

Due to the need for extensive inventory and monitoring throughout the Refuge, a priority system would be used to direct these efforts. Priorities would include pre- and post-treatment monitoring, and monitoring for special status species and species of special management interest.

Monitoring for winter-active mammals (Canada lynx and others) along Olson Creek Road and elsewhere in the Refuge is an example of a monitoring priority for a special status species.

Because so much active management would occur under the action alternatives, a key strategy would be to adopt methodology for pre and post-treatment wildlife monitoring and conduct this kind of monitoring where habitat management actions would occur. This monitoring will provide data to evaluate whether treatments are having desired effects. This monitoring will be high priority and initially will include: Starvation Flat, pre-commercial thinning sites, alluvial riparian habitats along Little Pend Oreille River and Bear Creek, Minnie Flats, and Biarly Flats.

All field staff will be trained in identification of special status species and all sightings will be recorded. Baseline inventory for these and selected species of management interest such as American marten and other forest carnivores will be initiated immediately. In the year 2001, additional surveys will commence, targeting amphibians and bats.

The Refuge would continue to gather baseline data on bird species, particularly those identified by the U.S. Fish and Wildlife Service as Species of Management Concern and Partners in Flight priority species. In addition to continuing the monitoring avian production and survival (MAPS) survey and the breeding bird survey (BBS), the Refuge will initiate specific assessments of forest and riparian avian communities using a variety of techniques to assess songbird abundance, use and diversity, as well as evaluate health of Refuge avian communities by assessing key demographic variables. These variables will be related to characteristics of vegetation and habitat conditions to assist in developing habitat management strategies for land bird conservation.

Annual evaluations will be made on harvested species including deer, grouse, and trout. Population counts such as grouse drumming surveys and deer buck:doe:fawn counts will be conducted annually. Harvest assessments such as grouse wing barrel surveys, as well as angler and deer hunter harvest reports will continue. Waterfowl pair and brood counts will be continued, with special emphasis on understanding how recreational fishing may be affecting bird use of lakes.

Recreational Use and Access: Alternatives and Relationship to Goals, Objectives, and Strategies *(contributes to Goal 3)*

A. Recreational Uses

The National Wildlife Refuge System Improvement Act of 1997 affirmed that wildlife conservation is the primary mission of wildlife refuges and clarified that compatible wildlife dependent recreational uses are the priority general public uses of the System. Wildlife-dependent recreation is defined as a use involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation.

More than in any of the other programs, the alternatives described for this final CCP/EIS differ over the treatment of recreational uses. The alternatives interpret the six priority uses in slightly different ways. The six priority uses are included in all alternatives, but are emphasized to a greater extent in Alternatives C and E.

Other recreational uses that presently exist on the Refuge would be managed differently under the alternatives. Alternative B seeks to maintain traditional recreational uses, with modifications to reduce impacts on Refuge resources. Alternative D de-emphasizes recreation of a particularly disturbing nature. Alternatives C and E emphasize the priority uses and eliminate or reduce many others.

Under all alternatives, the recreation character of the Refuge would continue to be semi-primitive. Minor improvements would be made to facilities but would be limited.

By 2006, Refuge staff would complete a step-down Public Use Management Plan to expand on and provide more detail for Refuge recreation. Game and fish components will be written in cooperation with the Washington Department of Fish and Wildlife.

The alternatives were developed in light of the national standards adopted by the Service to initiate, administer and evaluate all public uses on National Wildlife Refuges:

1) The activity will be compatible with the major purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

2) Funding will be available for the development, operation, and maintenance of the activity.

3) The activity will not adversely influence the desired base populations or communities of Refuge fish and wildlife.

4) All activities will be coordinated to minimize conflicts and wildlife-dependent activities will receive enhanced consideration over other forms of recreation.

5) Current demands and opportunities for the activity in the vicinity of the Refuge will be periodically evaluated.

1. Refuge System Priority Uses

a) Fishing

Alternatives B, C, and E

Fishing Opportunity Objective:	•	***Provide a range of high quality lake and stream fishing opportunities***. Provide participants with reasonable harvest opportunities, minimal conflicts with other users, and opportunities to use various angling techniques while minimizing disturbances to migratory birds and other wildlife.
Natural Spawning Objective:	•	***Improve conditions for natural spawning in lakes and streams, particularly for native species.***

The fishing program would strive to maintain fish population levels appropriate for habitats and provide a quality recreational experience for anglers. Management of native fish species would be emphasized where feasible. Overall, the fishing program would aim to provide a fishing experience superior to that found on other private and public lands.

Manage Potter s Pond as a family-oriented fishing site. Continue WDFW program of stocking coastal rainbow trout as part of a put-grow-take fishery program.. Maintain standard State eastside fishing regulations. However, gasoline powered motors would be prohibited to reduce impact to wildlife and other anglers. Limit bank fishing to the south side of Potter s pond and relocate camping areas a suitable distance from the lake.

Continue fly fishing only regulations and the prohibition on motorized boats on Bayley and McDowell Lakes. Continue catch and release only fishing on McDowell Lake. Maintain current regulations on Bayley Lake, while exploring the potential to change to season-long catch and release regulations.

Work with WDFW to discontinue stocking of eastern brook trout in Bayley Lake. Encourage converting these lakes to native fish species through stocking of redband or other native trout while maintaining a recreational fishery. Cooperate with WDFW to control the tench population in McDowell Lake using the least obtrusive methods possible.

Stream habitats would be managed primarily for wild trout with an emphasis on native species. No stocking would occur on Refuge streams for recreational fishing. However, reintroduction of native species would be allowed. Encourage WDFW to implement selective gear and catch and release fishing regulations on those portions on the Little Pend Oreille River within the Refuge boundaries. An exception may be made allowing harvest of eastern brook trout to facilitate management of that species.

Investigate the impact recreational fishing may be having on breeding and nesting waterfowl and other wildlife.

Strategy unique to Alternative C: Delay fishing opener on lakes until July 1 to minimize disturbance to nesting birds.

Alternative D

Fishing Opportunity Objective:

- ***Provide high quality stream fishing opportunities*** to approximately 2000 visitors per year, providing participants with reasonable harvest opportunities, uncrowded conditions, minimal conflicts with other users, and an opportunity to use various angling techniques.

This Alternative incorporates a greater emphasis would be placed on the conservation and recovery of native fish stocks, together with restoration of the natural hydrological regimes at the Refuge. In keeping with this emphasis, no stocking of non-native fish would occur at all. Dams and diversions would also be breached, returning the lakes to their natural condition. Fishing opportunities would still be encouraged, but would mainly be available on Refuge streams.

b) Hunting

Alternatives B, C, D, and E

Hunting Opportunity Objective:

- ***Promote quality hunting experiences and expand hunting opportunities by opening State seasons for spring turkey, grouse, and deer and elk bow hunts.*** A quality hunt includes providing participants with reasonable harvest opportunities, uncrowded conditions, minimal conflicts with other users, relatively undisturbed wildlife, and limited interference from or dependence on mechanized aspects of the sport.

Strategies for Alternatives C and E: These alternatives focus on adding new seasons, specialized hunter education opportunities and providing hunters access to parts of the Refuge previously closed due to Air Force training. A Refuge-wide hunting closure would be retained from January 1 through August 31, with the exception of allowing hunting during the spring turkey season. Road closures may be adopted as a way to increase animal security, reduce road hunting, and improve the quality of the hunt. The use of bait to hunt any wildlife on the Refuge, as well as hound hunting for cougar, black bear, coyote, fox or bobcat, would be prohibited.

Strategy for Alternative D: This Alternative eliminates predator hunting, but retains the current seasons for other hunted species. This Alternative also includes road closures as a major component.

c) Viewing, Photography, Interpretation, and Environmental Education

Alternatives B and D

Viewing, Photography, Env. Ed and Interpretation Objective:

- ***Accommodate wildlife viewing, photography, and interpretation.*** Conduct limited environmental education.

These alternatives would accommodate wildlife viewing and photography by maintaining Refuge habitats in good condition for wildlife. Interpretation and environmental education activities would be accorded a lower priority and would be implemented only as funding and staff time become available.

Alternatives C and E

Viewing, Photography, Env. Ed and Interpretation Objective:

- ***Expand opportunities for wildlife viewing, photography, and interpretation.*** Explore opportunities for expanding an environmental education program.

These alternatives would promote additional wildlife viewing and photography on the Refuge. Interpretation of natural features would be emphasized, with kiosk construction and brochure development a priority. These alternatives would seek partnerships with citizens in developing a Refuge-specific wildlife viewing leaflet. Funds would be sought to improve roads and provide an auto tour route with interpretive signs relaying specific themes of Refuge habitats, wildlife, and history. There would be an effort to stage annual events celebrating Refuge wildlife, particularly around the International Migratory Bird Day in May and National Wildlife Refuge Week. Refuge staff would explore opportunities to develop the old Winslow logging railroad grade as an interpretive trail. Rails to Trails is one possible source of funds for such a project. These projects would rely on funds over and above annual operating dollars.

A volunteer program would be necessary to support an on-site environmental education program. There has been little demand for this type of program but that could change in the future. In the interim, Refuge staff will provide environmental education programs on an as-requested basis as other priorities and time allow. Participation in environmental education activities off-site will also be conducted. Teacher workshops could be one way to encourage use of the Refuge as a site for learning about habitats and wildlife.

2. Other recreational uses

Recreationists have long used Little Pend Oreille NWR for a variety of other recreational activities, which are now considered non-priority under camping, horseback riding, and other

uses (described in further detail in Chapter 3). The alternatives have different objectives with respect to the non-priority uses and thus are presented separately below.

a) Camping

Alternative B

Camping Objective:

- ***Minimize impacts associated with Refuge camping***, especially along riparian areas and during the sensitive winter period.

Camping would be managed under Alternative B to allow use to continue, but with decreased impact to Refuge resources. Some dispersed camping sites would remain open but dispersed riparian camps within 200 feet of water, or in sensitive floodplain areas would be closed. Camping with horses would only be allowed in Horse Camp. Law enforcement patrols of Refuge camps will be made regularly throughout the camping season.

Alternative C

No objective is adopted for camping under Alternative C. This activity would be eliminated from the Refuge entirely under this Alternative.

Alternative D

Camping Objective:

- ***Minimize impacts associated with Refuge camping,*** specifically reducing vehicular disturbance and compaction of sensitive areas.

Camping would still be allowed under this Alternative, but no permanent campgrounds or dispersed sites would be designated and maintained. Only no-trace camping would be allowed, as appropriate with the reserve theme of Alternative D.

Alternative E

Camping Objective:

- ***Create a Refuge camping program supportive of Refuge System priority uses. Minimize impacts associated with Refuge dispersed camping, especially along riparian areas and during the sensitive winter and spring/summer periods.***

Like Alternative B, this Alternative strives to accommodate some traditional uses but with limits to ensure minimal impact to Refuge resources. Camping is most popular in the early part of the fishing season and during the deer hunting season. The strategy to support the objective of restructuring Refuge camping so that it supports the Refuge System priority uses would limit

dispersed camping to late fall. Some dispersed sites will remain open but dispersed riparian camps within 200 feet of water, or in sensitive floodplain areas would be closed and naturalized.

Campgrounds would remain open, but only April 15-October 15. Basic improvements would be made to some Refuge campgrounds including new, wheelchair-accessible toilets, designated sites, fire pits, and running water. There are a few sites within the campgrounds that are causing severe riparian degradation; these few sites would be permanently closed. The Refuge would Develop a site plan to reduce impact to wildlife from all recreational activity near Potter s Pond and Bayley Lake. This could include eliminating camping at these lakes.

Camping with horses would be allowed only in designated sites. Law enforcement patrols of Refuge camps would be made regularly throughout the camping season.

An education campaign addressing appropriate social behavior for Refuge camping will be developed and implemented. Since camping is not dependent on wildlife and does not contribute to the wildlife conservation purpose of the Refuge, its future is dependent, in part, upon its proponents. Refuge staff would seek the cooperation of users and partnerships with interested parties to insure compliance with compatibility stipulations and protection of Refuge resources. Without user compliance, these uses will be terminated.

b) Horseback Riding

Alternatives B and E

Horseback Riding Objective:	•	***Produce an equestrian plan in cooperation with riders that minimizes impacts to Refuge resources.***

The Refuge would develop partnerships with organized riding groups to offset costs associated with offering this use on the Refuge, including for example, staff and facilities. The Refuge would develop a fee system or some kind of user-maintained effort to support this use. The Refuge would designate and map roads and trails available for riding from April 15 through October 15; develop parking areas for day use; and designate and improve one camp for horse users.

Specific restrictions to protect resources that the Refuge would incorporate into an equestrian plan include: Eliminate cross-country riding; avoid trails through wet areas until they are dry; limit group size; require high lines or temporary corrals; and require weed-free hay or pelletized food in horse camps area. The Refuge would recommend feeding these to horses one day prior to riding on Refuge.

The Refuge would seek to restore damaged areas and identify appropriate crossings and watering areas. In concentrated use sites such as horse camps and trailheads, unused hay would be removed and manure piles scattered.

Since horseback riding is not dependent on wildlife and does not contribute to the wildlife conservation purpose of the Refuge, its future is dependent, in part, upon its proponents. Refuge staff would seek the cooperation of users and partnerships with interested parties to insure compliance with compatibility stipulations and protection of Refuge resources. Without user compliance, these uses will be terminated.

Alternatives C and D

There are no objectives associated with this program, since the horseback riding would be eliminated under this Alternative.

c) Off-Road Vehicles

Alternatives B, C, D, and E

Alternatives B, C, D, and E control disturbance to wildlife and damage to resources caused by motorized and non-motorized off-road vehicles. Motorized vehicles not licensed by the State for operation on public roads are prohibited from operating on the Refuge. (Code of Federal Regulations 50, Part 27.31(f)). State licensed motorized vehicles, capable of operating off-road, are restricted to existing open roads. Mountain bikes will be allowed, but are restricted to existing open roads. Illegal uses will be controlled through public education including signing and law enforcement patrols. The Refuge will coordinate with the U.S. Forest Service to insure correct information is included on the Colville National Forest Travel Map.

d) Snowmobiling

Alternative E

Under the preferred Alternative E, snowmobiling would be discontinued on the Refuge with the exception of travel to and from Calispell Peak along Olson Creek Road. Snowmobiling through the Refuge on four miles of Olson Creek Road would be allowed at the current level of use until an alternate route can be developed. Refuge staff would work with adjacent land managers and recreationists to seek a new snowpark and alternate winter access to Calispell Peak.

Law enforcement patrols would be necessary, particularly on weekends. In areas of mixed ownership, the Refuge would work with adjacent property owners to minimize the disturbing effects of these uses, and establish informational and regulatory signs and gates. The Refuge would monitor the level of snowmobile use and wildlife use of the road and nearby areas during the winter.

Snowmobiling would be reevaluated during development of the public use management plan. Landscape scale management would be necessary to address future lynx conservation.

Law enforcement patrols will be necessary, particularly on weekends. In areas of mixed ownership, work with adjacent property owners to minimize the disturbing effects of these uses using informational and regulatory signs and gates.

B. Law Enforcement

Alternative E

Law Enforcement Objective:	•	***Establish and maintain an effective, professional and courteous law enforcement presence to discourage unauthorized uses.***

The Refuge would seek funding for a permanent full-time law enforcement officer. Priority areas for law enforcement would be controlling uses that are illegal or have been deemed incompatible. The law enforcement officer would also serve to disseminate information or policies to the public.

C. Access and Roads

There are currently 12 entrances or informal access points to the Refuge, and at least an additional 7 unauthorized access points to the Refuge. Many of these are unofficial entrances that have been kept open for management and occasional public use. Several require access through private land.

Alternatives B and C

Access Control Objective:	•	***Designate 8 official entrances.***
Open Road Density Objective:	•	***Close roads as needed to attain an open road density not exceeding 0.5 miles/square mile during winter and 1.5 miles/square mile during summer.***

The Refuge staff would achieve the low densities desired during the winter period by closing all but the county-maintained roads from January 1 - April 15. Seasonal or periodic closure of certain roads is a typical management practice that would continue to be used in managing public use. Selected roads would be closed during critical times such as nesting season and winter use by white-tailed deer. Other roads may be closed past April 15 because of snow depths or to protect the roadbeds from erosion during snowmelt. Cooperative agreements with the managers of inholdings would be pursued to achieve the lower road densities and access objectives.

Alternative D

Access Control Objective:	•	***Designate 4 official entrances.***
Open Road Density Objective:	•	***Close roads as needed to attain an open road density not exceeding 0.5 miles/square mile during winter and 1.0 miles/square mile during summer.***
Roadless Area Protection Objective:	•	***Buffer or protect the integrity of current roadless areas .***

The Refuge staff would achieve the low densities desired during the winter period by closing all but the county-maintained roads from January 1 - April 15. Seasonal or periodic closure of certain roads is a typical management practice that would continue to be used in managing public use. Selected roads would be closed during critical times such as nesting season and winter use by white-tailed deer. Other roads may be closed past April 15 because of snow depths or to protect the roadbeds from erosion during snowmelt.

Alternative D incorporates an additional objective to effectively enlarge or buffer the roadless areas located in the eastern half of the Refuge by closing adjoining roads to public traffic. Specifically, Blacktail Mountain Road would be gated east of Blacktail Bridge and where it crosses the Refuge boundary at the eastern border. Cooperative agreements with the managers of inholdings would be pursued to achieve the lower road densities and access objectives.

Alternative E

Access Objective:	•	***Designate 9 official entrances.***
Open Road Density Objective:	•	***Close roads as needed to attain an open road density not exceeding 0.5 miles/square mile per subwatershed during winter and 1.5 miles/square mile per subwatershed during summer*** (Rodrick and Milner 1991, section on White-tailed deer).

Open road densities would be evaluated by subwatershed to determine if the objective is being met. The Refuge staff would achieve the low densities desired during the winter period by closing all but the county-maintained roads from January 1 - April 14. Seasonal or periodic closure of certain roads is a typical management practice that would continue to be used in managing public use. Selected roads would be closed during critical times such as nesting season and winter use by white-tailed deer. Other roads may be closed past April 14 because of snow depths or to protect the roadbeds from erosion during snowmelt. Cooperative agreements

with the managers of inholdings would be pursued to achieve the lower road densities and access objectives.

Alternatives B, C, D, and E

Road Minimization Objective:

- ***Ensure no net increase in the total miles of Refuge roads. No new roads in RNAs or roadless areas.***

These alternatives would recommend no net increase in the total miles of roads on the Refuge (regardless of whether the road would be closed or open). Construction of new roads would be minimized through maximum reliance on existing roads. Any new roads required by management would be offset by the closure of a corresponding length of old road. This will allow management flexibility within a certain limit. If new road construction is required, roads will be properly located and constructed to minimize adverse environmental impacts. Use of signs would also be expanded.

Public Access Roads Objective:

- ***Employ the following criteria to determine whether roads shall be kept open and maintained for public uses.*** (Roads not meeting these criteria may still be necessary in some cases for management purposes; these shall continue to meet basic safety standards.)

  1. Traffic has minimal disturbance on wildlife populations.
  2. Road has minimal impact on wildlife and fish habitat. (Excessive runoff and sedimentation controlled through proper design and maintenance).
  3. Vehicle access is necessary to support primary wildlife-dependent activities of the Refuge including: wildlife observation, hunting, fishing, wildlife photography, environmental education and interpretation.
  4. Road is necessary to provide access to the five Refuge campgrounds.
  5. Roads meet basic safety standards for road type.
  6. Funding is available to make periodic improvements and repairs.
  7. Traffic does not adversely affect recreational experience of primary activities.

Refuge roads open to the public would be evaluated under the above criteria for need, and environmental and wildlife impacts.

A network of management roads would be maintained to allow for periodic Refuge management practices such as habitat monitoring, selective timber harvest, fire management and control, habitat restoration and law enforcement activities. Management roads will be gated and posted with signs indicating Authorized Vehicles Only . Roads not necessary for management will be abandoned and left to revert to a natural condition or obliterated.

Other Programs: Alternatives and Relationship to Goals, Objectives, and Strategies

A. Cultural Resources Program

Alternatives B, C, and E

Cultural Resource Objective:

- ***Implement a proactive cultural resource management program.***

In partnership with local Tribes, historical societies, Universities, the FWS Region 1 Cultural Resource Team, and using the cultural resource overview by Renk and Miss (1998) as a point of departure, Little Pend Oreille NWR will establish a cultural resource program using the following strategies. Conduct a stratified sample survey to identify areas that contain evidence of prehistoric occupation, such as stream terraces, ridge lines, and natural shorelines. Inventory and evaluate fields, orchards, and homesteads to identify those that are especially significant or interpretable. Survey the railroad features associated with the Winslow logging era and evaluate the opportunities for an interpretive trail. Develop a cadre of volunteers to collect information and make interviews concerning the Refuge homesteads. Evaluate the significance of Winslow flat and its potential as an historic interpretive site. Stabilize and maintain structures and landscape features eligible to the National Register of Historic Places. Inventory and identify cultural resources in need of protection or stabilization at a sample of facilities and areas currently subject to high public use, cattle concentration, Air Force activity, and habitat manipulation.

Alternative D

There is no objective for a cultural resources program under Alternative D, beyond basic protection of cultural resources as outlined in section 3.2, Features Common to All Alternatives.

B. Grazing Program

Alternative B

Grazing Objective:

- ***Continue an annual Refuge grazing program where it does not conflict with habitat objectives.*** Specifically,

1. Allow for optimum growth of riparian and upland vegetation (sedges, shrubs, deciduous trees).
2. Reduce plant competition to woody species and encourage reestablishment and regeneration of trees and shrubs.
3. Do not exceed 50% use of grasses and forbs.
4. Reduce browsing on woody vegetation.
5. Minimize new fencing and reduce miles of fence on deer winter range. Use electric fencing where feasible. Use fencing specifications that maximize wildlife passage.
6. Reduce stream bank impacts and fecal contamination by designating water access points.
7. Build in flexibility (rest, defer, etc.) to allow for other management tools such as planting , harvest, or fire.
8. Address inholdings either through non-use or compensation to owners.
9. Keep cattle out of campgrounds and lakes.

Under Alternative B, the annual grazing program (by permit) would be continued but modified from the existing program to reduce impacts on riparian and other habitats. Grazing of cattle in this Alternative is considered a secondary use that would be allowed where it does not conflict with other wildlife habitat objectives. The number of units and acreage grazed would be reduced by eliminating grazing in alluvial riparian habitats. Grazing would also be concentrated in locations where it may provide improved spring forage to white-tailed deer. This includes those grazing units dominated by herbaceous cover or with grass understory below 3,000 ft. elevation. The assumption is that grazing conditions grasses for late winter and early spring use by deer.

Intensive management (e.g., monitoring and herding) of livestock would be necessary and is more critical than stocking rates (AUMs) or numbers of cows. Season of use would be based on requirements of wildlife, soil, and vegetation. Rotation would be used to rest pastures during regular intervals. Timing of intervals would depend on the vegetative species requirements in each pasture. If necessary, the grazing season could also be shortened to reduce potential for grazing of woody vegetation. Permittees would need to monitor stubble height and cattle

distribution to avoid concentration and overgrazing of small areas. Cattle would also need to be removed from any specific pasture before they switched from grazing on grasses to browsing on woody vegetation. Refuge staff would also need to devote more time to managing the grazing program to ensure compliance, monitor livestock use, and assist the permittee in determining when to move cattle through units.

Permittees would be selected based on negotiation, competitive bidding, or lottery. Existing permittees who comply with permit requirements may be given the opportunity to meet high bids if competitive bidding is used. Permits would be issued for a one-year period initially. Once the habitat management plan is complete, permits may be issued for a five-year period.

Alternative C

No grazing objective would be adopted under this alternative. Annual livestock grazing will be phased out beginning the grazing season after plan approval and will be completed within five years. Following the phase out, grazing would be used only as a wildlife habitat management tool and its use would fall under the umbrella of the benefitting habitat objective.

Alternative D

Under Alternative D, all grazing is phased out on the Refuge and grazing would not be an option as a future management tool. Fences would be removed from the Refuge.

Alternative E

No grazing objectives would be adopted under this alternative. The annual livestock grazing will continue at its present intensity for five additional years, after which it would be discontinued. Subsequent grazing would be used only as a wildlife habitat management tool and its use would fall under the umbrella of the benefitting habitat objective.

C. Air Force Survival School

Alternative B

Air Force Objective: B. ***Continue to support an Air Force Survival School program where it does not conflict with habitat objectives.***

Alternative B is the only proposed action alternative that continues use of the Refuge by the Air Force Survival Training program. The training program would be modified to reduce impacts on Refuge wildlife and on the priority recreational activities. The Special Use permit would reduce the time of year training could occur from a current nine month program (January through September) to a two month program, (August and September). This would reduce impacts to wildlife during critical seasons. Use of helicopters and explosives would also be eliminated from

the program to further reduce the disturbance these activities cause to wildlife and people. To reduce soil disturbance, the training group size would be reduced to 25 or fewer people and off-road vehicles would be restricted to emergency use only.

Alternatives C, D and E

Under Alternatives C, D, and E, no objective is adopted for the Air Force program, since the program would be phased out within five years of CCP implementation. The five year phase out would allow the program to relocate operations to other public lands that are more suitable with multiple use objectives. These alternatives emphasize that the Air Force Training program is an inappropriate use for a Wildlife Refuge as the Refuge s primary mission is to conserve, manage, and restore fish, wildlife and plant resources and their habitats.

3.4 COMPARISON OF FUNDING AND PERSONNEL NEEDS BY ALTERNATIVE

Because all alternatives must be equally analyzed for implementation, funding considerations must be addressed. The cost to implement each alternative is presented based on typical staff and projects expected for each. Projections are based on normal and predicted budgets. The management activities and projects outlined would be implemented as funds become available. The level of funding required to implement the plan is considered reasonable over the next 15 years. However, there may be periods when budgets are lower and it is difficult to obtain funding for even high priority projects. Funding constraints may influence the priority of implementation.

Currently the Refuge staff included eight permanent full-time positions (see Appendix C). Five other positions are permanent but not full-time. Temporary positions include an engine foreman and firefighters as well as a seasonal four-person Youth Conservation Corps (YCC) crew and crew leader.

Government staffing is usually expressed in units of full-time equivalents (FTE). One permanent, full time position represents one FTE. One seasonal position working six months out of the year represents 0.5 FTE.

Table 3-2. Comparison of Refuge Staffing under the Alternatives - in FTEs

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Permanent FTEs	7.8	13.4	13.4	10.6	13.4
Temporary FTEs	4.5	4.5	3.5	2.5	4.0
Total FTEs	12.3	17.9	16.9	13.1	17.4

* volunteer positions not included in staff estimates

Additions to budgets or another funding source would be necessary to support all new forestry, wildlife, maintenance, and portions of administrative positions. Fire management staff and portions of administrative support staff salaries would be paid through fire suppression and prescribed fire funds.

Project Summary

Several projects have been identified for implementation in the CCP (See Appendix C). Actual funding that will be available for these projects is unknown. Funds vary greatly depending on Congressional appropriations and the Refuge staff s ability to obtain specialty funds from sources such as grants, fire control, flood repairs, mitigation, challenge grants, and road funds.

Predicting the future nonsalary funding for each alternative is difficult. The economic assessment associated with this document is conservative and estimates relatively low nonsalary expenditures. In Alternative A, the $160,482 is based on what occurred in 1998, when the Refuge received flood funds for road repair in addition to other maintenance management dollars. It was a good year for funding. The other alternatives are based on a projection of *average budgets and project needs specific to each alternative.*

Table 3-3. Estimated Annual Nonsalary Expenditures Used in the Economics Model.

	Alt A.	*Alt. B*	*Alt. C*	*Alt. D*	*Alt. E*
Annual Nonsalary Costs* (projects, see Appendix C)	$160,482	$121,200	$119,267	$93,733	$124,267

* expressed in 1997 dollars

In Appendix C, the project lists represent an operational need associated with implementation of the preferred Alternative E over the next fifteen years. The figures there (an average annual non-salary expenditure of approximately $467,000) are substantially higher than what is projected for Alternative E in the economic analysis (results presented in Chapter 4). There are two reasons for the discrepancy. One, we wished the analysis to proceed based on a realistic expectation of funding. Although the Refuge has demonstrated a need, under Alternative E, of $467,000 per year for the next fifteen years in non-salary funds, funding sources are perpetually tight and the Refuge must compete with other Refuges for available appropriated funds. It could be difficult to secure these funds. Second, some of the projects in Appendix C are eligible for funding under the Transportation Equity Act for the 21 Century (TEA-21), a new pot outside of the traditional FWS Refuge System allocation. The Refuge hopes to tap some of these funds, but again, must compete with others to secure these monies. Not counting TEA-21 projects, the Refuge has demonstrated a need under Alternative E for average annual non-salary funds of approximately $279,000 (see Appendix C).

In summary, the economic analysis (results are presented in Chapter 4) was conducted using a realistic assessment of non-salary funds that should be available to Little Pend Orielle, based on the recent history of allocations.

All CCP projects identified in Appendix C will be included in the Refuge Operating Needs System which is used nationally to budget for Refuge projects.

Chapter 4: Environmental Consequences

This chapter describes the effects of each alternative presented in Chapter 3. Effects expected from implementation of the alternatives are described as related to the issues identified in Chapter 1. The evaluation species identified in Chapter 2 are used to represent expected outcomes for wildlife and fish. Management actions expected and analyzed are derived from the alternatives, including the strategies associated with each alternative. Both direct and indirect effects likely to occur over the 15-year life span of the plan are discussed. Also discussed are outcomes that could manifest beyond the plan s 15 years, but would be predicted under actions taken under the CCP.

In the following discussion, the terms positive , negative , and neutral are used frequently. A positive effect means that the action would be favorable over the short or long term to the resources under consideration. A negative effect means that the action or set of actions would be detrimental over the short or long term to the health or availability of the resource under consideration. A neutral effect means either (a) that there would be no discernable effect, either positive, or negative, on the resources of concern over the time period indicated; or (b) that positive and negative effects would both occur and in summary cancel each other out. No change in management practices from the present (as in Alternative A) does not imply neutral effects over time. See each resource for the comparison of effects under different alternatives.

4.1 EFFECTS RELATED TO HABITATS AND EVALUATION SPECIES *(Responds to All Issues)*

Effects to Coniferous Forests

Ponderosa pine and Douglas-fir (dry site) forest habitats would be actively managed under Alternatives B, C, D, and E with the use of precommercial and commercial thinning, selective harvest, and prescribed fire. Approximately 1,000 acres per year would be treated over the 15-year span of this plan. The long term intent of the treatments under these alternatives is to restore the forest structure and composition to conditions more closely resembling those present in the mid 1880s (Historic Range of Variability) just prior to settlement by American pioneers, homesteaders, and miners.

The forest treatments undertaken, particularly in the ponderosa pine stands, would have the objective of increasing stand vigor, increasing the proportion of mature forest, maintaining or enhancing the presence of mature forest components, and preparing the stands for the reintroduction of low intensity ground fires. This would be accomplished by removing excess trees, mostly from age classes less then 70 years. Cut-tree selection in these age classes would be based upon those trees exhibiting poor form, vigor, or that face a significant risk of disease or insect mortality. Trees aged 125 years or older would largely be left standing to continue to develop. In some instances, older trees could be marked for removal where reduced competition and better spacing would enhance the longevity and vigor of neighboring desirable trees. Since a

primary component of mature forests is the presence of defects including broken tops, flattened tops, mistletoe brooms, heartrot, large coarse branches and decay, all of which are important to wildlife, trees with these kinds of defect would be left standing in many cases.

The effect of these treatments would be to reduce the overall tree density, generally favoring the larger, older trees with characteristics favorable to wildlife. Such treatments are considered to be particularly effective at promoting the diameter and height growth of the remaining stand, thus speeding the development of mature and old growth characteristics such as large boles, large limbs and robust canopies (Oliver and Larson 1990).

Thinning and use of prescribed fire is also intended to promote conditions that would be favorable to reintroduction of a more natural fire disturbance regime over the long term, thus lessening the likelihood of a catastrophic or lethal fire that could wipe out huge areas. Scientists studying the ecosystems of the Interior Columbia Basin have repeatedly emphasized the importance of restoring natural ecological processes such as regular fire disturbance in this area (Quigley, et al. 1996). The suppression of natural fire is implicated in several problems widespread across Interior Columbia Basin ecosystems, including severe insect outbreaks and loss of native species diversity.

Treatments in Alternatives B, C, D, and E would begin the process of promoting forest stand development into mature and old stages. These habitats are increasingly scarce at a regional scale (especially in the ponderosa pine stand types) and have important values to native wildlife (Quigley and Cole 1997). Little Pend Oreille National Wildlife Refuge lies within the Northern Glaciated Mountains Ecological Reporting Unit (ERU), one of six subsets of the Interior Columbia Basin. In this ERU, late seral forest communities have declined by more than 90 percent (Quigley and Arbelbide 1997). By contributing to the regional recovery of these habitats, under Alternatives B, C, D, and E, the Refuge would establish itself as a firm federal partner in the restoration process.

Specific areas proposed for forest management under Alternatives B, C, D, and E include Starvation Flats, Biarly Flats, and Minnie Flats. Treatments proposed for these pilot projects are presented and analyzed in greater detail in Appendix E. Under Alternatives B, C, D, and E, other areas, not yet selected, would also be managed with the same objective of promoting the development of late successional characteristics. These other areas would be analyzed in greater detail in the future.

Alternative D would adopt a slightly more conservative approach than Alternatives B, C, or E. Under Alternative D, forest areas that were unlogged in the past would not be commercially thinned or salvaged. The intent would be to allow nature to run its course in the areas that remain the least disturbed on the Refuge. Low impact techniques for fire suppression would be used across the Refuge as much as possible. Benefits to interior forest dwelling and disturbance sensitive wildlife would likely be higher (at least over the short term) than under Alternatives B, C, or E.

Alternative A takes a largely passive management approach, proposing a limited amount of activity, mainly salvage and limited thinning and burning. Wildfires would also be actively suppressed. In this alternative, tree density would remain high and species conversion to shade tolerant types would continue, augmenting problems associated with forest health. This would result in increased fuel loadings, such that over the long term, these conditions would probably make catastrophic wildfire inevitable, despite fire suppression efforts. Forest habitats could be dramatically altered under this alternative, with large expanses converted to shade tolerant trees which would eventually be subject to a lethal fire. Habitats for certain species that rely on mature stands of large trees with open canopies would remain limiting.

Effects to Riparian and Deciduous Forests

Alternatives B, C, and D would eliminate livestock grazing completely (Alternative D) or in riparian areas (Alternative B), or use grazing only as an occasional vegetative management tool (Alternatives C). The elimination of annual livestock grazing from riparian areas can dramatically speed the vegetative recovery of bare and degraded sites (Clary and Medin 1990; Ohmart 1995). Alternative E would eliminate livestock grazing after five more years of grazing at the current stocking rates, then would use grazing only as an occasional vegetative management tool. Vegetative recovery in riparian areas would begin in 2005.

The cattle grazed at the Refuge also preferentially use old homesteads and natural forest openings that have the greatest potential for hardwood forests. Alternative D would exclude cattle from these areas and allow the natural regeneration of deciduous forests in these areas.

Alternatives B, C, D, and E would all reintroduce periodic fire into the landscape, which may have positive benefits to aspen. Other active measures to restore aspen pockets (planting and curtailing of grazing) would also occur under Alternatives B, C, D, and E. These four action alternatives would also each enact programs to plant trees and shrubs in devegetated or degraded riparian areas.

Riparian areas would be protected from road construction and timber harvest by a buffer measuring 200 feet (or greater, depending on the width of the 100-year floodplain) under Alternatives B, C, D, and E.

Some riparian areas on the Refuge are in poor condition due to recreational use. Traditional camping spots adjacent to streams (some located in campgrounds, others dispersed) have caused problems similar to or worse than those apparent with grazing, such as compaction from vehicles and trampling, loss of live riparian vegetation, loss of standing and down dead wood, bank erosion, and fecal contamination. Alternative C, which eliminates all Refuge camping, would go the furthest to aid recovery of riparian areas damaged by camping. Dispersed riparian camping would be prohibited under Alternatives B and E, although campgrounds located within the riparian zone would remain. Minor amounts of riparian camping could persist under Alternative

D, which allows no-trace camping only; areas accessible by vehicle would be closed. Since most campers prefer to locate near water, adoption of any of the action alternatives would likely cause an overall reduction in Refuge camping, with attendant benefits to the recovery of riparian vegetation. Camping would continue to grow under Alternative A, with continued detrimental effects to riparian forests.

Overall, Alternatives D and C would most promote the restoration and development of riparian forests, especially the deciduous riparian forests of the alluvial stream areas that have been strongly affected by grazing.

Alternative A would not adopt any additional measures to restore or protect riparian areas and would keep grazing and camping as at present. This alternative would have a continued negative impact to existing and potential riparian forests.

Effects to Noxious Weeds

Noxious weeds, which inhabit roadsides, open fields, riparian corridors, trails, and anywhere soil and plant disturbance has occurred at the Refuge, would be controlled with integrated weed management under all alternatives. Integrated weed management is a technique to eliminate unwanted organisms that uses non-chemical methods as well as chemical treatments. Specific weed and invasive plants are targeted in this integrated approach while other plants are not-targeted. While some non-targets have the potential to be harmed in this approach, every effort is made to limit the effect. In the case of sensitive species or endangered plant species, buffer zones are established around the non-target plants to ensure no effect. Buffer zones are also used around water which provide a special distance zone to prevent chemical impact to water and associated organisms.

Although chemical treatments are often the most effective, they can be risky, leaving poisonous residues in soil and water. All refuges are limited in what pesticides they can use. Mechanical methods, such as pulling or mowing are labor intensive but safe. Biological control is the use of undomesticated organisms, usually insects or plant pathogens to reduce the vigor, reproductive capacity, or density of weeds (DeLoach, 1991). The Technical Advisory Group for the Biological Control of Weeds (TAGBCW) reviews research concerning the proposed introduction of natural enemies for biological control of weeds before such insects can be brought into the U.S.; only after TAGBCW approval can such insects be moved to USDA-certified quarantine laboratories where further work and testing is done with the insects before going through another approval process and release permits are obtained with public input.

Alternatives B, C, D, and E would treat 50 miles of roadside weeds annually. Weeds tend to spread along roads so Alternatives B, C, D, and E would help to check the problem and begin the process of gradually reducing weed coverage on the Refuge. In addition these alternatives would treat openings and some forested areas. Alternatives B, C, and E would each treat 250 acres of openings and 250 acres of forested areas. However, under these alternatives a number of

openings would also be in cultivation and noxious weeds would be prevented from growing in these areas as well. Alternative D would treat more acres of each type: 350 acres of openings and 350 acres of forested acres. Alternative A proposes to treat 34 miles of roadside weeds and 12 acres of openings and is clearly inferior to the other alternatives in controlling noxious weed invasions on the Refuge.

The action alternatives (B, C, D, and E) would also attempt to curb the spread of noxious weeds indirectly, through controls on grazing and horse use. Domestic animals are thought to act as direct vectors for the spread of some noxious weed seeds. Alternatives B and E would regulate equestrian use under the auspices of an equestrian plan, which would require weed-free hay among other stipulations. However, Alternatives C and D, which eliminate horseback riding, would be more effective than the other alternatives in curbing weed introduction and spread.

Alternatives B, C, and D would have the greatest immediate effect since grazing would be reduced (B) or eliminated through phase out (C and D). Positive impacts from Alternative E would begin in 2005. In some cases, prescribed grazing may be useful as a tool for noxious weed management.

All alternatives strive to reduce weed infestation beyond Alternative A, which sets no objective for weed elimination. Overall, Alternatives D would enact the most aggressive programs against noxious weeds.

Effects to Rare Plants

To date, limited surveys for rare plants have occurred on the Refuge. Under Alternatives B, C, and E, all known locations inhabited by rare plants would be monitored on a regular basis. Alternatives A and D include provisions for monitoring *Ophioglossum pusillum* only.

Inventories to find new locations of rare plants are planned under Alternatives B, C, D, and E. These alternatives would better protect Refuge populations of rare plants than Alternative A, because a resource cannot be protected with certainty if its existence is unknown. Protections of known rare plant locations would occur under all alternatives.

Effects to Water Quality

Water quality improvement or deterioration within the Refuge would affect the water quality downstream in the Colville River and ultimately (though insignificantly) the Columbia River. Water quality is influenced by activities near streams that expose soil or affect runoff, such as road construction and maintenance, camping, or road maintenance. Water quality is also influenced by activities taking place over the watershed as a whole, such as timber management and prescribed or natural fire.

All alternatives would minimize the construction of new roads. In addition, Alternatives B, C, D, and E each would involve repair of roads that limit fish passage and/or cause sedimentation to aquatic habitats, and the planting and stabilizing of devegetated or unstable streambanks. These measures would result in a reduction of direct sediment input to streams. Alternative A proposes no active measures to limit stream sedimentation except by minimizing new road construction.

Alternative B would eliminate grazing within the riparian zones. Riparian grazing would be immediately discontinued under Alternative C, and in 2005 under Alternative E. Under these latter alternatives, limited prescriptive grazing may be used occasionally as a vegetative management tool. These restrictions would help to diminish vegetation loss and soil compaction in riparian zones, streambank sloughing and erosion, and fecal contamination of Refuge streams. Alternative D eliminates grazing altogether. Ohmart (1996) demonstrated that riparian recovery may be two to four times faster in ungrazed riparian areas than in riparian areas subjected to managed grazing.

Camping within the riparian zone impacts water quality through compaction, destruction of filtering and buffering riparian vegetation, and through pollutants entering the stream. Water quality in streams, measured by total coliform bacteria counts adjacent to camps, was negatively affected by weekend camp site use that revealed higher coliform counts (Christensen, et al. 1978). In this western Washington study, bacteria were rapidly transmitted to the river water, even in dry periods. There are no toilets or outhouses to contain human waste at any of the dispersed sites. No dispersed riparian camping would be allowed under Alternatives B, C, and E. Although this rule could be difficult to enforce in all the corners of the Refuge, overall there would likely be an immediate reduction in pollutants and, over time, visible riparian recovery in these former campsites. Compacted sites would have time to heal and would ultimately contribute less sediment laden runoff to streams. Alternative D would accommodate only no-trace camping. Since very little camping would probably continue if Alternative D was adopted, this alternative would also have beneficial effects to water quality. Alternative A would not have these beneficial effects.

Alternatives B, C, D, and E each also propose forest management activities that would possibly involve some soil displacement. During timber harvest and subsequent fuel reduction activities, soil disturbance could result from yarding systems, the fuels reduction methods, or road construction. Forest harvest is also known to increase the magnitude and frequency of peak flows, especially in areas subject to rain-on-snow events (Harr and Coffin 1992). These effects are proportional to the number of acres harvested and the percent of canopy removed. Under Alternatives B, C, D, and E, the Refuge would adopt 200-foot buffers along streams where timber harvest and road construction would generally not occur. This rule would help to keep displaced soil from entering Refuge water systems. However, some short term increases in peak flows with resultant potential effects to channel morphology are possible. In sum, Alternatives B, C, D and E may have a small negative short-term effect on water quality stemming from the

upland forest management activities. Over the long term, water quality should be enhanced as a larger percentage of the Refuge develops into mature structural stages.

Over the short term, Alternative A would not result in dramatic degradation or improvement of water quality. However, under this alternative, the Refuge has a higher likelihood of experiencing catastrophic wildfire. Wildfire could cause severe loss of vegetation cover and can increase soil surface water repellency for a short period (Skaugset 1992). The possible effects of severe wildfire on streams would include high sediment loading, elevated temperatures, and the potential for highly increased peak flows for several years, as well as significant channel morphology changes.

Effects to Aquatic Habitats

Stream sedimentation, high road densities, loss of instream large wood, and loss of pool habitat have been cited as key factors involved in fish species declines in the Interior Columbia Basin (Quigley, et al. 1996). Based on the discussion above, Alternatives B, C, D, and E would be expected to have positive long term benefit to aquatic habitats, owing to passive and active measures taken in these alternatives to repair or obliterate eroding roads, replace culverts that block fish passage, restore streambank stability, and increase instream structural complexity.

Hydrologic changes at the Refuge would occur under Alternatives C, D, and E. Alternatives C and E would ensure that flows in the original channels of diverted streams take priority over diversion flows. In a low water year, this could result in positive benefits to stream conditions at the expense of the lake habitats. Since stream and riverine conditions are of concern regionally, and the Refuge is located in a sub-basin considered to have low aquatic and hydrologic integrity (Quigley, et al. 1996), this is considered to be an overall benefit. Alternative D goes farther, proposing to restore the natural hydrology altogether on the Refuge by breaching the dams and diversions that were built to establish Bayley and McDowell Lakes and Potter's Pond. The lake beds would likely revert to shallow wetland areas. Eliminating the diversions would mean that more water would remain in the main streams, especially during high water runoff seasons (late spring).

Aquatic habitats would realize an immediate positive benefit under Alternatives B, C, and D, because grazing would be eliminated or conducted outside riparian areas under these alternatives. Under Alternative E, these positive benefits would be delayed until five years after the plan is implemented. Cattle trampling and grazing often stunts or kills riparian vegetation, initiating a cycle of root death, soil sloughing, soil compaction, channel widening and downcutting, and stream temperature rise. None of these effects are positive for fish native to the area, so the interruption of this cycle would ultimately benefit fish.

Effects to Air Quality

Known and predictable air quality impacts would result primarily from smoke generated by forestry activities undertaken under Alternatives B, C, D, and E. Temporary impacts to air quality (mainly from particulates) can be expected from the prescribed burning and slash disposal that would occur on up to 1,000 acres each year. Fire effects on air quality fall into three classifications: visibility, particulates, and pollutants. All three classes can affect human health and safety. Both wildfire and prescribed fire can cause impairment of air quality in the above mentioned categories, but prescribed fire can mitigate those impacts through regulations, timing, and techniques of application.

Holsapple and Snell (1996) and Snell (1996) modeled mid-scale modal wildfire and prescribed fire scenarios for the Interior Columbia Basin. They concluded that the prescribed fire scenarios did not cause particulate emissions [in size class $\leq$ 10 microns] exceeding the EPA standards (40 CFR 50.6). Conversely, all wildfire scenarios exceeded the standard. Similar projections were observed for the standard governing particulate matter $\leq$ 2.5 microns in size.

Research has demonstrated that by maintaining the flaming stage of combustion during prescribed fires, particulate output is decreased by 50%. The flaming stage of combustion is attained by developing prescriptions which utilize low fuel moistures in all size classes, and by using firing techniques which have low rates of spread, allowing the flaming stage of combustion to maintain itself for the longest period of time within a fuelbed. The best seasons for prescribed fire at Little Pend Oreille NWR in relation to good smoke management conditions (low fuel moistures) are during the late summer and fall. Unfortunately, burning during the dry season also increases the risk of an escaped fire.

If the recommendations for smoke mitigation outlined in the Fire Management Plan are followed, the impacts from the proposed prescribed fire program should be of relatively short duration and would mainly affect unpopulated areas on the Colville National Forest, east of the Refuge, under prevailing westerly winds.

Large volumes of smoke could be released at any time (normally late summer) if a catastrophic wildfire were to occur, exceeding EPA standards for particulates. Wildfire could occur under any of the alternatives, but is more likely under Alternative A. This alternative would allow fuel loading to continue and increase unchecked, whereas the other alternatives include plans to thin and underburn approximately 8,000 acres of dry forest over the life of this plan. Stands receiving this treatment are less likely to ignite or contribute to the spread of large wildfires. Wildfires have the capability to affect air quality not only in the vicinity of the fire, but hundreds of miles downwind. Air quality deterioration during large wildfires can last for weeks or months. These events affect visibility on roads and airports, often requiring closures.

Effects to Selected Species

To simplify and focus the discussion of plan alternative effects on plants and animals inhabiting the Refuge, this analysis centers on the twelve selected evaluation species described in Chapter 2.

As discussed in that chapter, these species were selected using an array of criteria and are meant to serve as good representatives of what could happen to the broader set of species inhabiting the Refuge. Because the different management alternatives would result in different habitat conditions, human uses, and disturbance regimes on the Refuge, wildlife and fish and plants are likely to respond accordingly.

The analysis of effects to evaluation species shows that an action may cause a short term deleterious effect while ultimately benefitting the species over the long term. Although the Comprehensive Conservation Plan is intended to guide management only for the next 15 years, identifying and distinguishing temporary from longer lived effects is important, and management actions taken over the next 15 years can reserve or foreclose future management options.

Bald Eagle: Most bald eagle use at the Refuge occurs during winter and along the Little Pend Oreille River. No nesting areas are known to exist. In Oregon and Washington, most nests are located within a half mile of a large water body or large river. It is not known if any of the Refuge lakes are large enough to attract eagles for nesting. As a highly visible species found mainly in association with aquatic habitats, the eagle is more vulnerable than many other species to human disturbance, especially at nest areas (Anthony, et al. 1982). Bald eagles are particularly intolerant of human disturbance during the breeding season. This sensitivity varies between individuals, but generally adult eagles are more sensitive during courtship, egg-laying, and incubation, with sensitivity decreasing as young develop (Fraser 1981). Recreational activity can be a major disturbance. Research done on nesting bald eagles in Arizona found the strongest response was caused by ground-based disturbances, particularly pedestrians. Within that category, hiking activities were the most disturbing. In addition to pedestrian disturbance, the other disturbances analyzed in decreasing order of severity were: aquatic (tubers, boat, canoes); vehicles, noise (gunshots and sonic booms); and lastly aircraft (Grubb and King 1991).

The level of recreational use that would be expected to continue near the lakes under Alternatives A, B, and E during the nesting season would probably preclude the possibility of eagles establishing a nest on the Refuge. The delay of the fishing opener at the lakes until July 1 under Alternative C, coupled with the elimination of camping, could improve the chance of nest site establishment at McDowell or Bayley Lake.

Foraging habitat for bald eagles could improve slightly under Alternatives B, C, and E, primarily because under these alternatives, improved aquatic habitats could result in healthier fish populations. In addition, forest management actions in these alternatives could produce positive effects on the deer population, which is likely a significant source of winter food. Over the long term, these alternatives would produce a number of suitable nest and roost trees, which are in short supply now.

Alternatives B, C, D, and E would all eliminate low-level helicopter overflights on the Refuge. This policy would benefit the eagle.

Under Alternative D, the eagle could suffer a negative impact due to the loss of the lake habitat, yet since most of their use of the Refuge occurs during winter and along the river, this impact is expected to be small. An offsetting factor in Alternative D which would be expected to benefit the eagle would be the forest management actions (which could accelerate the development of nest trees) and the overall reduction in human disturbances. Overall Alternative D would have a neutral effect.

The combination of positive and negative effects to the eagle under Alternatives B, D, and E result in overall neutral effects under these alternatives.

Alternative A would be expected to result in a negative impact to bald eagles, due to the continuing degradation of riparian and aquatic habitats, loss of streamside vegetation, absence of active management to promote the development of large nest or roost trees, the continuation of helicopter overflights by the Air Force within proximity of potential or occupied roost trees, and unregulated recreational uses in areas of potential bald eagle habitat.

Overall, Alternative C would be expected to have an overall positive effect on bald eagles, while the other action alternatives would have a neutral effect.

Lynx: This feline predator should benefit primarily from actions that would reduce or eliminate human disturbance and access into its habitats, especially during winter, and from actions that would promote or maintain the specific habitat needs necessary for this species to den and find adequate food (Koehler and Aubrey 1994). The cold forests that represent potential habitat for the lynx (see Map 6) are currently the most fragmented areas on the Refuge. The current checkerboard pattern of inholdings reduces the value of this habitat, both from the perspective of the roads that permeate this habitat, and the limited ability of the Refuge to manage a contiguous area consistently for the lynx.

Lynx Disturbance Issues

Several documents pertinent to this topic have emerged since the May 1999, release of the draft CCP/EIS. These include scientific findings on lynx and on winter recreation contained in the Lynx Science Report (Ruggiero et al.1999) which was commissioned in response to the proposed listing of the lynx by the US Fish and Wildlife Service in July, 1998. The Lynx Science Report (more formally titled *Ecology and Conservation of Lynx in the United States*) reviews, reanalyzes (where warranted), and summarizes the scientific literature and data on lynx so as to document the scientific basis for conservation of lynx. In addition to this report, we relied on a new report issued by Yellowstone National Park, titled *Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment* (Oliff, et al. 1999).

Current disturbance impacts to lynx and their habitat stem primarily from snowmobile use of high elevation areas of the Refuge, including Olson Creek Road, during winter months. Other wintertime activities such as dogsledding and cross country skiing are not pursued as frequently as snowmobiling and would present minimal impact under any alternative. Alternative A would

continue snowmobiling as it currently exists on the Refuge. Alternative E would allow snowmobilers to pass through the Refuge on Olson Creek Road only.

Impacts of snowmobiles to lynx are mainly indirect, resulting from 1) effects impacting their main food source (snowshoe hares) and from 2) effects benefitting a key competitor (coyotes). These phenomena are explained in the next several paragraphs.

According to Neumann and Merriam (1972) snowmobile use affected snowshoe hare and red fox mobility and distribution in Ontario, mainly within 76 meters of snowmobile trails. Snowshoe hares avoid snowmobile trails while red foxes use them. Snowshoe hares are the primary food of lynx, therefore loss of snowshoe hare habitat areas affects lynx by reducing their food source.

The authors of the Lynx Science Report (Ruggiero et al. 1999) feel that the coyote is a "potentially formidable" competitor with lynx, citing the coyote's wide habitat niche, heavy predation on snowshoe hares, high reproductive rate, great behavioral plasticity, and high tolerance of humans. Coyote population numbers have increased dramatically in many places over the last few decades, (including a 44 times increase in Washington state between 1960-1984), using coyote harvests as an indicator (Novak et al. 1987).

The Lynx Science Report authors also cite several studies showing that coyotes prey heavily on snowshoe hares, especially during snowshoe population highs, and that coyote populations cycle with snowshoe populations like lynx populations are known to do (data from both Montana and Alberta). The authors also cited a study by O Donoghue (1997) which compared densities of lynx, hares and coyotes in Alberta and the Yukon, and showed that in both places, lynx were more abundant where coyotes were less dense, rather than where hares were more dense.

With several citations, The Lynx Science Report substantiates the claim that coyotes access high elevation areas by moving along paths, roads, and even snowshoe hare trails. In one Colorado study involving track counts along approximately 725 miles of snow transects within snowshoe hare habitat (7500 - 11,800 feet elevation), coyotes were the second most common carnivore species encountered (after weasels). The authors also cite a study by Murray et al. (1994) finding that coyotes were more selective of hard or shallow snow conditions than were lynx, and another study showing that between November and March, coyote use of open habitats increased. This shift was attributed to the greater compactness and load-bearing strength of snow in openings.

In conclusion, the authors of the Lynx Science report stated:

> Fragmentation of habitats occupied by lynx (including increased openings, higher road densities, exurban residential development and wider use of snowmobiles and devices that compact snow in areas with deep, soft snow) is a plausible mechanism for the questionable conservation status of the lynx in the contiguous United States. (Ruggiero et al. 1999, Chapter 4 p. 13)

The habitat issues highlighted by the Lynx Science Report authors and others (openings, snowmobiles, higher road densities, etc.) all exist in the local area and may be combining to pose a problem for lynx. These problems would worsen under Alternative A. Under Alternative E, the Refuge would seek to delineate another snowmobile route, ultimately resulting in no snowmobiling impact on the Refuge. In the interim, snowmobile use would continue on Olson Creek Road, and the positive effects of this activity on lynx would be the same as those of Alternative A. Alternatives B, C, and D would all eliminate snowmobile use on the Refuge and on Olson Creek Road. Although this strategy would require increase law enforcement patrols, it would clearly benefit lynx. Alternatives B, C, D, and E would also provide benefit by implementing road closures on all but the county maintained roads between January 1 and April 14, a critical time for lynx.

Lynx Habitat Issues

Alternatives B, C, D, and E would each adopt an objective to strive (over the long term) for vegetative structural conditions approximating the Historic Range of Variability within cold forests, as well as dry and moist forests. Historically, in this area, cold forests (which comprise the greater part of lynx habitat on the Refuge) were characteristically mosaics comprised of approximately 25% early seral forest stands, 43% mid seral stands and approximately 32-42% late seral stands (Quigley and Arbelbide 1997. Vol II, Appendix 3N). Such a mosaic provided lynx with an ideal access to both foraging habitat (early seral stands) and denning habitat (late seral stands), along with plenty of travel habitat (mid seral stands). None of these alternatives would make a great deal of progress towards achieving the HRV over the life of this plan, for instance, there are no plans to produce early successional forests over the next 15 years, but there would be plans to provide a range of successional forest habitats over the long term. Surrounding federal and private lands will likely provide sufficient quantities of early successional forest over the next fifteen years (Washington DNR 1996).

Alternatives B, C, D, and E each include forest management actions to promote the development of late successional characteristics on forest lands. To the extent that these actions occur in high elevation lynx habitat, these actions would benefit the lynx, which relies on late successional forests with large downed woody debris to provide denning sites with security and thermal cover for kittens. These sites are typically located in lodgepole pine, subalpine fir, or Engelmann spruce stands older than 200 years (Koehler 1990).

Under Alternative A, conditions for the lynx would be expected to continue to deteriorate. More visitors would arrive at the Refuge, road density and use would remain unregulated, human disturbances from recreationists and the Air Force would remain moderate to high and little to no forest management actions would be undertaken. Overall, adoption of Alternative A would represent a negative impact to the lynx.

Overall, Alternative D would be expected to have the most benefit to lynx, since this alternative limits human access to the Refuge to the greatest extent, avoids roading and harvest in unlogged

stands, implements proactive measures to restore forest structures, eliminates Air Force training use, and reduces camping significantly.

Columbia Spotted Frog: Although more tolerant of warm-water conditions than many other Northwest aquatic species, the Columbia spotted frog appears vulnerable to disruption of water levels (especially while eggs are developing), introduction of non-native aquatic species, loss of riparian cover, and use of chemicals near aquatic zones (Nordstrom and Milner 1997). Based on these factors, Alternatives B, C, and D, which include measures to eliminate grazing in riparian areas and measures to restore streamside vegetation, would result in immediate positive benefits for the spotted frog. Similar positive benefits to this specie would occur under Alternative E beginning in 2005.

Alternative D would be likely to have the most positive benefit of the alternatives because it also eliminates fish stocking and restores the natural hydrology of the lakes. The lake beds would likely revert to shallow wetland areas, supporting more shallow water species such as wading birds and amphibians, but fewer deep water aquatic species. Fish stocking (especially in historically fishless montane lakes) and the spread of exotic predators such as bullfrog have been implicated in the decline of numerous native amphibian species across the West (Hecnar and M'Closkey 1997; Drost and Fellers 1996); native amphibians become prey for the stocked fish and eventually are extirpated. It is not known to what degree historic stocking in the Little Pend Oreille River and Bear Creek has affected populations of this species on the Refuge.

Under Alternative A, habitat conditions for the spotted frog would possibly deteriorate and would not improve. Similar levels of grazing would mean that riparian conditions would continue to degrade in certain areas. Fish stocking would continue. Overall, this alternative would have a neutral to slightly negative effect on the frog.

Northern Goshawk: This species utilizes dense forests across its range, typically choosing stands with the largest trees, on north-facing slopes near water for nesting (Reynolds 1982). Statistically, the proportion of the landscape surrounding the nest with mid to large sized trees and high levels of crown closure is positively correlated with nest site location and success (Desimone 1997; McGrath 1997). Forest management activities (thinning and prescribed fire) would occur within potential goshawk habitat under alternatives B, C, D, and E. Forest management has the potential to cause short-term deleterious effects to goshawks through removal of canopy closure. Depending upon the prescription, thinning and/or prescribed fire may temporarily reduce canopy closures below levels that support goshawk territories. (USFWS 1998).

Disturbance impacts are not well understood. Goshawks are known to maintain high site fidelity to their territories, not particular nest sites (USFWS 1998). A pair may maintain up to five alternate nest sites in a single territory. Anecdotal evidence abounds that goshawks exhibit very high tenacity to their nest sites once young have hatched. However, since very few nests are located by surveyors during the courtship and incubation phase, it is not known whether human

disturbance of goshawks during the early part of the breeding season is more harmful than later on, displacing birds unknown to biologists (Woodbridge, pers. comm.).

To mitigate disturbance and habitat impacts to goshawks, a combination of distance buffers and seasonal restrictions would be applied where forest management activities are undertaken near known nest sites under Alternatives B, C, D, and E.

Alternatives B, C, D, and E would all be expected to have (over the long term) a positive effect on goshawks, since the forest treatments identified in these alternatives would provide for a greater abundance of large trees (and in some areas, multistoried canopies may develop as a result of thinning and underburning). Over the short term, there could be some negative impacts to goshawks as forests are thinned.

Alternative A would be expected to have a neutral effect on the goshawk. No proactive measures would be taken to improve nesting opportunities on the Refuge, but foraging habitat would continue to be available.

MacGillivray s warbler: The MacGillivray s warbler represents passerine migrants that use woodland riparian and aspen habitats. The Little Pend Oreille NWR is in the center of the bird s breeding range, where it inhabits dense thickets (especially riparian willow and alder stands), the edges of mixed conifer woodlands, dry brushy hillsides near water, fire swept or cut-over areas, and aspen stands (Ehrlich et al. 1988; Towry 1984; Thomas et al. 1979). They feed and reproduce in stands ranging in age from shrub-sapling (0-10 years) through mature (<160 years) (Thomas et al. 1979). This species is a common nester in moist shrubby stands where it builds its nest one to six feet above the ground, usually between upright stems of saplings or shrubs (Towry 1984, Thomas et al. 1979). Food consists of insects gleaned from foliage or off the ground in these same habitats. It is an uncommon cowbird host (Ehrlich et al. 1988).

Planting trees and shrubs in riparian areas as proposed in Alternatives B, C, and D should have a positive effect by increasing the amount of woody shrub habitat available. Many of these riparian sites are vegetatively degraded due to many years of annual livestock grazing. The elimination of livestock grazing Refuge-wide (Alternative D), or in riparian areas (Alternative B), or only using grazing an occasional vegetation management tool (Alternatives C), should have a significant positive impact on habitat quality for MacGillivray s warbler and other wildlife species using riparian sites by speeding the recovery of these degraded areas. Alternative E would eliminate livestock grazing after five more years of grazing at the current stocking rates, then would use grazing only as an occasional vegetative management tool. Vegetative recovery in riparian areas and an associated improvement in MacGillivray s warbler habitat will be delayed until 2005. The potential decrease in the number of cowbirds infesting the Refuge expected with the decrease or total elimination of cattle grazing proposed under Alternatives B, C, D, and E would likely have little effect on nesting success of MacGillivray s warbler since the warbler is an uncommon cowbird host.

Traditional camping sites next to streams have resulted in the loss of riparian vegetation. The total elimination of camping on the Refuge (Alternative C), or the elimination of dispersed recreational camping in riparian areas (Alternatives B and E) should result in the recovery of vegetation in these camping sites. Implementation of Alternative D would likely result in little to no riparian camping, with a similar positive result.

Measures to restore and encourage aspen reproduction, such as prescribed fire, tree planting, and curtailing grazing, would occur under all action alternatives. These actions should also result in positive benefits for this species.

Under Alternatives B, C, D, and E, riparian areas would be protected from road construction and timber harvest by either a 200 foot buffer (or greater, depending on the width of the 100 year flood plain). Adoption of this standard should protect these areas from the pre-commercial and commercial thinning of nearby upland sites proposed under all the action alternatives. This thinning, when combined with the prescribed fire also proposed in the alternatives, should encourage shrub growth, further enhancing habitat quality for this warbler.

Alternative A would not adopt any additional measures to restore or protect riparian areas, nor include the increased use of prescribed fire, while maintaining livestock grazing and camping at present levels. Therefore, this alternative would have a continued negative impact on MacGillivray s warbler.

Common Goldeneye: This species represents waterfowl that use the Refuge lakes and streams. Three Refuge lakes were created by humans, but provide some valuable deepwater habitat for waterfowl. Nesting habitat is limited at Bayley Lake, but exists at Potter s Pond and McDowell Lake and possibly at other Refuge lakes.

Refuge waterfowl may be impacted by current levels of recreational activity, especially fishing and camping. Camping and other human uses disproportionately impact riparian areas on the Refuge and likely disturb or disrupt nesting or foraging goldeneyes and other species of waterfowl (DeLong and Schmidt 1998). The curtailment or elimination of dispersed riparian camping under Alternatives B, C, D, and E would benefit the goldeneye. However, campgrounds adjacent to Refuge lakes would remain open under Alternatives A, B, and E.

Alternative D would eliminate much of the lacustrine habitat on the Refuge, by breeching dams and diversions. Under this alternative, about 115 acres of goldeneye habitat would be reduced.

Overall, Alternative C would be likely to result in a positive benefit to the common goldeneye, partly because camping restrictions may be most easily enforced under this alternative, but also because this alternative delays the fishing season till after July 1 so as to reduce disturbances to nesting waterfowl.

Alternatives A, B, and E are expected to have a negative effect on goldeneye since human disturbances at Refuge lakes (with the exception of eliminating dispersed camping) would remain at similar levels to those existing currently.

Flammulated owl: An associate of low to mid elevation mature ponderosa pine forests (Marshall, et al. 1996), this insectivorous owl benefits from actions that promote the development of large diameter ponderosa pines (for nesting) and a multilayered and relatively open canopy (for foraging) interspersed with dense thickets (for roosting) (Hayward and Verner 1994). Goggans (1986) found these owls nesting in trees averaging 22 inches in diameter at breast height (DBH), though trees as small as 17 inches DBH were also used. Bull et al. (1990) found that nest trees averaged 28 inches DBH. This owl frequently nests in abandoned pileated woodpecker cavities. Habitat for this species is quite limited over its historic range, and the Refuge currently contains almost no suitable habitat for this species. Because of the forest restoration efforts planned in low elevation forests under Alternatives B, C, D, and E, these alternatives would have a long-term positive effect on this species. No negative short term effects are expected since forest management actions are not planned in any habitats that are currently suitable for this species. Alternative A, which does not adopt forest restoration measures, would be expected to have a slightly negative effect on the owl.

White-tailed Deer: Although deer are often considered generalist species, their habitats can be negatively affected by management practices that do not take their particular needs into account. As elevational migrants, they need access to security cover and accessible, nutritious forage during the winter months. Healthy browse located under a snow-intercepting canopy is critical during periods of heavy snow. Decades of fire suppression have taken their toll on woody browse species. Cattle compete with deer for the browse resource, especially in late summer. During spring green-up and fawning, succulent forage (often located in moist meadows and riparian zones) is often chosen, but once again, under current management, the supply is shared with cattle. Under current grazing guidelines, there is little evidence that the cattle grazing supports and enhances the production of forage for deer, rather than depleting it. Alternative D eliminates grazing, and would eliminate the competition between these two groups for the forage resource.

Alternatives B, C, D, and E each propose the reintroduction of low intensity fire in dry forest habitats. Underburning under the right conditions can stimulate sprouting and regeneration of browse species such as ceanothus, thus benefitting the winter range habitats of the white-tailed deer.

Fields remaining from historic patterns of human settlement currently provide rich sources of late winter/early spring forage for deer, with the smallest fields providing forage in close proximity to secure cover. Alternatives B, C, and E each propose maintaining up to 400 acres of this habitat, with grasses maintained through cattle grazing, mowing, or fire (Alternative B) or mowing or prescribed fire (Alternatives C and E). In addition, Alternatives B, C, and E would maintain 200 acres as openings that could benefit wintering white-tailed deer.

Alternative A would allow grazing where it occurs presently (65% of the Refuge s open habitats are grazed). Under Alternative A, a greater number of acres would be available in grass forage, but competition between cattle and deer would slightly diminish the quantity and quality of forage available to the deer, and little would be done to slow the spread of noxious weeds. Aggressive integrated interventions to suppress noxious weeds in the fields would be undertaken in Alternatives B, C, D, and E. Alternative B, C, and E all apply management in old fields that would improve deer habitat more than Alternative A. Thirty-five miles of interior fencing, an impediment to wildlife passage that occasionally causes deer mortality, would be removed under Alternatives C, D, and E.

Deer are also impacted by human disturbance. The consequences of disturbance can range from short-term increases in energy expenditures, to displacement from desirable feeding locations, to direct or indirect mortality (Knight and Cole 1991). Noise and people presence is especially troubling during winter, when fleeing from humans costs the deer energetically, especially during deep snow conditions. If weakened during a time when metabolic expenditures are high, indirect mortality could result. Disturbing agents in past winters have included Air Force personnel, who tend to be widely dispersed throughout the central portion of the Refuge (overlapping winter range). They may use snowmobiles or off-road vehicles during the course of their winter training. Cross-country skiers, sledding and snowshoers also likely contribute to wintertime disturbance to deer.

During spring and summer, Air Force helicopters are another source of disturbance, especially over openings and during low level flights and landings. Use of old fields for landing zones occasionally displaces deer from these sites. Various studies have demonstrated that big game exposed to low-level flights (up to 500 feet above ground level) exhibit a variety of stress responses, including flight from the area (Calef et al. 1976; Krausman et al. 1983). The 1983 study showed that the percentage of animals taking flight was correlated with the aircraft height above ground. Another study documented an increase in heart rate when mule deer were exposed to low level flights (Krausman and Hervert 1993). This study (on captive mule deer) also demonstrated that habituation, in response to repeated and predictable flights, did take place.

Because observational studies tend to require open spaces, many of these studies took place in habitats that tend to be open and unlike the Little Pend Oreille landscape. However, a radio-telemetry study of woodland caribou (Harrington and Veitch 1992) examined the impacts to animals living in an environment similar to Little Pend Oreille. Interestingly, this study demonstrated that calf survival was negatively correlated with the female s exposure to low-level jet overflights during the calving and immediate post-calving period and again during the period of insect harassment during summer. Air Force use of simulated explosives also likely disturbs deer.

Direct mortality occurs during the fall deer hunt. As an important wintering area, the Refuge often does not harbor the majority of its wintering ungulate populations until December, after rifle hunts close. Approximately 110 bucks and a small number of additional anterless deer are killed each fall at the Refuge during the state seasons (USFWS 1989), and Air Force personnel are also allowed to take 2 deer per year in order to practice survival skills. Deer populations at the Refuge have remained relatively stable under this hunting pressure.

The cumulative effect of practices under Alternative A has produced a moderate to high level of disturbance. Because of these negative impacts under current management, Alternative A is considered to be poor for deer.

Additional deer hunting opportunities could potentially be offered at the Refuge under Alternatives C and E. Though these hunts may increase hunting disturbance somewhat over current levels. The cumulative level of disturbance will be considered when designing seasons.

Alternatives C, D, and E would eliminate all disturbances associated with the Air Force and Alternative B would reduce the level of Air Force disturbance by eliminating wintertime use, limiting the number of Air Force personnel, and curtailing helicopter and off-road vehicle use.

Alternatives B, C, E, and especially D, would ensure road density levels remain at or below the standard recommended for big game. Enacting these closures would significantly reduce disturbance to deer, especially in the winter, when only the three county maintained roads would be open between January and April. This action could also reduce incidental poaching.

Although all of the action alternatives would benefit deer, overall, deer would be best served under Alternatives C and E.

Pileated woodpecker: The pileated woodpecker is associated with older, dense forests, but also utilizes younger forests with dead or dying trees or mature/old-growth remnant trees and occasionally can be seen in openings with woody residues. The species requires an abundance of down logs and snags for foraging and prefers large diameter logs and trees for feeding due to their higher insect abundance. In northeast Oregon, they are located primarily in stands with greater than 60% crown closure and often with multilayered canopies (Bull and Holthausen 1993). These researchers recommended increasing the density of snags for nesting and foraging and increasing the density of downed logs in foraging areas. They also recommended that pileated woodpecker management areas on public lands be maintained with at least 60 percent canopy closure.

Alternatives B, C, D, and E would be expected to benefit the pileated woodpecker over the long term because the forest restoration efforts that are included in these alternatives would be expected to produce a higher density of large trees and snags that these woodpeckers use for feeding, roosting and nesting. Over the short term, these alternatives could have a negative impact, for the same reasons as described for the northern goshawk. Both species rely on mature

forests with scattered to numerous large trees and a high degree of canopy closure. The action alternatives would result in some loss of this type of cover with the thinning that is planned.

Alternative A would likely have a neutral effect. Without prescribed fire, the forest habitats would continue to grow more crowded and there would likely be more snags developing in forested areas over the short to mid term under this alternatives. However, the snags would mainly represent feeding opportunities; few would be large enough to support nesting.

Rainbow Trout: The species present on the Refuge includes introgressed (interbred) forms of the native redband rainbow and the stocked coastal rainbow in streams. Lakes contain only the stocked coastal form. Although the introduced forms of coastal rainbow trout are considered more adaptable to habitat disturbance and alterations than other salmonids (Quigley and Arbelbide 1997, p 1238), current practices of livestock grazing in riparian areas potentially limit their populations. Behnke and Raleigh (1978) found a three to four-fold decrease in the trout biomass in grazed versus ungrazed areas. Fish population increases have been documented after removal of livestock grazing by Hunter (1991), Amour, et al. (1991) and Platts (1991). Changes in the livestock grazing program proposed under Alternatives B, C, and D would all be expected to have a positive effect on this species. The riparian and stream restoration efforts undertaken under Alternatives B, C, and D would also aid the trout. Positive impacts to rainbow trout habitat under Alternative E will be similar to those associated with other action alternatives, but effects will be delayed for five years, until 2005.

Alternative D would potentially provide the largest benefit to the native redband rainbow, since stocking of all fish would cease under this alternative. Stocking does only occur in the lakes, but a small potential occurs for stocked fish to spill over into streams during high water (Shuhda, pers. comm.). Although it is highly unlikely ceasing stocking would cause the river fish to revert back to the pure and distinct native strains, ceasing stocking would at least have the benefit of not further polluting the gene pool. Strategies under Alternatives B, C, and E would include ceasing stocking of the eastern brook trout, but stocking of coastal rainbow would continue.

Alternatives B, C, and E continues coastal rainbow stocking in Potter s Pond, but the Refuge will work with WDFW to stop stocking eastern brook trout in Bayley Lake. These alternatives encourage stocking of natives, i.e., redband and cutthroat trout. They also leave the door open for restocking natives in streams. Fishing regulations could be modified to reduce eastern brook trout in streams. Alternative D is a passive alternative that increases natives through stopping the practice of stocking non-natives. Alternatives B, C, and E, are active management through ceasing non-native stocking, regulations to favor non-natives, and restocking native fish.

Under Alternatives B, C, and E, the Refuge would attempt to promote natural spawning at the lakes. Under Alternative D, the lakes would be eliminated. However at this time limited spawning occurs at the lakes, so the lakes do not currently represent a habitat asset so much as a fishing opportunity.

Catch and release fishing on the Little Pend Oreille River would be implemented under Alternatives C and E. This would probably result in a higher likelihood of natural spawning and larger fish in the rivers.

Alternative A would be expected to result in a negative effect on rainbow trout since stream degradation from grazing, camping, and roads would continue. Populations may remain stable, perhaps more due to stocking than to habitat improvement factors, but habitat conditions for wild self-sustaining populations would remain limiting or deteriorate over time.

Ruffed Grouse: The Habitat Suitability Index model compiled for ruffed grouse (Cade and Sousa 1984), determined winter food and spring to fall cover as being the two limiting factors most affecting the species. Therefore, the impact of the proposed alternatives on these two life requisites will be evaluated to determine their effect on this species.

Implementing Alternative A includes allow livestock grazing at approximately the current stocking level. Livestock would continue to browse the aspen, retarding both the expansion and development of more desirable multi-aged stands. The relatively limited amount of thinning activity and prescribed fire treatment (when compared to the other alternatives) coupled with total fire suppression, would also limit the disturbance stimuli needed by aspen to encourage sprouting. Alternative A would continue to allow unregulated camping. The majority of these camping sites are in riparian habitats, reducing or eliminating their value as high quality grouse habitat. Finally, Alternative A would not restore riparian areas. Under this alternative, grouse populations would be expected to remain stable or gradually decrease.

Alternative B would eliminate grazing in low-gradient alluvial riparian areas. Removing livestock browsing pressure in this area of high aspen density would have a substantial positive effect on the quantity and quality of existing and future grouse habitat.

Natural forest structure and composition would be restored with this alternative. This would include managing aspen stands. Thinning, as well as the increased use of prescribed fire, would also stimulate aspen and improve its value as habitat, while removing some of the competing conifers. Alternative B would eliminate dispersed camping and restore riparian areas, having a positive affect on the amount and quality of ruffed grouse habitat available.

Implementing either Alternative C or D would have equal effects on ruffed grouse habitat and populations as they both phase out livestock grazing on the Refuge within 5 years. Alternative B would have a limited positive effects since it eliminates annual grazing in riparian areas but retains it in upland areas. All three alternatives would also plant and stabilize streambanks, further improving riparian habitats. Alternative E continued annual livestock grazing at its current level for five more years before discontinuing that activity in 2005. Significant streambank planting stabilization efforts would also be delayed. After this five year delay, ruffed grouse habitat should improve in a manner similar to what is expected with Alternative C and D. The eliminations of riparian camping in Alternatives B, C, D, and E (Alternative C eliminates all

camping) will all increase habitat for ruffed grouse. The use of thinning and prescribed fire, described for all action alternatives, will also benefit grouse habitat.

Hoary Bat: This species is a foliage-roosting bat closely associated with late successional forests for roosting. The species is not very maneuverable during flight; they require tall trees with foliage sufficiently high above the ground to enable them to drop far and rapidly, thus gaining momentum to fly (USDA 1994). The species relies mainly on trees for roosts (caves and mines may also be used occasionally) and shows differential roost heights for clusters of females and young (high in the canopy) while males and non-breeding females roost in the lower canopy (Christy and West 1993). Perkins and Cross (1988), working in western Oregon, found that the species appears to prefer roost sites in low-mid elevation forest older than 200 years. This species commonly feeds along forest edges, roads, or open areas within the forest, while flying high over the water or ground surface (up to 50 meters; Christy and West 1993). Riparian areas, which attract many more small flying insects than forested areas, are used heavily by bats for foraging. Protecting this habitat value is important. Hayes et al. (1995) found that logged riparian areas supported 4-7 times fewer bats than unlogged riparian areas.

As a user of contrasting habitats, the hoary bat represents those species that rely on the simultaneous maintenance of several components of Refuge habitat. This species may realize more benefits from the fields that have been maintained on the Little Pend Oreille than most other native species; yet it would also likely benefit from actions to improve the distribution of riparian forests and actions to promote mature and late successional forests. Alternatives B, C, and E would be expected to positively benefit the species, primarily due to actions promoting late successional characteristics in forested habitats (considered best for roosting), the actions to restore riparian habitats, and the maintenance of some fields as openings.

Alternative D would be expected to have a neutral effect on this species because it enhances roosting habitat and some foraging habitat in riparian areas, but all fields would also be allowed to revert back to forest. Alternative A would also likely have a neutral effect because it maintains fields as foraging habitats but does nothing to promote roosting habitat.

Effects to Cultural Resources

Effects to cultural resources are discussed by alternative below. The variables within each of the alternatives that are most positive for cultural resources are those that reduce or eliminate activities and access on the Refuge. Many activities such as hunting, fishing, noxious weed control, and recreation have virtually no potential to affect cultural resources and are perceived as having a neutral affect. Cultural resources are sensitive to ground disturbing types of activities. Potentially negative impacts to cultural resources include logging, concentrated grazing on historic farmsteads, construction of new trails or facilities, and in-filling the open fields of the homestead landscape. Treatment of fire has both positive and negative consequences. Suppressing fires can protect log buildings and archaeological sites, yet the suppression techniques are sometimes more damaging than the fire itself.

Under all alternatives, the cultural resource values of the Little Pend Oreille NWR would be treated according to the regulations of Section 106 of the National Historic Preservation Act (NHPA). will. To provide data adequate to analyze any effects under this Act, survey, reporting, and consultation would be required for each project that has the potential to affect historic properties. Sometimes the historic values are not immediately apparent: for instance, the landscape values of the homesteading era may be categorized as historic agricultural landscape features .

Alternative B would have a neutral to positive effect on cultural resources. The riparian and stream management, noxious weed management, livestock grazing, entrances and roads, Air Force survival school, hunting, fishing, equestrian, and camping programs would all remain essentially the same as the current program or would be only slightly modified. Therefore, the net effect of these programs is neutral. Changes in programs that would have a positive effect on cultural resources include maintaining 200 acres of openings, closing off a few entrances and roads, and eliminating off-road vehicles. Changes that could have a negative effect on cultural resources include forest management techniques that include harvest and thinning and control of wildfires, and revegetating old farm fields. The lack of any interpretive program that might promote the understanding of cultural resources is also viewed as a negative effect to cultural resources. This alternative also includes provisions to enact a proactive cultural resources program, which would be very positive for cultural resources. All projects that include a ground disturbing element would be reviewed under Section 106 of the NHPA prior to implementation.

Alternative C is similar to Alternative B except for some modifications that make this alternative generally more positive toward cultural resources. The riparian and stream management, noxious weed management, livestock grazing, roads and entrances, hunting, and fishing programs are all essentially the same as the current program or are only slightly modified. Therefore, the net effect of these programs is neutral. Positive changes in programs include the elimination of the Air Force survival school, camping, horseback riding, and off-road vehicles, and closing off roads and entrances. Maintaining 200 acres of openings, developing wildlife viewing in some fields, and developing an interpretive program that includes natural and cultural history are very positive aspects of this alternative. Timber harvest, fire suppression, and revegetation of fields are viewed as potentially negative to cultural resources. This alternative also includes provisions to enact a proactive cultural resources program, which would be very positive for cultural resources. All projects that include a ground disturbing element would be reviewed under Section 106 of the NHPA prior to implementation.

Generally, Alternative D has a positive affect on preserving cultural resource values. Limiting access to 4 entrances and closing roads would lessen the opportunity for vandalism of archaeological sites. Elimination of the Air Force survival school, grazing, and horseback riding would lessen the threats to historic sites posed by these activities. Closing off camp grounds and promoting no trace camping would have a neutral affect on cultural resources. Hunting, fishing, riparian management, noxious weed management, and recreation would have no affect on cultural resources and are viewed as neutral. Forest management (thinning) and

rehabilitation of farm fields have potential to disturb cultural resources. All projects that include a ground disturbing element would be reviewed under Section 106 of the NHPA prior to implementation.

Alternative E includes both positive and negative affects to cultural resources. Phasing out the training school, closing selected roads, and modifying or eliminating the grazing program would be positive steps toward resource protection. Developing interpretive programs would be very beneficial for cultural resources, especially for interpreting the homestead landscape. This alternative also includes provisions to enact a proactive cultural resources program, which would be very positive for cultural resources.

Activities that have a neutral affect on cultural resources are the current fishing strategies, noxious weed management, and camping in designated campgrounds. Repairing roads for fish passage would require compliance with Section 106, but no known sites would be affected.

The management strategy for old fields is both positive and negative. Maintaining 200 acres as openings that coincide with homestead parcels could enhance the recognition of this type of cultural resource. But the revegetation of all other remaining open fields indicates a loss of this landscape as well. Forest management practices including thinning and selective harvest would require compliance with Section 106. Meeting the equestrian constituency needs might require the construction of new trails, corrals, and overnight camping areas. Any new development would need to comply with Section 106 of the NHPA. Fire suppression can have both a positive and negative affect on cultural resources. Fire suppression can be positive by protecting the remains of the log homestead cabins on the Refuge. The process of fire suppression can have negative results if new roads, firelines, and fire camps are constructed while combating the fire. Often the damage caused by a bulldozer while cutting a fire line is worse than the fire itself on an archaeological site. Close coordination between the fire crew and a cultural resource specialist familiar with the Little Pend Oreille NWR is necessary during fire suppression efforts.

4.2 EFFECTS RELATED TO PUBLIC ACCESS AND RECREATION OPPORTUNITIES *(Responds to Issue # 2)*

Effects to Public Access

The Refuge would have more controlled access under all alternatives except Alternative A. Alternatives B and C would maintain an intermediate level of public access with eight maintained entrances; Alternative E would maintain nine entrances; and Alternative D would close all but four entrances. Seasonal road closures to reduce disturbance and harassment would also be implemented under Alternatives B, C, D, and E. Under Alternatives B, C, and E, road density would be kept below 1.5 miles per square mile between April 15-December 30, and below 0.5 miles per square mile between January 1 - April 14. Alternative D would adopt a stricter road density standard of 1.0 miles per square mile during summer. In addition, under Alternative D, portions of the eastern Refuge would no longer be publicly accessible by vehicle.

Road closures or obliterations would be determined under a road management plan. Criteria leading to closure would consider levels of public or management use and potential for resource degradation. Criteria that would be used to select roads for closure are described in Chapter 3.

The reduced access under Alternatives B, C, and E may have a slight effect on public use, but this effect is expected to be negligible because most Refuge users utilize the eight or nine entrances that would be maintained. The largest effect to public use would probably occur during winter, when seasonal closures would eliminate access to all but the county maintained roads (Buffalo-Wilson Rd., Bear Creek Rd. to Headquarters and Narcisse Creek. Rd.) and Olson Creek Rd. from January 1-April 15. The impact would be larger under Alternative D; reducing public access and use is the tradeoff for providing larger disturbance-free areas for wildlife at the Refuge.

Users who prefer foot or non-motorized travel to vehicle travel (for instance some horseback riders, photographers, hunters, and joggers) would doubtless find the road density policies under the action alternative to increase their opportunities for solitude and recreation free from vehicular disturbance.

Effects to Recreation Opportunities

General: Outdoor recreational use of public lands is on the increase nationwide, and, with the population growth in Stevens County and Spokane, the Little Pend Oreille NWR could probably expect increased visitation in the next ten years, if this plan were not to take effect.

To a large extent the alternatives are designed to differentially channel human activities on the Refuge; each alternative strikes a different balance between the goal of meeting public demand for wildlife-dependent recreational opportunities and the goal of maintaining and restoring wildlife populations and habitats. The following is a summary of the management actions related to recreation under the different alternatives.

Alternative A maintains the status quo, but otherwise reflects national and regional trends in public uses.

Alternative B continues hunting as at present, eliminates snowmobiling, endeavors to increase spawning habitat, limits dispersed riparian and winter camping, and seeks to reduce impacts associated with horseback riding activity.

Alternative C eliminates camping, snowmobiling, and horseback riding; endeavors to increase spawning habitat, promotes catch and release fishing at Bayley Lake and the Little Pend Oreille River, and restricts the fishing season on the lakes; builds an environmental education program, promotes wildlife viewing; expands quality hunting opportunities and introduces new seasons for game birds and big game.

Alternative D eliminates most forms of camping, eliminates snowmobiling and horseback riding and restricts hunting of predators and would modify the fishing opportunities through lake changes and elimination of fish stocking.

Alternative E limits dispersed camping and camping during winter, promotes catch and release fishing; endeavors to expand natural fish spawning, builds an environmental education program, promotes wildlife viewing; expands quality hunting opportunities, introduces new seasons for game birds and big game; and seeks to reduce impacts associated with snowmobiling and horseback riding activity.

However, human response to management actions is inherently complex. For example, hunting and fishing activities are affected not only by the seasons offered, but also by changes in camping regulations, management of fish and game populations, and the availability of similar opportunities nearby. The analysis below attempts to better predict the ultimate effects to recreation opportunities by looking at these intertwining factors. Table 4-1 shows the number of visits to the Refuge that occur currently and the number of visits that would be expected under each of the alternatives.

Table 4-1. Projected Visitors in Key Recreation Categories, under all alternatives, Year 2014.

Activity	Current *	*Alternative*				
		A	*B*	*C*	*D*	*E*
Wildlife Observation	3,200	6,700	6,700	8,200	6,700	8,200
Hunting	14,900	13,300	13,300	6,800	8,000	14,000
Fishing	8,325	8,800	8,800	6,000	3,000	8,800
Camping	15,000	19,000	13,000	0	1,900	10,000
Snowmobiling	7,000	9,400	0	0	0	8,400
Horseback Riding	1,800	1,600	1,800	0	0	1,800
Organized Nature Study	200	300	300	1,000	300	1,000
Other	650	800	800	800	800	800

* Current visitor numbers are based on a 1999 estimate of Refuge visitation using vehicle traffic counters and other means.

Even without any management initiatives, (Alternative A) visitor use at the Refuge would change over the next fifteen years, reflecting national and regional demographic and recreational preference trends. To accurately project future visitor levels in Alternative A, we consulted two studies: *USFWS (1999). 1980-1995 Participation in Fishing, Hunting and Wildlife Watching: National and Regional Demographic Trends.* Numerical indices for change between 1980 - 1995 for All (by Recreation Category) for the West region were used as a basis. In addition, we consulted *Cordell et al. (1997). Outdoor Recreation Trends and Market Opportunities in the United States.* From this study we utilized trend indices change between 1982/83 1994/94 by recreation category. We used historical trends as a basis for predicting future visitor levels under Alternative A. Where the studies differed, we averaged and then rounded the result.

Visitation within each category under the other alternatives was estimated partly on the trends foreseen for Alternative A, and partly on the particular management strategies adopted under that alternative. Interacting factors were considered. For instance, changes in the camping program and access were considered when estimating hunter visitation.

These visitation numbers are utilized in the economic analysis discussed later in this chapter.

Under all action alternatives, many recreational activities would be reigned in or regulated in one form or another.

Hunting: National and state trends for hunting project declines over the next fifteen years. The alternatives would be affected by these larger trends, however, total hunting visits on the Refuge would be influenced by the seasons offered and area available for hunting and camping as well. Alternatives C and E could expand Refuge hunting opportunities, specifically offering the state seasons for spring turkey and grouse, and deer and elk bow hunts. By eliminating Air Force use of the Refuge under Alternatives C, D, and E, a larger area could also be made available for hunting during fall seasons. Even with these expanded opportunities, total hunting on the Refuge would likely decline slightly under Alternative E.

Under Alternative C, camping restrictions would make hunting a day use only opportunity. Combined with the social trends showing hunting to be less popular, this would be expected to result in a significant decline in hunting visits to the Refuge over the period of fifteen years (see Table 4-1). However, deer populations may be higher and more large bucks may be present due to enhancement of winter range habitat and greater use of road closures, and therefore, hunters may experience greater satisfaction and success, as well as having access to a wider array of seasons and area of hunt.

Alternative D would restrict Refuge hunting somewhat, specifically limiting bear, cougar, coyote, and bobcat hunts, though these seasons involve a small minority of hunting visits anyway. Additional road closures under Alternative D, and encouragement of no-trace camping as opposed to vehicular based camping, would mean that quality big game hunts with greater isolation may be most readily available under this alternative. As in Alternative C, habitat enhancements may also increase deer populations. Waterfowl hunting would likely diminish, as lake habitat would be reduced. Total hunting visits would be expected to be slightly higher than under Alternative C, since camping would not be totally restricted.

Hunting seasons would remain the same as at present under Alternatives A and B; some restrictions on camping would occur under Alternative B but these would probably negligibly affect hunting opportunities. Game and waterfowl could become less prevalent under Alternative A, due to the combined effects of disturbance from roads, unregulated camping, Air Force use, and lack of habitat management. Quality hunting may not be as readily available; however total hunting visits to the Refuge would decline slightly, due to the social and demographic trends away from hunting.

Fishing: Under Alternative C, lake fishing would be de-emphasized, since the season would be delayed on lakes till July 1. Lake fishing would also decline severely under Alternative D, since the dams maintaining Bayley and McDowell Lakes would be breached, and these areas would revert to seasonally moist wetlands. In addition, stocking would cease. The elimination and strong restrictions on camping under Alternatives C and D further discourage camping weekends with fishing mixed in. However, Alternative C would promote catch and release fishing on the Little Pend Oreille River, which, together with the riparian and aquatic restoration measures included in these alternatives, may increase riverine fishing opportunities. Still, overall, under Alternatives C and D, fishing opportunity would show an overall decline, with an accompanying decline in fishing visits.

Alternative E would also promote catch and release fishing on the Little Pend Oreille River. However, the continuation of the annual livestock grazing program for five years will delay the increase in river fishing opportunities due to limiting the opportunities for riparian and aquatic restoration measures. Fishing visits would be expected to remain approximately the same over the next 15 years under this alternative.

Alternatives B, C, and E all seek to increase opportunities for natural spawning at the lakes. If effective, this strategy would decrease reliance on stocked fish, possibly resulting in an increase in the average size of caught fish, and promote fish wariness, overall leading to a higher quality fishing experience.

Alternatives A, B, and E continue the fishing seasons as they presently exist on the Refuge. Overall, fishing opportunity at the Refuge may be greatest under Alternatives B and E.

Wildlife Viewing, Interpretation, Environmental Education, and Photography: Wildlife observation and photography are two of the fastest growing outdoor recreational activities, both statewide and nationwide. Even without active programs to encourage this activity, all alternatives would see a marked increase in visitation for wildlife observation and photography.

It is not known to what extent visitors combine wildlife observation and photography with other activities at the Refuge such as camping, fishing, and hunting. However, people who exclusively come to the Refuge to view and photograph wildlife may be deterred to some extent by hunting, snowmobiling, Air Force overflights, and other noisy, disturbing activities. The Refuge has received comments from visitors to that effect over the years. The opportunities for these non-consumptive activities would therefore increase as these human disturbances decrease. Overall, Alternative D would probably result in the least disturbance on the Refuge. Likewise, delaying the fishing opener under Alternative C could greatly enhance viewing and photography opportunities at McDowell and Bayley Lakes and Potter's Pond, although too large an increase in non-consumptive recreation could disturb waterfowl (with subsequent impacts to viewing opportunity) (Klein 1993). In addition, wintertime closures of Refuge roads under all of the action alternatives would limit vehicular access and thus increase potential viewing opportunities

for certain publics. For those willing to walk, snowshoe, or ski, viewing opportunities could be greatly enhanced during winter under Alternatives B, C, E, and especially Alternative D.

Alternatives C and E would emphasize visitor education and create both viewing areas and programs for environmental education. Visitor enjoyment may be increased by the additional interpretive information and programs available.

Camping: Camping opportunities would be curtailed under Alternatives C, D, and E, and, to some extent, B. Under Alternative C, camping would no longer be allowed. Alternative D would allow primitive (no-trace) camping in areas that vehicles cannot access; i.e. tent backpacking would be allowed. All vehicle accessible camps and campgrounds would be closed and restored to a natural condition. Dispersed riparian camping would be stopped under Alternatives B and E; these two alternatives would also permit camping only in certain designated campgrounds and dispersed sites during specific times of year. Alternative A would allow camping to continue in a largely unregulated fashion. Restrictions on camping may be difficult to enforce without an active education and law enforcement effort. Alternative B would allow some Air Force camping use to continue.

Snowmobiling: Snowmobile use would not be allowed to continue on the Refuge under Alternatives B, C, and D. In addition, snowmobile traffic on Olson Creek Road, which largely accesses Calispell Peak, would be eliminated under Alternatives B, C, and D, and the snowpark off Highway 20 at Olson (Tacoma) Creek Road would be eliminated under Alternatives C and D. Under Alternative E, snowmobile use would also be prohibited, except that traditional snowmobile ingress and egress (together with associated grooming) along the four miles of Olson Creek Road that cross the Refuge would be permitted at the current level of use. No off-road snowmobile excursions would be allowed. The Refuge would also initiate work with adjacent land managers and recreationists to seek a new snowpark and alternate winter access to Calispell Peak. Even with the prohibition on snowmobiling elsewhere in the Refuge, total snowmobile traffic experienced on Refuge lands (including Olson Creek Road) would rise from the present time.

Other recreational activities: With the exception of horseback riding and all-terrain-vehicle use, most other recreational activities (including dog sledding, cross-country skiing, snow sledding, mountain biking, and others) would be allowed to continue as at present under all alternatives until and unless these uses become incompatible with Refuge goals and purposes. Horseback riding would be eliminated under Alternatives C and D. Alternatives B and E could maintain or even increase horseback riding, but it would occur under the auspices of an equestrian plan that would deal with such issues as overnight use, trails, and horse feed.

Unlicenced off-road vehicles would be prohibited from operating on the Refuge under all alternatives. Only licenced motorized vehicles would be allowed on designated roads.

4.3 EFFECTS RELATED TO CATTLE GRAZING *(Responds to Issue 3)*

As discussed above in Sections 4.1 and 4.2, continuation of cattle grazing as it currently stands under Alternative A would result in negative effects to riparian and deciduous forest, water quality, aquatic habitats, and evaluation species including bald eagles, Columbia spotted frogs, MacGillivray's warbler, deer, rainbow trout, ruffed grouse. In addition, continuation of cattle grazing would be likely to negatively affect the protection of cultural resources, and riverine fishing.

This section takes a broad look at the effects of cattle grazing, beyond that for indicator species. The effects on the permittees of changing the program are largely economic and are examined in section 4.4 together with the economic effects of other programmatic changes by alternative.

Based on an in-Service 1996 grazing review (USFWS 1997), fisheries habitat surveys of the Little Pend Oreille River and Bear Creek in 1996 and 1997 (Kelly Ringel 1997; Kelly Ringel 1998), and a riparian condition evaluation on 32 valley units of five Refuge streams in 1996 and 1997 (Pyle 1997), the annual cattle grazing program is contributing to a poor condition for Refuge fish and wildlife riparian and stream habitats. See Chapter 2 for a summary of the specific problems occurring in streams and riparian areas as related to grazing.

Cattle grazing poses risks to wildlife, fish and plants in upland areas as well as riparian areas, through a number of mechanisms. Livestock can compete with wildlife for a common food source, displace wildlife through their presence, facilitate the invasion of pest species, and alter the structure of habitat. The following are areas where livestock affect Refuge fish, wildlife, and plant populations and habitat:

• Brown-headed cowbirds are found in the Little Pend Oreille NWR. These species are parasites that do not build their own nests but instead lay their eggs in the nests of other passerine birds. Brown-headed cowbirds will not travel more than 12 miles from agricultural areas and their cattle herds (Saab, pers. comm.). Removing cattle from the Little Pend Oreille could reduce this parasitism problem on the Refuge.

• Cattle trampling and grazing often stunts or kills riparian vegetation, and the shear force of trampling hooves damages bank plants and soil stability. This initiates a cycle of root death, soil sloughing, soil compaction, channel widening and downcutting, and stream temperature rise (Kaufman et al. 1983) . These stream morphology changes harm habitats for native cold water game fish.

• There are two periods in each year when livestock and big game compete for the same food resource. During early spring, mule deer consume grass more heavily than at other times of the year (Peek and Krausman 1996). The diet for white-tailed deer should be similar. By about mid-summer, grass forage becomes scarcer and cattle begin to switch their diet to increasing

amounts of browse. This brings them into direct competition with both white-tailed and mule deer, and to lesser extent with elk.

• Saab et al. (1995) concluded, in a review of relevant studies, that livestock grazing in the West has led to a decline in abundance of 46% of the 68 neotropical migrant landbirds that utilize riparian habitat, an increase in 29% of the migrants, and no clear response in 25% of the migrants. Ground-nesting birds as well as birds that forage in riparian areas with heavy shrub or ground cover tended to decrease in abundance with grazing.

• Ruffed grouse on this part of their range depend very heavily on the flower buds of mature aspens for winter food. These aspen inclusions are also valuable habitat for deer, woodpeckers, and many songbirds. Aspen groves on the Refuge show a very low rate of reproduction. Almost all of the suckers present have been browsed heavily. While this may be the result of wildlife and domestic livestock browsing as well as other influences, cattle are contributing to the suppression of these stands.

• Researchers have detected a significant reduction in small mammal populations in grazed areas when compared to ungrazed. (Fagerstone and Ramey 1996). This is thought to be tied to a loss of cover from cattle foraging resulting in higher predation rates or emigration from grazed areas to ungrazed. In either case, the overall carrying capacity of the area for small mammals was reduced, which in turn reduces the amount of prey base available to predators such as coyotes, great-horned owls, and red-tailed hawks, thereby reducing the areas carrying capacity for these carnivores.

• Maintaining a grazing program on the Refuge has required the construction and maintenance of between 65-70 miles of fences, most within the alluvial river bottoms. Many of these fences are in poor condition and not designed for deer passage. This, coupled with the fact that most occur in white-tailed deer winter range, increases their negative impact on deer.

• A recent comprehensive literature review (Belsky et al. 1999) compared the results from approximately 140 peer reviewed empirical studies examining the effects of livestock grazing on streams and riparian ecosystems in the western United States. Of all the studies reviewed, there were none that reported a positive impact of cattle on riparian areas when those areas were compared to ungrazed controls. Some studies did report no statistical difference. Studies conducted in the more humid areas of the west, resembling Little Pend Oreille to some extent (Western Washington and Oregon) showed similar effects as those in arid zones from cattle grazing, including consumption of streamside vegetation, soil disturbance, destabilization of streambanks, manure and urine deposits along banks and churning up of channel sediments (Armour et al. 1994; Trimble and Mendel 1995).

In summary, all of the action alternatives would improve the situation for native fish and wildlife at Little Pend Oreille, by reducing or eliminating livestock grazing. Managed, rotational grazing designed to reduce impacts on riparian habitats would occur under Alternative B, and would

diminish effects of grazing on Refuge habitats compared to Alternative A. This alternative would require modification of existing allotments and the construction of additional fencing to keep cattle out of alluvial riparian areas. Non-alluvial riparian areas would continue to be available. Recovery of grazed areas currently showing impacts would be faster under Alternatives C, and D and those locations in Alternative B where cattle are excluded completely (according to Ohmart 1996, riparian healing occurs two to four times more rapidly under exclusion than when subjected to rotational grazing.) Under Alternative E, impacts would continue to be similar to those occurring under Alternative A because the annual grazing program would be continued for five years. The elimination of grazing beginning in 2005 should ultimately result in the recovery of grazed areas similar to the recovery in Alternative C and D.

4.4 EFFECTS RELATED TO AIR FORCE *(Responds to Issue 4)*

As discussed above, the continuation of the Air Force Survival School training program under Alternative A would result in negative effects to bald eagle, lynx, deer, cultural resources, hunting opportunities, wildlife viewing, photography, interpretation, and environmental education opportunities.

A broader look at the effects of Air Force training, beyond that known for indicator species, is provided here and in Appendix F (Compatibility Determinations).

The most significant potential impacts to wildlife are associated with helicopter support of training which involves low-level flights, hovering and landing; use of certain pyrotechnics and simulated weapons, and effects of disturbance from approximately 80 people scattered over one-third of the Refuge.

Air Support of Training

Effects to wildlife: Many people familiar with Little Pend Oreille NWR have asserted that the Air Force Survival program has no proven effect to wildlife. Since no on-site empirical studies have been completed, we relied on several literature reviews undertaken by others to explore the effects of aircraft noise and proximity on wildlife. Manci et al.(1988) compiled a literature synthesis of the effects of aircraft noise and sonic booms on domestic animals and wildlife. Andersen (1997 draft) has compiled a critical review of field studies examining the effects of noise and related human activity on raptors. Bryant (1993) completed an annotated bibliography of the effects of disturbances due to aircraft on fish and wildlife. Bryant s review is the most comprehensive and the most recent and was used as the basis for the analysis presented here.

Most of the studies reviewed by Bryant were conducted on raptors, big mammals or waterfowl. Since there is only a small amount of waterfowl habitat available at the Refuge, we concentrated on the results obtained from raptor and large mammal studies. Of the fifty-three sources Bryant reviewed, thirty-four constituted scientific studies. Of these, about 12 were considered of superior value because they were conducted with large sample sizes and/or were experimental

manipulations with controls. Two of these studies focused on raptors. The remaining studies focused on large mammals of varying species. These studies were the primary sources consulted to determine effects of low level aircraft and noise on wildlife.

Raptor studies: Both raptor studies showed effects from military training activities and/or low flying aircraft. In one study, eighteen raptors were equipped with radio transmitters. When military training activity (including increased ground vehicle traffic including trucks, tanks and artillery; helicopter and fixed- wing overflights; simulated weapons fire; and extensive bivouacs by large numbers of troops) was initiated in their area, behavioral changes, including shifts in territory and movements, were observed in the raptors. Birds in areas not being actively used for maneuvers did not show these reactions (Andersen et al. 1990). A second study (Andersen et al. 1989) examined the effects to raptors from low-level helicopter flights and documented that birds living in areas exposed to low-level traffic since the 1950s did not flush as easily as birds living in areas that had been previously non-existent.

Large mammal studies: Seven of the ten studies considered most reliable in Bryant (1993) showed that large mammals exhibit a variety of stress reactions in response to low level overflights. These studies, as well as the three that did not document adverse effects, are summarized in Table 4-2.

Effect of distance and sound level: Reaction to helicopter overflights and similar disturbances varies greatly among species as well as among individuals within a species. Grubb et al. (1997) cites examples of helicopters approaching within 150 meters of bald eagles before eliciting a flush response; while similar studies involving Mexican spotted owls, osprey and peregrine falcons noted that they were all approached to distances of 100 m, 50 m, and 30 m respectively, before flushing. Watson (1993) reports the distance at which individual bald eagles flushed when disturbed by helicopters in northwestern Washington as ranging from <30 meters to >120 meters.

Distance seems to be a better predictor of response to helicopter overflights than sound level. An inverse relationship existed between the distance from the helicopter to the subject and the rate of response (Watson 1993, Grubb and Bowerman 1997, Delaney et al. 1997). Grubb and Bowerman (1997) recommend that helicopters stay at least 150 meters from nesting bald eagles, while Watson (1993) recommended >60 meters. Delaney et al. (1997) recommends >105 meters from Mexican spotted owl nests.

Several other factors can influence raptor response to helicopter overflights. Watson (1993) found that the flushing distance of eagles was greater when wind velocities were above 16 kph, when eagles were without their young, and when they were perched farther from their nest. This coincides with observations of bald eagles in Arizona showing eagles on nests being less easily disturbed than foraging eagles. Grubb and King (1991) also found eagles more consistently flushed from perches than from nests. Other factors that influenced flushing rates were duration

of disturbance and number of aircraft passes per episode. Increases in either of these factors increased flushing rates (Watson 1993, Grubb and Bowerman 1997, Delaney et al. 1997).

Table 4-2. Summary of studies on large mammals from low flying aircraft (summarized in Bryant [1993]).

Effect noted	Species	Author/ Date	Additional notes
Startle /alert reactions	caribou	Harrington and Vietch, 1991	jets 30 m-300 m above ground; response correlated to height
Heart Rate Increases	desert mule deer	Krausman et al. 1993	captive mule deer subjected to simulated aircraft noise 92-112 db.
Flight	barren ground caribou	Calef et al. 1976	Panic reactions when helicopters < 60 m.
	mountain sheep	Krausman and Hervert, 1983	All responses extreme, involving movements > 1 km from initial area when flights ≤ 50 m.
Change of Home Range or Territory	desert mountain sheep	Bleich et al. 1990	Radio-collared animals showed 2.5X movement on day following helicopter surveys than on day preceding survey
	coyotes	Geese et al. 1989	Change in home ranges and abandonment of home ranges occurred after military maneuvers initiated. Responses related to amount of cover, topography, and intensity of military activity.
Reproductive Effects	woodland caribou	Harrington and Vietch, 1992	Radio-collared females w/ calves subjected to different levels of low level jet overflights, calf survival found negatively correlated with female s exposure during calving and immediate post calving period and again during period of insect harassment in summer. Overflight included all jets within 1 km of caribou location.
Impact not apparent or not significant	bison	Fancy 1982	Flights from 61-150 m above ground had no effect on behavior of bison
	muskox	Miller et al. 1988	Nursing bouts measured while helicopter overflights conducted. Nursing frequency could not be correlated with helicopter exposure
	desert mule deer	Krausman et al. 1986	Deer subjected to overflights up to 150 m above ground showed no change to a different habitat type.

Stockwell et al. (1990), described height of helicopters flying above the ground as a threshold for mountain sheep. No disturbance was noted when flights were greater than 100 meters above the ground. Movement of 2 to 3 times greater than normal and increase in size and shape of home ranges were noted following helicopter surveys of mountain sheep (Bleich et al. 1990). Sheep

foraging efficiency was also reduced. Deer and elk exhibited flight/fright behaviors at the approach of helicopters (USFWS Aircraft Overflight Issues Report 1993).

Type of aircraft and proximity: Of the three types of aircraft evaluated for their effect on nesting raptors (low level jets, light fixed wing aircraft, and helicopters), helicopters appear to cause the greatest disturbance (Grubb et al. 1992, Watson 1993, Grubb and Bowerman 1997). This may be because helicopters fly slowly and at lower altitudes than other types of aircraft. Also, jet engines produce more noise at higher pitch and magnitude than do piston aircraft engines. The Air Force typically uses Bell UH-1 Iroquois helicopters (Hueys) for their training activities on the Refuge. This aircraft uses a jet turbine engine.

Habituation: Evidence exists that raptors may become habituated to aircraft disturbance. Indications of this phenomenon were reported in red-tailed hawks (Andersen et al. 1989) and Mexican spotted owls (Delaney et al. 1997). The extent and frequency of this effect are not yet understood.

Effects to people: Aircraft noise also disturbs Refuge visitors who seek quiet and the potential for a wildlife encounter. Campers, bird watchers, horseback riders and hunters have complained about Air Force low-level helicopter flights. Refuge neighbors have also complained about helicopter activity, particularly night flights.

Summary: All the information available describing the effects of helicopter and other aircraft on wildlife pertains to overflights and other in air activities. The relatively longer duration of noise associated with the take-offs, taxiing, approaches, and landings being conducted in forest openings and fields on the LPO NWR may impose a substantially greater level of disturbance to wildlife using specific landing zones. In summary, Alternatives C, D, and E, which eliminate Air Force Survival School Training at the Refuge, would completely eliminate the risk this activity poses. Alternative B, which eliminates helicopter and explosive use, but maintains most other aspects of the program, would also benefit wildlife.

Ground-based Training Activity

The effect of the ground-based activity is likely similar to other ground-based public use activities, particularly camping, use of off-road vehicles, snowmobiling, and hiking. The impacts of these activities on Refuge values are discussed earlier in this chapter, but are also discussed in much more detail in Appendix F. See that Appendix for more information. The Air Force Survival School creates an additive impact to public activities like camping. There are approximately 50 Air Force camps scattered throughout the Refuge. At any one time, the Training School is represented by about 80 plus people, split into two groups, using about twenty-two square miles of the Refuge, but with the majority of use in the core of the Refuge.

USAF Survival School ground activity may be more disturbing to some wildlife than the helicopters. All studies of disturbance to raptors that included an analysis of ground activity

disturbance found it to have a greater effect on birds of prey than did aircraft. Research conducted on the Army maneuver sites observed a displacement reaction by some wildlife to the training activities. While the intensity of the training conducted on these areas is much greater than that occurring on LPO, the many fold increase in the number of people in the areas, greater vehicular traffic on the roads, operation of ATVs and helicopters, and the use of simulated weapons are variables they have in common.

Research done on nesting bald eagles in Arizona found the strongest response was caused by ground-based disturbances, particularly pedestrians. Within that category, hiking activities were the most disturbing. In addition to pedestrian disturbance, the other disturbances analyzed in decreasing order of severity were: aquatic (tubers, boat, canoes); vehicles, noise (gunshots and sonic booms); and lastly aircraft (Grubb and King 1991). Other researchers have also determined that aircraft overflights were less disturbing than ground-based activities (Awbrey and Bowles 1990 *in* Delaney et al. 1997). Recent work examining the effect of helicopter overflights on nesting Mexican spotted owls in Arizona also measured the owls response to chain saw noise. Their results indicated this ground-based disturbance elicited a greater flush response than the aerial disturbance caused by helicopters (Delaney et al. 1997). They speculated that spotted owls perceived helicopters as less threatening than chain saws because of the aircraft s shorter duration, gradual crescendo in sound levels, and minimal visibility or association with human activity. They also believed owls would have responded more if individual exposure times to helicopters were increased through slower maneuvers and increased hovering.

In summary, the reduction of ground-based disturbances can only benefit Refuge wildlife and habitats. Alternatives C, D, and E, which eliminate Air Force training at the Refuge, would have the most positive benefit to wildlife. Alternative B would continue some negative impact, though it would be less than Alternative A.

4.5 EFFECTS TO REGIONAL ECONOMY *(Responds to Issue 5)*

All dollar figures below are expressed in terms of 1997 equivalent dollars.

Refuge Management Economics

Under the No-Action Alternative (Alternative A), annual Refuge salary expenditures (including salaries and benefits) would be $428,800, and nonsalary expenditures would be $160,482 (Table 4-3). IMPLAN modeling results indicate that Refuge management would result in 9.9 jobs and $460,000 in personal income in the nonmilitary federal government sector. These results differ from the information obtained directly from the Refuge planning process, as reported in Appendix C, Table 3-2, and Table 4-3, which indicates that Refuge staffing currently includes eight full-time and nine seasonal jobs and $428,800 in salaries and benefits. Similar discrepancies occurred in modeling the other alternatives. Discrepancies between the IMPLAN modeling results and the information obtained directly from Refuge planning are primarily attributable to the low average annual income of seasonal Refuge employees relative to the

average income of nonmilitary federal employees in Stevens County. The effects shown in Tables 4-4 and 4-5 are based on the IMPLAN modeling results rather than the employment and payroll data obtained from Refuge planning. Including indirect, direct, and induced effects, Refuge management under Alternative A would account for an estimated 18.7 jobs and $598,000 in annual personal income in the region (Table 4-4).

Refuge management would directly generate more jobs and income Alternatives B, C, and E than under Alternative A (Table 4-4). Fewer jobs and income would be generated under Alternative D than under Altemative A. The same comparative results apply to the total (i.e., direct, indirect, and induced) employment and income effects.

Table 4-3. Annual Refuge Salary and Nonsalary Expenditures (in Dollars) by Planning Alternative

	Expenditures by Alternative				
	A	**B**	**C**	**D**	**E**
Salary					
Permanent, full time	350,000	505,600	477,600	420,000	533,600
Temporary	78,800	111,600	89,000	14,000	100,300
Subtotal	428,800	617,200	566,600	434,000	633,900
Nonsalary	160,482	121,200	119,267	93,733	124,267
Total	589,282	738,400	685,867	527,733	758,167

Forest Products Economics

Under Alternative A, 50-250 thousand board feet (MBF) would be harvested annually on the Little Pend Oreille NWR, consistent with recent harvesting levels and patterns. Under Alternatives B, C, and E, 100-1,000 MBF would be harvested annually, mostly through commercial thinnings designed to remove excess small trees from the forest understory. Under Alternative D, 250-500 MBF would be harvested annually.

Employment and income effects under the action alternatives would increase relative to Alternative A in proportion to the annual harvest level (Table 4-4). Assuming that an average of 150 MBF is harvested annually under Alternative A, it is estimated that Refuge timber sales would account for a total of 0.3 jobs and $20,000 in personal income in the regional forest products industry. Total effects of Alternative A on employment and personal income are estimated at 0.6 jobs and $33,000 per year, respectively. Results shown in Table 4-4 are calculated based on the assumption that an average of 375 MBF would be harvested annually under Alternative D, and that an average of 550 MBF would be harvested annually under

Table 4-4. Regional Economic Effects of Refuge Activities by Sector and Planning Alternative by Year 2014

Sector and Type of Effect	A	B	C	D	E
Refuge Management					
Direct effects					
Employment (jobs)	9.9	12.4	11.5	8.8	12.7
Personal income ($/year)	460,000	576,000	535,000	412,000	591,000
Total effects					
Employment (jobs)	18.7	23.4	21.7	16.7	24.0
Personal Income ($/year)	598,000	749,000	695,000	535,000	769,000
Forest Products					
Direct effects					
Employment (jobs)	0.3	1.1	1.1	0.8	1.1
Personal income ($/year)	20,000	73,000	73,000	50,000	73,000
Total effects					
Employment (jobs)	0.6	2.4	2.4	1.6	2.4
Personal income ($/year)	33,000	125,000	125,000	86,000	125,000
Livestock Production					
Direct effects					
Employment (jobs)	1.9	0.8	0	0	0
Personal income ($/year)	59,000	24,000	0	0	0
Total effects					
Employment (jobs)	3.0	1.2	0	0	0
Personal income ($/year)	96,000	38,000	0	0	0
Recreation					
Direct effects					
Employment (jobs)	19.1	13.1	6.8	6.2	17.1
Personal income ($/year)	315,000	225,000	116,000	105,000	282,000
Total effects					
Employment (jobs)	29.9	20.6	10.6	9.6	26.8
Personal income ($/year)	646,000	452,000	233,000	210,000	578,000
Aggregate effects					
Direct effects					
Employment (jobs)	31.2	27.4	19.4	15.8	30.9
Personal income ($/year)	854,000	898,000	724,000	567,000	946,000
Total effects					
Employment (jobs)	52.2	47.6	34.7	27.9	53.2
Personal income ($/year)	1,373,000	1,364,000	1,053,000	831,000	1,472,000
Net economic value ($/year)	2,600,00	2,082,00	1,066,00	1,038,00	2,394,000

Alternatives B, C, and E. Under the action alternatives, the direct and total effects of Refuge timber harvesting would increase in proportion to the harvest level.

Refuge forest management activities other than commercial timber harvesting include precommercial thinning, prescribed burning, and planting of trees in old fields. These activities are usually conducted by Refuge staff, rather than by private contractors. Their economic impacts are accounted for as part of Refuge management.

Livestock Production Economics

This analysis was based on the assumptions that regional calf sales would change in proportion to the change in Refuge forage supplied to the 3 livestock permittees, and that calves are sold when they weigh an average of 600 pounds. Under Alternative A, forage to support approximately 750 AUMs would continue to be sold to local permittees, and it was assumed that this level of forage sales would support the annual sale of 180 calves, for a total sales weight of 108,000 pounds (1,080 hundred weight).

Under Alternative B, grazing would be restricted to low-elevation upland forest areas, which provide approximately 300 AUMs during the grazing season. Under Alternatives C, and D, livestock grazing would be phased out over the next 5 years, except for incidental grazing (under Alternatives C) to achieve wildlife habitat objectives. For this analysis, it was assumed that no forage would be sold to permittees under Alternatives C, and D. Under Alternative E, grazing would be continued for five years and then eliminated from the Refuge, except to achieve wildlife habitat objectives.

Employment and personal income effects of the Refuge grazing program under the planning alternatives are shown in 4-4. Under Alternative A, Refuge forage supply would account for an estimated 1.9 jobs and $62,000 in personal income in the range-fed cattle industry, and a total of 3.0 jobs and $96,000 in personal income throughout the regional economy. Under the other alternatives, direct and total employment and income effects of grazing would decline in proportion to the amount of forage sold on the Refuge.

Eliminating Refuge grazing would increase production costs for the affected permittees, and could result in herd reductions for one or more permittees. For example, if no alternative forage sources were available, permittees could be forced to reduce their herd sizes by the number of head grazed on the Refuge. Under a worst-case scenario, such herd reductions could reduce the size of the permittee s overall operation below the minimum size needed for a cow-calf operation to be viable. In this case, phasing-out of Refuge grazing could result in the closure of one or more local cattle operations, and could lead to a reduction in regional calf sales by more than the approximately 180 head annually produced on the Refuge.

The availability of leasable private rangeland holdings large enough to accommodate a permittee s herd has historically been limited because most local ranch owners allocate their forage to their own cattle operations. Although private rangeland is available for leasing, most

holdings are too small to support herds as large as those grazed on the Refuge. The availability of large holdings has declined in recent years as a result of ranch subdivisions for homesite development associated with Stevens County s growing population (Gillaspy and Madson pers. comms.). Although permittees could divide their herds among multiple private pastures, doing so would substantially increase the hauling costs and labor requirements of their operations.

The number of livestock permitted by the Colville National Forest, the region s largest public forage provider, is expected to decline gradually in response to resource protection measures associated with the federal listing of the bull trout, and because of the loss of transitional pastures resulting from declining levels of clear cutting (Ridlington pers. comm.). As a result, competition for available forage is likely to increase.

Opportunities to obtain alternative forage supplies also depend on the overall profitability of livestock operations. Cattle-production profit margins have narrowed in recent years as cattle prices have declined by nearly 50% from their previous peak levels (Hammel pers. comm.). In summary, few, if any, economically viable alternatives to Refuge grazing appear to be available to the permittees.

Other Refuge activities related to cattle grazing include construction, maintenance, and removal of fences. These activities are usually conducted by the grazing permittees, who are compensated for major work by deducting their labor costs from grazing fees.

Recreation Economics

Consistent with historical trends, total recreation use on the Refuge is projected to increase over time under the No-Action Alternative (Table 4-1), although participation in hunting and horseback riding is projected to decline slightly. Under Alternative B, participation rates would parallel those under Alternative A, except for camping, which would decrease, and snowmobiling, which would be eliminated. Under Alternative C, wildlife observation and organized nature study would increase faster than under Alternative A; hunting and fishing would decline; and camping, snowmobiling, and horseback riding would be eliminated. Under Alternative D, hunting, fishing, and camping would decline, and snowmobiling and horseback riding would be eliminated. Under Alternative E, recreation use would generally increase slightly faster than under Alternative A, except for snowmobiling, which would grow relatively slowly, and camping, which would decline.

Economic effects of recreation were analyzed based on projected Refuge use levels in 2014 (see Table 4-1). Under Alternative A, Refuge recreation use in 2014 would account for an estimated 19.1 jobs and $315,000 in personal income in the directly affected industries (i.e., food stores, service stations, restaurants, miscellaneous retail, and lodging places) (Table 4-4). Including direct, indirect, and induced effects, recreation use would account for 29.9 jobs and $646,000 in personal income. Recreation-related spending would be lower under all of the action alternatives, along with affected jobs and income. These adverse economic effects would be

relatively small under Alternative E, somewhat larger under Alternative B, and larger still under Alternatives C and D (Table 4-4).

In addition to employment and personal income, Refuge recreation use results in net economic value to users reflecting the amount they would be willing to pay to visit in excess of the amount they would actually pay. Based on the per-day net economic values discussed in Chapter 2 under "Recreation Economics", Refuge use in 2014 would generate $2.6 million in consumer's surplus under Alternative A, approximately $2.4 million under Alternative E, approximately $2.1 million under Alternative B, and approximately $1.0 million under Alternatives C and D (Table 4-4).

Analysis of Snowmobile Recreation Use and its Economic Effects

To assess the recreation and economic effects of potential restrictions on the use of snowmobiles in portions of the refuge, interviews were conducted with three individuals knowledgeable regarding snowmobiling on and near the refuge; counts were made to estimate snowmobiling use on the refuge; and information was compiled on the spending patterns of snowmobilers.

Information from the interviews indicated that closure of the Olson Creek Road to snowmobile use could result in a substantial reduction in use of the Calispell Mountain loop trail, as well as reduced winter patronage of Beaver Lodge (Hull and Inman pers. comms.). Calispell Mountain is a popular destination for snowmobiling residents of Stevens and Spokane Counties. Beaver Lodge is also a popular destination and rest stop for winter recreation, with nearly all users of the Calispell Mountain trail patronizing the lodge and using it as a source of food, lodging, and occasionally emergency services. Closure of Olson Creek Road would probably result in a seasonal reduction in Beaver Lodge's sales of at least 2%-5% (Beech pers. comm.). Whether this reduction in business would lead to seasonal or permanent closure of the lodge is unknown (Beech pers. comm.).

Snowmobile use on the refuge in fiscal year 1999 was estimated at 7,000 visitor days based on traffic counts obtained from an automatic counter on Olson Creek Road. Future snowmobiling use was projected for each alternative in the final EIS based on recreational trends combined with the restrictions that would be placed on refuge snowmobiling under Alternatives B, C, and D (Table 4-1).

The economic effects of changes in snowmobiling under the various alternatives were estimated based on daily snowmobiler spending profiles obtained from a recent survey-based study of snowmobiling in Montana (Sylvester and Nesary 1994), and on a economic model of the Stevens County economy (Minnesota IMPLAN Group 1994).

Air Force Training Economics

Under Alternatives B and E, use of the Refuge by the Air Force Survival School would be reduced. Under Alternatives C and D, it would be phased out over the next 5 years. Because of

the small level of regional expenditures related to Air Force training on the Refuge, however, the regional economic impacts of reducing or phasing out this program would be negligible.

Economics Summary

Employment

Under the No-Action Alternative, economic activity directly related to all Refuge operations would generate an estimated 31.2 jobs. Including direct, indirect, and induced effects, all Refuge activities would account for 52.2 jobs (Table 4-4). Fewer direct and total jobs related to Refuge operations would be generated under Alternative B than Alternative A; Alternatives C and D would result in more substantial job reductions (Table 4-5). The direct employment effect would be slightly smaller under Alternative E than under Alternative A, but the total effect would be slightly larger. Changes in recreation use are the most important source of the variations in employment.

Personal Income

Under the No-Action Alternative, all Refuge operations would directly account for an estimated annual personal income of $854,000, while the direct, indirect, and induced effects on personal income would total $1.37 million in 2014 (Table 4-4). Refuge operations under Alternatives E and B would directly generate more personal income than under Alternative A; under Alternatives C and D less income would be directly generated than under Alternative A (Table 4-5). Total income effects would generally parallel the direct income effects, except under Alternative B, where all Refuge operations would generate less (by $9,000 annually) personal income than Alternative A. As with employment, most of the income variations are attributable to changes in recreation use.

Net Economic Value

Refuge recreation use would result in consumer s surplus reflecting the amount users are willing to pay to participate above the amount actually spent to participate. Net economic value resulting from recreation use would total an estimated annual $2.6 million under Alternative A, but would decline in proportion to recreation use under the other alternatives.

Refuge management would probably result in additional consumer s surplus representing, for example, the amount wildlife enthusiasts would be willing to pay to maintain or enhance habitat above the amount actually spent for such activities. The net economic value of wildlife and fish habitat enhancement resulting from the planning alternatives was not estimated for this analysis, however.

Table 4-5. Change in Regional Economic Effects from the No-Action Alternative

Sector and Type of Effect	B	C	D	E
Refuge Management				
Direct effects				
Employment (jobs)	2.5	1.6	(1.1)	2.8
Personal income ($/year)	116,000	75,000	(48,000)	131,000
Total effects				
Employment (jobs)	4.7	3.0	(2.0)	5.3
Personal Income ($/year)	151,000	97,000	(63,000)	171,000
Forest Products				
Direct effects				
Employment (jobs)	0.8	0.8	0.5	0.8
Personal income ($/year)	53,000	53,000	30,000	53,000
Total effects				
Employment (jobs)	1.8	1.8	1.0	1.8
Personal income ($/year)	92,000	92,000	53,000	92.000
Livestock Production				
Direct effects				
Employment (jobs)	(0.9)	(1.9)	(1.9)	(1.9)
Personal income ($/year)	(35,000)	(59,000)	(59,000)	(59,000)
Total effects				
Employment (jobs)	(1.8)	(3.0)	(3.0)	(3.0)
Personal income ($/year)	(58,000)	(96,000)	(96,000)	(96,000)
Recreation				
Direct effects				
Employment (jobs)	(6.0)	(12.3)	(12.9)	(2.0)
Personal income ($/year)	(90,000)	(199,000)	(210,000)	(33,000)
Total effects				
Employment (jobs)	(9.3)	(19.3)	(20.3)	(3.1)
Personal income ($/year)	(194,000)	(433,000)	(436,000)	(68,000)
Aggregate effects				
Direct effects				
Employment (jobs)	(3.6)	(11.8)	(15.4)	(0.3)
Personal income ($/year)	44,000	(130,000)	(287,000)	92,000
Total effects				
Employment (jobs)	(4.6)	(17.5)	(24.3)	1.0
Personal income ($/year)	(9,000)	(320,000)	(542,000)	99,000
Net economic value ($/year)	(518,000)	(1,534,000)	(1,562,000)	(206,000)

4.6 ENVIRONMENTAL JUSTICE

In accordance with Executive Order 12898, *Federal Actions to address Environmental Justice in Minority Populations and Low-Income Populations*, federal agencies must identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. The following discussion addresses environmental justice as related to the land-use alternatives being considered for the Little Pend Oreille NWR. The evaluations considered potential impacts arising under each of the major impact categories evaluated in this EIS, including social and economic, cultural, and physical and biological resources.

Social and Economic Analysis: According to 1990 statistics, the population of Stevens County, where 99% of the Refuge is located, is composed of 93% white and 6% Native Americans. Less than 1% of the population is African, or Asian or Pacific Islander American. People of Hispanic origin of any race account for approximately 1.6% of the community. The population of the County in 1996 was 38,567 and 60% of the population was classified as rural.

The Stevens County economy is dependent on the timber industry, agriculture, manufacturing, mining, trade, and services. Its largest industries are logging, wood and paper products manufacturing, mining, and metal refining. The economics of the area, including jobs and income, may change but not significantly, and no significant change in taxes or revenue from the Refuge is expected. Refer to the Economics sections, Chapters 3 and 4 of this document, for more detailed information.

Considering social and economic impacts, current uses are not known to cause disproportionately high and adverse human health impacts in any population and no such impacts would be expected to occur as a result of the No-Action or any action alternative. Current uses are not known to result in disproportionally high and adverse socioeconomic impact to low-income or minority populations and no such impacts would be expected to occur as a result of the No-Action or any action alternative.

Cultural Resources Analysis: As noted in the Cultural Resource section, use of the area within the boundaries of the Little Pend Oreille NWR by Native Americans is not well documented. In fact, no prehistoric sites have been located within the Refuge itself. There are no treaty reserved Tribal hunting or fishing rights on the Refuge. The Refuge is also not known to provide Tribal traditional uses, such as gathering of foods and medicines, hunting, and pasturing of horses and cattle.

Based on information gathered in the nineteenth century, the Kalispel Indians lived along the eastern boundaries of the Pend Oreille range, around Lake Pend Oreille, Calispell Lake, and along the Pend Oreille River. A population center for the Kalispel was also in the Chewelah area, south of the Refuge. The Colville Indians inhabited the area from Kettle Falls on the Columbia River, south to the Colville Valley. The Spokane Indians were centered around the

falls at Spokane. Refer to the Cultural Resources sections, Chapters 3 and 4, for more detailed information.

Considering cultural resources, current uses are not known to cause disproportionately high and adverse human health impacts in any population and no such impacts would be expected to occur as a result of the No-Action or any action alternative. Current uses are not known to result in disproportionally high and adverse impact to low-income or minority populations and no such impacts would be expected to occur as a result of the No-Action or any action alternative.

Physical and Biological Analysis: Potential effects to wildlife, fish, and plants, water quality, public access and recreation, special use activities, and air quality are described earlier in this chapter. In analyzing the alternatives potential effects, and considering the areas population, the natural environment, Refuge use and possible health issues, such as herbicide use and smoke management, current uses are not known to cause disproportionately high and adverse human health impacts in any population and no such impacts would be expected to occur as a result of the No-Action or any action alternative. Current uses are also not known to result in disproportionally high and adverse impact to low-income or minority populations and no such impacts would be expected to occur as a result of the No-Action or any action alternative.

In summary, this environmental justice analysis concludes that the socioeconomic, cultural, and physical and biological effects of each alternative do not predict any outcomes that would cause disproportionately high and adverse human health impacts in any population, nor would they result in disproportionally high or adverse impact to low-income or minority populations, nor would any alternative create a greater burden on low-income households.

4.7 CUMULATIVE EFFECTS

Potential cumulative effects for all of the alternatives are described below. Such an analysis is intended to consider the interaction of activities at the Little Pend Oreille NWR with other actions occurring over a larger spatial and temporal frame of reference. In addition, the inter-related effects of separate actions under the alternatives are considered.

Cumulative effects resulting from forest management actions: The problem of overstocked forests extends throughout forested areas on the public lands of Eastern Washington, Eastern Oregon, and Idaho. There is a concern throughout federal land management agencies, including the USDA Forest Service and the USDI Bureau of Land Management, about the problems posed by these overstocked forests, including the risk of catastrophic wildfires. Projects now being undertaken throughout Eastern Washington, Eastern Oregon and Idaho include measures to accelerate the development of large trees in forests across the region by thinning from below and use of prescribed fire for the purposes of reducing high fuel loads.

The combination of these region-wide actions (which would also occur at the Little Pend Oreille NWR under action Alternatives B, C, D, and E) could result in three potential cumulative effects.

First, existing air quality is thought to be far superior to that occurring prior to settlement; the improvement is a direct result of the fire suppression. With the simultaneous impetus to subject thousands or millions of acres to prescribed fire, there could be a significant short-term deterioration of air quality caused by burns of excess fuels occurring more or less simultaneously throughout the region. However, models show that regionally simultaneous prescribed burning still may not cause degradation severe enough to exceed EPA limits (see Air Quality effects analysis). In parallel, these simultaneous efforts to restore forest structures and restore the role of fire in ecosystem processes lead us to conclude that a cumulative long-term positive effect for plants and animals dependent on mature and late-successional forests may be anticipated.

Also, regional timber markets may be flooded with small-diameter timber, depressing prices and rendering many of the fuel reduction projects non-viable by commercial operators. This is an example of negative feedback which could diminish or slow the combination of cumulative effects mentioned above. A different cumulative effect could occur as a result of the No-action Alternative. The combination of recreational and Air Force disturbances under Alternative A could cause cumulative impacts to sensitive wildlife.

Cumulative effects resulting from recreation changes: All proposals to reduce or restrict recreational opportunities could cause increased pressure on other nearby public (or private) lands, particularly the Colville National Forest and Washington State Department of Natural Resources lands to the north, where numerous recreational opportunities exist. The extent of this displacement is difficult to predict at this time, though it is likely that users would seek recreation sites at similar distances from the major local population centers (Colville, Chewelah, Spokane) and that offer similar experiences (primitive campsites, lake fishing, etc.).

4.8 POTENTIAL IRRETRIEVABLE AND IRREVERSIBLE COMMITMENTS

The dedication of certain areas to main arterial roads represents an irretrievable loss of natural productivity by the Refuge under all alternatives. Likewise, maintaining campgrounds and campsites (as under Alternatives A, B, D, and E) represents an irreversible diminishment of productivity. Fields would be maintained in varying acres in all alternatives except Alternative D. This would represent an irretrievable loss of native forested habitat value.

Under Alternative A, there would be no attempt to manage excess fuels. Fire suppression would occur under all alternatives. Alternative A would thus result in an irretrievable loss of habitat value for those species requiring an open understory and an overstory dominated by larger, more scattered trees.

Commercial thinning, which would occur under Alternatives B, C, D, and E, as well as salvage, would result in an irretrievable loss of organic material to the soils on certain sites at Little Pend

Oreille NWR. Also, fish stocking, which is practiced now and would continue under Alternatives A, B, C, and E, could represent an irretrievably altered species balance in Refuge lakes and rivers.

4.9 RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

All of the action alternatives of this draft Comprehensive Conservation Plan are clearly aimed at enhancing the long-term productivity of the Refuge; that is, enhancing the habitat quality and quantity for native species. Existing uses that have been deemed incompatible (See Appendix F) will be eliminated or modified under the preferred Alternative E. Alternative C, D, and E adopt the most measures to enhance long-term productivity. Alternative B accommodates more existing short term human uses (specifically grazing and the Air Force Survival school), but also enacts sideboards to at least partially mitigate the effects of these uses on the long-term productivity. In summary, all action alternatives improve the enhancement of long-term productivity. The No-Action Alternative would allow long-term productivity to be compromised and further degraded.

4.10 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

The preferred alternative (Alternative E) is not expected to result in any unavoidable adverse environmental effects. Habitat and species monitoring that will be undertaken as part of the preferred alternative will enable Refuge staff to adapt management policies to any unforeseen situations.

Chapter 5: Public Involvement, Consultation, and Coordination With Others

5.1 PUBLIC INVOLVEMENT SUMMARY

The following summarizes public outreach including open houses, public meetings, plan work group meetings, camping survey results, planning update mailings, Federal Register notices, and some of the topics discussed or comments received.

Open Houses, Public Meetings

Date and Location of Outreach: July 29, 1995, Open House, at Refuge Headquarters
Purpose: To begin pre-scoping for management planning and hear from visitors what was special or important to them about the refuge.
Number of non-FWS Participants: 30
Audience: Public
Topics discussed: road closures, homesteading era, grazing, natural beauty, hunting, fishing, trapping, OHVs, non-motorized recreation, horseback riding, limit Bayley to catch and release only, quality fishing opportunities, search and rescue training, camping, migratory bird sanctuary, phase out snowmobiling, grazing, and hunting

Date and Location of Outreach: October 17, 1995, Meeting, Colville High School, Colville, Washington
Purpose: To initiate public scoping in the planning process.
Number of non-FWS Participants: 42
Audience: Public
Topics discussed: special and unique features of the Little Pend Oreille Refuge, draft goals, encroachment of trees in meadows, partnering with public service groups, weeds, hunting predators, cattle and bank erosion along streams, managing fences, natural restoration, loud parties and litter, law enforcement, Air Force conflicts with wildlife and recreationists, Air Force noise, entrances for non-motorized and foot traffic, educational opportunities, gates for horses, monitoring of activities, maintaining diverse uses, safety, horseback riding tradition, hunting closure during Air Force training, road closures, fees for use, field management, fund generation, timber management, wildlife richness in past and off refuge, refuge boundary signing, government intrusions on citizen freedoms, old homestead sites and artifacts, vandalism, volunteers, motorcycle damage to trails, noxious weeds, logging for white-tailed deer, free outdoor recreation, cattle in riparian zones, access by Air Force, restoration and use of old fields, community support, road closures, information signs, off-road vehicles, windfall cleanup, sanitary facilities near water, grooming of trails, cattle corral, Air Force road maintenance work, dump station for RVs, old fencing removal, spring repair, organic matter choking lakes, dispersed camping in riparian areas, bank stability, fish stocking, fire control roads, primitive nature of camping, horse hitching posts, and large groups

Date and Location of Outreach: July 29, 1998, Open House at Colville High School, Colville, Washington
Purpose: To present and discuss preliminary alternatives.
Number of non-FWS Participants: 22
Audience: Public
Topics discussed: camping traditions, campsites designation, congestion, hunting restrictions, benefits of weed free hay, photographic documentation of old homesteads, Air Force disturbances to wildlife, grazing modifications, management of old fields, aspen restoration, limits of economic benefits from thinning, weed control, road construction, technologies for forest harvest without roads, map improvements, the return of low-intensity fire, and inholding consolidation

Date and Location of Outreach: July 30, 1998, Open House at Inland Northwest Wildlife Council Headquarters, Spokane, Washington
Purpose: To present and discuss preliminary alternatives.
Number of non-FWS Participants: 17
Audience: Public
Topics discussed: road closures, earth science education, horse presence on trails, camping in the riparian zone, predator trapping, Air Force road maintenance, primitive state of refuge, public access, partnerships with user and friends groups, grazing impacts and benefits, mast for deer and turkey, cropping for wildlife forage, Air Force impacts, natural spawning, white tailed deer, and refuge revenue distribution

Date and Location: August 4, 1998, Meeting, Inland Northwest Wildlife Council Headquarters, Spokane, Washington
Purpose: To present and discuss issues and alternatives for CCP.
Number of non-FWS participants: 60
Audience: Inland Northwest Wildlife Council members
Topics discussed: Air Force hunting closure, camping and hunting, deer management, ORV use

Date and Location: May 12, 1999, Meeting, Community College, Colville, Washington
Purpose: To present draft CCP/EIS, field questions, encourage written comments
Number of non-FWS participants: 53
Audience: public
Topics discussed during question and answer period: snowmobiling, collecting, special use permit process, forest management, dog sledding, horseback riding, camping, fees, Refuge Improvement Act

Date and Location: May 13, 1999, Meeting, Inland Northwest Wildlife Council Headquarters, Spokane, Washington
Purpose: To present draft CCP/EIS, field questions, encourage written comments.
Number of non-FWS participants:50

Audience: public
Topics discussed during question and answer period: funding, IEB horsemen helping with trails, visitor days, camping fees, snowmobiling, white-tailed deer herd status, hunter camping, wild turkey populations, fly fishing, prescribed fire, and Air Force phase out

Plan Working Group

In 1997, the Service convened a group of interested persons, a plan work group, representing diverse interests and backgrounds and major stakeholders, to provide feedback to the planning team during the comprehensive conservation planning process.

Name(s)	Representing
John Andrews	Washington Department of Fish and Wildlife
Dan and Evelyn Bell	refuge neighbors, inholding owners, and Safari Club International
Gary Bellinger	horseback riding interests
John Blauser	archery hunting interests
Connie and Gene Cada	refuge grazing permittees and Stevens County Cattlemen s Assoc.
Timothy Coleman	Kettle Range Conservation Group
Ken Elliot	Inland Empire Backcountry Horsemen
Sara Folger	Lands Council
Chuck Gades	Stimson Lumber Company
Bob Gillaspy	Natural Resource Conservation Service
Rick Hatcher	Air Force Survival School
Larry Heming	Inland Empire Backcountry Horsemen
Ron King	Washington Department of Natural Resources
Greg Konkel	Inland Northwest Wildlife Council
Tim Kunka	Stevens County Cattlemen s Association
Dan Len	Colville National Forest
Cena Lotze	horseback rider
Beverly McLaughlin	conservationist
George Potter	Inland Empire Fly Fishing Club
Scott Price	wildlife photographer
Dick Rivers	Spokane Audubon Society and Lands Council
Dave Robinson	Kettle Range Conservation Group
Shelly Short	Congressman George Nethercutt s office
Tony Delgado	Stevens County Federal Lands Advisory Committee
Jim Kolthoff	Colville National Forest/Air Force Survival School
Russ Larsen	Stevens County Federal Lands Advisory Committee

Others attending these meetings included Kevin Morrissey, Lello Galassi, and Al Bobst from the Air Force Survival School; Ed Shaw and Chris Loggers from the Colville National Forest; and Steve Zender from Washington Department of Fish and Wildlife. Others invited to participate in

this work group included: Duane Scott, Mayor of Colville, WA, Fred Lotze, Stevens County Commissioner; Steve Rumsey; Publisher Open Spaces, Tricounty Recreation Guide; and Rod Fogle, former Colville Chamber of Commerce President.

Date and Location of Outreach: June 30, 1997, meeting, Colville Community Center
Purpose: First in a series of meetings of interested citizens and stakeholders in CCP discussions
Number of non-FWS Participants: 17
Audience: Plan Working Group
Topics discussed: introductions, issues as seen by organizations/people in this group, management of wildfires, logging and white-tailed deer management, grazing, trail and road maintenance funds, equal consideration for all wildlife, historic vegetation conditions, off-refuge wildlife values, Air Force training, effects of commercial uses on wildlife, Interior Columbia Basin Ecosystem Management Project, ecosystem management approach, road maintenance, primacy of wildlife, grazing allotment fencing, quality fishing, wildlife diversity, dependence on natural processes, including fire, winter range, risk of fire, budget and staff needed to implement plan, Air Force services to refuge, Air Force conflicts with wildlife, road closures, logging methods and benefits, logging influence on noxious weeds, human use as related to logging roads, water quality and roads, grazing incompatibility with other uses, elk/cattle conflict, wildlife objectives met by grazing, grazing riparian damage, hunting closure associated with Air Force, helicopter use by Air Force, restorations, core areas for seclusion-dependent species, and inclusion of other interests, others who should be invited to these meetings

Date and Location of Outreach: August 11, 1997, Meeting, Stevens County
Purpose: Second in series of meetings of interested citizens and stakeholders in CCP discussions; preliminary management objectives.
Number of non-FWS Participants: 14
Audience: Plan Working Group
Topics discussed: riparian issues, preliminary management objectives for riparian areas, preliminary management objectives and strategies for public use, riparian survey methodology, and proper functioning condition definition

Date and Location of Outreach: September 29,1997, Meeting, USDA/Stevens County Conservation District Conference Room, Colville
Purpose: Third in a series of meetings of interested citizens and stakeholders in CCP discussions; roads and access, biological workshop summary, alternative development
Number of non-FWS Participants: 22
Audience: Plan Working Group
Topics discussed: passage of NWRS Improvement Act, roads and entrances, weeds, draft vegetation maps, goal statement revisions, summary of September 16-17, 1997, biological workshop, summary of potential management tools being considered,

measurable objectives, natural fire regime, timber management, retain management flexibility

Date and Location of Outreach: July 28, 1998, Meeting at Colville National Forest Supervisor s Office Conference Room; Colville, Washington.
Purpose: Fourth in a series of meetings of interested citizens and stakeholders in CCP discussions; discuss preliminary alternatives.
Number of non-FWS Participants: 13
Audience: Plan Working Group
Topics discussed: historic uses, deer depredations on adjacent agriculture lands, native biodiversity, grazing AUMs, Air Force, natural disturbances, habitat restoration, road closures, fur trapping, fire program, road rehabilitation, white-tailed deer population fluctuations, stream restoration, weed control, diverse vegetation types on refuge, fish stocking, refuge contributions to local economy, and camping fees

Date and Location of Outreach: May 11, 1999, Meeting at Community College Classroom; Colville, Washington.
Purpose: Fifth in a series of meetings of interested citizens and stakeholders in CCP discussions; discuss draft CPP/EIS
Number of non-FWS Participants: 8
Audience: Plan Working Group
Topics discussed: grazing: other refuges use of grazing, grazing plan submitted by permittees, science used, deer, 100-year flood, ICBEMP standards referenced in fish habitat assessment; Air Force: hunting closure, compatibility determination, Improvement Act and military preparedness; new compatibility policy; LPO uses in Federal Register; credentials of regional director; trading LPO

Camping Survey

Date and Location of Outreach: May-June, 1997, written public use survey at campgrounds at the Refuge
Purpose: To discover public reasons for using the Little Pend Oreille Refuge, and solicit information on public concerns
Number of Responses: 20
Audience: Campers
The responses indicated: 60% of campers came from Spokane area, 15% from Stevens County, and 25% from Western Washington, 35% came to the Refuge primarily to camp, 35% came primarily to fish, and 30% came to the Refuge primarily to view wildlife. Special qualities of the Little Pend Oreille that campers enjoy include: traditional camping area, not many people, good horse country, and enjoy large trout, catch and release fishing, away from logging

Planning Updates

Date of Outreach: February, 1996, Mailing of Planning Update # 1
Purpose: To share information gathered from open houses in July and October 1995, present issues to be addressed in the plan, and present potential draft goals.
Number of recipients: 300
Audience: Refuge mailing list

Date of Outreach: April, 1997, Mailing of Planning Update # 2
Purpose: To disseminate results of recent biological inventory findings, share draft management principles and goals, and advise public of upcoming public meetings and workshops
Number of recipients: 400
Audience: Refuge mailing list

Date of Outreach: September, 1997, Mailing of Planning Update # 3
Purpose: To summarize progress on CCP planning; disseminate results of recent biological inventory findings; share draft management strategies for refuge management; and advise public of upcoming public meetings and workshops.
Number of recipients: 400
Audience: Refuge mailing list and refuge visitors

Date of Outreach: July 10, 1998, Mailing of Planning Update # 4
Purpose: To present preliminary alternatives, advise public of upcoming open houses and invite comment on the preliminary alternatives.
Number of recipients: 500
Audience: Refuge mailing list and other interested parties
Comments were received indicating: By December 1, 1998, 141 written responses were received. Comments are too varied and numerous to summarize here, but received support for the preliminary alternatives as follows: 48 responses for Alternative A, 44 responses for Alternative B, 4 responses for Alternative C, 3 responses for Alternative D, 1 response for Alternative E, 1 response preferring Alternative A or Alternative B, 28 responses preferring either Alternative B or Alternative C with specific modifications, and 5 responses preferring none of the preliminary alternatives

Date of Outreach: April 29, 1999, Mailing of Planning Update # 5
Purpose: To present alternatives, advise public of upcoming open houses and invite comment on the draft CPP/EIS.
Number of recipients: 800
Audience: Refuge mailing list and other interested parties
Comments were received indicating: See Appendix J - Comments on Draft CCP/EIS and Service Responses

Federal Register Notices

Date and Location of Outreach: December 13, 1996, listing in the Federal Register
Purpose: Notice of Intent to Prepare a Comprehensive Management Plan and NEPA document
Audience: National
Notice included: Public notice of initiation of planning process for the Refuge, and solicitation of written suggestions and information

Date and Location of Outreach: July 24, 1998, listing in the Federal Register
Purpose: Notice of Intent to Prepare a Comprehensive Conservation Plan and EIS
Audience: National
Notice included: Public notice of preliminary alternatives developed for the Little Pend Oreille Comprehensive Conservation Plan, solicitation of written suggestions and information on the alternatives, and announcement of public open house meetings

Date and Location of Outreach: May 5, 1999, listing in the Federal Register
Purpose: Notice of availability of Draft Comprehensive Management Plan and Draft Environmental Impact Statement
Audience: National
Notice included: Public notice announcing that a Draft Comprehensive Conservation Plan and Draft Environmental Impact Statement for the Refuge was available for public review with comments due on June 30, 1999, and to announce public open house meetings

Date and Location of Outreach: July 5, 1999, listing in the Federal Register
Purpose: Notice of extension of public comment period.
Audience: National
Notice included: Public notice announcing that the comment period for the CCP/EIS drafts was extended to July 31, 1999

Date and Location of Outreach: August 25, 1999, listing in the Federal Register
Purpose: Notice of extension of public comment period.
Audience: National
Notice included: Public notice announcing that the comment period for the CCP/EIS drafts was extended to August 31, 1999

5.2 CONSULTATION AND COORDINATION WITH OTHERS

Stevens County

Date and Location: March 7, 1995
Purpose: To brief Commissioners of upcoming planning process.
Number of non-FWS participants: 6
Audience: Stevens County Board of Commissioners
Topics discussed: weed management, grazing, involving Stevens County Federal Land Advisory Committee (FLAC) in plan development

Date and Location: March 16, 1995
Purpose: To inform FLAC members of refuge projects, upcoming planning, endangered species.
Number of non-FWS participants: Unknown
Audience: Stevens County Federal Lands Advisory Committee
Topics discussed: planning status, refuge policy, FLAC members interested in developing planning process and strategy, weed management

Date and Location: September 21, 1995
Purpose: To brief for FLAC on refuge projects, planning.
Number of non-FWS participants: 7
Audience: Stevens County Federal Lands Advisory Committee
Topics discussed: Clearwater Land Exchange proposal, management plan, upcoming public scoping meeting, forest management, fire management, commercial uses of refuge

Date and Location: January 16, 1997
Purpose: To inform FLAC members of refuge projects, planning process.
Number of non-FWS participants: Unknown
Audience: Stevens County Federal Lands Advisory Committee
Topics discussed: fishing dock, management plan update, overviews of fish habitat and riparian surveys, upcoming grazing review

Date and Location: March 20, 1997
Purpose: To brief FLAC on refuge projects.
Number of non-FWS participants: 8
Audience: Stevens County Federal Lands Advisory Committee
Topics discussed: bull trout listing, grazing, damage on refuge from winter storms, planning update

Date and Location: July 16, 1997
Purpose: To brief FLAC on CCP.
Number of non-FWS participants: 6
Audience: Stevens County Federal Lands Advisory Committee
Topics discussed: comments received on preliminary alternatives, grazing study, Air Force, whether our outreach efforts are reaching interested parties

Date and Location: May 18, 1999
Purpose: To brief commissioners on draft CCP/EIS.
Number of non-FWS participants: 4
Audience: Stevens County Board of Commissioners

Date and Location: May 20, 1999
Purpose: To brief FLAC on draft CCP/EIS.
Number of non-FWS participants:
Audience: Stevens County Federal Lands Advisory Committee
Topics discussed: plan implementation and human uses, NEPA process, snowmobiling, wildland fire prevention, feeding deer, monitoring plan, weed control

FWS Orientation

Date and Location: May 23-25, 1995
Purpose: First step in planning process development and served as a field orientation to Fish and Wildlife Service personnel who would be involved in LPO planning.
Number of non-FWS participants: 12
Audience: Participants were invited because either they would have some role in refuge planning (FWS staff), they managed adjacent or other public lands, or have worked on some aspect of LPO management.
Topics discussed: draft goals, field orientation discussion covered: old fields, noxious weeds, historic vegetation and fire history, homesteading history, Bayley Lake, adjacent forest management by FS, leafy spurge, recreational fishing, prescribed burning, Washington GAP report, Air Force training, stream diversions, grazing program, bank stability, fish habitat, logging history, forest management techniques, deer winter range, forest diversity, old growth species, industrial timber inholdings management, forest carnivores, snowmobiling, adjacent DNR management, forest fragmentation, riparian habitat condition, desired future of refuge, priorities, and issues. The following sites were visited: Christiansen place Cliff Ridge overlook, Potter s Pond, Bayley Lake, Lenhart Meadows and adjacent unmanaged/unroaded forest, AF Rookery/cedar camp, McDowell Lake overlook, Little Pend Oreille River downstream from Headquarters, Starvation Flat, Lower Manz Field, Blacktail Mountain cedar hemlock, Plum Creek inholdings, Olson Creek Road sno-park

Grazing Management

Date and Location: October 8, 1997 meeting at USDA/Stevens County Conservation District Office Conference Room, Colville, Washington
Purpose: To discuss specific concerns about refuge grazing program with permittees and potential role of grazing in meeting CCP goals and objectives.
Audience: Refuge permittees and other grazing interests
Number of non-FWS participants: 10
Topics discussed: permittees concerns related to preliminary objectives presented in planning updates and plan work group meetings, role of grazing in meeting objectives, Service grazing policy, riparian restoration, grazing as a tool, intensive management, overstocked forest, permittees preparing a grazing alternative for CCP, fences, competition between cows and ungulates, fish habitat objectives

Date and Location: June 2, 1999 meeting at USDA/Stevens County Conservation District Office Conference Room, Colville, Washington
Purpose: To discuss preferred alternative for grazing in draft CCP/EIS
Audience: Stevens County Cattlemen s Association
Number of non-FWS participants:
Topics discussed: grazing: 1938 concerns of cattlemen related to Biological Survey management, promises made in 1930's, grazing as a refuge purpose, refuge definition, effect on permittees and local economy, involving a range consultant, grazing under State management, ICBEMP standards not accepted, permittees grazing alternative, Refuge Improvement Act, deer and deer habitat, prescribed grazing - where, when, how many cows

Air Force Survival School Training

Date and Location: July 7, 1997 meeting at Air Force Survival School Headquarters, Fairchild, Washington.
Purpose: To discuss concerns regarding Air Force Survival School Training.
Number of non-FWS Participants: 14
Audience: Air Force Survival School
Topics discussed: discussions about balancing divergent missions of refuge and survival school

Date and Location: April 22, 1998, meeting at Colville Community College, Colville, Washington.
Purpose: To discuss CCP process and concerns regarding Air Force Survival School Training
Number of non-FWS Participants: 5
Audience: Colville National Forest staff
Topics discussed: Air Force survival school training on both administrative units

Date and Location: July 8, 1998, meeting at Refuge Headquarters, Colville, Washington.
Purpose: To discuss concerns regarding Air Force Survival School Training.
Number of non-FWS Participants: 5
Audience: Air Force Survival School
Topics discussed: Air Force survival school training and stipulations to insure compatibility, opening hunting season

Date and Location: December 9, 1998, meeting at Air Force Survival School Headquarters, Fairchild Air Force Base, Washington.
Purpose: To discuss concerns regarding Air Force Survival School Training.
Number of non-FWS Participants: 4
Audience: Air Force Survival School
Topics discussed: preferred alternative for Survival School training, alternate training sites

Other Outreach

Date and Location: April 28, 1999, at Refuge Headquarters; Colville, Washington.
Purpose: Program on draft CCP/EIS.
Number of non-FWS Participants: 15
Audience: Washington Department of Natural Resources staff
Topics discussed: closing Starvation Lake access and effect on DNR campground users, snowmobile route, fire and forest management.

Date and Location: May 11, 1999 at Cookie s Cafe; Colville, Washington.
Purpose: Program on draft CCP/EIS.
Number of non-FWS Participants: 50
Audience: Colville Chamber of Commerce
Topics discussed: economic effects, Air Force phase out, deer management

Date and Location: June 9, 1999, at Woody s Restaurant; Colville, Washington.
Purpose: Program on draft CCP/EIS.
Number of non-FWS Participants: 42
Audience: Colville Rotary Club
Topics discussed: access, grazing management, Air Force phase out, fishing, hunting, Refuge Improvement Act

Date and Location: July 21, 1999, at Refuge Headquarters; Colville, Washington.
Purpose: Discuss draft CCP/EIS and snowmobile issue.
Number of non-FWS Participants: 12
Audience: snowmobilers

Topics discussed: snowmobiling: impacts on snowmobilers, FWS concerns - compatibility, not a priority use; groomer access, state trail since 1976, competition between lynx, bobcat coyote, estimating use, economic effects to Beaver Lodge, alternative routes, planning process

Date and Location: July 27, 1999 at Colville Forest Supervisor s Office; Colville, Washington.
Purpose: Briefing on draft CCP/EIS.
Number of non-FWS Participants: 20
Audience: Colville Forest Leadership Team

Media

Information, in the form of press releases and fact sheets, was provided to the regional media - newspapers, radio, television, prior to all meetings and open houses. Fliers were posted at key locations in Colville for all public meetings and open houses.

5.3 ACKNOWLEDGMENTS

Many people have been involved in meetings and discussions related to the future of Little Pend Oreille National Wildlife Refuge. These meetings began in 1995, with an orientation to the refuge for upper management. We thank all of the following individuals for their thoughtful discussions and insight.

In 1997, we convened a group of interested persons, a plan work group, representing diverse interests and backgrounds, to provide feedback to the planning team during the comprehensive conservation planning process. We thank them for their honest feedback.

Plan Work Group

John Andrews (Washington Department of Fish and Wildlife); Dan and Evelyn Bell (refuge neighbors, inholders, and Safari Club International members); Gary Bellinger, (horseback rider); John Blauser (refuge archery hunter); Connie and Gene Cada (refuge grazing permittees and Stevens County Cattlemen s Association); Timothy Coleman, (Kettle Range Conservation Group); Ken Elliot (Inland Empire Backcountry Horsemen); Sara Folger (Lands Council); Chuck Gades (Stimson Lumber Company); Bob Gillaspy (Natural Resource Conservation Service); Rick Hatcher (Air Force Survival School); Larry Heming (Inland Empire Backcountry Horsemen); Ron King (Washington Department of Natural Resources); Greg Konkel (Inland Northwest Wildlife Council); Tim Kunka (Stevens County Cattlemen s Association); Dan Len (Colville National Forest); Cena Lotze (Horseback Rider); Beverly McLaughlin (conservationist); George Potter (Inland Empire Fly Fishing Club); Scott Price (wildlife photographer); Dick Rivers (Spokane Audubon Society and Lands Council); Dave Robinson (Kettle Range Conservation Group); Shelly Short (Congressman George Nethercutt s office);

Tony Delgado (Stevens County Federal Lands Advisory Council); Jim Kolthoff (Colville National Forest/Air Force Survival School liaison); and Russ Larsen (Stevens County Federal Lands Advisory Council). Others attending one of these meetings included Kevin Morrissey, Lello Galassi, and Al Bobst from the Air Force Survival School; Ed Shaw and Chris Loggers from the Colville National Forest; and Steve Zender from Washington Department of Fish and Wildlife.

Fish and Wildlife Service

Many Service employees attended planning meetings and/or provided input on draft documents including: Howard Browers (wildlife biologist, Upper Columbia Fish and Wildlife Office); Brian Cates (field supervisor, Mid-Columbia Fish and Wildlife Office); Rick Coleman (formerly regional refuge supervisor for Idaho, Oregon, and Washington); Nancy Curry (refuge manager, Turnbull NWR); Michelle Eames (wildlife biologist, Upper Columbia Fish and Wildlife Office); Julie Gillum (regional writer/editor); Ben Harrison (regional NEPA coordinator); Chuck Houghten (regional refuge planner); Barb Kelly-Ringel (fisheries biologist, Mid-Columbia Fish and Wildlife Office); Dick Kuehner (regional education, publications and interpretive communications chief); Phil Laumeyer (field supervisor, Upper Columbia Fish and Wildlife Office); Jim Lillie (LPONWR administrative officer); Karl Mallory (maintenance worker/law enforcement officer, LPONWR); Dave Menke (outdoor recreation planner, Klamath NWR Complex); Steve Moore (regional refuge operations chief); Dick Munoz (assistant regional refuge supervisor for Idaho, Oregon, and Washington); Sandy Noble (assistant field supervisor, Mid-Columbia Fish and Wildlife Office); Fred Paveglio (regional biologist); Bill Pyle (biologist, Gray s Lake NWR); Mike Rule (biologist, Turnbull NWR); Lou Ann Speulda (regional archeologist/historian); Don Voros (refuge supervisor for Columbia Basin Ecoregion); and Tara Zimmerman (regional nongame biologist).

Others

Others providing input during planning meetings included: Dr. Margaret O Connell, Eastern Washington University; Lt. Col. William Osborne, Chief Carson House, Lt. Col. Steve Childers, SMSgt. Clay Steele from the Air Force Survival School; Jim McGowan, Cindy Len, Julie Richardson, and Carl Damman from the Colville National Forest; Chuck McComb, Washington Department of Fish and Wildlife; Jim Gleaton, Natural Resource Conservation Service; Kevin Ritzer, Bureau of Indian Affairs; Bruce Edmonston, National Park Service; and Phil Dubois, Rick and Roger Larsen, and Andy and Bobbi Kroiss who are Refuge grazing permittees.

Post Draft CCP/EIS input was appreciated from the following sources: Ken Hull - Chewelah Sno-Posse Snowmobile Club; Larry Inman - Driftriders Snowmobile Club and former trail groomer; Robert Beech - owner of Beaver Lodge; and Perry Anderson - Colville Chamber of Commerce.

Chapter 6: List of Preparers

Name	Contributions	Degree(s)	Years of Experience
U.S. Fish and Wildlife Service Contributors:			
PNW Refuge Planning Team:			
Mike Marxen	Planning Team Leader	BLA Landscape Architecture	20
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Helen Hamilton	Writer/Editor	BS Wildlife Management & Forestry, Minors in Range Management & History	20
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Little Pend Oreille NWR:			
Lisa Langelier	Refuge Management, Writing, Public Involvement	BS Wildlife Resources MS Wildlife Resources	17
Jerry Cline	Wildlife and Fisheries, Writing	BS Wildlife MS Wildlife	10
Steve Fowler	Forestry, Fire, Operations, Writing	BS Forestry & Wildlife	20
Barbara Rasch	Mailing and Comments Sections	BS Biology	4
Regional Office and Field Stations:			
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http://www.fws.gov
http://www.r1.fws.gov/planning/plnhome.html

Refuge Information
1 800/344 WILD

Whitetail deer, McDowell Lake,
Ponderosa pine stand, and
background photo/USFWS
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