DRAFT Management Plan
and Environmental Assessment
October, 2006

Kenai National Wildlife Refuge
U.S. Fish and Wildlife Service

# Skilak Wildlife Recreation Area

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United States Department of the Interior
FISH AND WILDLIFE SERVICE
1011 E. Tudor Road
Anchorage, Alaska 99503-6199

Dear Reader,

Enclosed is the DRAFT Management Plan and Environmental Assessment for Kenai National Wildlife Refuge's Skilak Wildlife Recreation Area. The DRAFT Plan identifies three alternatives for enhancing wildlife viewing, environmental education, interpretation, photography, and other non-conflicting wildlife-dependent recreation opportunities throughout the 44,000-acre Skilak Wildlife Recreation Area. It also presents our evaluation of the environmental consequences associated with implementing each of the alternatives. The final version of this plan will guide future management of the Skilak Wildlife Recreation Area.

This DRAFT Plan has been sent to you because public involvement in the planning process is essential for development of an effective plan. Please review and provide comments on the plan's contents by **November 17, 2006**. Comments should be specific, addressing merits of the alternatives and adequacy of the environmental analysis. We will consider your comments as we prepare the FINAL Plan.

All public comments received, including respondent names and addresses, will be included in the planning record, which will be available for public review. If you, as an individual, wish us to withhold your name or address, state this prominently at the beginning of your comments. We will honor your request to the extent allowed by law. All comments from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be available for public inspection. Anonymous comments will not be considered. Comments should be mailed, e-mailed, or provided orally by **November 17, 2006**, to:

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The DRAFT Plan is available on CD-ROM from Rob Campellone, or on the Internet at http://alaska.fws.gov/nwr/planning/kenpol.htm under *Step-down Management Plans*.

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# Kenai
# National Wildlife Refuge

## Skilak Wildlife Recreation Area

## Draft Management Plan
## and
## Environmental Assessment

**October 2006**

*Prepared by*
*U.S. Fish and Wildlife Service*

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# Chapter 1: Introduction

## Introduction

This chapter identifies the action the U.S. Fish and Wildlife Service will take through this planning document, and the purpose and need for taking the action. It describes decisions the U.S. Fish and Wildlife Service Regional Director has to make in light of information provided in the document, provides background information on events that have led the Service to undertake this planning effort, and provides a rationale for coordinating planning efforts with the State of Alaska.

### *1.1 Proposed Action*

The Kenai National Wildlife Refuge is proposing to update, consolidate, and modify as necessary management direction provided in the Skilak Wildlife Recreation Area Species Management Plan (1986) and the Skilak Wildlife Recreation Area Public Use Facilities Plan (1988). The revised Skilak Wildlife Recreation Area Management Plan will identify strategies for providing and enhancing wildlife viewing, interpretation, photography, and where appropriate, other non-conflicting wildlife-dependent recreation opportunities throughout the Skilak Wildlife Recreation Area (or Skilak WRA).

### *1.2 Purpose and Need*

The purposes of the revised step-down management plan are:

1. To identify and describe where wildlife viewing, interpretation, and photography opportunities may be provided or enhanced within the Skilak WRA;
2. To identify where development of compatible facilities and programs to facilitate wildlife viewing, interpretation, and photography opportunities would occur during the life of the plan;
3. To consider and facilitate the development of other wildlife-dependent recreation opportunities that do not conflict with #1 & #2 above.

Most of the actions identified in the 1988 Skilak WRA Public Use Facilities Plan have been implemented. However, for a variety of reasons, some of the projects identified in the plan have not been implemented and the environmental assessment for those projects is over 18 years old. The Refuge needs to take a new look to see which projects from the existing plan should be pursued and what additional opportunities exist to contribute to the Kenai Refuge Comprehensive Conservation Plan management direction to provide enhanced opportunities for wildlife viewing, interpretation, and photography. It also needs to update the environmental assessment for those projects, and conduct an assessment of impacts associated with new projects.

The management strategies described in the revised step-down management plan will meet the following need: Identification of wildlife viewing, interpretation, photography, and other non-

conflicting wildlife-dependent opportunities, facilities, and programs in the Skilak WRA. Identification of appropriate and compatible public use opportunities, facilities, and programs will ensure that quality wildlife-dependent recreation opportunities are provided for the public's use and enjoyment as directed by the Refuge's Comprehensive Conservation Plan.

## *1.3 Decisions That Need To Be Made*

The Regional Director will decide what, if any, actions identified in this Environmental Assessment (EA) to undertake in the Skilak WRA over the next 5 years. The Regional Director will also determine whether this EA is adequate to support a Finding of No Significant Impact (FONSI) decision, or whether an Environmental Impact Statement (EIS) will need to be prepared.

## *1.4 Background*

The Refuge Administration Act, as amended, establishes wildlife-dependent recreational uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) as priority general public uses of the Refuge System, and that if found compatible with refuge purposes, should receive enhanced and priority consideration in refuge planning and management over other general public uses.

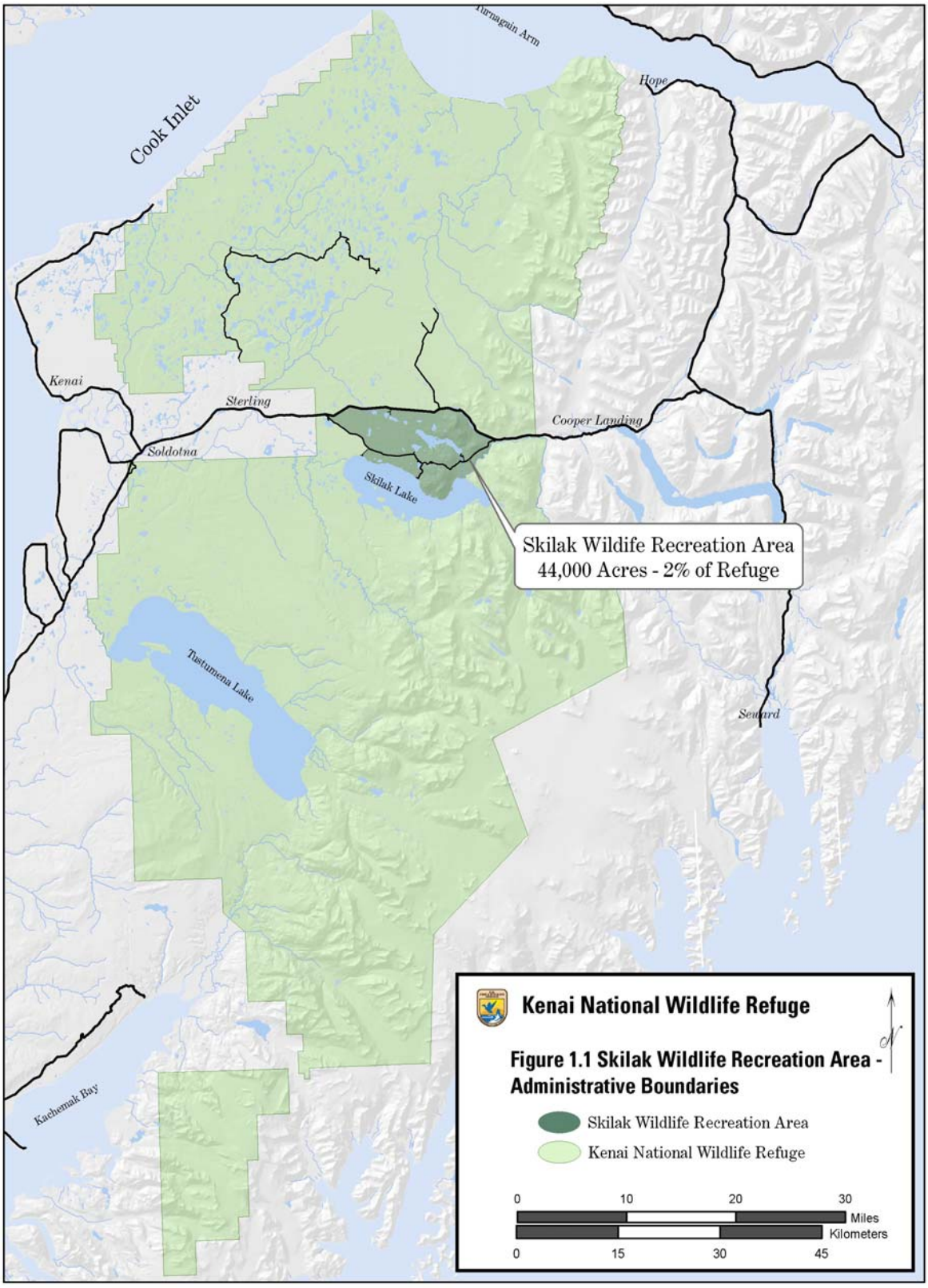
The 1.98 million acre Kenai National Wildlife Refuge (Kenai NWR) is unique among Alaskan refuges in that it includes wildlife-oriented recreation, interpretation, and environmental education among the major purposes for which the refuge was established as identified in Section 303(4) of the Alaska National Interest Lands Conservation Act (ANILCA) of 1980.

Section 304(g) of ANILCA directs the Secretary of the Interior "to prepare, and from time to time, revise, a comprehensive conservation plan…for each refuge (in Alaska)…" In 1984, Kenai Refuge's Comprehensive Conservation Plan was developed. The planning process involved several years of data collection and analysis. The general public and various federal, state, and local agencies participated in the process, helping to identify issues and provide comments on Service proposals. The Record of Decision to begin implementation of the plan was signed by the Regional Director in 1985.

The Comprehensive Conservation Plan directed the Service to establish a special area that would be managed to increase opportunities for wildlife viewing, interpretation and photography:

> *"The entire refuge would remain open to hunting and trapping, except for areas where public safety is a concern (i.e., campgrounds, the headquarters/visitor center in Soldotna, etc) and in the Skilak Loop Special Management Area, where special restrictions on hunting and trapping apply. This area…would be managed to provide enhanced opportunities for wildlife viewing."* (Kenai NWR Comprehensive Conservation Plan)

The Comprehensive Conservation Plan also directed the Service to improve public use facilities in the Skilak Loop Special Management Area – an area approximately 44,000-acres in size, or 2.2% of the Refuge (Figure 1.1). These facilities included campgrounds, trails, boat launches, and interpretive signs.


Turnagain Arm
Cook Inlet
Hope
Kenai
Sterling
Cooper Landing
Soldotna
Skilak Lake
Skilak Wildife Recreation Area
44,000 Acres - 2% of Refuge
Tustumena Lake
Seward
Kachemak Bay
Kenai National Wildlife Refuge
Figure 1.1 Skilak Wildlife Recreation Area - Administrative Boundaries
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
0 10 20 30
Miles
Kilometers
0 15 30 45

In December, 1986, the Service developed a species management plan for the Skilak Loop Special Management Area. The plan identified the following three specific goals:

1. *To provide the public with opportunities to view a diversity of wildlife/wildlands;*
2. *To interpret the diversity of wildlife/wildlands, and;*
3. *To allow for a limited public harvest of certain species when such harvest is necessary to achieve the first and second goal.*

To attain the wildlife viewing objectives identified in the Comprehensive Conservation Plan, hunting and trapping opportunities were limited so wildlife would become more abundant, less wary, and easily viewed. The Service worked closely with the Alaska Department of Fish and Game (ADF&G) to develop regulatory proposals that limited trapping, allowed taking of small game by archery, and provided a moose hunt by special permit. In 1987, the Board of Game approved these regulations that provided a framework for achieving the wildlife population objectives for enhanced wildlife viewing opportunities.

To further support development of wildlife viewing, environmental education, and interpretation opportunities in the Skilak Loop Special Management Area, the Service adopted a contractor's recommendation (Land Design North, Inc) to name it the Skilak Wildlife Recreation Area, and in 1988, developed a Public Use Facilities Step-Down Management Plan for the area. The plan proposed development of public use facilities to supplement existing facilities including: an additional day use area, 4 additional campgrounds, 20 additional interpretive signs, 12 additional pullouts, 7 additional trails, and a new visitor contact facility. The Service has been implementing the plan over the past 18 years by developing public use facilities in the area as funding has permitted. Management direction identified in that plan that has yet to be implemented is identified in Alternative A (the No Action Alternative) of this document.

In March 2005, the Board of Game adopted regulations providing for the use of firearms to hunt small game and fur animals in the Skilak WRA. In September 2005, the Board delayed implementation of the authorization until July 2007, supporting efforts of the FWS to prepare a Skilak WRA Management Plan. This management plan fulfills management direction provided in the Refuge's Comprehensive Conservation Plan by consolidating, updating, and modifying, where necessary, management direction provided in previous step-down management plans.

## *1.5 Coordination With The State Of Alaska*

In 1982, the Service and ADF&G signed a Master Memorandum of Understanding that defines the cooperative management roles of each agency and identifies the framework for cooperation between the two agencies. ADF&G has the primary responsibility for managing fish and resident wildlife populations in the state. On Refuge lands, ADF&G manages fish and resident wildlife populations in their natural species diversity. The Service conserves fish, wildlife, and their habitats, and regulates human use on Refuge lands. The Service and ADF&G share a concern for all fish and wildlife resources and their habitats, and both agencies are engaged in extensive fish and wildlife conservation, management, and protection programs.

The State of Alaska establishes fishing, hunting, and trapping regulations throughout the state at

the direction of the Board of Fisheries and Board of Game. These regulations apply to federal public lands unless superseded by federal regulations. The state is divided up into 26 game management units (GMU); most of these are further divided into game management subunits (GMS). Management objectives are developed for populations within the GMUs. All of Kenai Refuge lands lie within GMU 7, 15A, 15B, or 15C. The Skilak Wildlife Recreation Area falls within GMU 15A.

# Chapter 2: Management Direction

## Introduction

This chapter describes three alternatives for managing the Skilak WRA including the Service's preferred alternative (Alternative B). The alternatives comply with the National Environmental Policy Act (NEPA), the Alaska National Interest Lands Conservation Act (ANILCA), and other pertinent laws. They were designed to respond to the issues identified during scoping and present an option for addressing each issue. In addition to responding to public comments and interests, each of the alternatives must be responsive to the mission and goals of the Service and of the National Wildlife Refuge System. The purposes of the Refuge and this planning document's purpose and need, as identified in Chapter 1, also direct actions that could be considered.

## *2.1 Alternatives*

### 2.1.1 Alternative A (No Action Alternative)

This is the No Action Alternative as required by NEPA. It describes what would happen with a continuation of current management direction and serves as a baseline against which to compare other alternatives.

**Management Direction By Issue**

*Issue 1: How can the Service enhance wildlife viewing and photography opportunities within the Skilak WRA?*

Administrative Boundaries

Existing administrative boundaries would be maintained (Figure 2.1):

> "The Skilak WRA consists of all lands bounded by a line beginning at the easternmost junction of the Sterling Highway and the Skilak Loop Road (MP 58), then due south to the south bank of the Kenai River to its confluence with Skilak Lake, then westerly along the north shore of Skilak Lake to Lower Skilak Lake Campground, then northerly along the Lower Skilak Lake Campground road and the Skilak Loop Road to its westernmost junction with the Sterling Highway (MP 75.1), then easterly along the Sterling Highway to the point of beginning."

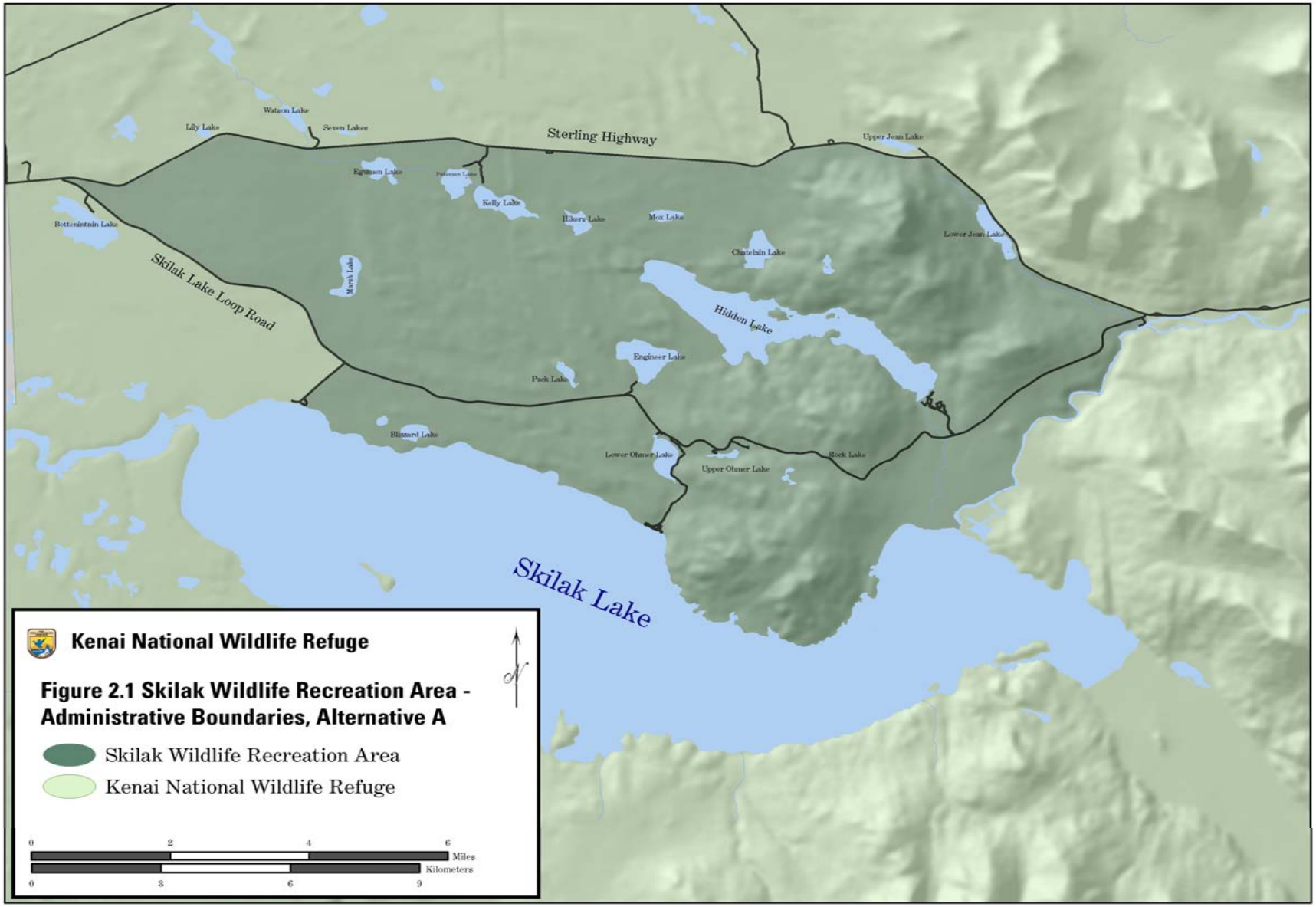
Human Health and Safety (Firearm Use)

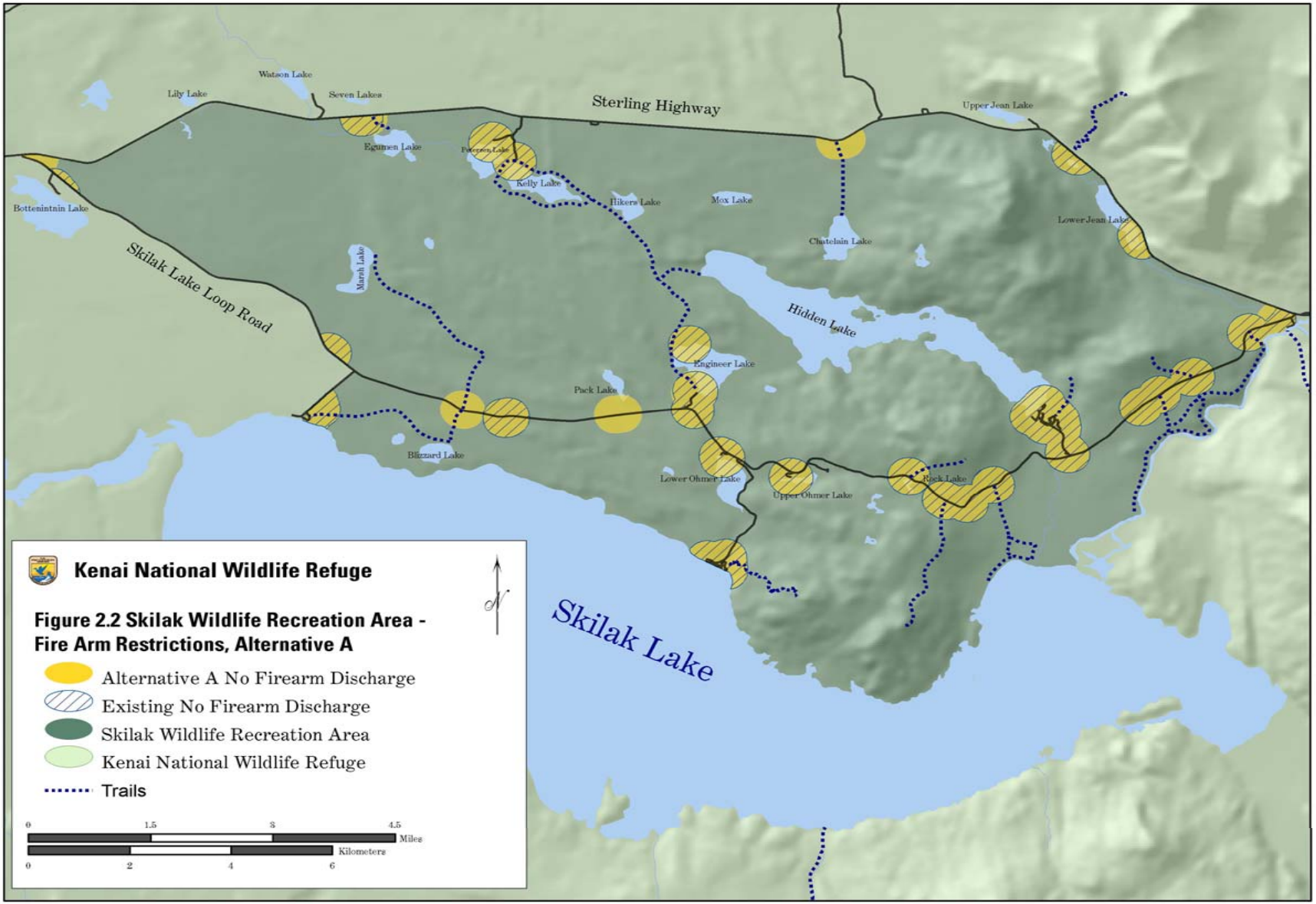
Existing human health and safety regulations would be implemented (Figure 2.2):

> "Discharging firearms within ¼ mile of designated public campgrounds, trailheads, waysides, buildings, or the Sterling Highway from the east refuge boundary to the east junction of the Skilak Loop Road would not be allowed."

Trails

Construct five (5) trails totaling approximately 9.0 miles in length: 1) Sterling Highway Trailhead Parking Area to Chatelain Lake (1.8 miles), 2) Kelly Lake Loop Trail (1.8 miles), 3) Lower Skilak Lake Campground to Blizzard Lake (1.9 miles), 4) Blizzard Lake to Skilak Loop


Watson Lake
Lily Lake
Seven Lakes
Sterling Highway
Upper Jean Lake
Egumen Lake
Petersen Lake
Kelly Lake
Botteristein Lake
Hikers Lake
Mox Lake
Lower Jean Lake
Chatelain Lake
Skilak Lake Loop Road
Marsh Lake
Hidden Lake
Engineer Lake
Pack Lake
Blizzard Lake
Lower Ohmer Lake
Rock Lake
Upper Ohmer Lake
Skilak Lake
Kenai National Wildlife Refuge
Figure 2.1 Skilak Wildlife Recreation Area - Administrative Boundaries, Alternative A
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
0 2 4 6
Miles
Kilometers
0 3 6 9


Watson Lake
Lily Lake
Seven Lakes
Sterling Highway
Upper Jean Lake
Egumen Lake
Evergreen Lake
Kelly Lake
Hikers Lake
Mox Lake
Bottenintnin Lake
Lower Jean Lake
Chatelain Lake
Skilak Lake Loop Road
Marsh Lake
Hidden Lake
Engineer Lake
Pack Lake
Blizzard Lake
Lower Ohmer Lake
Upper Ohmer Lake
Rock Lake
Skilak Lake
Kenai National Wildlife Refuge
Figure 2.2 Skilak Wildlife Recreation Area - Fire Arm Restrictions, Alternative A
Alternative A No Firearm Discharge
Existing No Firearm Discharge
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
Trails
0
1.5
3
4.5
Miles
Kilometers
0
2
4
6

Road Trailhead Parking Area (0.5 mile), and 5) Skilak Loop Road Trailhead Parking Area to Marsh Lake (2.9 miles) (Figure 2.3).

Vegetation Management

Habitat would be managed to provide for 130+ resident moose and 170+ wintering moose. Utilization standards for key browse species would be used to determine when the carrying capacity is being approached and harvest is necessary to avoid habitat damage. Browse surveys would be completed west of Engineer Lake each year in April. Moose density objectives may be modified by the degree of forage utilization indicated by browse surveys.

Wildlife Management

*Moose:*

To provide opportunities to view moose populations in relatively natural settings throughout the year; to interpret various components of the moose population, their behavior, and habitat; and to provide opportunities for the public to harvest moose when removal is desirable to achieve public use and resource protection goals, the following wildlife management strategies would be implemented:

> Resident moose population densities of 130 animals (1.8 – 2.0 animals per square mile of habitat) would be managed for. Population density would be determined utilizing the standard density census as defined by ADF&G and FWS and would be conducted every second year at a minimum assuming adequate snow cover. Sex ratios would be allowed to rise to a minimum of 40 bulls/100 cows as measured with the standard composition survey. This survey would be conducted before December 1 each year. To avoid habitat damage, harvest of cow moose by firearm would be allowed by permit only when populations exceed density objectives. Harvest of spike-fork bulls by firearm would be allowed by permit only when ratio objectives are exceeded.

*Small Game:*

To provide opportunities to view small game populations in relatively natural settings; to interpret and provide prey for predators particularly raptors such as bald eagles, goshawks, and great-horned owls, and lynx and coyotes; and to provide opportunities for the public to harvest these species the following wildlife management strategy would be implemented:

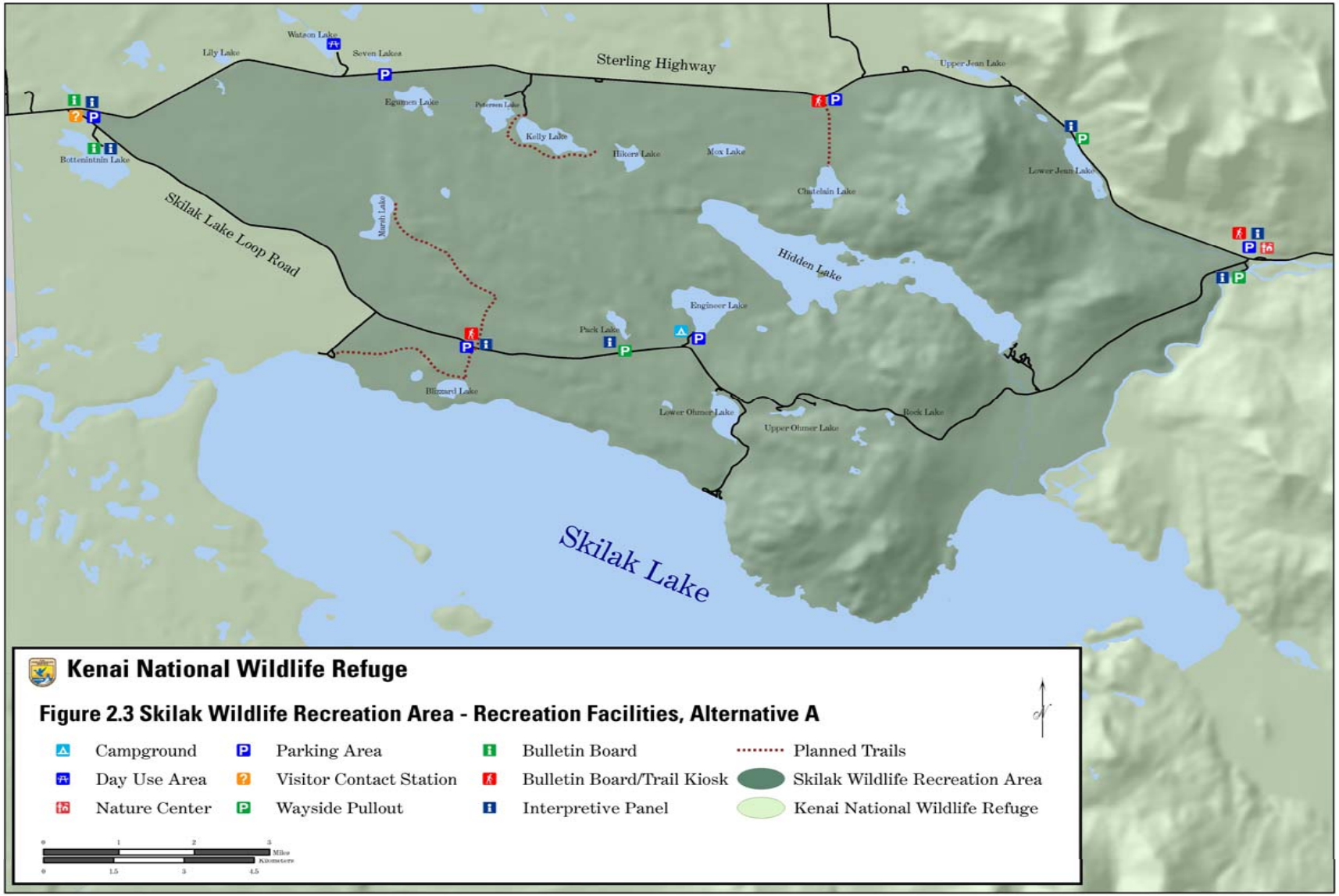
> During the period October 1 to March 1, each year, harvest of small game by bow and arrow would be allowed.

*Fur Animals and Bears:*

Harvest not allowed.

Wayside Pullouts

Wayside pullouts would be constructed at the following three (3) locations (Figure 2.3): 1) Skilak Loop Road at Jean Creek Culvert, 2) Skilak Loop Road at Pack Lake, and 3) Sterling Highway at Lower Jean Lake.


Watson Lake
Lily Lake
Seven Lakes
Sterling Highway
Upper Jean Lake
Egumen Lake
Peterson Lake
Kelly Lake
Bottenintnin Lake
Hikers Lake
Mox Lake
Lower Jean Lake
Chatelain Lake
Skilak Lake Loop Road
Marsh Lake
Hidden Lake
Engineer Lake
Puck Lake
Blizzard Lake
Lower Ohmer Lake
Rock Lake
Upper Ohmer Lake
Skilak Lake
Kenai National Wildlife Refuge
Figure 2.3 Skilak Wildlife Recreation Area - Recreation Facilities, Alternative A
Campground
Day Use Area
Nature Center
Parking Area
Visitor Contact Station
Wayside Pullout
Bulletin Board
Bulletin Board/Trail Kiosk
Interpretive Panel
Planned Trails
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
0 1 2 3 Miles
0 1.5 3 4.5 Kilometers

*Issue 2. How can the Service enhance environmental education and interpretation opportunities within the Skilak WRA?*

Bulletin Boards & Kiosks
Bulletin boards and trail registers would be provided at the following five (5) locations (Figure 2.3): 1) Bottenintnin Lake Day Use Area, 2) Chatelain Lake Trailhead Parking Area, 3) Crushed Area / Marsh Lake Trailhead Parking Area, 4) Nature Center Parking Area, and (5) Visitor Contact Station (West Entrance).

Interpretive Panels
Interpretive panels would be provided at the following six (6) locations (Figure 2.3): 1) Crushed Area / Marsh Lake Trailhead Parking Area 2) East Entrance Parking Area, 3) Jean Creek Culvert Wayside Pullout, 4) Lower Jean Lake Wayside Pullout, 5) Pack Lake Wayside Pullout, and 6) Bottenintnin Lake Day Use Area.

Nature Center
A 2,000-5,000 square foot nature center would be constructed near the site of the existing Visitor Contact Station (East Entrance) (Figure 2.3).

*Issue 3. How can the Service provide recreation support facilities within the Skilak WRA?*

Campgrounds
The Engineer Lake campground would be redesigned. The Watson Lake Campground would be converted to a day use area.

*Parking Areas*
Parking areas would be rehabilitated/improved and/or constructed at the following six (6) locations (Figure 2.3): 1) Egumen Lake, 2) Engineer Lake, 3) Chatelain Lake Trailhead, 4) Nature Center (East Entrance), 5) Crushed Area / Marsh Lake Trailhead, 6) Visitor Contact Station (West Entrance).

Roads
The Skilak Loop Road would be paved using Federal Highway funds though no realignment would be conducted. All campground and access area roads, trailhead parking, and waysides would be paved. The East and West Entrances of the Skilak Loop Road would be redesigned to conform to Federal and State Highway Standards.

Sanitary Facilities
Portable toilets would be provided in "over flow" camping areas when opened for use during peak visitation periods.

Visitor Contact Station
A Visitor Contact Station would be constructed at the West Entrance of the Skilak Loop Road (Figure 2.3).

### 2.1.2 Alternative B (Preferred Alternative)

The management direction proposed in the Service's Preferred Alternative would address issues identified during public scoping in the following manner:

*Issue 1: How can the Service enhance wildlife viewing and photography opportunities within the Skilak WRA?*

Administrative Boundaries

Same as Alternative A plus all lands between the Upper Kenai River and the Sterling Highway from the Refuge's easternmost boundary to the Skilak Loop Road; and all lands beginning 100 yards from the north shore of Skilak Lake and the Lower Kenai River from the Lower Skilak Campground and Skilak Loop Road west along the Sterling Highway to the westernmost Refuge boundary would be included in the Skilak WRA (Figure 2.4).

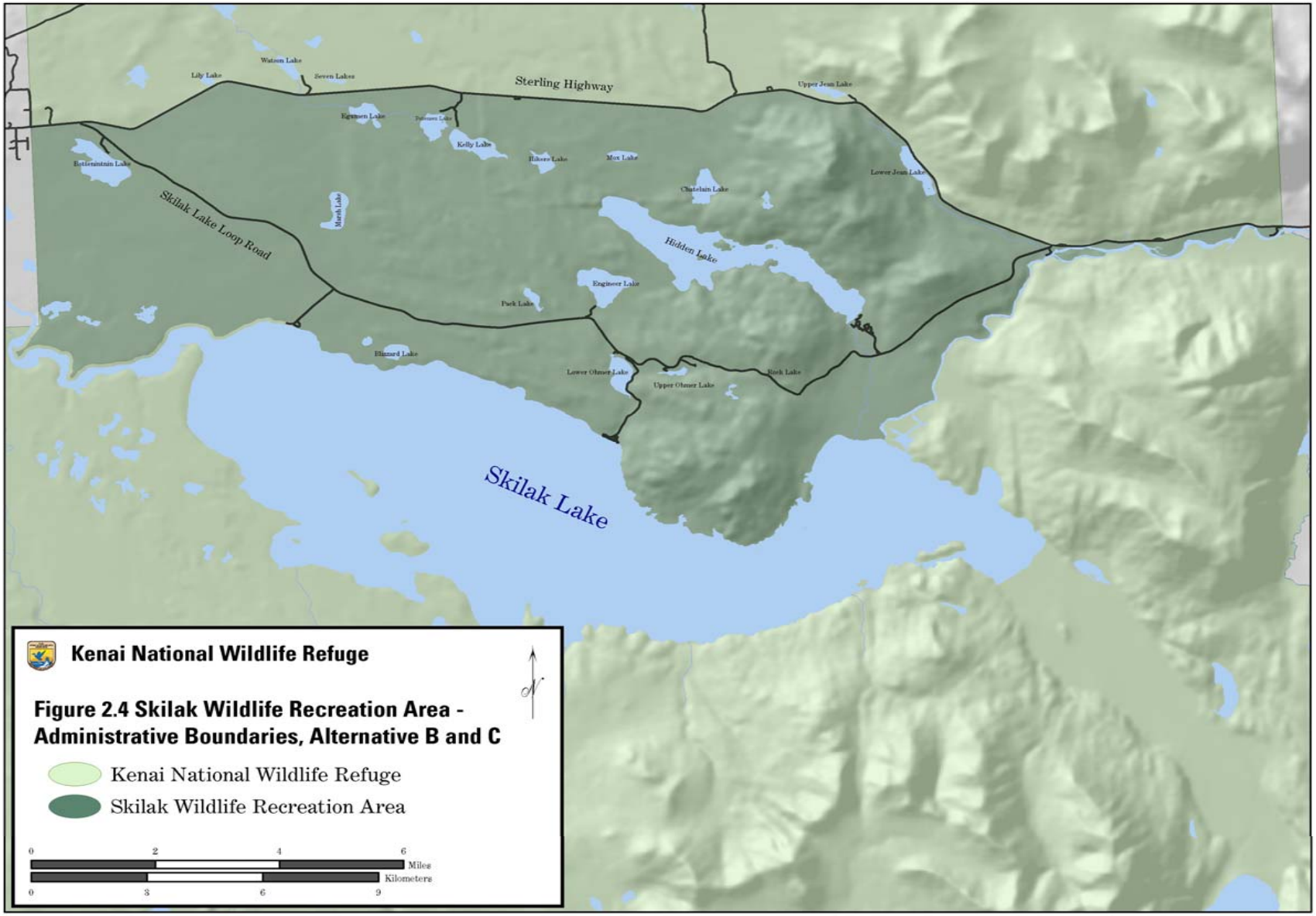
Human Health and Safety (Firearm Use)

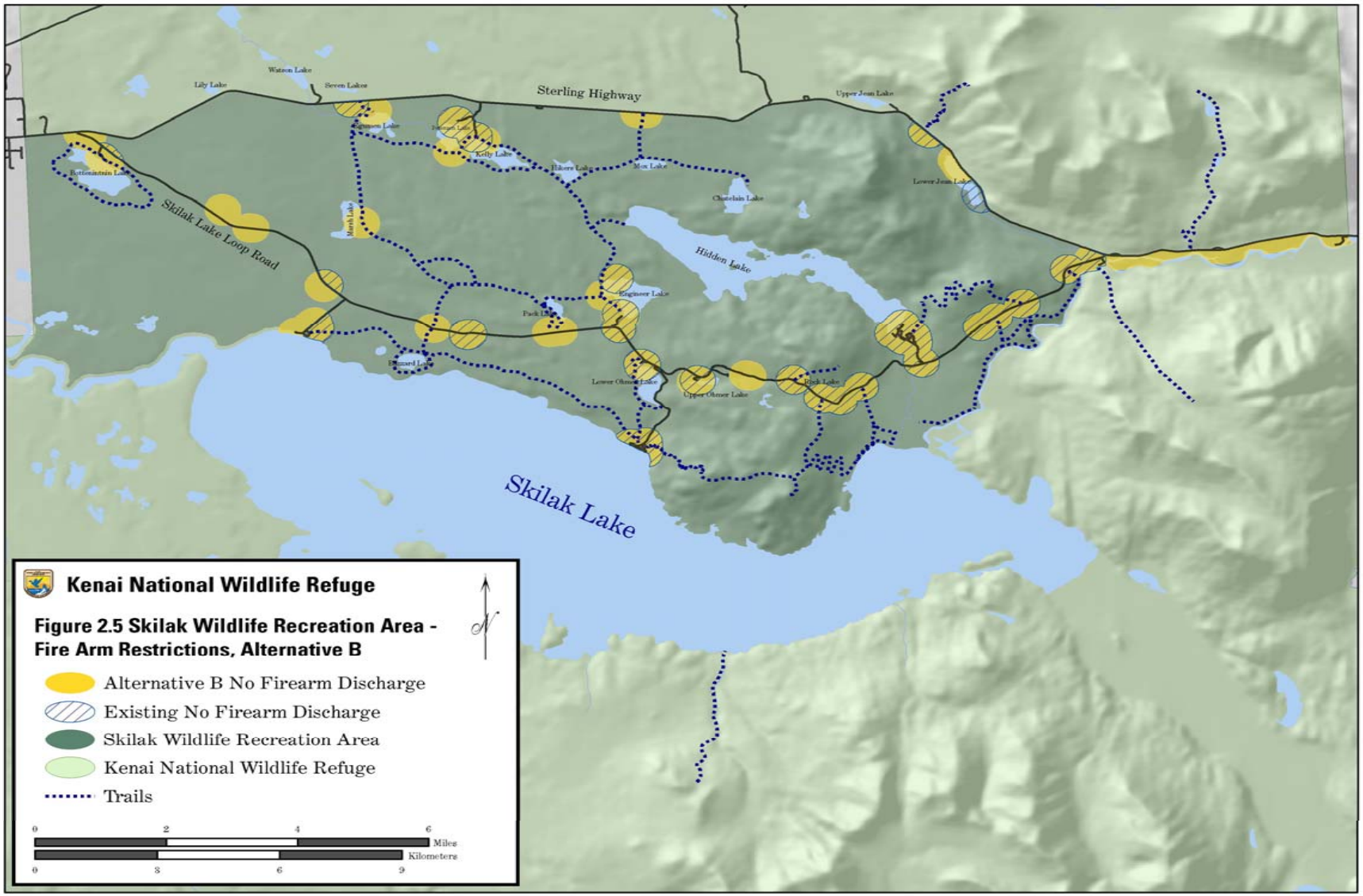
Same as Alternative A (Figure 2.5).

Trails

Construct the following trail segments to develop a total of six (6) trails totaling approximately 35.5 miles in length (Figure 2.6):

1) Bottenintnin Lake Group Day Use Area Loop Trail (4.0 miles)
2) Hideout Mountain Scenic Trail (2.5 miles)
    - Connect Burney's Trail to Hideout Mountain Trail via 1.5-mile connector trail
3) Kenai River Extension Trail
    - Construct 1-mile trail initiating from the end of the existing Kenai River Trail southwest towards, but not to, Hidden Creek/Skilak Lake.
4) Skilak Lake Long Distance Trail (13.5-miles)
    - Connect existing Hidden Creek Trail to existing Skilak Lookout Trail (2.2 miles)
    - Connect existing Skilak Lookout Trail to existing Vista Trail (1.6 miles)
    - Construct a Lower Ohmer Lake Campground Family Loop Trail (1.4 miles)
    - Connect Upper Skilak Lake Campground to Lower Ohmer Lake Campground Family Loop Trail (0.7 miles)
    - Connect Upper Skilak Lake Campground to Blizzard Lake (3.9 miles)
    - Construct a Blizzard Lake Family Loop Trail (1.3 miles)
    - Connect Blizzard Lake Family Loop Trail to the Moose Habitat Enhancement Loop Trailhead on the Skilak Loop Road (0.5 mile)
    - Connect Blizzard Lake Family Loop Trail to the Lower Skilak Lake Campground (1.9 miles)
5) Seven Lakes Long Distance Loop Trail (10.0 miles)
    - Construct a Moose Habitat Enhancement Loop Trail off the Skilak Loop Road (1.2 miles)
    - Connect the Moose Habitat Enhancement Loop Trail to Marsh Lake (1.0 mile)
    - Connect Marsh Lake to Egumen/Peterson/Kelly Lakes (2.0 miles)
    - Connect Egumen/Peterson/Kelly Lakes trail to existing Seven Lakes Trail (2.5 miles)


Watson Lake
Lily Lake
Seven Lakes
Sterling Highway
Upper Jean Lake
Egumen Lake
Kelly Lake
Hikers Lake
Mott Lake
Lower Jean Lake
Chatelain Lake
Skilak Lake Loop Road
Mark Lake
Hidden Lake
Engineer Lake
Park Lake
Blizzard Lake
Lower Ohmer Lake
Upper Ohmer Lake
Rock Lake
Skilak Lake
Kenai National Wildlife Refuge
Figure 2.4 Skilak Wildlife Recreation Area - Administrative Boundaries, Alternative B and C
Kenai National Wildlife Refuge
Skilak Wildlife Recreation Area
0 2 4 6
Miles
Kilometers
0 3 6 9


Sterling Highway
Skilak Lake Loop Road
Skilak Lake
Hidden Lake
Kenai National Wildlife Refuge
Figure 2.5 Skilak Wildlife Recreation Area - Fire Arm Restrictions, Alternative B
Alternative B No Firearm Discharge
Existing No Firearm Discharge
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
Trails
Miles
Kilometers

- Connect Seven Lakes Trail to the Pack Lake Environmental Education Complex (1.0 mile)
- Connect the Pack Lake Environmental Education Complex to the Moose Habitat Enhancement Loop Trailhead (1.5 miles)

6) Mox/Chatelain Lake Trail (4.5 miles)
- Sterling Highway Trailhead Parking Area to Mox Lake (1.0 mile)
- Connect Mox Lake to Chatelain Lake (2.0 miles)
- Connect Mox Lake to existing Seven Lake Trail (1.5 miles)

Vegetation Management

Prescribed and wildland fire use, and mechanical treatment would be used to enhance wildlife viewing, environmental education/interpretation and photography opportunities at the following two (2) locations (Figure 2.6): 1) Moose Habitat Enhancement Loop Trail northwest of the Pack Lake Environmental Education Complex, and 2) Vegetation Management Interpretive Drive. Treatment would be conducted on approximately 50 – 100 acres/year when conditions permit.

Viewing Facilities

Viewing platforms with spotting scopes would be constructed at the following five (5) locations (Figure 2.6): 1) Engineer Lake (west shore), 2) Kelly Lake (north shore), 3) Marsh Lake (east shore), 4) Peterson Lake (south shore), and 5) Upper Ohmer Lake (east shore).

Photo blinds would be constructed at the following two (2) locations (Figure 2.6): 1) Egumen Lake (north shore), and 2) Rock Lake (east shore).

A viewing tower with spotting scope(s) would be constructed along the Vegetation Management Interpretive Drive.

Additional spotting scopes would be provided at the following two (2) locations: 1) Hidden Creek Wayside Pullout, and 2) Skilak Lake / Redoubt Mountain Wayside Pullout.

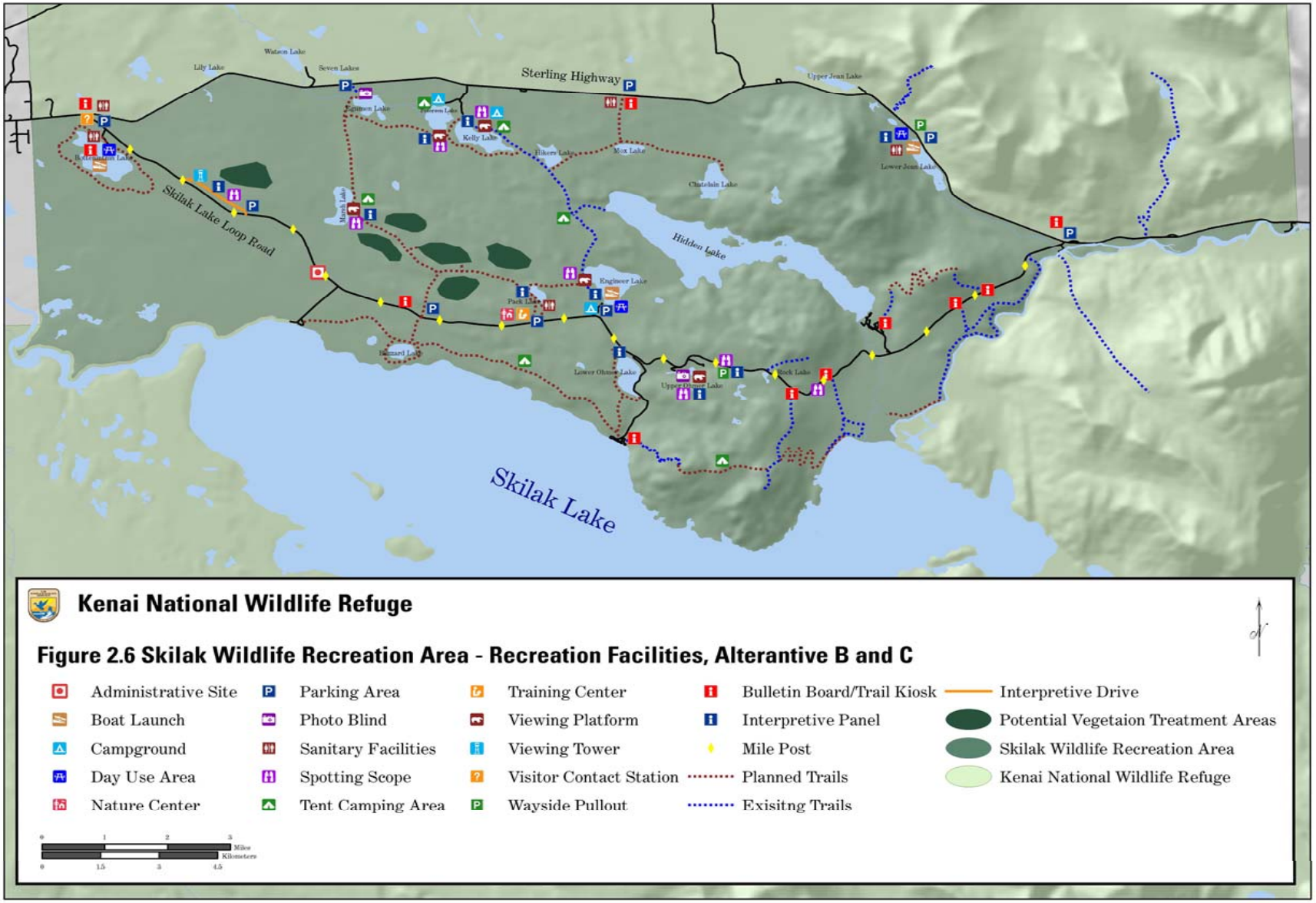
In addition, refuge biologists, public use specialists, and maintenance personnel would consider and evaluate the feasibility of developing a Track Trap facility at an appropriate location. The facility would capture animal track impressions for interpretation and education purposes.

Wildlife Management

*Moose:*

To provide opportunities to view moose populations in relatively natural settings throughout the year; to interpret various components of the moose population, their behavior, and habitat; and to provide opportunities for the public to harvest moose when removal is desirable to achieve public use and resource protection goals the following wildlife management strategies would be implemented:

Same as Alternative A except Kenai NWR and ADF&G will jointly re-evaluate moose population objectives to provide for healthy moose populations and enhance viewing opportunities based on currently ongoing studies and/or other scientific information provided in the future.


Watson Lake
Lily Lake
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Kelly Lake
Hikers Lake
Mox Lake
Lower Jean Lake
Chatelain Lake
Skilak Lake Loop Road
Hidden Lake
Engineer Lake
Lower Ohmer Lake
Upper Ohmer Lake
Rock Lake
Skilak Lake
Kenai National Wildlife Refuge
Figure 2.6 Skilak Wildlife Recreation Area - Recreation Facilities, Alterantive B and C
Administrative Site
Boat Launch
Campground
Day Use Area
Nature Center
Parking Area
Photo Blind
Sanitary Facilities
Spotting Scope
Tent Camping Area
Training Center
Viewing Platform
Viewing Tower
Visitor Contact Station
Wayside Pullout
Bulletin Board/Trail Kiosk
Interpretive Panel
Mile Post
Planned Trails
Exisitng Trails
Interpretive Drive
Potential Vegetaion Treatment Areas
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
Miles
Kilometers

*Small Game:*
Same as Alternative A.

*Fur Animals and Bears:*
Same as Alternative A.

Wayside Pullouts
An undeveloped wayside pullout located at MP 12.6 along the Skilak Loop Road (referred to throughout this plan as the Skilak Lake / Redoubt Mountain Wayside) will be enhanced (Figure 2.6).

*Issue 2. How can the Service enhance environmental education and interpretation opportunities within the Skilak WRA?*

Bulletin Boards & Kiosks
Bulletin boards or kiosks would be provided at the following six (6) locations (Figure 2.6):
1) Bottenintnin Lake Group Day Use Parking Area, 2) Burney's Trailhead Parking Area, 3) East Entrance Parking Area, 4) Moose Habitat Enhancement Loop Trailhead Parking Area, 5) Mox/Chatelain Trailhead Parking Area, and 6) Visitor Contact Station Parking Area (West Entrance).

Existing bulletin boards would be upgraded to kiosks at the following five (5) locations:
1) Hidden Creek Trailhead, 2) Hideout Mountain Trailhead, 3) Kenai River Trailhead (West), 4) Skilak Lookout Trailhead, and 5) Vista Trailhead.

Environmental Education Complex
An Environmental Education Complex consisting of two buildings – a 2,000 square foot Nature Center, and a 10,000 square foot Boreal Forest Lands Research and Management Training Facility – would be constructed west of Pack Lake off of the Skilak Loop Road at MP 8.8 (Figure 2.6).

Environmental Education "Ranger" Programs
Campfire programs and Discovery Hikes offered by Refuge personnel would be increased by 20% and offered year-round, including the shoulder seasons (September – May), and a "Roving Ranger" program would be initiated.

Interpretive Panels
Interpretive panels would be provided at the following ten (10) locations (Figure 2.6):
1) Engineer Lake Day Use Area Platform (west shore), 2) Kelly Lake Viewing Platform (north shore), 3) Lower Jean Lake Day Use Area (north shore), 4) Lower Ohmer Lake Family Loop Trailhead, 5) Marsh Lake Viewing Platform (east shore), 6) Nature Center Disability-Accessible Interpretive Trail, 7) Peterson Lake Viewing Platform (south shore), 8) Skilak Lake/Redoubt Mountain Wayside, 9) Upper Ohmer Lake Viewing Platform, and 10) Vegetation Management Interpretive Loop Drive.

Interpretive Drives

A self-guided Vegetation Management Interpretive Loop Drive would be constructed along the Skilak Loop Road at MP 2.0 (Figure 2.6). Interpretive materials would be developed for this road and the Skilak Loop Wildlife Drive (see *Outreach Materials and Media* below).

Interpretive Trail

A disability-accessible Interpretive Trail (1.0 mile) would be constructed at the Pack Lake Environmental Education Complex.

Outreach Materials and Media for Visitor Orientation

A variety of outreach materials (e.g., brochures, pamphlets, etc) and media formats (e.g., audio tapes, CD, DVD, MP3) will be developed to educate visitors about the Skilak WRA. Educational topics may include: 1) Purpose and management of the Skilak WRA, 2) Recreation opportunities and related facilities, 3) Interpretive / educational opportunities and related facilities, 4) Common wildlife species and opportunities to view them identified by milepost, 5) Recorded calls of common avian species, and 6) Human history of the area.

*Issue 3. How can the Service provide recreation support facilities within the Skilak WRA?*

Administrative Facility

The existing Administrative Facility located off the Skilak Loop Road at MP 5.3 will be maintained and enhanced as needed (Figure 2.6). The following amenities will be considered: 1) 500-square foot seasonal office space, 2) 350-square foot shop, and 3) 1,000-square foot housing facility for Visitor Services staff.

Boat Launches

The existing boat launches at Bottenintnin Lake Group Day Use Area and Engineer Lake Day Use Area will be improved. Through a cooperative effort with State of Alaska Department of Transportation, construct a boat launch at the Lower Jean Lake Day Use Area (north shore) (Figure 2.6).

Campgrounds

The following campground-related work would be implemented (Figure 2.6): 1) Relocate the Engineer Lake Campground to the bluff above the lake to include designation of six (6) vehicle camping sites, 2) Rehabilitate the Kelly Lake Campground to include designation of eight (8) vehicle camping sites, and 3) Rehabilitate the Peterson Lake Campground to include designation of four (4) vehicle camping sites.

To address public safety concerns associated with entry and exit from/to the Sterling Highway at Lower Jean Lake the existing campground would be replaced, through a cooperative effort with the State of Alaska Department of Transportation, with a day use area and related facilities located on the lake's north shore (see Day Use Areas below).

Hardened Campsites ("Walk-in" and "Backcountry" Campsites)
Two (2) hardened "walk-in" campsites would be provided at Kelly Lake Campground, and one (1) hardened "walk-in" campsite would be provided at Peterson Lake campground (Figure 2.6). To protect refuge resources, hardened "backcountry" campsites would be identified and developed for voluntary use along the Skilak Lake Long Distance Trail and Seven Lakes Long Distance Loop Trail. Campsites would be no closer than 0.5 mile apart (Figure 2.6).

Day Use Areas
The Bottenintnin Lake Group Day Use Area would be rehabilitated and the Engineer Lake Campground would be converted to a day use area after the new campground is constructed on the bluff above the lake (Figure 2.6).

To address public safety concerns associated with entry and exit from/to the Sterling Highway at Lower Jean Lake the existing campground would be replaced, through a cooperative effort with the State of Alaska Department of Transportation, with a day use area and related facilities located on the lake's north shore (Figure 2.6).

Parking Areas
The existing Engineer Lake Campground parking area would be rehabilitated. The Refuge would construct three (3) parking areas at the following locations (Figure 2.6): 1) Moose Habitat Enhancement Loop Trailhead, 2) Pack Lake Environmental Education Complex, and 3) Vegetation Management Interpretive Drive. Through a cooperative effort with State of Alaska Department of Transportation, parking areas would be constructed at the following locations: 1) East Entrance (Skilak Loop/Sterling Highway Intersection), 2) Lower Jean Lake Day Use Area, 3) Mox/Chatelain Lakes Trailhead, and 4) West Entrance (Skilak/Sterling Intersection).

Roads
Same as Alt A plus obtain the Skilak Loop Road ROW through a cooperative effort with DOT; increase year-round maintenance; ensure appropriate wildlife crossings and culvert replacement; and rename the road as the "Skilak Loop Wildlife Drive".

Sanitary Facilities
Sanitary facilities would be provided at the following five (5) locations (Figure 2.6):
1) Bottenintnin Lake Group Day Use Area (1 unit), 2) Lower Jean Lake Day Use Area (1 unit), 3) Mox/Chatelain Lakes Trailhead (1 unit), 4) Pack Lake Environmental Education Complex (1 unit), and 5) Visitor Contact Station (West Entrance). The frequency of servicing sanitary facilities will be increased during the highest visitor use months, and will occur weekly during the shoulder season (September – May).

Signs (Information, Direction, Location)
The following actions would be implemented: 1) Signs containing the "binocular" wildlife viewing logo would be placed on the Sterling Highway in advance of the East and West Entrances, 2) "Welcome to the Skilak WRA" monuments would be constructed at the East and West Entrances, 3) Information, direction, and location signs for all public use facilities would be provided / enhanced along the Skilak Loop Wildlife Drive and Sterling Highway, and 4) Milepost markers would be provided along the Skilak Loop Wildlife Drive.

Visitor Contact Station
Same as Alternative A plus information would be provided year-round including periods when the facility is not attended by staff.

### 2.1.3 Alternative C

The management direction proposed in Alternative C would address issues identified during public scoping in the following manner:

*Issue 1: How can the Service enhance wildlife viewing and photography opportunities within the Skilak WRA?*

Same as Alternative B except for the following provisions:

Human Health and Safety (Firearm Use)
Discharging firearms within ½ mile of designated public campgrounds, trailheads, waysides, buildings, and parking areas; or within ¼ mile of the Skilak Loop Road or the Sterling Highway from the Refuge's easternmost boundary to the western intersection of the Sterling Highway and Skilak Loop Road would not be allowed (Figure 2.7).

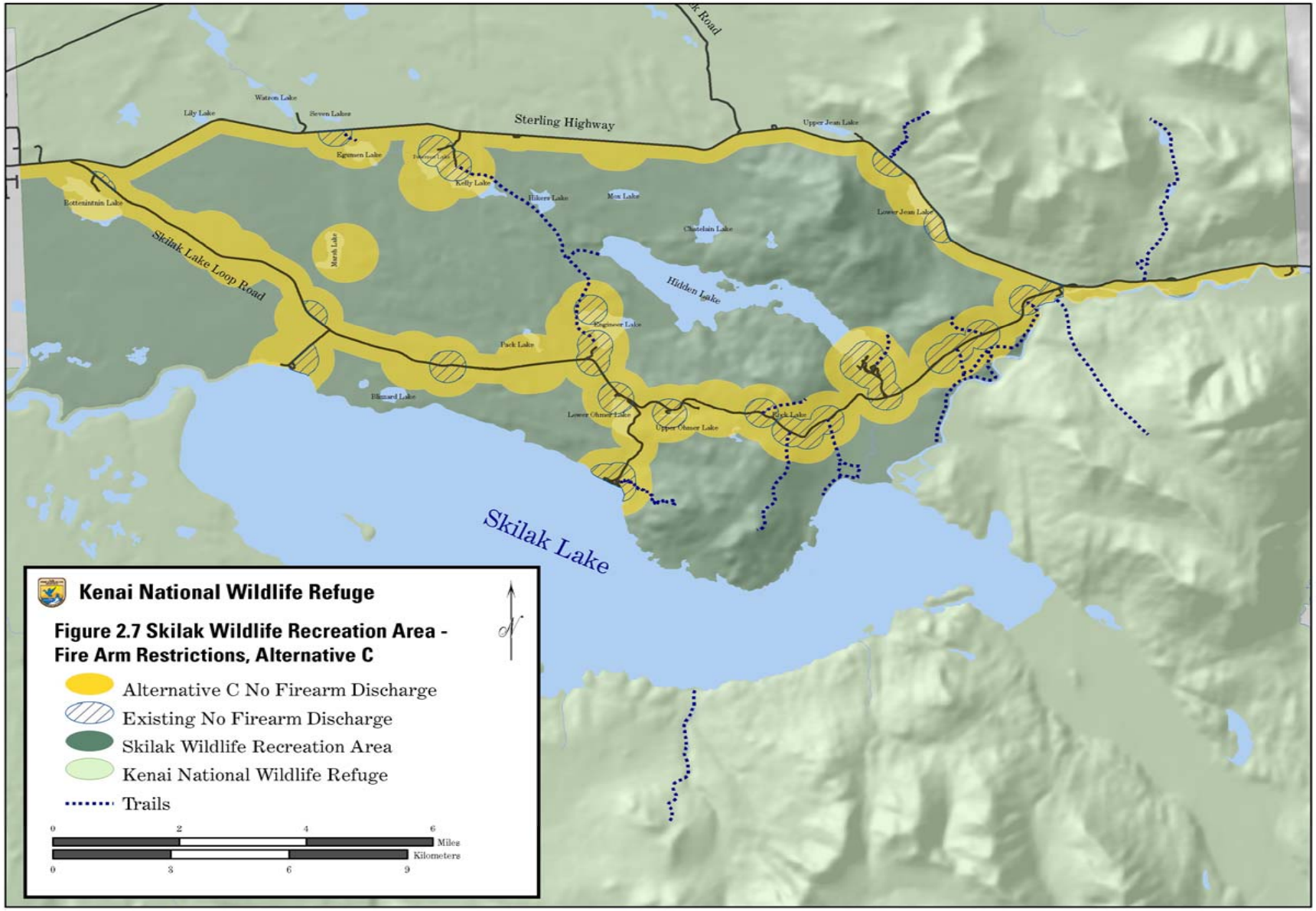
*Wildlife Management*
*Small Game and Fur Animals:*
Small game and fur animals may be taken from October 1 through March 1 by firearms.

*Issue 2: How can the Service enhance environmental education and interpretation opportunities within the Skilak WRA?*

Same as Alternative B.

*Issue 3: How can the Service provide recreation support facilities within the Skilak WRA?*

Same as Alternative B.


Sterling Highway
Skilak Lake Loop Road
Skilak Lake
Watson Lake
Lily Lake
Seven Lakes
Egumen Lake
Kelly Lake
Hikers Lake
Moe Lake
Rottenintnin Lake
Mirth Lake
Chatelain Lake
Upper Jean Lake
Lower Jean Lake
Hidden Lake
Engineer Lake
Pack Lake
Blizzard Lake
Lower Ohmer Lake
Upper Ohmer Lake
Kenai National Wildlife Refuge
Figure 2.7 Skilak Wildlife Recreation Area - Fire Arm Restrictions, Alternative C
Alternative C No Firearm Discharge
Existing No Firearm Discharge
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
Trails
0 2 4 6
Miles
Kilometers
0 3 6 9

## *2.2 Summary Comparison of the Alternatives*

**Table 2.1 Summary Comparison of the Alternatives**

| **Issue 1. How can the Service enhance wildlife viewing and photography opportunities within the Skilak WRA?** | | | |
|---|---|---|---|
| | **Alternative A: (No Action Alternative)** | **Alternative B: (Preferred Alternative)** | **Alternative C** |
| **Administrative Boundaries** | Encompasses 44,000-acres or 2.2% of the Refuge. | Encompasses 52,750-acres or 2.7% of the Refuge. | Same as Alternative B. |
| **Human Health and Safety (Firearm Use)** | Firearm use prohibited on 3,200 acres near roads and other public use facilities; firearm use allowed by permit September 15 thru September 30 on 40,800-acres (93% of 44,000-acres). | Firearm use prohibited on 5,620-acres near roads and other public use facilities; firearm use allowed by permit September 15 thru September 30 on 47,120-acres (89.3% of 52,750-acres). | Firearm use prohibited on 17,180-acres near roads and other public use facilities; firearm use allowed October 1 to March 1 on 35,570-acres (67.4% of 52,750-acres). |
| **Trails** | Construct five (5) trails totaling approximately 9.0-miles in length. | Construct six (6) trails totaling approximately 29.7-miles in length. | Same as Alternative B. |
| **Vegetation Management** | Habitat managed to sustain specific moose population numbers. | Habitat managed to enhance public use opportunities at specific locations. | Same as Alternative B. |
| **Viewing Facilities (Blinds, Platforms, Towers and other Facilities)** | No Direction Provided. | Provide five (5) viewing platforms, two (2) photo blinds, one (1) viewing tower, and nine (9) spotting scopes. Consider development of a Track Trap facility. | Same as Alternative B. |

| | Alternative A:<br>(No Action Alternative) | Alternative B:<br>(Preferred Alternative) | Alternative C |
|---|---|---|---|
| **Wildlife Management:** | | | |
| **Moose** | Managed to provide for a variety of public use opportunities. Firearm harvest by permit only. | Same as Alternative A plus re-evaluate moose population objectives as needed. | Same as Alternative B. |
| **Small Game** | Managed to provide for a variety of public use opportunities. Bow and arrow harvest only. | Same as Alternative A. | Firearm harvest allowed. |
| **Fur Animals** | Harvest not allowed. | Same as Alternative A. | Firearm harvest allowed. |
| **Waysides (Scenic pull-outs for vehicles)** | Construct three (3) wayside pullouts. | Rehabilitate one (1) existing undeveloped wayside pullout. | Same as Alternative B. |

| **Issue 2. How can the Service enhance environmental education and interpretation opportunities within the Skilak WRA?** | | | |
|---|---|---|---|
| | **Alternative A:**<br>**(No Action Alternative)** | **Alternative B:**<br>**(Preferred Alternative)** | **Alternative C** |
| **Bulletin Boards & Kiosks** | Provide bulletin boards and trail registers at five (5) locations. | Provide bulletin boards at three of the five locations identified under Alternative A plus provide bulletin boards or kiosks at three (3) additional locations. Upgrade five (5) existing bulletin boards to kiosks. | Same as Alternative B. |

| | Alternative A:<br>(No Action Alternative) | Alternative B:<br>(Preferred Alternative) | Alternative C |
|---|---|---|---|
| **Environmental Education Complex:** | | | |
| **Boreal Lands Research & Land Management Training Facility** | No Direction Provided. | To fulfill refuge purposes, construct a research and land management training facility for public and private educational purposes at Pack Lake. | Same as Alternative B. |
| **Nature Center** | Construct a 2,000 – 5,000 square foot facility near the site of the existing Visitor Contact Station (East Entrance) | Construct a 2,000-square foot facility at Pack Lake. | Same as Alternative B. |
| **Environmental Education "Ranger" Programs** | No Direction Provided. | Increase number of programs offered by 20%; provide programs year-round. | Same as Alternative B. |
| **Interpretive Panels** | Provide interpretive panels at six (6) locations. | Provide interpretive panels at two of the six locations identified under Alternative A plus provide interpretive panels at eight (8) additional locations. | Same as Alternative B. |
| **Interpretive Drive** | No Direction Provided. | Use abandoned roadbed to facilitate development of a self-guided interpretive drive. | Same as Alternative B. |
| **Interpretive Trails** | No Direction Provided. | Construct one (1) disability-accessible interpretive trail. | Same as Alternative B. |
| **Outreach Materials and Media for Visitor Orientation** | No Direction Provided. | Develop and provide outreach materials in a variety of media formats for visitor orientation. | Same as Alternative B. |

| Issue 3. How can the Service provide recreation support facilities within the Skilak WRA? | | | |
|---|---|---|---|
| | **Alternative A: (No Action Alternative)** | **Alternative B: (Preferred Alternative)** | **Alternative C** |
| **Administrative Facility** | No Direction Provided. | Maintain and enhance the existing facility as needed. | Same as Alternative B. |
| **Boat Launches** | No Direction Provided. | Improve two (2) existing boat launches, plus through a cooperative effort with DOT, enhance public safety by relocating the Lower Jean Lake boat launch. | Same as Alternative B. |
| **Campgrounds** | Relocate and expand one (1) campground; convert one (1) campground to a day use area. | Relocate and expand one (1) campground; expand one (1) campground; rehabilitate one (1) campground, and through a cooperative effort with DOT replace the Lower Jean Lake campground with a day use area located on the lake's north shore. | Same as Alternative B. |
| **Hardened Campsites ("Backcountry" or "Walk-in")** | No Direction Provided. | Construct walk-in campsites at two (2) locations, plus provide backcountry campsites for voluntary use along two (2) long distance trails. | Same as Alternative B. |
| **Day Use Areas** | No Direction Provided. | Rehabilitate and/or construct day use areas at two (2) locations, plus through a cooperative effort with DOT construct a day use area at Lower Jean Lake. | Same as Alternative B. |
| **Parking Areas** | Rehabilitate three (3) parking areas, and construct three (3) parking areas. | Rehabilitate one (1) parking area, construct three (3) parking areas, plus through a cooperative effort with DOT construct four (4) parking areas. | Same as Alternative B. |

| | Alternative A:<br>(No Action Alternative) | Alternative B:<br>(Preferred Alternative) | Alternative C |
|---|---|---|---|
| **Roads** | Pave all roads, parking, and wayside pullouts using Federal Highway funds. Redesign Skilak Loop-Sterling Highway intersections to conform to state and federal standards. | Same as Alternative A plus obtain the Skilak Loop Road right-of-way through a cooperative effort with DOT; increase year-round maintenance, and rename the road as the "Skilak Loop Wildlife Drive." | Same as Alternative B. |
| **Sanitary Facilities** | Portable toilets will be provided in "over flow" camping areas when opened for use during peak visitation. | Construct sanitary facilities at five (5) locations, plus increase frequency of maintenance and cleaning year round. | Same as Alternative B. |
| **Signs (Information, Direction, Location)** | No Direction Provided. | Design, construct, and improve signs along all roads to promote/identify facilities, and points of interests. | Same as Alternative B. |
| **Visitor Contact Station** | Construct one (1) visitor contact station at the west entrance. | Same as Alternative A. | Same as Alternative A. |

# Chapter 3: Affected Environment

## Introduction

This chapter describes the physical, biological, and social settings that could be affected by management actions proposed in this plan.

### *3.1 Physical Environment*

#### 3.1.1 Landforms

The Kenai NWR is located in south-central Alaska on the Kenai Peninsula. Three major landforms are present on the Refuge: the Kenai Lowlands, the Kenai Mountains, and the Tustumena Benchlands. The Kenai Lowlands and Kenai Mountains are found within the boundaries of the 44,000-acre Skilak WRA.

The west and central portions of the Skilak WRA lie within the Kenai Lowlands which fall within the Cook Inlet Basin ecoregion. This landform consists of ground moraine and stagnant ice terrain with low ridges, hills, muskeg, lakes, and ponds. Relief ranges from 50 to 250 feet. The eastern portion of the Skilak WRA lies within the Kenai Mountains which fall within the Chugach-St. Elias Mountains ecoregion. The Kenai Mountains rise to 3,000 feet in the Skilak WRA and over 6,000 feet elsewhere on the refuge.

#### 3.1.2 Air Quality

Kenai Refuge, including the Skilak WRA, is designated a Class II air quality area under the Clean Air Act. Class II areas allow some incremental increase in pollution over base-line concentrations. Air quality in the Skilak WRA is generally excellent; however, vehicles using the Skilak Loop Road during dry periods stir up dust which deteriorates air quality. In addition, exhaust from these vehicles degrade air quality along the road corridor, particularly during periods of high public use.

#### 3.1.3 Geology And Soils

Two geologic terranes are found within the Skilak WRA: Tertiary rock found within the Kenai Lowlands (or western and central portions of the area) known as the Alaska Peninsular terrane, and Mesozoic rock found in the Kenai Mountains (or eastern portion of the area) known as the Chugach-Prince William terrane.

The Alaska Peninsular terrane is covered by glacial deposits consisting of siltstone, fine sandstone, and shale. Lowland soils are mantled by glacial deposits that vary in texture and are overlain by well-drained to poorly drained silt loams. Depression areas, such as muskeg, are usually covered by peat soils produced by the slow decomposition of organic materials. Sloped areas are vulnerable to erosion, especially if vegetation is removed. The Mesozoic rock of the Chugach-Prince William terrane is mostly greywacke, a marine sandstone derived from igneous rock, with lesser amounts of basalt, radiolarian chert, and limestone.

### 3.1.4 Water Resources

Lentic systems (i.e., lakes, ponds, and wetlands) and lotic systems (i.e., streams and rivers) account for more then 4,630-acres or approximately 10% of the Skilak WRA. Aquatic and riparian habitats associated with these systems contain unique plant communities and other distinguishing features. Riparian habitats account for only 5% of Kenai Refuge but they account for some of the most valuable habitat for wildlife. Approximately 199 species use riparian habitats on the Refuge during some cycle of their lives, and 139 vertebrate species use them specifically for breeding (USFWS 1985). The following provides a short assessment of lentic and lotic systems in the Skilak WRA.

**Lentic Systems**

The Skilak WRA contains seventeen lakes totaling approximately 3,490-acres (8%) (Table 3.1). Three lakes immediately adjacent to the Skilak WRA are also commonly used by wildlife: Bottenintnin Lake, Skilak Lake, and Watson Lake. These lakes amount to 24,831-acres.

Lakes within the Skilak WRA remain frozen from November to May, and summer water temperatures rarely exceeds 68 degrees F. Skilak Lake freezes for shorter periods of time due to its size but does not get as warm as the smaller lakes in summer because much of its inflow is glacial meltwater. Cold water temperatures and low light levels common in northern latitude ecosystems severely limits productivity. High oxygen content, lack of pollution, and physical diversity balances these limitations. The net results are conditions that favor the reproduction and early growth of anadromous fishes.

**Table 3.1. Lakes**

| Name | Size (Acres) | | Name | Size (Acres) |
|---|---|---|---|---|
| Blizzard Lake | 57 | | Marsh Lake | 110 |
| Bottenintnin Lake | 262 | | Mox Lake | 45 |
| Chatelain Lake | 118 | | Pack Lake | 33 |
| Egumen Lake | 82 | | Petersen Lake | 92 |
| Engineer Lake | 225 | | Rock Lake | 19 |
| Hidden Lake | 1,597 | | Skilak Lake | 24,512 |
| Hiker's Lake | 61 | | Unnamed Lake | 21 |
| Kelly Lake | 146 | | Unnamed Lake | 13 |
| Lower Jean Lake | 113 | | Upper Ohmer Lake | 20 |
| Lower Ohmer Lake | 116 | | Watson Lake | 58 |

Wetland habitats are defined by periodic saturation or coverage of the soil by water. Wetlands account for only 3% of Kenai Refuge but they are valuable habitat for wildlife contributing to the survival and reproductive success of 96 vertebrate species (USFWS 1985). Wetlands account for 1,140-acres (2.6%) in the Skilak WRA.

**Lotic Systems**
The Skilak WRA contains nine streams and/or rivers totaling approximately 19-miles in length (Table 3.2). These streams, in addition to transporting water from lake to lake, provide access for anadromous fish, and reproduction and rearing habitat for resident fish. The productivity of these systems in subarctic regions is very fragile and dependent on high water quality, proper water temperature, clean stream gravel, and nutrient cycling (driven by the annual return of anadromous fish from the sea).

Wildlife species found in riparian habitats include brown bear, black bear, moose, caribou, river otter, beaver, muskrat, wood frog, bald eagle, common snipe, red-necked phalarope, and a variety of goldeneyes, grebes, gulls, loons, mergansers, sandpipers, swallows, yellowlegs, and terns.

**Table 3.2. Streams and Rivers**

| Name | Length (Miles) | | Name | Length (Miles) |
|---|---|---|---|---|
| Hidden Creek | 2.7 | | Ohmer Creek | 1.7 |
| Hidden Lake Inlet | 0.2 | | Unnamed 1 | 0.6 |
| Jean Creek | 3.1 | | Unnamed 2 | 0.4 |
| Kenai River | 7.3 | | Unnamed 3 | 1.8 |
| Moose River, East Fork | 1.7 | | | |

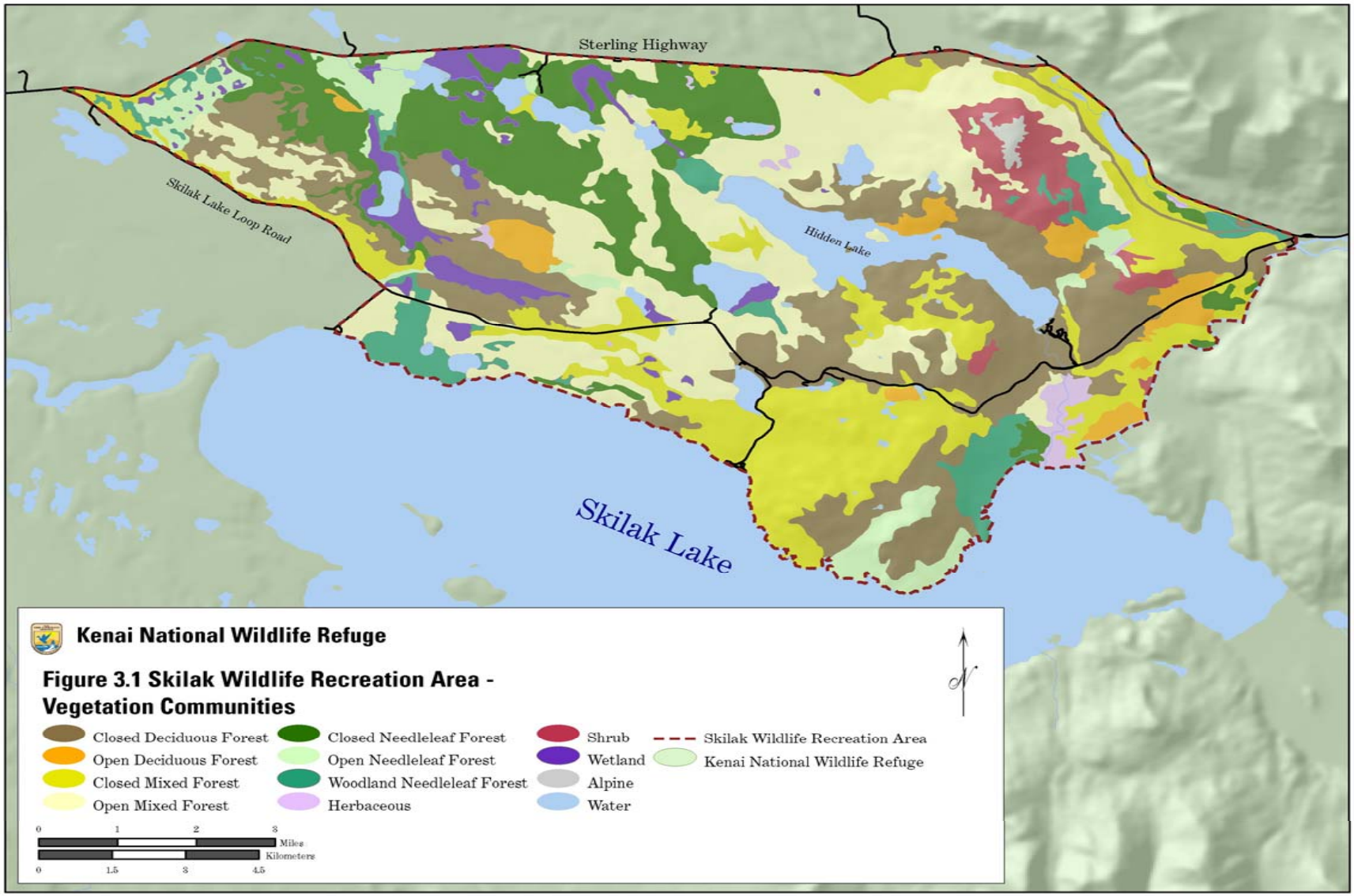
## *3.2 Biological Environment*

### 3.2.1 Vegetation

**Community Types**
Vegetative communities cover approximately 39,368-acres (89.4%) of the Skilak WRA. The remaining 4,630-acres (10.6%) are water resources. Forested habitats dominate the landscape accounting for approximately 37,438-acres or 95% of all vegetative cover. Other vegetative communities, including shrub, herbaceous, and alpine communities make up approximately 1,930-acres (5%).

The following vegetative communities (Viereck, et al., 1992) are found in the Skilak WRA (Figure 3.1 & Figure 3.2):

Mixed Forests – Mixed forests consist of needleleaf and deciduous trees. In the Skilak WRA, mixed forests consist of white spruce (*Picea glauca*), black spruce (*Picea mariana*), quaking aspen (*Populus tremuloides*), and paper birch (*Betula papyrifera*). These forests account for


Sterling Highway
Skilak Lake Loop Road
Hidden Lake
Skilak Lake
Kenai National Wildlife Refuge
Figure 3.1 Skilak Wildlife Recreation Area - Vegetation Communities
Closed Deciduous Forest
Open Deciduous Forest
Closed Mixed Forest
Open Mixed Forest
Closed Needleleaf Forest
Open Needleleaf Forest
Woodland Needleleaf Forest
Herbaceous
Shrub
Wetland
Alpine
Water
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
0 1 2 3
Miles
0 1.5 3 4.5
Kilometers
N

approximately 17,272-acres (43.9%). Open mixed forests (25-59% canopy cover) account for 9,417-acres (23.0%). Closed mixed forests (60-100% canopy cover) account for 7,855-acres (20.0%). Mixed forests are typically found in the east and central sectors of the area with a fairly large continuous portion found south of the Skilak Loop Road from the Rock Lake area to the Lower Skilak Lake Campground.

Deciduous Forests – Deciduous forests consist of broadleaf trees. In the Skilak WRA, deciduous forests consist of quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and black cottonwood (*Populus balsamifera trichocarpa*). These forests account for approximately 10,534-acres (26.8%). Open deciduous forests (25-59% canopy cover) account for 1,278-acres (3.2%). Closed deciduous forests (60-100% canopy cover) account for 9,256-acres (23.5%). Deciduous forests are typically found in the south-east sector of the Skilak WRA, but a significant portion is also found in the western sector north of the Skilak Loop Road.

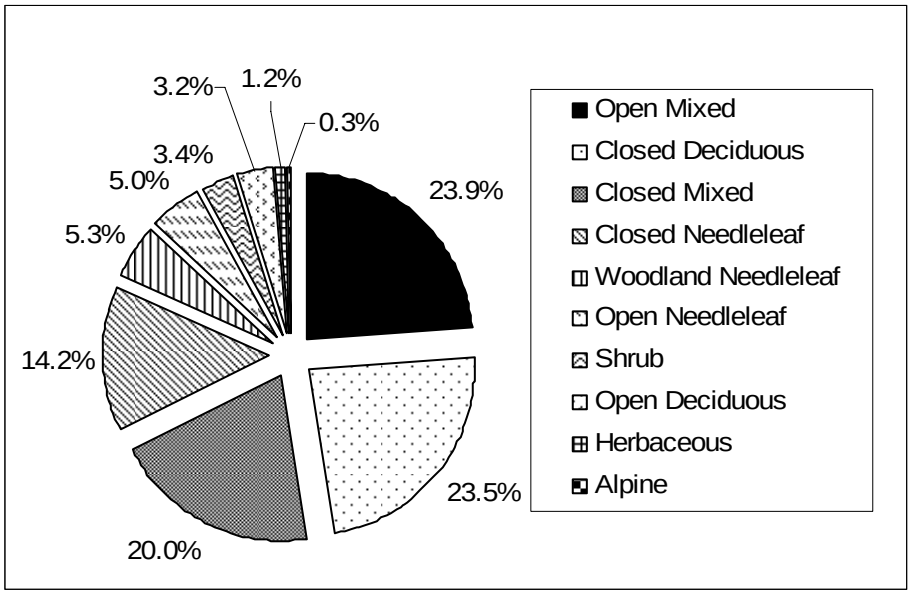
Needleleaf Forests – Needleleaf forests consist of coniferous trees. In the Skilak WRA, needleleaf forests consists of white and black spruce. These forests account for approximately 9,632-acres (24.5%). Open needleleaf forests (25-59% canopy cover) account for 1,972 (5.0%). Closed needleleaf forests (60-100% canopy cover) account for 5,591-acres (14.2%), and woodland needleleaf forests (10-24% canopy cover) account for 2,069-acres (5.3%). The majority of the acreage is found in the north-west sector of the Skilak WRA.

Shrub – Shrub communities contains two distinct vegetation categories: Closed Tall Scrub and Open Low Scrub. This community type accounts for approximately 1,330-acres (3.4%). Closed Tall Scrub is dominated by Sitka alder (*Alnus sinuata*) and/or willow (*Salix spp.*), and is typically found in wet meadows and near streams. Open Low Scrub primarily consisting of bog birch (*Betula glandulosa),*dwarf arctic birch (*Betula nana),*bog blueberry *(Vaccinium uliginosum*), and mountain cranberry *(Vaccinium vitis-idaea*) can be found at higher elevations on Hideout Mountain.

Herbaceous – Herbaceous communities are dominated by bluejoint reedgrass *(Calamagrostis canadensis)* but also includes various sedges (*Carex spp.).* This community type is typically found along flood plains and edges of lakes or drained wetlands. It accounts for approximately 465-acres (1.2%) primarily along Hidden Creek.

Alpine – Alpine communities are dominated by arctic willow (*Salix arctica*), dwarf arctic birch (*Betula pubescens),* and several species of grasses, sedges, and lichens. The highest elevations in the Skilak WRA support alpine tundra. This community type, found only on Hideout Mountain, accounts for approximately 135-acres (0.3%).

**Figure 3.2. Vegetation Classification**




## Habitat Disturbance

Approximately half of the forested areas on the Kenai Lowlands (refuge-wide) are in various stages of succession largely due to lightening strikes and human-caused fire, but also, as a result of management activities such as mechanical crushing and prescribed fire use. More than 11,000-acres (29.5%) of the Skilak WRA, and an additional 5,000-acres immediately adjacent to it have been managed since 1978 (Figure 3.3, Table 3.3).

Wildfire – The 1947 Skilak Lake Fire, which was started by a road construction crew, burned approximately 310,000-acres in GMU 15A which included 24,945-acres in the Skilak WRA. In 1963, a 400-acre wildfire burned in the vicinity of Engineer Lake, and in the early and mid-1990s, two wildland fires, the Pothole Lake and Hidden Creek fires, burned approximately 7,000-acres (18.7%) of the Skilak WRA.

Vegetation Crushing and Prescribed Fire – In 1970, the Refuge purchased three 40-ton Letourneau timber crushers. From 1974 to 1978 the crushers were used to manage approximately 7,000-acres in the northern portion of the Refuge. They were transferred to ADF&G in 1983. Over the next four years, approximately 4,000-acres were crushed in and adjacent to the Skilak WRA by ADF&G. All but 600-acres were subsequently burned by the Refuge using prescribed fire. ADF&G surplused the Letourneau tree crushers in 1988, marking the end of large scale mechanical manipulation on Kenai Refuge (USFWS 1996).

Spruce Bark Beetle Infestation – Kenai Refuge has historically suffered periodic infestations of spruce bark beetle (*Dendroctonus rufipennis*). Dendrochronology studies have shown evidence of regional bark beetle outbreaks in the 1760s, 1780s, 1810s, 1850s, 1870s, 1910s, 1970s, and 1990s. Approximately 850-acres (2.2%) have been impacted by spruce bark beetle in the Skilak WRA.

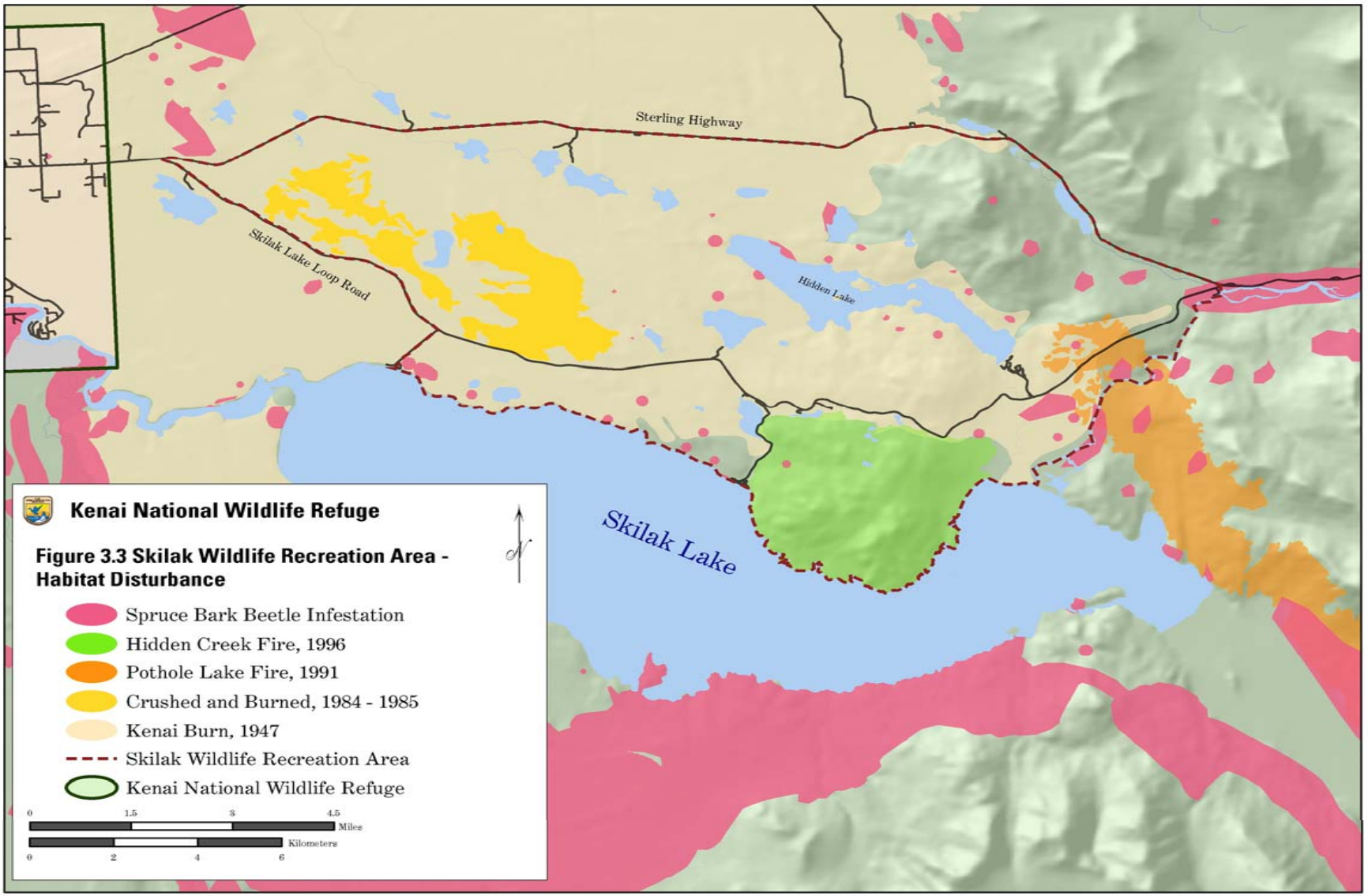

Sterling Highway
Skilak Lake Loop Road
Hidden Lake
Skilak Lake
Kenai National Wildlife Refuge
Figure 3.3 Skilak Wildlife Recreation Area - Habitat Disturbance
Spruce Bark Beetle Infestation
Hidden Creek Fire, 1996
Pothole Lake Fire, 1991
Crushed and Burned, 1984 - 1985
Kenai Burn, 1947
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
0 1.5 3 4.5
Miles
Kilometers
0 2 4 6

**Table 3.3. Habitat Modifications In and Adjacent to the Skilak WRA**

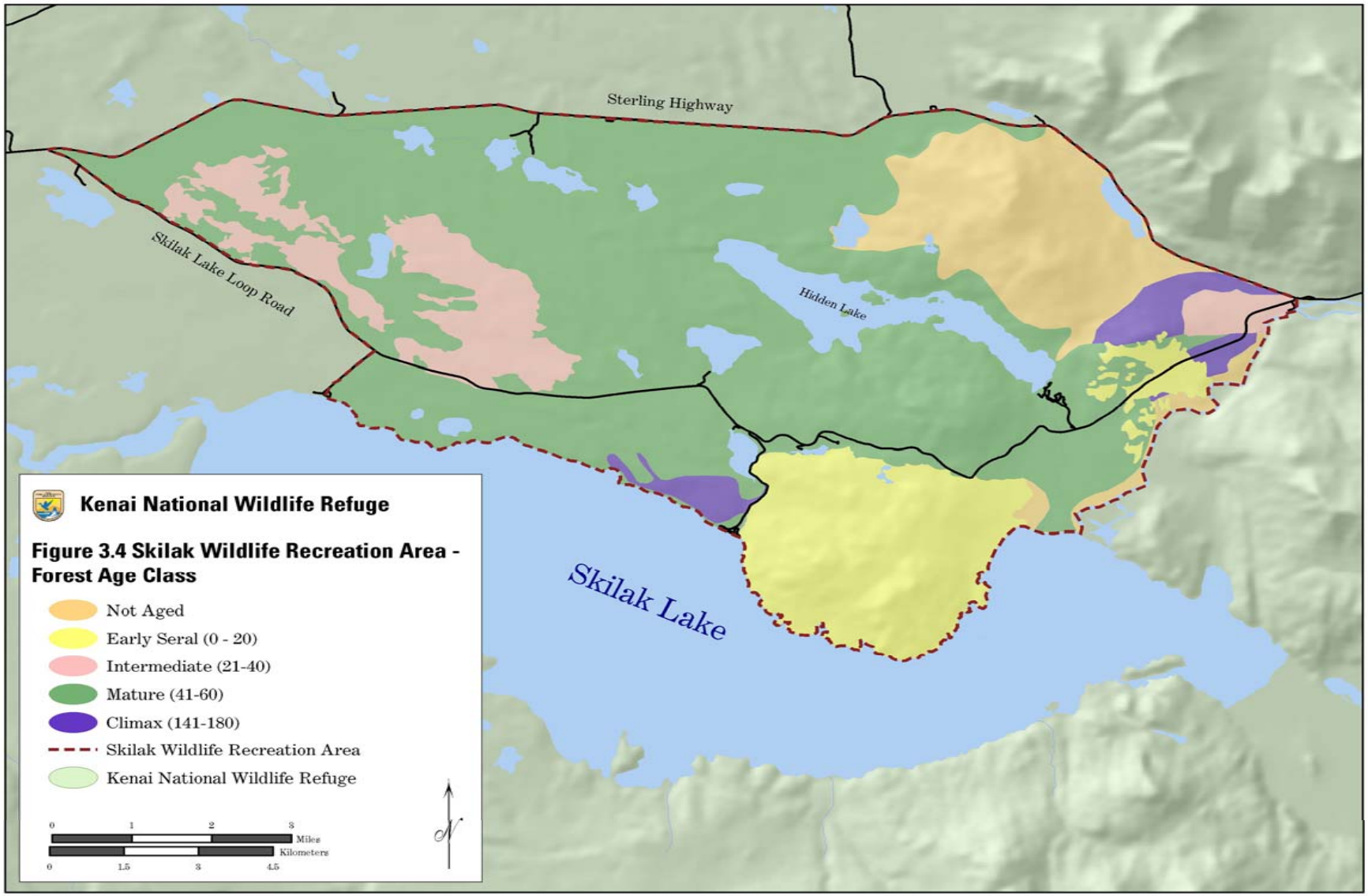
| Name | Treatment Type | Treatment Year | Acres | % of Forest Cover |
|---|---|---|---|---|
| Mystery Creek Vegetation Management Area | Mechanical Crushing | 1978 | 4,300 | Adjacent to SWRA |
| Skilak WRA Vegetation Management Area (Unit 1) | Mechanical Crushing | 1984 | 1,225 | 3.3% |
| Skilak WRA Vegetation Management Area (Unit 2) | Mechanical Crushing | 1985 | 1,972 | 5.3% |
| Skilak WRA Vegetation Management Area (Unit 1) | Prescribed Fire | 1986 | Same as above | Same as above |
| Lily Lake Vegetation Management Area | Mechanical Crushing | 1986 | 700 | Adjacent to SWRA |
| Skilak WRA Vegetation Management Area (Unit 2) | Prescribed Fire | 1987 | Same as above | Same as above |
| Lily Lake Vegetation Management Area | Prescribed Fire | 1987 | Same as above | Adjacent to SWRA |
| Unit 3 Pothole Lake Fire | Wildland Fire | 1991 | 1,800 | 4.8% |
| Unit 4 Hidden Creek Fire | Wildland Fire | 1996 | 5,200 | 13.9% |
| Throughout Skilak WRA | Bark Beetle Infestation | Ongoing | 842 | 2.2% |
| **Total** | | | **16,039** | |

## Forest Age Classes

Natural processes and management actions have influenced forest succession throughout the Skilak WRA. As a result, the Skilak WRA contains a diversity of forest age classes ranging from early seral (<20 years old) to climax forests (141-180 years old) (Table 3.4, Figure 3.4). A short description of forest age classes follows:

Mature Forests – Forest communities of this age class are dominated by trees that are 41-60 years old. They are the product of forest succession resulting from the 1947 Skilak Lake Fire. Mature forests, which account for approximately 24,945-acres (63.3%), dominate the Skilak WRA and consist of a diversity of deciduous, needleleaf, and mixed forest communities. Although it is the dominate age class throughout the area, its continuity is disrupted at specific locations in the western, central, and eastern sectors where additional fire events have occurred and habitat management actions have been implemented.

Wildlife species found in this age class include black bear, coyote, lynx, porcupine, red-backed vole, red squirrel, wolf, dark-eyed junco, gray jay, great horned owl, spruce grouse, and a variety of woodpeckers, chickadees, warblers, and thrushes. Approximately 66 wildlife species are thought to use this age class for breeding (USFWS 1985).


Sterling Highway
Skilak Lake Loop Road
Hidden Lake
Skilak Lake
Kenai National Wildlife Refuge
Figure 3.4 Skilak Wildlife Recreation Area - Forest Age Class
Not Aged
Early Seral (0 - 20)
Intermediate (21-40)
Mature (41-60)
Climax (141-180)
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
0 1 2 3
Miles
Kilometers
0 1.5 3 4.5
N

Early Seral Stage Forests – Forest communities of this age class are dominated by trees that are less than 20 years old. They are the product of forest succession resulting from the Pothole Lake and Hidden Creek wildland fires. Early seral stage forests, which account for approximately 5,160-acres (13.2%) in the eastern and central sectors of the Skilak WRA, are deciduous forest communities.

Wildlife species found in this age class include black bear, brown bear, coyote, lynx, masked shrew, moose, red-backed vole, snowshoe hare, wolf, spruce grouse, and a variety of woodpeckers, sparrows, thrushes, flycatchers, and warblers. Approximately 39 wildlife species are thought to use this age class for breeding (USFWS 1985).

Intermediate Stage Forests – Forest communities of this age class are dominated by trees that are 21-40 years old. They are the product of forest succession resulting from vegetation management activities conducted in the mid-1980s. Additional acreage of this age class can be found in the vicinity of the Sterling Highway and Skilak Loop Road intersection (East Entrance). Intermediate stage forests make up approximately 3,320-acres (8.4%) in the Skilak WRA and consist of a diversity of deciduous and mixed forest communities.

Wildlife species found in this age class include black bear, brown bear, coyote, lynx, moose, red-backed vole, short-tailed weasel, wolf, and a variety of woodpeckers, sparrows, thrushes, flycatchers, and warblers. Approximately 47 wildlife species are thought to use this age class for breeding (USFWS 1985).

Climax Forests – Forest communities of this age class are dominated by trees that are 141-180 years old. Climax forests make up approximately 1,100-acres (2.8%) in the Skilak WRA. This age class can be found in the vicinity of the Sterling Highway and Skilak Loop Road intersection (East Entrance) consisting of closed deciduous and mixed forest communities. It can also be found along the Skilak Loop Road where deciduous, mixed, and needleleaf forest communities occur. An additional stand is located in the central sector of the area west of the Upper Skilak Campground access road below Lower Ohmer Lake. This stand is a closed mixed forest community.

Wildlife species found in this age class include black bear, coyote, masked shrew, red squirrel, wolf, black-capped chickadee, spruce grouse, and a variety of woodpeckers and warblers. Approximately 68 wildlife species are thought to use this age class for breeding (USFWS 1985).

Not Aged – Approximately 5,420-acres (12.4%) of the eastern sector has not been aged. Much of this area is identified as shrub and alpine communities found on Hideout Mountain. Other portions of this area consists of deciduous, needleleaf, and mixed forest communities.

**Table 3.4. Forest Age Classes**

| Forest Age Class | Acres | % of Skilak WRA | Diversity Index[1] | % of All Species |
|---|---|---|---|---|
| Not Aged | 4,855 | 12.4 | n/a | n/a |
| Early Seral Stage (<20 years old) | 5,160 | 13.1 | 39 | 19.6 |
| Intermediate Stage (21-40 years old) | 3,320 | 8.4 | 47 | 23.6 |
| Mature Stage (41-60 years old) | 24,945 | 63.3 | 66 | 33.1 |
| Climax Stage (141-180 years old) | 1,100 | 2.8 | 68 | 34.1 |
| **Total** | **39,380** | **100%** | **-** | **-** |

### 3.2.2 Wildlife

Due to the location of the Skilak WRA situated between the Kenai Lowlands, Kenai Mountains, and Skilak Lake, the diversity of habitats and relatively undisturbed condition of the area, many if not most, of the 199 vertebrates common to Kenai Refuge are also thought to inhabit the Skilak WRA. A short assessment of species common to the area and/or those that could be affected by proposed management actions follows.

**Megafauna**

Black bears (Ursus americanus)

*Habitat* – Black bears are found in all forested habitats on Kenai Refuge, though they are most abundant in intermediate stage forests (21-40 years old) (USFWS 1985). Although they prefer forested and shrubby areas, they will also use wet meadows, ridgetops, burned areas, and riparian areas (Pelton 1987). They prefer wet over dry sites, and timbered over open areas (Unsworth 1989). Forest habitats dominate the landscape in the Skilak WRA accounting for approximately 37,438-acres. Intermediate stage forests account for 3,320-acres (8.9%), and mature forests resulting from the 1947 Skilak Lake Fire accounts for 24,945-acres (62.3%).

*Population* – The black bear population for the Kenai Peninsula is estimated at 3,000 bears (Del Frate 2002). Although the population is believed to be stable, fewer moose in the 1969 burn area and loss of habitat through continuing human encroachment will probably result in declining population numbers (Del Frate 2002). In GMU 15A, bear densities are estimated at 205 bears/1000 km squared (or 1 bear per 1,205 acres) for mature forests resulting from the 1947 Skilak Lake Fire (Schwartz and Franzmann 1991)). As such, mature forests in the Skilak WRA may support up to 20 bears. Although the black bear population for the Skilak WRA is unknown, numerous sightings and encounters with visitors indicate their use of the area.

[1] Diversity Index is the total number of species using the habitat for breeding purposes.

Brown Bears (Ursus arctos)

*Habitat* – Brown bears use 8,800 square kilometers (2,175,000 acres) or 37.7% of the Kenai Peninsula (Jacobs 1989). Human activities associated with development are altering important brown bear habitat on the peninsula. The infrastructure associated with this growth fragments habitat for bears, which need large, undeveloped areas for viability. Kenai Refuge provides the largest continuous, homogenous block of brown bear habitat on the peninsula. Habitat use varies seasonally in response to food availability (Jacobs 1989; Schoen 1994). Meat obtained from moose, caribou, and rodents is an important food source during spring and summer. Salmon are a critical resource from the time they arrive in summer to the time bears den in the fall (Hilderbrand et al. 2000).

*Defense of Life and Property (DLP)* – Human encroachment into brown bear habitat has led to a significant increase in the number of bears killed to protect life and property. Over 150 brown bears have been killed in DLP on the Kenai Peninsula since statehood. For the 17-year period from 1973 through 1989, a total of 38 (2.4 per year) DLP deaths were recorded. The rate of DLP deaths more than doubled during the 7-year period from 1990 thorough 1996, when a total of 40 (5.7 per year) bear deaths were recorded (ADF&G 2000). Five DLP deaths have occurred within the boundaries of the Skilak WRA over the last 25 years.

*Population* – The Kenai Peninsula brown bear population is listed as a "Species of Special Concern" (ADF&G 2000). Although there is no statistically reliable estimate of the Kenai Peninsula population, extrapolation from other regions with assumed similar bear densities has been attempted. Jacobs (1989) provided an initial estimate of 150-250 bears. ADF&G biologists later increased the estimate to 277 for management purposes (Del Frate 1993). Although the brown bear population in the Skilak WRA is unknown, numerous sightings and encounters with visitors indicate their use of the area.

Caribou (Rangifer tarandus)

*Habitat* – The Kenai Lowlands Caribou Herd is the only caribou herd on the Kenai Peninsula that migrates between summer calving grounds and winter ranges. The herd summers in GMU 15A typically where poorly drained meadows, sedge bogs, and muskeg habitats are found. In October, they migrate to winter in the Moose River drainage including portions of the Skilak WRA. Their winter range encompasses 291 square miles (ADF&G et al 2003). They are often observed through the month of April in black spruce forests located in the western portion of the Skilak WRA.

*Population* – Caribou were extirpated from the peninsula by 1912. In 1966, a population of 29 caribou (3 males and 26 females) was released at Watson Lake in the vicinity of the present day Skilak WRA. By 1993, the herd numbered 66 animals (ADF&G et al 1994). The population continued to increase steadily from 96 animals in 1995-96 to a peak of 140 during spring 1999. The population has declined slightly since then and is now estimated at 135 animals (Selinger 2005).

Moose (Alces alces)

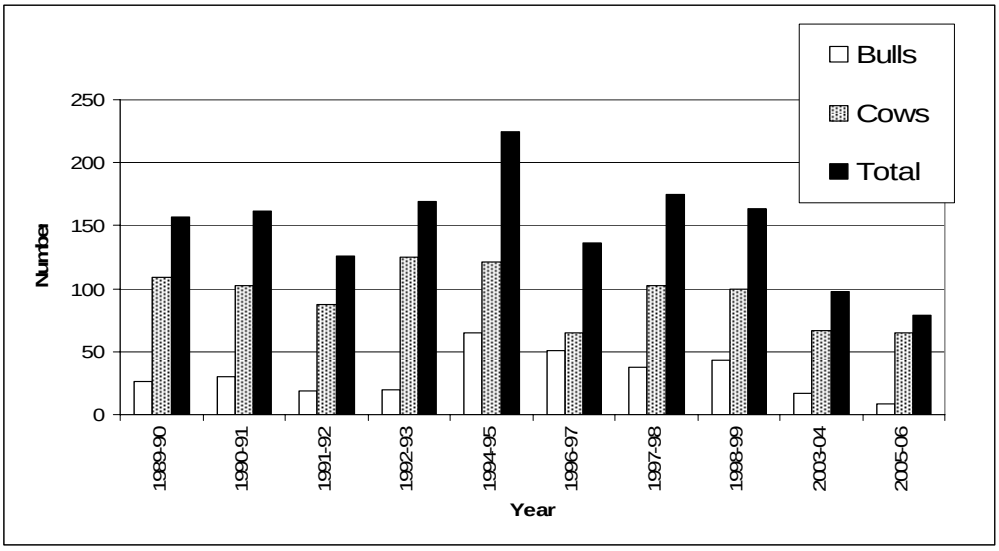
*Habitat* – Moose inhabit white and black spruce forests mixed with birch and willow, riparian communities, and herbaceous bogs. Habitat preference varies with season. In spring and summer moose can be found in open plant communities where forage is abundant, such as riparian communities, bogs, and early seral stage forests. During winter, moose prefer forested areas below 3,500 feet and move into denser, needleleaf forests as the winter progresses. Ideal winter range is composed of needleleaf trees taller than 18 feet with a canopy cover of 75% or greater (Timmermann, H.R. 1988). The use of needleleaf forests has been suggested for both predator avoidance (Stephens and Peterson 1984) and thermal protection (VanBallenberghe and Peek 1971). Moose distribution in winter is limited by the availability of woody food plants and by snow conditions.

Habitat quality has declined throughout most of GMU 15A as forest succession resulting from the 1947 Skilak Lake fire transitions from an intermediate to mature age class. Approximately 85,000-acres of intermediate stage forests resulting from a 1969 wildland fire in GMU 15A continues to provide browse for most of the moose wintering in the area. In the Skilak WRA summer habitat includes early and intermediate stage deciduous and mixed forests and riparian habitats associated with lentic and lotic systems. Early seral stage deciduous and mixed forests amount to 5,499-acres (11.7%) and intermediate stage deciduous and mixed forests amount to 3,184-acres (8.5%). Winter range (i.e., closed needleleaf forests with 50-100% canopy cover) amounts to 5,591-acres (14.2%).

*Roadkills* – According to State Trooper records, 57 moose were killed by vehicle collisions on the Sterling Highway in the Skilak WRA (i.e., between MP 58-75) from 1998 – 2005 or on average over 8 moose per year. Most collisions (63%) have occurred on either side of the East Fork of the Moose River in the vicinity of Egumen Lake (MP 69-71; n=20) and Bottenintnin Lake (MP 73-75; n=16). An interagency effort to address roadkills along the Sterling Highway is currently underway.

*Population* – In 1982, 3,000 moose were estimated in GMU 15A (Selinger 2004). Estimations made in 1987 and 1990 indicated a stable population trend in the range of 3,014-3,850 animals (Selinger, 2004). The population exhibited a declining trend through the 1990s, probably mainly due the result of forest succession in the 1969 burn. In 1995, the moose population estimate for GMU 15A was 1,780 animals (USFWS 1996) and 2,097 in 2001 (Selinger 2004). In the Skilak WRA, moose surveys are conducted every other year when survey conditions allow. Lack of complete snow cover prevented surveys from taking place in 1999-2000, 2000-01, or 2002-03. Survey data show moose numbers have varied over time (Figure 3.5).

**Figure 3.5 Moose Composition in the Skilak WRA During Surveyed Years**




Wolf (Canis lupus)

*Habitat* – Wolves are habitat generalists which do not require a specific habitat type for survival. Wolf habitat is based largely on the density of prey species found in a given habitat. To maintain wolf habitat, viable, robust ungulate populations must be present.

*Population* – Wolves were exterminated on the Kenai Peninsula by 1915. Wolves remained absent from the Kenai Peninsula for about 50 years (except for a few rare sightings) until they naturally recolonized in the late 1960s. The wolf population on Kenai Refuge reached about 90 animals in the 1970s. In the early 1980s, it was estimated at 82 with 60% of it located in GMU 15A. From the 1980s to the early 1990s, average wolf pack territory size in the northern half of the Refuge ranged from 180 to 850 square kilometers, and wolf density averaged about 13 wolves per 1,000 square kilometers. The refuge likely supports an estimated 80-99 wolves in at least five to seven packs in GMU 15A. The number of wolves using the Skilak WRA is unknown.

**Fur Animals**

ADF&G categorizes a number of species as fur animals. The following fur animals are found within the Skilak WRA:

Beaver (Castor canadensis)

*Habitat* – Beaver require stable aquatic habitat that provides adequate water, a channel gradient of less than 15%, and quality food species present in sufficient quantity (Allen 1983). Lakes 20-acres in surface area with irregular shorelines provide optimum habitat for Beaver. All of the lakes in the Skilak WRA are over 20-acres in size except one and are thought to support beaver. Intermittent streams or streams that have major fluctuations in discharge have little year-round value.

*Population* – Population density and trends have not been measured and are poorly understood in

most areas on the Kenai Peninsula, though Beaver numbers are thought to vary dependent upon habitat quality or predator abundance. Incidental observations and the trend in nuisance beaver complaints indicate that beaver populations peaked about 1984 and have remained relatively stable (Spraker 2001). Although the beaver population in the Skilak WRA is unknown, numerous sightings indicate their use of the area.

Coyote (Canis latrans)

*Habitat* – Coyotes are habitat generalists which do not require a specific habitat type for survival. Coyote habitat is based largely on the density of prey species found in a given habitat. Smaller mammals such as snowshoe hares, porcupines, and red-backed voles make up the majority of a coyote's diet on the Kenai Peninsula. There is little evident overlap in food habits between coyotes and wolves because the latter rely primarily on moose.

*Population* – Coyotes are thought to have colonized the Kenai Peninsula during the same period wolves were absent (1915-1965). Red fox were abundant prior to 1930 according to long-time Kenai residents, however they quickly disappeared as coyotes established and rapidly increased during the 1930s (Spraker 2001). Today, coyotes are found throughout the Kenai Peninsula at varying density levels dependent upon habitat quality or prey abundance, but generally, they are believed to be widely distributed and abundant (Spraker 2001). Although the coyote population in the Skilak WRA is unknown, sightings indicate their use of the area.

Lynx (Lynx canadensis)

*Habitat* – Lynx are cyclically abundant in the forest habitats of the Kenai Peninsula. They require a mix of early and late stage habitats to meet their food and cover needs. Early successional stage habitats provide lynx with a prey base, while mature forests provide denning space and cover. Lynx can also be found in intermediate stage forests when hare are numerous (Heinselman 1973). Early seral stage mixed forests on the Refuge, particularly within GMU 15A, appear to have a higher carrying capacity for snowshoe hares (*Lepus americanus*) which are lynx primary prey. In the Skilak WRA, there are approximately 4,958-acres (13.2%) of early seral stage mixed, deciduous, and woodland needleleaf forests, and 17,026-acres (45.5%) of mature mixed, deciduous, and woodland needleleaf forests.

*Population* – Lynx populations usually fluctuate in a cycle with snowshoe hare populations, peaking about every 9 to 10 years (USFWS 1994). Between 1977 and 1982, 25 lynx were estimated to reside in the northern part of the Refuge. By 1987, densities had risen in some areas three-fold after a lynx trapping closure in 1984 (USFWS 1988). In the late 1980s to early 1990s, lynx showed a preference for areas burned by the 1947 Skilak Lake Fire, particularly areas that included mature forest remnants. Lynx density increased noticeably during the mid-1990s in response to an increase in the abundance of snowshoe hares. Harvest records indicate lynx density remained high from 1997-98 to 1999-00 (Spraker 2001). Although the lynx population in the Skilak WRA is unknown, routine sightings indicate their presence in the area.

Red Fox (Vulpes vulpes)

*Habitat* – Although red foxes can survive in many habitats, they prefer areas with a mixture of plant communities (Ables 1971).

*Population* – Red fox were abundant prior to 1930 according to long-time Kenai residents, however they quickly disappeared as coyotes established and rapidly increased during the 1930s (Spraker 2001). Although the red fox population in the Skilak WRA is unknown, it is generally believed to be rare or absent from the area.

Red Squirrel (Tamiasciurus hudsonicus)
*Habitat* – Red squirrel inhabits needleleaf forests and mixed forests, and occasionally can be found in deciduous forests. They require mature needleleaf trees, preferably white spruce, as a source of cones and seed (DeGraaf 1986, Brink 1964). There are approximately 16,951-acres (45.2%) of potential habitat for red squirrel in the Skilak WRA including 6,319-acres (16.9%) of mature needleleaf forests and 10,632-acres (28.4%) of mature mixed forests. White spruce is found in well-drained soils typical of uplands areas in the Kenai Lowlands and at higher elevations on Hideout Mountain. Black spruce dominates poorly drained sites throughout the Kenai Lowlands.

*Population* – Although the red squirrel population for the Skilak WRA is unknown, numerous sightings along trails indicate their extensive use of the area.

**Small Game**
ADF&G categorizes a number of species as small game. The following small game species are found within the Skilak WRA.

Common Snipe *(*Gallinago gallinago)
*Habitat* – Snipe are found in lentic and lotic systems, primarily bogs, ponds, and riparian habitats that contain sedges, rushes, and willows. The Skilak WRA consists of 4,630-acres (10.6%) of lake, pond, and wetland habitat, and 19-miles of rivers.

*Population* – Although the snipe population in the Skilak WRA is unknown, sightings are common in the area.

Ruffed Grouse (Bonasa umbellus)
*Habitat* – Ruffed grouse occupy a variety of plant communities across its distribution range, however, they seem to have higher survival rates in mixed forests than in pure needleleaf forests (Barber et al 1989). Throughout most of their range, ruffed grouse prefer pure stands of quaking aspen if those stands have a mix of age classes (Gullion 1972) or quaking aspen mixed with other deciduous or needleleaf trees. Newly regenerated aspen stands provide nesting cover for up to 10 years, while 10 to 25-year old aspen are good for overwintering and breeding. Stands over 25 years provide nesting cover and food (Perala 1977). The Skilak WRA consists of 17,272-acres (43.9%) of mixed forests and 10,534-acres (26.8%) of deciduous forests. Early seral stage deciduous forests account for 1,689-acres (4.5%) and more than 8,000-acres of deciduous forests are older than 25 years.

*Population* – Between 1995 and 1997, 232 ruffed grouse were transplanted from Interior Alaska and released, in part, one mile from the refuge boundary by ADF&G. Within a year of introduction, broods had been spotted at Lily Lake and along the Skilak Loop Road (Steen

1997). The ruffed grouse population in the Skilak WRA is unknown. Sightings, although uncommon, indicate their use of the area.

Sandhill Crane (Grus Canadensis)

*Habitat* – In the northern part of its range, sandhill cranes inhabit sedge meadows and wetland communities that contain adequate emergent vegetation for nest building (Melvin 1990). The single most important factor regulating sandhill crane populations is habitat availability. Nesting effort and success, as well as survival of young, correlate directly with the amount and quality of nesting habitat (Sharp et al 1992). In the Skilak WRA, wetlands account for 1,140-acres (2.6%).

*Population* – Population estimates and trends have come from direct counts of wintering and migrating birds. The total population estimate for the species is 652,000 to 715,000 birds. The number of sandhill cranes using the Skilak WRA is unknown. Sightings, although uncommon, indicate their use of the area.

Snowshoe Hare (Lepus americanus)

*Habitat* – Snowshoe hares occupy needleleaf and mixed forests in all stages of succession, but early seral forests that have dense understories foster peak abundance. Deciduous forests are usually occupied only in early successional stages (Grange 1965). The presence of understory cover is the primary determinant of habitat quality and is more significant than food availability (Carreker 1985) or species composition (Litvaitis 1990). The Skilak WRA consists of 9,639-acres (25.7%) of needleleaf forests and 17,289-acres (46.1%) of mixed forests in various stages of succession. Early seral stage deciduous forests account for 1,689-acres (4.5%). The condition of the understory in these forest communities has not been analyzed.

*Population* – Snowshoe hare populations undergo cycles that range from 7 to 17 years between population peaks. The average time between peaks is approximately 10 years. The period of abundance usually lasts for 2 to 5 years followed by a population decline. Based on population density studies conducted by the Refuge in 1984, average adult hare densities were 2.5 adults per square mile in GMU 15A. GMU 15A appears to have a higher carrying capacity for snowshoe hare than other portions of the Refuge. Hare populations increased in the early-1990s and remained stable in the area until 1998 (Spraker 2001) when densities declined to 1.0 adult per square mile. Although the snowshoe hare population in the Skilak WRA is unknown, sightings indicate their use of the area.

Spruce Grouse (Falcipennis canadensis)

*Habitat* – Spruce grouse, a native species to the Kenai Peninsula, can be found in needleleaf-dominated forest habitats. Over most of its range, it uses dense, early successional stage needleleaf forests (<30 years old) that have well-developed middle canopies. Their association with needleleaf forests may be less close during periods of dispersal and migration. There are approximately 9,632-acres (24.5%) of needleleaf forests in the Skilak WRA with some 1,290-acres (13.4%) of it in early successional stage.

*Population* – Although the spruce grouse population for the Skilak WRA is unknown, sightings along the Skilak Loop Road and trails indicate their use of the area.

Waterfowl (Anatidae)
*Species* – Ten species of ducks have been identified in the Skilak WRA including four species of dabbling ducks (American Widgeon (*Anas Americana),* Northern Pintail (*Anas acuta),* Mallard (*Anas platyrhynchos),* and Green-winged Teal (*Anas crecca*)) and six species of diving ducks (Barrow's Goldeneye (*Bucephala islandica),* Common Goldeneye (*Bucephala clangula*), Common Merganser (*Mergus merganser),* Red-breasted Merganser (*Mergus serrator),* Surf Scoter (*Melanitta perspicillata),* and Bufflehead (*Bucephala albeola)*). Dabbling ducks, which are typically migratory species, are abundant during the breeding season. Diving ducks, most of which are year round residents, are common during the non-breeding season but less so during the breeding season.

*Habitat* – Dabbling ducks are commonly found on small ponds and wetlands in the Skilak WRA, and diving ducks are more common on deeper lakes.

Willow Ptarmigan (Lagopus lagopus)
*Habitat* – Willow ptarmigan are common in areas with patches of dense vegetation, especially where willow or birch shrubs are abundant (Weeden 1965). They are also found in sedge-willow marshes, in meadows, and along road and forest edges (Campbell et al 1990).

*Population* – The willow ptarmigan population in the Skilak WRA is unknown. Sightings, although uncommon, indicate their use of the area.

**Birds**
Kenai Refuge provides a mosaic of habitats for over 150 species of birds or approximately 32% of all bird species identified in Alaska. At least 76 species have been recorded in the Skilak WRA and 87% of those species are known to breed locally (USGS website). Over half of the birds recorded in the Skilak WRA are migratory birds which spend only a portion of their life cycle in the area. Twenty-five species are year-round residents (Brown 1999). A short assessment of the most common bird families follows:

Gulls and Terns (Laridae)
*Species* – Three species of gulls and one tern have been identified in the Skilak WRA: Bonaparte's Gull (*Larus Philadelphia),* Mew Gull (*Larus canus),* Glaucous-winged Gull (*Larus glaucescens*), and Arctic Tern (*Sterna paradisaea).* These species are migratory birds that are abundant during the breeding season.

*Habitat* – Gulls and terns are found in riparian habitats and black spruce bog forests in the Skilak WRA. Glaucous-winged gull rookeries occur on various islands in Skilak Lake.

Raptors (Accipitridae)
*Species* – Five species of raptors have been identified in the Skilak WRA: Bald Eagle (*Haliaeetus leucocephalus*), Northern Goshawk (*Accipiter gentiles),* Northern Harrier (*Circus cyaneus),* Red-tailed Hawk (Buteo *jamaicensus*), and Sharp-shinned Hawk (*Accipiter striatus).* These species are residents or short-distance migrants that are common during the breeding season.

*Habitat* – Bald eagles are regularly found in riverine systems, particularly along the Kenai River where salmon and other fish species are readily available. Three Bald Eagle nests are present in the Skilak WRA. Northern Goshawks use a wide variety of forest ages, structural conditions, and successional stages including transitional zones from bog to forest and forest to shrubland. Riparian zones and mosaics of forested and open areas are important hunting habitats, and climax stands are typically used for nesting. Sharp-shinned hawks occur primarily in coniferous forests, but are also found in woodland needleleaf forests. Northern harriers prefer sloughs, wet meadows, and shrublands, and hunt in large forest openings..

Sandpipers (Scolopacidae)

*Species* – Six species of sandpipers have been recorded in the Skilak WRA: Red-necked Phalarope (*Phalaropus lobatus)*, Spotted Sandpiper (*Actitis macularia)*, Least Sandpiper (*Calidris minutilla),* Common Snipe (*Gallinago gallinago)*, Greater Yellowlegs (*Tringa melanoleuca),* and Lesser Yellowlegs (*Tringa flavipes)*. These species are migratory birds that are abundant during the breeding season.

*Habitat* – Sandpipers are found in riparian habitats and black spruce bog forests in the Skilak WRA.

Sparrows and Juncos (Emberizidae)

*Species* – Eight species of sparrows and juncos have been recorded in the Skilak WRA: Fox Sparrow (*Passerella iliaca)*, American Tree Sparrow (*Spizella arborea),* Slate-colored Junco (*Junco hyemalis)*, Lincoln's Sparrow (*Melospiza lincolnii)*, Savannah Sparrow (*Passerculus sandwichensis)*, White-crowned Sparrow (*Zonotrichia leucophrys)*, Song Sparrow (*Melospiza melodia)*, and Golden-crowned Sparrow (*Zonotrichia atricapilla)*. These species are migratory birds that are abundant during the breeding season.

*Habitat* – Sparrows and juncos are found in all forest communities and age classes in the Skilak WRA.

Thrushes (Turdidae)

*Species* – Five species of thrushes have been identified in the Skilak WRA: Gray-cheeked thrush (*Catharus minimus),* Varied Thrush (*Ixoreus naevius)*, Swainson's Thrush (*Catharus ustulatus)*, Hermit Thrush (*Catharus guttatus)*, and American Robin (*Turdus migratorius)*. These species are migratory birds that are common during the breeding season.

*Habitat* – Thrushes are found in all forest communities and age classes except black spruce bogs and riparian habitats in the Skilak WRA.

Waterbirds (Gaviidae, Podicipedidae, and Phalacrocoracidae)

*Species* – Six species of waterbirds have been identified in the Skilak WRA: Pacific Loon (*Gavia pacifica)*, Common Loon (*Gavia immer)*, Red-throated Loon (*Gavia stellata*), Double-crested Cormorant (*Phalacrocorax auritus)*, Horned Grebe (*Podiceps auritus)*, and Red-necked Grebe (*Podiceps grisegena)*. These species are migratory birds that are common during the breeding season.

*Habitat* – Waterbirds are found in lake systems throughout the Skilak WRA.

Woodpeckers (Picidae)
*Species* – Three species of woodpeckers have been identified in the Skilak WRA: Hairy (*Picoides villosus)*, Downy (*Picoides pubescens)*, and Three-toed woodpeckers (*Picoides tridactylus)*. These species are year-round residents that are common throughout the year.
*Habitat* – Woodpeckers are found in all forest communities of all age classes in the Skilak WRA.

Wood Warblers (Parulidae)
*Species* – Seven species of wood warblers have been identified in the Skilak WRA: Townsend's Warbler (*Dendroica townsendi)*, Myrtle Warbler *(Dendroica coronata)*, Orange-crowned Warbler (*Vermivora celata)*, Yellow Warbler (*Dendroica petechia)*, Wilson's Warbler (*Wilsonia pusilla*), Blackpoll Warbler (*Dendroica striata)* and Northern Waterthrush (*Seivrus noveboralensis*). These species are migratory birds that are common during the breeding season.

*Habitat* – Wood warblers are found in all forest communities and age classes except black spruce bog forests and riparian habitats in the Skilak WRA.

**Fish**
Fish are an important resource on the Kenai Peninsula and in the Skilak WRA. Not only are various fish species found in the Skilak WRA attractive to anglers for recreational fishing, they also provide an important food source for some of the wildlife that inhabit the region.

Anadromous Fish
Waters within the Skilak WRA contain several species of anadromous fish. Anadromous fish are those species of fish that migrate upriver from the ocean to reproduce in freshwater. In the Skilak WRA, these include Chinook (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), sockeye (*Oncorhynchus nerka*), and pink (*Oncorhynchus gorbuscha*) salmon as well as Dolly Varden (*Salvelinus malma Walbaum*). Anadromous fish are found in the Kenai River, as well as Skilak and Hidden Lakes. In addition, several lakes attached to the east fork of the Moose River are spawning grounds for coho and sockeye salmon.

Resident Fish
The Kenai River and most lakes in the Skilak WRA contain populations of resident fish. Resident fish are those fish species that remain in freshwater systems (streams, rivers, or lakes) throughout their lives. In the Skilak WRA, important resident fish species include rainbow trout (*Oncorhynchus mykiss*), lake trout (*Salvelinus namaycush*), and Dolly Varden. Rainbow trout are found in the Kenai River and in many lakes, such as Hidden, Engineer, and Peterson Lakes. Lake trout are found in the Kenai River and larger lakes, such as Skilak and Hidden Lakes. There are several species of resident fish found in the Skilak WRA, such as sculpins (*Cottus spp*.) stickleback (*Gasterosteidae*) and whitefish (*Coregonus*), which have no recreational significance, but are important food sources for other fish and wildlife.

Many of the isolated lakes in the Skilak WRA are not very productive biologically for resident fish. Because of the low biological productivity, populations of resident fish remain sparse and growth is slow. In the lakes and river systems containing anadromous fish, resident fish often grow at a faster rate because of the high amount of food available from spawning salmonids.

Resident fish, such as rainbow trout and Dolly Varden, gorge themselves on salmon eggs and spawned out salmon flesh. These fish reach much larger sizes than the same species located in isolated lakes in the Skilak WRA.

Both anadromous and resident fishes are attractive to recreational anglers in the Skilak WRA. The resident populations, because of their low levels and slow growth, warrant especially careful management to protect them from excessive harvesting. Some of the lakes can support recreational fishing naturally; others cannot. Controlling factors seem to be lake depth, which must be sufficient to prevent freezing to the bottom in winter, and the availability of suitable reproductive habitat for resident fish.

## *3.3 Human Environment*

### 3.3.1 Brief History of the Area

The Skilak Lake area has been occupied by humans for at least 5,000 and possibly 9,000 years. The earliest inhabitants were big game hunters, pursuing caribou and sheep in the highlands. By about 1000 BC people were living along the rivers and had a mixed economy based on hunting and salmon fishing. The river corridor and Skilak and Kenai Lakes have been major transportation corridors across the Kenai Peninsula for hundreds if not thousands of years.

Russian explorers and traders established trading outposts along the shores of Cook Inlet beginning in 1786. By 1794 there were forts at English Bay, Kasilof River, Kenai River and on the north Forelands. No more than 150 Russians ever occupied the area but the economic system centered on furs established during this time remained intact after the sale of Alaska to the U.S. in 1867.

In 1848, the mining engineer Petyr Doroshin explored Skilak Lake and the upper Kenai River for gold. Although he found traces of it he discouraged further development as unprofitable. An American named Stone searched the Skilak Lake area in 1868. In 1884, Joseph Cooper opened a trading post at present day Cooper Landing. Gold was found in commercial quantities on the upper Kenai River in 1895 by Charles Sickles and James Stetson (McMahan and Buzzell 1986). By 1910-11, the Kenai River from Cooper Landing to Skilak Lake was claimed for dredging operations. Dredging was attempted until 1914 but with little success (Buzzell 1985). Mining activity peaked in 1910 and tapered off rapidly (McMahan and Buzzell 1986).

After WWI the economy shifted from mining to a mixed based on summertime mining, big game guiding, fur farming, winter trapping, and other activities. Fishing and gardening were important subsistence pursuits. The first homestead applications were filed in 1915 (McMahan and Buzzell 1986; Buzzell 1985). The Skilak Lake area was the focus of these families economic and social activities and an elaborate annual subsistence routine developed to use local resources. World War II brought a huge influx of new people and recreational development. The Skilak Military Recreation Site at the outlet of Skilak Lake was built in the early 1940’s. It was eventually turned over to the U.S. Fish and Wildlife Service in 1958. Also during the 1950’s, the Seward Army Recreational Center maintained temporary camps on Hidden Lake.

The Kenai River corridor has always been a major travel route across the Kenai Peninsula.

Surveying and clearing for the Sterling Highway began in 1946 (McMahan and Buzzell 1986). Actual construction began in 1947 and the road was graveled in 1948. Though graveled the road was only passable in good weather. A portion of the original highway is now the Skilak Loop Road located in the Skilak WRA. At first the road was too poor to encourage much traffic and had little impact on the area between Sterling and Cooper Landing. In the mid-1950s, oil companies began to explore the northern part of the Peninsula along the Swanson River. Increasing development led to road improvements and the present highway was paved in 1956.

### 3.3.2 Local Population

Kenai NWR lies within the Kenai Peninsula Borough, which is comprised of the Kenai Peninsula, Cook Inlet, and a large, mostly unpopulated area, northeast of the Alaska Peninsula. The total population of the Borough was 50,980 in 2004 (Alaska Department of Commerce, Community, and Economic Development). The twin cities of Kenai and Soldotna, along with nearby Sterling, form the population center of the Borough. The Borough also includes the cities of Homer and Seward as well as numerous smaller communities along the road system and several villages accessible only by boat or aircraft

The population of the Kenai Peninsula Borough is dwarfed by that of the Municipality of Anchorage, which is only three hours by road and 15-20 minutes by air from Kenai Refuge. Anchorage is the largest city in Alaska, home to 277, 498 people in 2004, or about 43% of the total state population (Alaska Department of Commerce, Community, and Economic Development). The Anchorage population has grown by nearly 100,000 since the first Kenai Refuge Comprehensive Conservation Plan was completed in 1985. At the same time, continuous road improvements have made travel between Anchorage and the Kenai Peninsula more convenient.

### 3.3.3 Summary of Current Use

The Skilak WRA is one of the most heavily used areas, if not *the* most heavily used area, of Kenai NWR due to its close proximity to population centers, easy access, and diversity of public use facilities provided in a natural setting. Recreational choices range from passive to active recreation and occur throughout the area during all seasons of the year. In the spring, summer, and fall, recreation activities include archery hunting, camping, freshwater sport fishing, hiking, nature photography, sightseeing, and wildlife viewing. During the winter, recreation activities include cross-country skiing, snowshoeing, and wildlife viewing. Most visitors participate in several activities while using the area.

### 3.3.4 Public Use Access

Access to the Skilak WRA is facilitated by two developed roads into and around the area: the Sterling Highway and the Skilak Loop Road. Most visitors approaching from the east enter the Skilak WRA from the Sterling Highway via the Skilak Loop Road at MP 58. Soldotna, Kenai, and Homer residents generally use the Skilak Loop Road west entrance at MP 75. Visitors can access the “backcountry” of the Skilak WRA via a number of developed trails, or they can embark on a cross country journey off-trail through a variety habitats. Boaters can access the area via the Kenai River or Skilak Lake; pilots can land their aircraft on Hidden Lake, Bottenintnin Lake, and/or Skilak Lake; and canoeists can explore a number of lakes accessible from campgrounds and the Bottenintnin Day Use Area.

**Roads**

Sterling Highway

The Sterling Highway is a two lane, paved highway that runs east to west for nearly fifteen (15) miles along the northern border of the Skilak WRA. It has a speed limit of 55 mph and is a major route for intrastate commerce and travel. In recognition of its spectacular scenery, rich cultural heritage, diverse recreational opportunities, archeological importance, wildlife, and natural beauty the Sterling Highway from MP 37 to the Skilak Lake Loop Road near MP 75 is designated a state scenic byway.

According to Alaska Department of Transportation (ADOT) traffic figures, in 1996, 2,367 vehicles passed through the Skilak WRA using the Sterling Highway on average each day (863,955 vehicles per year). In 2004, 3,280 vehicles passed through the Skilak WRA using the Sterling Highway on average each day (or 1,197,200 vehicles per year). The Sterling Highway provides access to a number of Skilak WRA facilities.

Access roads originating from the Sterling Highway include: Kelly/Peterson Lake Campground Access Road (0.93 mile) and Watson Lake Campground Access Road (0.43 mile).

Skilak Loop Road

The Skilak Loop Road is a two lane, gravel road that runs east to west through the southern portion of the Skilak WRA. It is 18.8 miles in length and has a speed limit of 35 mph. It is the main artery into the Skilak WRA. According to ADOT traffic figures, in 1996, 210 vehicles passed through the Skilak WRA using the Skilak Loop Road on average each day (76,650 vehicles per year). In 2004, 398 vehicles passed through the Skilak WRA using the Skilak Loop Road on average each day (145,270 vehicles per year). The road provides access to the majority of facilities located within the Skilak WRA.

The Skilak Loop Road, and the access roads leading into Hidden Lake, and Upper and Lower Skilak campgrounds, are state roads. Campground access roads are gravel except for the access road to Hidden Lake Campground which is paved. The ADOT is responsible for maintenance of these roads. ADOT maintenance is performed in accordance with district-wide priorities. Due to budget reductions, the Skilak Loop Road receives sporadic maintenance. When road conditions become intolerable and ADOT has not responded to requests for maintenance, Refuge maintenance crews grade or plow the road to ensure visitor safety.

Access roads adjoining the Skilak Loop Road include: Bottenintnin Lake Day Use Area (0.36 mile), Lower Skilak Lake Campground (1.3 miles), Engineer Lake Campground (0.30 mile), Upper Skilak Lake Campground (2.4 miles), Hidden Lake Campground (1.5 miles), and Jim's Landing (0.20 mile).

**Trails**

Trails are one of the most effective ways for visitors to observe wildlife in a boreal forest setting where vegetation is often thick and difficult to see and/or bushwhack through. The Skilak WRA has eleven (11) designated hiking trails totaling 19.5-miles in length (Table 3.5). There is an additional 1-mile spur trail originating from the Seven Lakes Trail that provides access to the northern shore of Hidden Lake.

Trails provide opportunities for visitors to access every vegetative community in the Skilak WRA except wetland and alpine communities which are susceptible to human-related impacts. Access to a diversity of habitats increases one's chances of viewing a wide variety of wildlife. Six (6) trails provide access to closed deciduous forests, five (5) trails provide access to closed and open mixed forests, and five (5) trails provide access to herbaceous and tall scrub communities. Only four (4) trails pass through portions of needleleaf communities where opportunities for viewing wildlife are limited; one of which is the short 0.3 mile trail to Egumen Lake. Because there are few designated hiking trails throughout Alaska, particularly in boreal forest settings, the number of trails and diversity of habitats within the Skilak WRA makes it a unique destination point for hiking and wildlife viewing.

**Table 3.5. Trails**

| Name | Vegetative Communities and Age Classes | Length (one-way) |
|---|---|---|
| Bear Mountain | Closed deciduous forest, open mixed forest, closed tall scrub; mostly 20-39 yrs old, some >60 yrs old | 0.8 |
| Burney's | Closed deciduous forest, closed mixed forest; <39 yrs old | 0.6 |
| Egumen Lake | Open needleleaf forest; <19 yrs old | 0.3 |
| Hidden Creek | Open needleleaf forest, woodland needleleaf forest, closed deciduous forest, dry forb herbaceous; <39 yrs old | 1.3 |
| Hideout Mountain | Closed deciduous forest, open mixed forest, closed tall scrub; <15 yrs old | 0.75 |
| Kenai River (East) | Closed needleleaf forest, closed deciduous forest, open deciduous forest, closed mixed forest; <39 yrs old | 2.8 |
| Kenai River (West) | Open deciduous forest, closed mixed forest, closed tall scrub; <39 yrs old | 2.3 |
| Seven Lakes | Closed needleleaf forest, open mixed forest; <39 yrs old, some >60 yrs old | 4.4 |
| Seven Lakes Spur | Open mixed forest; <39 yrs old, some >60 yrs old | 1.0 |
| Skilak Lookout | Closed deciduous forest, closed mixed forest; <39 yrs old | 2.0 |
| Skyline | Open deciduous forest, closed mixed forest, closed tall scrub; >60 yrs old | 1.9 |
| Vista | Closed mixed forest; <39 yrs old | 1.5 |

**Rivers and Lakes**

Rivers and lakes provide access to large portions of the Skilak WRA where scenic/wildlife viewing can be enjoyed (Table 3.6). The most popular river on the refuge (and possibly throughout the entire state) for outdoor recreation activities is the Kenai River. The river flows eighteen (18) river miles from Kenai Lake to Skilak Lake, and then on for another fifty (50) river miles before entering into the Cook Inlet. It flows for nearly twelve (12) river miles through Kenai Refuge; seven of which, as the eastern boundary of the Skilak WRA. Users typically put their crafts in at the Cooper Landing boat launch (Sterling Highway MP 48), Sportsman's Lodge

(Sterling Highway MP 55), or Jim's Landing (Skilak Loop Road MP 58) and float to either Jim's Landing or through the Kenai River Canyon to Skilak Lake. Crafts are towed, motored or paddled (*note: paddling rafts or other small crafts is not advised due to high wind conditions on the lake*) around Skilak Lake to the Upper Skilak Lake Campground boat launch. Nearly 7,000 crafts and 25,000 visitors floated the upper river section for either fishing or scenic viewing pleasure in 2004. Nearly 2,000 visitors floated through the Kenai River Canyon to Skilak Lake that same year with nearly two thirds of them specifically doing so for scenic viewing purposes.

**Table 3.6. Easily Accessible Lakes**

| Lake Name | Area (acres) | Boat Launch Provided | No Wake Restriction Applies |
|---|---|---|---|
| Bottenintnin | 262 | Yes | Yes |
| Egumen | 82 | Yes | No |
| Engineer | 225 | Yes | Yes |
| Hidden | 1,597 | Yes | No |
| Kelly | 146 | Yes | Yes |
| Lower Jean | 113 | Yes | Yes |
| Lower Ohmer | 116 | Yes | Yes |
| Peterson | 92 | Yes | Yes |
| Rock | 19 | No | No |
| Skilak | 24,512 | Yes | No |
| Upper Ohmer | 20 | Yes | Yes |
| Watson | 58 | Yes | Yes |

### 3.3.5 Public Uses and Related Facilities

**Overview**

The Skilak WRA contains a wide variety of public use facilities that directly or indirectly provide services for a multitude of outdoor recreation opportunities year-round including cross country skiing, fishing, hunting, photography, snowshoeing, and scenic and wildlife viewing (Figure 3.6, Table 3.7). Construction and/or rehabilitation of these facilities began in the late 1980's as directed by the Refuge's Public Use Facilities Step-Down Management Plan as funding was available.

**Current Uses and Facilities**

Administrative Facilities

One (1) administrative facility is located in the Skilak WRA; a 600-square foot log cabin at MP 13.5 along the Skilak Loop Road which is used for seasonal employee housing, and storage of maintenance equipment and supplies during the summer.

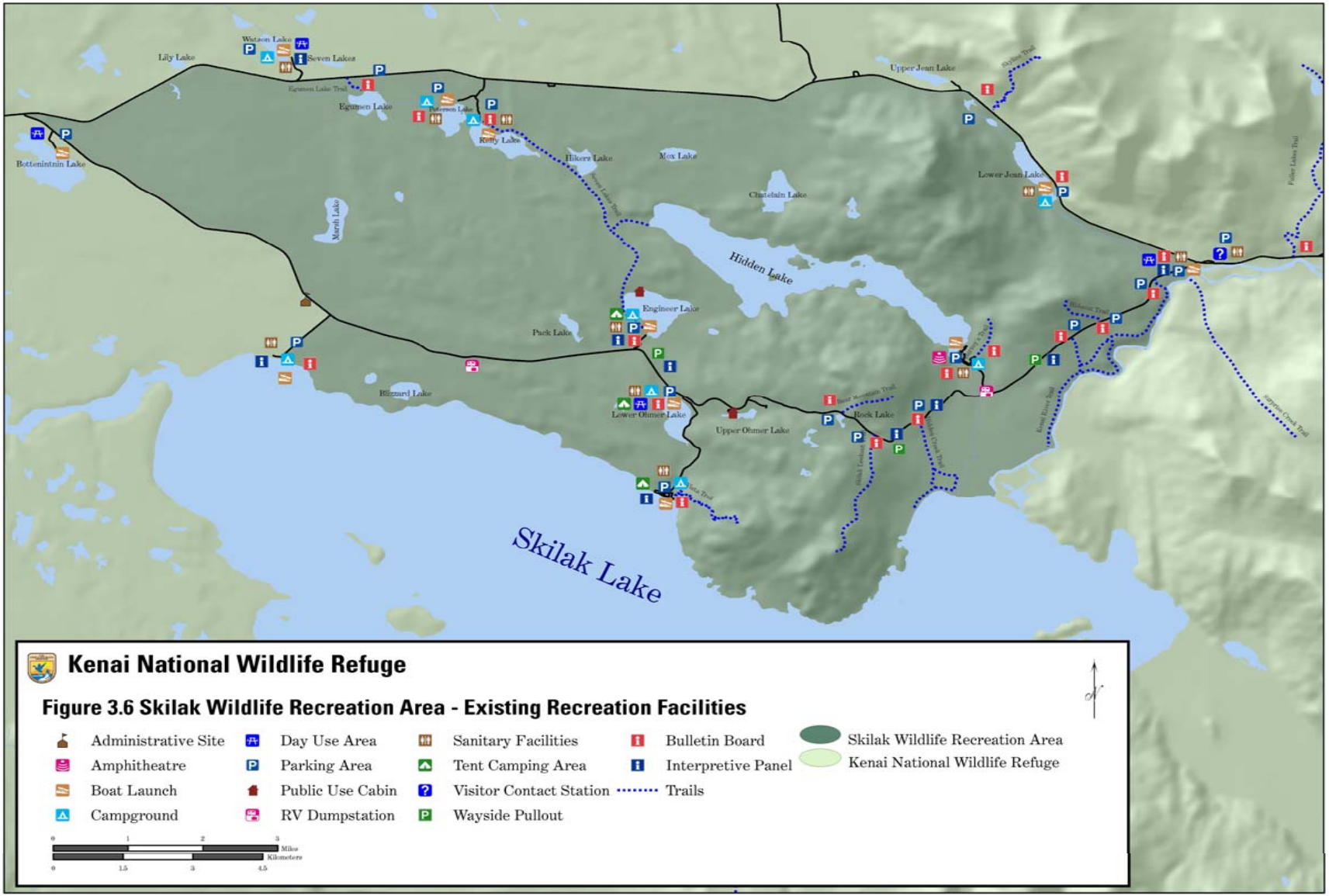

Watson Lake
Lily Lake
Seven Lakes
Egumen Lake
Egumen Lake Trail
Upper Jean Lake
Outlet Trail
Bottenintnin Lake
Hikers Lake
Mox Lake
Rusty Lake
Lower Jean Lake
Chatelain Lake
Morals Lake
Hidden Lake
Engineer Lake
Puck Lake
Blizzard Lake
Lower Ohmer Lake
Upper Ohmer Lake
Rock Lake
Skilak Lake
Kenai National Wildlife Refuge
Figure 3.6 Skilak Wildlife Recreation Area - Existing Recreation Facilities
Administrative Site
Amphitheatre
Boat Launch
Campground
Day Use Area
Parking Area
Public Use Cabin
RV Dumpstation
Sanitary Facilities
Tent Camping Area
Visitor Contact Station
Wayside Pullout
Bulletin Board
Interpretive Panel
Trails
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
Miles
Kilometers

**Table 3.7. Access to Public Use Facilities**

| Facility Type | Sterling Highway | Skilak Loop Rd. | Total |
|---|---|---|---|
| Administrative | 0 | 1 | 1 |
| Boat Launches | 4 | 7 | 11 |
| Bulletin Boards / Kiosks | 7 | 14 | 21 |
| Cabins | 0 | 2 | 2 |
| Campgrounds | 4 | 5 | 9 |
| Campsites ("Walk-in") | 0 | 14 | 14 |
| Day Use Area | 0 | 3 | 3 |
| Interpretive Sites | 0 | 9 | 9 |
| Parking Areas | 5 | 13 | 18 |
| Sanitary Facility Sites | 5 | 8 | 13 |
| Signs | 7 | 12 | 19 |
| Trails | 2 | 9 | 11 |
| Viewing Facilities | 0 | 1 | 1 |
| Visitor Contact Station | 1 | 0 | 1 |
| Wayside Pullout | 0 | 3 | 3 |

Boating and Boat Launches

There are eleven (11) boat launches in the Skilak WRA. Nine (9) of these are located in campgrounds (Table 3.8) and two (2) are located in day-use areas (i.e., Bottenintnin Lake and Jim's Landing). Boat launches vary in construction from simple, one vessel-capable gravel or dirt ramps, to concrete, two vessel-capable ramps. Motorboat use is allowed on all lakes within the Skilak WRA, Skilak Lake, and the Kenai River downstream of Skilak Lake; some lakes have a "no wake" restriction to minimize disturbance to water birds. Canoes, rafts, and kayaks are unrestricted on all waterbodies. Personal watercraft (i.e., jet skis) are not allowed on any waters within the Refuge.

Cabins

Two public use cabins are available by reservation only: Upper Ohmer Lake and Engineer Lake cabins. These 800-square foot cabins were built in 2004 – 2005. Approximately 341 visitors have used these cabins since their construction in August 2004.

Campgrounds

There are nine (9) campgrounds containing ninety-three (93) vehicle sites in the Skilak WRA (Table 3.8). Eight (8) campgrounds have potable water available and two (2) campgrounds have a user fee associated with them.

**Table 3.8. Campgrounds**

| Location | MP | Number of Sites | Potable Water | Boat Launch | Fee (per night) |
|---|---|---|---|---|---|
| Engineer Lake | 9.4 | 3 | Yes | Gravel | Free |
| Hidden Lake | 3.6 | 44 | Yes | Concrete | $10.00 |
| Kelly Lake | 67.0 (Sterling Highway) | 3 | Yes | Gravel | Free |
| Lower Jean Lake | 60.0 (Sterling Highway) | 3 | Yes | Gravel | Free |
| Lower Ohmer Lake | 8.5 | 4 | No | Gravel | Free |
| Lower Skilak Lake | 13.6 | 14 | Yes | Concrete | Free |
| Peterson Lake | 67.0 (Sterling Highway) | 4 | Yes | Gravel | Free |
| Upper Skilak Lake | 8.4 | 15 | Yes | Concrete | $8 - $10.00 |
| Watson Lake | 71.0 (Sterling Highway) | 3 | Yes | Gravel | Free |

Campsites (Backcountry & Walk-In)

There are fourteen (14) "walk-in" campsites located at two (2) campgrounds: Lower Ohmer Lake Campground (4 sites) and Upper Skilak Lake Campground (10 sites). The Lower Ohmer Campground walk-in campsites have defined gravel pads containing campfire rings and concrete picnic tables. These sites are accessible via a short foot path from the parking area. The Upper Skilak Campground walk-in campsites are located along a loop trail beginning at the parking lot. Amenities are the same as the ones at Lower Ohmer Lake. A gull/cormorant colony on a rock outcropping in Skilak Lake is an added attraction at this site.

Although the majority of camping occurs at campgrounds and designated "walk-in" sites associated with campgrounds, "backcountry" camping is allowed and occurs at undesignated sites along trails (particularly the Kenai River and Seven Lakes trails), gravel bars along the Kenai River, the shoreline of Skilak Lake, and islands in Hidden Lake. Although some of these undesignated campsites show signs of impact, the impact is not believed to be detrimental to refuge resources at this point in time, and as such, have not been treated to ensure resource protection.

Commercial Services

Commercial (or guided) services are provided in the Skilak WRA. These services are typically associated with sport fishing on the Kenai River, but hiking and tour guides also provide services. Guides authorized to offer their services must obtain a special use permit from the Refuge and are subject to the requirements of the permit's general and special conditions. Permitted guides operating on the upper and lower Kenai River utilize the boat ramps at Jim's

Landing, and the Upper and Lower Skilak campgrounds. Other permitted guides use various hiking trails and campgrounds. There are approximately sixty (60) permittees using the facilities and resources in the Skilak WRA.

Day Use Areas

There are three (3) day use areas located within the Skilak WRA: Bottenintnin Lake, Jims' Landing, and Lower Ohmer Lake. Bottenintnin Lake is primarily used by canoeists and cross-country skiers, and Jims' Landing is primarily used as a takeout for those floating the Upper Kenai River. Lower Ohmer Lake day use area was created in 2006 and is associated with a campground. Each site has a boat ramp. Jims Landing and Lower Ohmer Lake have sanitary facilities. All day use areas have bulletin boards/kiosks associated with them except Bottenintnin Lake.

Environmental Education & Interpretation Facilities

Environmental Education and Interpretation facilities consists of a variety of structures (e.g., bulletin boards, kiosks, and panels) which are used to provide information on wildlife and their habitats, resource management practices, and other information which increases visitor knowledge about the Refuge.

*Amphitheater*

One (1) 50-seat amphitheater is located at the Hidden Lake Campground. Interpretive programs are offered from June thru August.

*Birdhouse Bulletin Boards*

Small informational structures, or birdhouse bulletin boards, are located at all eleven (11) trailheads in the Skilak WRA (Table 3.9).

**Table 3.9. Location of Birdhouse Bulletin Boards (BBB), Interpretive Panels (IP), and Kiosks (K)**

| Location | Type | | Location | Type |
|---|---|---|---|---|
| Bear Mountain Trail | BBB | | Kenai River Trail (West) | BBB, IP |
| Burney's Trail | BBB | | Lower Jean Lake Campground | K |
| Egumen Lake Trail | BBB | | Lower Ohmer Lake Campground | K |
| Engineer Lake Campground | K | | Lower Skilak Campground | K, IP |
| Engineer Lake Wayside | IP | | Peterson Lake Campground | K |
| Hidden Creek Trail | BBB | | Pothole Lake Fire Wayside | IP |
| Hidden Creek Wayside | IP | | Seven Lakes Trail (Engineer Lake & Kelly Lake) | BBB |
| Hidden Lake Campground | K, IP | | Skilak Lookout Trail | BBB |
| Hideout Mountain Trail | BBB | | Skyline Trail | BBB |
| Jim's Landing Day Use Area | K, IP | | Vista Trail | BBB |
| Kelly Lake Campground | BBB | | Upper Skilak Lake Campground | K, IP |
| Kenai River Trail (East) | K, IP | | West Entrance | K |

*Interpretive Panels*
There are thirty-four (34) interpretive panels located at nine (9) sites within the Skilak WRA (Table 3.9).

*Kiosks*
Large information structures, or kiosks, are located at seven (7) campgrounds, one (1) day use area, one (1) trailhead, and the West Entrance (Table 3.9).

Environmental Education & Interpretation Programs
Environmental education (EE) is an education process that deals with the interrelationships among the natural world and its man-made surroundings. It is experienced-based and interdisciplinary in nature. It is a continuous, lifelong process that provides citizens with the basic knowledge and skills necessary to individually and collectively encourage positive actions for achieving and maintaining a sustainable balance between humans and their environment (North American Association for Environmental Education). Interpretation is a communication process that forges emotional and intellectual connections between the interests of the audience and the meanings inherent in the resource (National Association of Interpretation).

Refuge staff and interns conduct a number of environmental education programs throughout the Skilak WRA including "The Role of Fire in Alaska" where students hike the Hidden Creek Trail to explore a re-vegetating burn site, and "Leave No Trace" where students learn the seven (7) Leave No Trace principles through hands-on activities on the Seven Lakes Trail. Environmental education programs typically are conducted in the spring and fall. The following is a representation of the number of participants attending all Refuge EE programs: 1,863 (2003); 2,276 (2004); 2,630 (2005).

Refuge staff and interns interpret refuge resources to citizens with the desire to intrigue and motivate them so that they will go on to learn more about and take actions to protect those resources. Each summer, interpretive programs are offered at the Hidden Lake and Upper Skilak Lake campgrounds. Additional interpretive programs are offered through "Discovery Hikes" on Burney's and Vista trails. Examples of subject matter include "Bear Safety" and "Survivor: Techniques and Strategies to Help You Survive in the Alaskan Outdoors." The following is a representation of participants attending all Refuge Interpretive Programs: 1,457 (2003); 1,274 (2004); 1,174 (2005).

*Outreach Materials and Media for Visitor Orientation*
The Refuge provides flyers and brochures that identify the location of public use facilities including cabins, points of interest, and common wildlife species. In addition, the Refuge, through a cooperative effort with the Alaska Natural History Association, produces "Refuge Reflections" – a newspaper-style publication that provides more comprehensive information on facilities and recreational opportunities throughout the Refuge including the Skilak WRA.

Fishing
Fishing occurs on the Kenai River and on every lake in the Skilak WRA that has harvestable populations (Table 3.10). Highly sought after species include sockeye salmon, Coho salmon, kokanee, and lake trout.

**Table 3.10. Sport Fish By Location**

| Waterbody | Coho | Sockeye | King | Pink | White-fish | Rainbow Trout | Lake Trout | Dolly Varden | Artic Grayling | Lnose Sucker | N. Pike |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Egumen | X | X | | | | X | | | | | X |
| Engineer | X | | | | | X | | X | | | |
| Hidden Creek | X | X | | | | | | X | | | |
| Hidden Lake | X | X | | | | | X | X | | | |
| Kelly | X | | | | | X | | | | | |
| Kenai | X | X | X | X | X | X | | X | X | | |
| L. Jean | X | X | | | | X | | X | X | X | |
| L. Ohmer | | | | | | X | | | | | |
| Peterson | X | X | | | | X | | | | X | |
| Skilak | X | X | X | X | X | X | X | X | X | | |
| U. Ohmer | X | | | | | X | | X | | | |
| Watson | X | X | | | | X | | | | | |

Human Health and Safety (Firearm Use)

To provide for public safety, discharging firearms within a ¼-mile of designated public campgrounds, trailheads, waysides, buildings, or the Sterling Highway from the east refuge boundary to the east junction of the Skilak Loop Road is not permitted by refuge regulation (Figure 3.7).

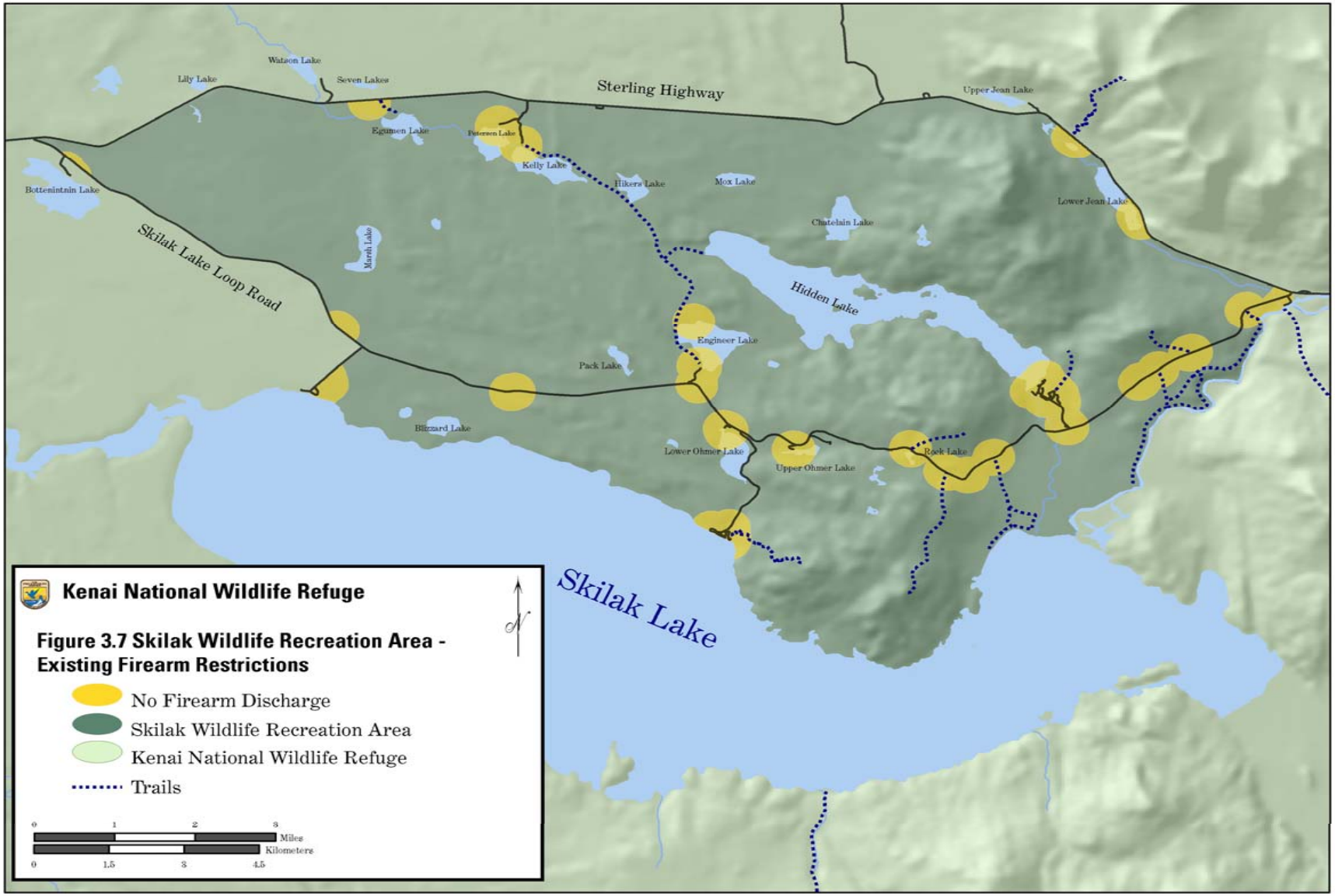
Hunting

*Cow Moose Hunt*

To fulfill public use and resource protection goals in the Skilak WRA, a permitted, antlerless moose hunt is allowed when the results of a fall survey (conducted cooperatively between ADF&G and Kenai NWR every other year at a minimum if snow cover is adequate) tallies at least 130 animals (1.8 – 2.0 moose per square mile of habitat) (Figure 3.8). These surveys have been conducted since 1989.

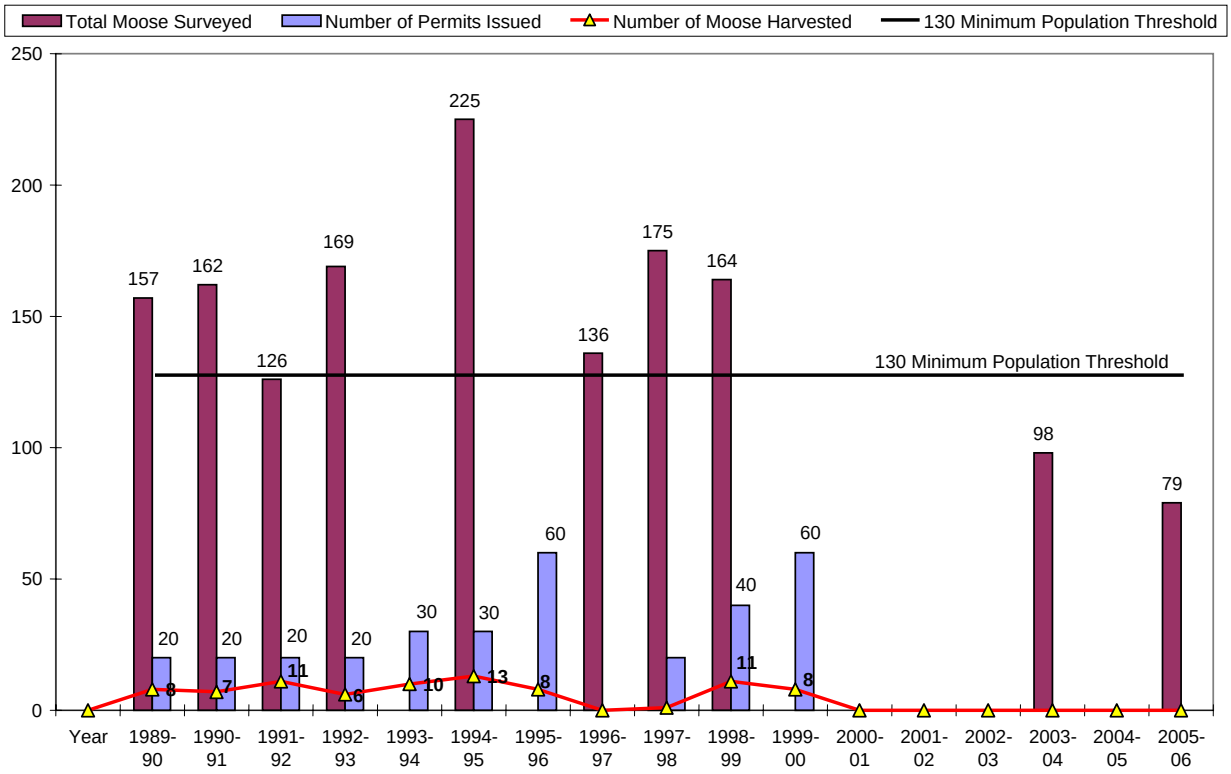
Over the course of 11 separate surveys, overall moose counts have ranged from a high of 225 during the 1994-95 season, to a low of 79 during the recent 2005-06 season. The average count has been about 145 moose. Because of the survey methods used, these data should be interpreted cautiously; they represent annual "snapshots" of moose within the Skilak WRA rather than reliable estimates of the number of moose that reside in or rely on the WRA and adjacent habitats.

ADF&G issued cow moose harvest permits in all but one season (1996-97) during the period 1989-2000. No permits have been issued since 2000. From 1989 through 1993, 20 permits were issued each season (80 permits total) and about 44% of active permit recipients (those that actually that hunted) harvested a moose. Thirty-two (32) moose were harvested during this four year period. Over the remaining six permitted years (1993-2000) between 20 and 60 permits


Watson Lake
Lily Lake
Seven Lakes
Sterling Highway
Upper Jean Lake
Egumen Lake
Petersen Lake
Kelly Lake
Hikers Lake
Mox Lake
Bottenintnin Lake
Lower Jean Lake
Chatelain Lake
Skilak Lake Loop Road
Marsh Lake
Hidden Lake
Engineer Lake
Pack Lake
Blizzard Lake
Lower Ohmer Lake
Upper Ohmer Lake
Rock Lake
Skilak Lake
Kenai National Wildlife Refuge
Figure 3.7 Skilak Wildlife Recreation Area - Existing Firearm Restrictions
No Firearm Discharge
Skilak Wildlife Recreation Area
Kenai National Wildlife Refuge
Trails
0 1 2 3
Miles
Kilometers
0 1.5 3 4.5

were issued each season and the harvest success rate dropped to about 26 percent. Fifty (50) moose were harvested during this period.

**Figure 3.8. Moose Population, Permit, and Harvest Data**




*Bull Moose Hunt*

A permitted spike-fork bull hunt is allowed when aerial composition surveys conducted each year before December 1 indicate the bull:cow ratio is greater than 40:100. On three occasions (1994, 1996, and 1998) the observed bull/cow ratio exceeded 40:100 allowing a spike-fork bull hunt during the season following these surveys. Twenty (20) of the 60 total permits issued in each of these seasons were for the special spike-fork bull hunt. A total of two spike-fork bulls were harvested (one each in 1995-96 and 1997-98).

*Moose Hunt Summary*

Overall, more than 300 hunting permits were issued and 83 moose (or 8.3 moose/year on average) were harvested during the 10 year period permits were issued in the Skilak WRA. There is no clear relationship between overall moose survey numbers and the number of permits issued or harvest success rates.

*Small Game Hunting*

A small game harvest is allowed by bow and arrow between October 1 and March 1 each year. There is no data on the number of individuals participating in this activity or the number of animals harvested.

*Fur Animals and Bear Hunting*
Fur animals and bears can not be harvested in the Skilak WRA.

Parking Areas
In addition to vehicle parking provided at campgrounds for campers, parking areas are provided at eighteen (18) additional locations within the Skilak WRA: eight (8) areas are located at trailheads, four (4) areas are located at day use areas, and six (6) areas are associated with boat launches and trailheads within campgrounds (Table 3.11).

**Table 3.11. Parking Areas**

| Location | No. of Vehicle Sites | | Location | No. of Vehicle Sites |
|---|---|---|---|---|
| Bear Mountain Trail | 3 | | Kenai River Trail (East) | 18 |
| Bottenintnin Lake Day Use Area | 6 | | Kenai River Trail (West) | 4 |
| Egumen Lake Trail | 6 | | Lower Ohmer Lake Day Use Area | 3 |
| Engineer Lake Campground | 3 | | Lower Skilak Campground | 50 |
| Hidden Creek Trail | 8 | | Peterson Lake Campground | 3 |
| Hidden Lake Campground | 36 | | Skilak Lookout Trail | 10 |
| Hideout Mountain Trail | 4 | | Skyline Trail | 10 |
| Jim's Landing Day Use Area | 18 | | Upper Skilak Campground | 24 |
| Kelly Lake Campground | 3 | | Watson Lake Day Use Area | 3 |

Photography
Scenic and wildlife photography opportunities are abundant in the Skilak WRA due to the nature of the topography, the variety and abundance of natural features, habitats and wildlife, and road accessibility. Photographing scenic views typically occurs along the Skilak Loop Road, particularly at designated waysides, but also from trail vistas, views provided at campgrounds, and from lakes (Table 3.13). Although there are no designated wildlife photography sites or facilities provided to enhance wildlife photography opportunities (e.g., photography blinds), wildlife can be commonly seen at specific locations with the Skilak WRA (Table 3.14). Commonly seen and photographed wildlife include moose, black bears, beaver, and a wide variety of birds including eagles, ravens, gray jays, and passerines.

Sanitary Facilities
There are twenty-one (21) concrete sanitary units and two (2) dump stations located at thirteen (13) locations within the Skilak WRA (Table 3.12). Sanitary unit vaults are serviced when approximately 80% full; interiors are cleaned and serviced daily in fee campgrounds and at least weekly at other sites during periods of heaviest use; unit servicing and interior cleaning at other times of the year are performed on an as-needed basis. The dump stations located at Hidden Lake Campground and at MP 11.5 are provided for recreational vehicles or trailers with self-contained sanitary systems.

**Table 3.12. Sanitary Facilities**

| Location | Number of Units | | Location | Number of Units |
|---|---|---|---|---|
| Engineer Lake Campground | 1 | | Lower Ohmer Lake Campground | 1 |
| Hidden Lake Campground | 4 | | Lower Skilak Lake Campground | 2 |
| Hidden Lake Campground Dump Station | 1 | | Peterson Lake Campground | 1 |
| Jim's Landing Day Use Area | 1 | | Skilak Loop Road Dump Station | 1 |
| Kelly Lake Campground | 1 | | Upper Skilak Lake Campground | 3 |
| Kenai River Trail (East) | 1 | | Visitor Contact Station | 2 |
| Lower Jean Lake Campground | 1 | | Watson Lake Campground | 1 |

Scenic Viewing

Scenic viewing opportunities are abundant in the Skilak WRA due to the topography of the landscape, the variety and abundance of natural features and habitats, and the ability to see it from a variety of access points. The typography of the Skilak WRA varies from low elevation rolling hills to majestic mountains towering nearly 3,000 feet above sea level. The transition point from one landform to the other is easy to recognize driving along the Skilak Loop Road. Scenic viewing opportunities, though afforded along the entire Skilak Loop Road are enhanced by the availability of three (3) waysides (Table 3.13). Additional scenic viewing opportunities are found at trail vistas, along the Kenai River corridor, views provided at various campgrounds, and from various lakes.

Signs

Information, direction, and location signs are located throughout the Skilak WRA. Signs consist of a variety of types ranging from small, wooden trailhead designators to large, aluminum road signs posted for visitor safety.

Trapping

Trapping is prohibited by regulation within the Skilak WRA.

Viewing Facilities

One (1) viewing platform is provided at Hidden Lake Campground. This facility is a wooden deck, approximately 6 ft. X 10 ft., located on the lake shoreline between the boat ramp and the picnic shelters in the campground day-use area. In addition to scenic views of the lake and surrounding forested areas, common wildlife seen include loons, gulls, terns, and other waterfowl, as well as immature salmon and lake trout in shallow areas below the platform.

**Table 3.13. Popular Scenic Viewing Locations**

| Location | MP | View | Interpretation Provided |
|---|---|---|---|
| Pothole Lake Wayside | 2.4 | 1991 Pothole Lake Fire and Succession | Wildlife & Vegetative Response to Fire |
| Kenai River Trail | 0.6 | Kenai River Canyon | Natural Geologic Features, Wildlife Species |
| Hidden Creek Wayside | 5.1 | Hidden Creek, Kenai River, Skilak Lake | Identification of Natural Features, Wildlife Species, Human History |
| Skilak Lookout Trail | 5.4 | Skilak Lake, Designated Kenai Wilderness | --- |
| Bear Mountain Trail | 6.0 | Hidden Creek, Kenai River, Skilak Lake | --- |
| Engineer Lake Wayside | 9.3 | Engineer Lake | Identification of Natural Features, Wildlife Species |
| Lower Skilak Lake Campground | 13.6 | Skilak Lake, Designated Kenai Wilderness | Salmon and Other Fish, Wildlife Species, Bear Safety Information, Kenai Wilderness |
| Hideout Mt. Trailhead Parking Area | 1.9 | 1991 Pothole Lake Fire / 2004 Kenai Trail Fire and Succession | --- |

Visitor Contact Station

The Visitor Contact Station (VCS) is a 500-square foot log cabin located at MP 58 of the Sterling Highway on the north side of the road, located approximately 100 yards east of the east entrance. The VCS is a primary contact point for Refuge visitors who stop to obtain general or specific information about the Refuge or the Kenai Peninsula. There are interpretive displays, an Alaska Natural History Association sales outlet, restrooms, and potable water. The VCS is staffed from approximately Memorial Day until mid-August, with open hours from approximately 9:00 am - 6:00 pm.

Waysides

There are three (3) designated waysides located along the Skilak Loop Road: Hidden Creek Overlook (MP 5.1), Pothole Lake Fire Overlook (MP 2.4), and Engineer Lake Overlook (MP 9.3). Each wayside has interpretive panels that provide information on wildlife and their habitats, management practices, and other information which increases visitor knowledge about the Refuge. There are a number of other “undeveloped” locations along the Skilak Loop Road where visitors typically pull off the road to enjoy scenic vistas and/or observe wildlife.

Wildlife Viewing

Wildlife viewing opportunities are abundant in the Skilak WRA due to the variety and undisturbed nature of habitats which wildlife depend, and the ability to access the area through a variety of transportation methods. Although there are no designated wildlife viewing sites or

facilities provided to enhance such opportunities (e.g., platforms, spotting scopes, etc), wildlife can be commonly seen at specific locations with the Skilak WRA (Table 3.14). Wildlife commonly seen include moose, black bears, beaver, and a wide variety of birds.

**Table 3.14. Popular Wildlife Viewing Areas**

| Location | MP | | Location | MP |
|---|---|---|---|---|
| Bear Mountain Trail | 6.0 | | Pothole Lake Fire Wayside | 2.4 |
| Engineer Lake Wayside | 9.3 | | Skilak Lookout Trail | 5.4 |
| Hidden Creek Wayside | 5.1 | | Skilak Loop Road | All |
| Kenai River Trail (East & West) | 0.6 & 2.3 | | Upper Skilak Lake Campground | 8.4 |
| Lower Skilak Lake Campground | 13.6 | | | |

Winter Recreation/Activities

Winter recreation activities include camping and cabin use, cross-country skiing, ice-fishing, photography, small game hunting, and snowshoeing.

### 3.3.6 Significant Concerns

Water skiing and the use of personal watercraft (e.g., jet skis) at Hidden Lake and Skilak Lake are not wildlife-dependent recreation activities and may negatively impact wildlife (especially waterbirds) and other human users. Increasing incidents of these activities have been observed by Refuge staff.

# Chapter 4: Environmental Consequences

## Introduction

The purpose of this chapter is to identify, describe, and compare the consequences (or impacts) of implementing the three management alternatives presented in Chapter 2 of this plan on the physical, biological, and social environments identified in Chapter 3. To facilitate development of the analysis, the physical, biological, and social environments were subdivided into the following seven resource areas:

- Physical Environment – air quality, soil resources, water quality
- Biological Environment – vegetation resources, wildlife resources
- Social Environment – access opportunities, public use opportunities

### *4.1 Definition of Terms*

Terms were identified and used to provide a framework for conducting the environmental consequences analysis. The following terms were used to describe the impacts on identified refuge resources and recreation opportunities:

Impact Type

| | |
|---|---|
| Beneficial Impacts | Impacts resulting from management actions that maintain or enhance the quality and/or quantity of identified refuge resources or recreation opportunities. |
| Adverse Impacts | Impacts resulting from management actions that degrade the quality and/or quantity of identified refuge resources or recreation opportunities. |

Duration of Impact

| | |
|---|---|
| Short Term | Impacts on identified refuge resources or recreation opportunities that occur during implementation of the management action but no longer. |
| Medium Term | Impacts on identified refuge resources or recreation opportunities that occur during implementation of the management action that are expected to persist for some time into the future though not throughout the life of the plan. |
| Long Term | Impacts on identified refuge resources or recreation opportunities that occur during implementation of the management action that are expected to persist throughout the life of the plan and possibly longer. |

Intensity of Impact

| | |
|---|---|
| Negligible Impacts | Impacts resulting from management actions that can not be reasonably expected to affect identified refuge resources or recreation opportunities at the identified scale. |
| Minor Impacts | Impacts resulting from the specified management action that can be reasonably expected to have detectable though limited affect on identified refuge resources or recreation opportunities at the identified scale. |
| Moderate Impacts | Impacts resulting from the specified management action that can be reasonably expected to have detectable and apparent affect on identified refuge resources or recreation opportunities at the identified scale. |
| Major Impacts | Impacts resulting from the specified management action that can be reasonably expected to have readily apparent and substantial affect on identified refuge resources or recreation opportunities at the identified scale. |

Context or Scale of Impact

| | |
|---|---|
| Site-Specific Scale | Beneficial or adverse impacts occurring at a specific site that is relatively small in size (e.g., a parking area) |
| Local Scale | Beneficial or adverse impacts occurring throughout a specific area that is large in size (e.g., the entire length of a trail, or throughout a campground). |
| Regional Scale | Beneficial or adverse impacts occurring throughout the Skilak WRA. |

## *4.2 Key Indicators and Assumptions*

Key indicators and various assumptions were identified and used to assist with development of the environmental consequences analysis. Key indicators (e.g., air pollution emissions) were established for each resource area (e.g., air quality). These indicators were used to measure the type, duration, intensity and scale of impact anticipated on refuge resources and/or recreation opportunities.

In most cases, a set of assumptions were made to facilitate development of the impact analysis. Assumptions are often used to clarify the intent of the management direction, but in some cases they are used to fill in gaps where specific information is not available. Assumptions are listed under the heading of each impact analysis (e.g., Consequences of Road Improvements on Air Quality).

## *4.3 Alternative A (No Action Alternative)*

This alternative would continue to fulfill current management direction identified in various related step-down management plans recognizing that current management is dynamic and reacts to new information or changing resource conditions as needed.

### 4.3.1 Physical Environment

**Air Quality**

Key Indicators:

- Air pollution emissions: fuel exhaust, particulate matter (PM 2.5 and PM 10), etc.

*Consequences of Improving Roads on Air Quality*

Assumptions:

- Approximately 23-miles of road, including the Skilak Loop Road and all related access roads, would be improved.
- Improvements would be limited to grading and hard-surfacing (e.g., chip seal, asphalt, etc).
- Improvements would facilitate vehicular use and traffic volume would increase over time.
- Particulate matter (PM 10 or particulate matter up to 10 microns in diameter) and exhaust emissions generated from vehicular use are the primary sources of air pollution in the Skilak WRA. The amount of particulate matter emitted varies depending on soil moisture, silt content, wind speed and other factors.

Analysis:

Implementation of Alternative A would improve approximately 23-miles of roads within the Skilak WRA by grading and hard-surfacing the existing corridor. Impacts associated with implementation of the alternative would result from construction-related activities as well as future vehicular use of the road. The impacts associated with each are analyzed below:

*Construction-Related Impacts*

Hard-surfacing the gravel road would have adverse, short-term impacts on air quality due to increases in PM 10 resulting from soil disturbance during grading-related work. Additional adverse, short-term impacts would occur due to an increase in fuel exhaust emissions resulting from diesel powered construction equipment used to conduct the work (e.g., graders, pavers, etc). Impacts would be of moderate intensity at the site-specific scale when compared with existing air quality conditions within the road corridor.

*Future Use-Related Impacts*

Hard-surfacing the gravel road would have beneficial, long-term impacts on air quality due to a decrease in PM 10 generated from passing vehicles driving at moderate speeds (i.e., 35-MPH). These impacts would be major at the local scale when compared with existing conditions within the road corridor. Adverse, long-term impacts would occur on air quality due to an increase in fuel exhaust emissions as traffic volume increases over time, particularly during high use seasons. These impacts would be moderate at the local scale when compared to existing conditions.

Conclusion:
Under Alternative A, air quality would change along the 23-mile road corridor. Although the degree of change can not be quantified, it is expected to be moderate compared to existing conditions because although PM 10 levels would decrease once the road is paved, fuel exhaust emissions would increase as traffic volume increases over time. At the regional scale, Alternative A would have negligible impacts on air quality.

*Consequences of Conducting Vegetation Management Activities on Air Quality*
Assumptions:

- Fire use would be the preferred management prescription over mechanical treatment due to the costs associated with mechanical treatment.
- Prescribed fire use would be the preferred fire method over wildland fire use since the Skilak WRA is identified as Full Suppression and actions may be taken to extinguish or control a wildland fire.
- Prescribed fire would be used in accordance with an approved fire management plan. Best available control measures, including reducing the amount of pollutants emitted or the impact of the pollutants emitted on sensitive locations, will be used to minimize emissions associated with prescribed fires.
- The amount of habitat needed to sustain identified moose populations is unknown.
- Fires emit air pollution emissions. The type and proportion of emissions varies widely due to fuel character, condition, and environment; and on fire behavior.
- Particulate matter generated from prescribe fire is predominantly PM 2.5 (particular matter up to 2.5 microns in diameter) or “fine particulates.”

Analysis:
Using fire to conduct vegetation management activities would have adverse, short-term impacts on air quality due to an increase in air pollution emissions and PM 2.5 resulting from burning. These impacts would be minor at the local scale when compared to existing conditions. Air pollution emissions would be generated but the variety and proportion of pollutants emitted would be based on the fuel consumed in each combustion stage, the size of the area burned, fuel characteristics, fire behavior, and combustion conditions. Air quality-related effects of smoke include deposition of particulates in the vicinity of the burn area and associated loss of aesthetic appeal, local visibility reduction in areas impacted by the smoke plume, odor, and potential health implications associated with inhalation of smoke.

Conclusions:
Under Alternative A, air quality would decline at the local scale where prescribed fire is used. Although the degree of decline cannot be quantified, the overall impact is expected to be minor due to the limited size and restricted combustion conditions prescribed burns are conducted under. At the regional scale, Alternative A would have negligible impacts on air quality.

**Soil Resources**
Key Indicators:

- Physical characteristics: bulk density, soil permeability, water repellency, erosion

*Consequences of Maintaining and Improving Administrative Facilities on Soil Resources*
No management direction is provided under Alternative A as it relates to administrative facilities (see Alternative B). As such, status quo management is anticipated and no impacts are expected.

*Consequences of Rehabilitating and Constructing Boat Launches on Soil Resources*
No management direction is provided under Alternative A as it relates to boat launches (see Alternative B). As such, status quo management is anticipated and no impacts are expected.

*Consequences of Constructing and Converting Campgrounds on Soil Resources*
Assumptions:

- A twenty (20) vehicle campground no larger than one (1) acre in size would be constructed at Engineer Lake. The campground would be relocated to the bluff above the lake and possibly other locations in the area to accommodate the expansion project. Vegetation would be removed from the project area, soils would be graded, and gravel would be added to access roads and campsites to minimize erosion.
- Each campsite would be 1,440-square feet in size including associated parking.
- The Watson Lake project would neither diminish nor expand in size.

Analysis:
Implementation of Alternative A would consist of two projects: one associated with development of a new campground, and one associated with conversion of an existing campground to a day use area. The impacts associated with each project type are analyzed below:

*New Construction Project*
Engineer Lake Campground
Constructing a permanent, semi-hardened, one (1) acre campground consisting of twenty (20) vehicle sites and an associated access road would have adverse, long-term impacts on soil resources due to compaction resulting from such activities. Impacts would be moderate when compared to existing natural conditions at specific locations within the campground area where roads, parking areas, and campsites are developed. Soil compaction would increase under the weight of heavy equipment used to clear vegetation and grade soils. Soil permeability would decline, water repellency would increase, and loss of soil function would be expected. Sheet runoff and erosion would result if work is conducted under wet conditions. Runoff and erosion would continue at lower rates after construction finishes though the intensity of such effects would be minimized, at least in the short-term, when gravel is added as a protective cap on access roads and campsites.

*Conversion Project*
Watson Lake Campground
Converting an existing campground to day use would have negligible impacts on soil resources

at the site-specific scale because the project area would not be expanded or reduced in size and current soil conditions would persist.

Conclusion:
Under Alternative A, the quality of soil resources would decline at twenty (20) vehicle campsites totaling 28,800-square feet (0.66-acre) and along an associated access road. At the site-specific scale, the degree of decline would be moderate compared to existing conditions due to the placement of a permanent semi-hardened facility on a previously undeveloped site. Conversely, at the regional scale, Alternative A would have negligible impacts on soil resources.

*Consequences of Constructing Campsites on Soil Resources*
No management direction is provided under Alternative A as it relates to campsites (see Alternative B). As such, status quo management is anticipated and no impacts are expected.

*Consequences of Improving and Constructing Day Use Areas on Soil Resources*
No management direction is provided under Alternative A as it relates to day use areas (see Alternative B). As such, status quo management is anticipated and no impacts are expected.

*Consequences of Constructing a Nature Center on Soil Resources*
Assumption:

- The project's footprint would be 2,000-square feet.

Analysis:
Constructing a permanent, hardened, 2,000-square foot nature center at a previously undeveloped site would have adverse, long-term impacts on soil resources due to compaction occurring beneath the constructed facility. These impacts would be major at the site-specific scale when compared to existing natural conditions, and would result in complete loss of soil function.

Conclusions:
Under Alternative A, the quality of soil resources would decline over a 2,000-square foot area where construction of a nature center is proposed. At the site-specific scale, the degree of decline would be major compared to existing natural conditions due to placement of a permanent hardened facility on a previously undeveloped site. Conversely, at the regional scale, Alternative A would have negligible impacts on soil resources.

*Consequences of Improving and Constructing Parking Areas on Soil Resources*
Assumptions:

- Action taken to construct new parking areas would include vegetation removal and grading.
- New parking areas would include: Chatelain Lake Trailhead – 4 vehicle sites, 2 RV/boat sites (2,080-square feet), Crushed Area Trailhead – 4 vehicle sites, 2 RV/boat sites (2,080-square feet), and Visitor Contact Station (West Entrance) – 6 vehicle sites, 3 RV/boat sites, and 2 staff parking sites (3,520-square feet).

- The Egumen Lake, Engineer Lake, and the Nature Center (East Entrance) parking areas would neither diminish nor expand in size.

Analysis:
Implementation of Alternative A would consist of six projects: three associated with construction of new parking areas, and three associated with rehabilitation of existing parking areas. The impacts associated new construction and rehabilitation projects are analyzed below:

*New Construction Projects*
Constructing three (3) permanent, semi-hardened parking areas consisting of sixteen (16) total vehicle sites (or 3,200-square feet) and seven (7) total RV/boat sites (or 4,480-square feet) would have similar adverse, long-term impacts as those described under *Consequences of Constructing Campgrounds on Soil Resources* except less erosion would occur at the Visitor Contact Station (West Entrance), Crushed Area Trailhead, and Engineer Lake Day Use parking areas after they are constructed if these facilities are paved as part of the Skilak Loop Road paving project proposed under this alternative.

*Rehabilitation Projects*
Rehabilitation of existing parking areas would have negligible impacts on soil resources at the site-specific scale because the project area will not be expanded or reduced in size and current soil conditions would persist.

Conclusions:
Under Alternative A, the quality of soil resources would decline at three locations where new parking area developments totaling 7,680-square feet (0.2-acres) are proposed. At the site-specific scale, the degree of decline is expected to be moderate compared to existing conditions due to placement of permanent semi-hardened parking facilities at previously undeveloped sites. Conversely, at the regional scale, Alternative A would have negligible impacts on soil resources.

*Consequences of Improving Roads on Soil Resources*
Assumptions**:**

- Approximately 23-miles of road, including Skilak Loop Road and all related access roads would be improved.
- Improvements would be limited to grading and hard-surfacing (e.g., chip seal, etc).

Analysis:
Hard-surfacing 23-miles of gravel road would have similar adverse, long-term impacts as those described under *Consequences of Constructing a Nature Center on Soil Resources* except impacts would be major at the local scale when compared to existing conditions. In addition, sheet runoff would increase resulting in increased rates of erosion at specific sites along the road corridor where runoff is directed. Best management practices, including construction of gutters, drainage zones, etc, would be implemented and the effects of erosion would be less when compared to existing conditions.

Conclusions:
Under Alternative A, the quality of soils would decline along 23-miles of roads. At the local scale, the degree of decline would be major when compared to existing conditions due hard-surfacing an existing gravel road. Conversely, at the regional scale, Alternative A would have

negligible impacts on soil resources.

*Consequences of Constructing Sanitary Facilities on Soil Resources*
Negligible impacts on soil resources would be expected because portable toilets would be placed during periods of peak visitation and removed from site shortly thereafter.

*Consequences of Constructing Trails on Soil Resources*
Assumptions:

- Soil impacts are the result of compaction and abrasion that occurs during construction and use.
- Tread width would be 4-feet wide.

Analysis:
Constructing five (5) permanent trails totaling approximately 9.0-miles in length would have similar adverse, long-term impacts as those described under *Consequences of Constructing Campgrounds on Soil Resources* except soil density would increase due to soil compaction resulting from trail construction and use. In addition, sheet runoff and erosion would be expected at specific sites along trails where sheet runoff is directed or where water naturally collects. Best management practices, including construction of water diversion structures, gutters, drainage zones, etc, would be implemented. The effects of erosion, though generally reduced, would be more than that observed under existing natural conditions.

Conclusion:
Under Alternative A, the quality of soil resources would decline on 9.0-miles of trails or 190,080-square feet (4.7 acres). Although the degree of decline currently cannot be quantified, the overall impact of trail development on soil resources at the local scale is expected to be moderate compared to existing natural conditions. Conversely, at the regional scale, Alternative A would have negligible impacts on soil resources.

*Consequences of Conducting Vegetation Management Activities on Soil Resources*
Assumptions:

- Prescribed fire use would be the preferred management prescription over mechanical treatment due to the costs associated with mechanical treatment.
- Prescribed fire would be the preferred fire method over wildland fire use since 1) the Skilak WRA is identified as Full Suppression and action may be taken to extinguish or control a wildland fire, and 2) wildland fires are typically more severe than prescribed fires and as such have greater impacts on soils.
- Prescribed fire would be used in accordance with an approved fire management plan.
- Soil property changes are the result of fire severity (i.e., peak temperatures and duration), fire frequency, and post-fire climatic conditions.
- The amount of habitat needed to sustain moose populations described in Alternative A is unknown.

Analysis:
Using fire to manage habitat for moose would have adverse, medium-term impacts on soil resources due to the effects of heat on soil structure and the removal of vegetation. These impacts would be minor at the local scale when compared to existing natural conditions if low-intensity prescribed fires are used because such fires may increase soil structure stability thus minimizing water repellency. Conversely, if moderate to high-intensity wildland fire is used to manage land, impacts would be moderate at the local scale when compared to existing natural conditions because soil structure stability would decline due to increased heat levels which disrupts organic cements and their ability to bond soil aggregates. Water repellency would increase under a wildland fire regime. Regardless of the management prescription used (i.e., prescribed or wildland fire use), vegetation would be burned, exposing soils to the effects of precipitation, including sheet runoff and erosion which would increase over existing natural conditions throughout the project area.

Conclusion:
Under Alternative A, the quality of soil resources would decline throughout the project area. Although the degree of decline cannot be quantified, the overall impact on soil resources at the local scale is expected to range from minor to moderate depending on the management prescription used. Conversely, at the regional scale, Alternative A would have negligible impacts on soil resources.

*Consequences of Constructing Viewing Facilities on Soil Resources*
No management direction is provided under Alternative A as it relates to viewing facilities. As such, status quo management is anticipated and impacts are not expected.

*Consequences of Constructing a Visitor Contact Station on Soil Resources*
Assumptions:

- The size of the project's footprint would be 500-square feet.

Analysis:
Constructing a visitor contact station at a previously undeveloped site would have similar adverse, long-term impacts as those described under *Consequences of Constructing a Nature Center on Soil Resources* except those impacts would be observed over a 500-square foot area.

Conclusions:
Under Alternative A, the quality of soil resources would decline over a 500-square foot area where construction of a Visitor Contact Station is proposed. At the site-specific scale, the degree of decline would be major compared to existing natural conditions due to placement of a permanent hardened facility on a previously undeveloped site. Conversely, at the regional scale, Alternative A would have negligible impacts on soil resources.

*Consequences of Constructing Wayside Pullouts on Soil Resources*
Assumptions:

- Heavy equipment would be used to implement the management action.

- Actions taken to construct new wayside pullouts along Skilak Loop Road would include removal of vegetation, grading, and compaction of soils. Gravel will be added to these sites as a protective cap until the Skilak Loop Road is paved.
- Wayside pullouts are approximately 25' x 75' in size.
- Actions taken to improve an existing pullout along the Sterling Highway might include grading but vegetation would not be removed or impacted in any way due to the existing developed condition of the site.

Analysis:
Implementation of Alternative A would consist of three projects: two associated with development of new wayside pullouts, and one associated with rehabilitation of an existing wayside pullout. The impacts associated with new construction and rehabilitation projects are analyzed below:

*New Construction Projects*
Constructing two (2) permanent, semi-hardened wayside pullouts along the Skilak Loop Road at Jean Creek Culvert and Pack Lake would have similar adverse, long-term impacts as those described under *Consequences of Constructing Campgrounds on Soil Resources* except impacts would be observed at two (2) locations, each 1,875-square feet in size.

*Rehabilitation Project*
Rehabilitation of an existing wayside pullout along the Sterling Highway at Lower Jean Lake would have negligible impacts on physical soil characteristics because the project area will not be expanded or reduced in size.

Conclusions:
Under Alternative A, the quality of soil resources would decline at two sites totaling 3,750-square feet. At the site-specific scale, the degree of decline would be moderate compared to existing natural conditions due to the development of permanent, semi-hardened facilities at previously undeveloped sites. Conversely, at the regional scale, Alternative A would have negligible impacts on soil resources.

**Water Quality**
Key Indicators:
- Sedimentation
- Non-point source pollutants: petroleum products, heavy metals

*Consequences of Improving Roads on Water Quality*
Assumptions:
- The Skilak Loop Road and associated access roads cross eight (8) streams and are in close proximity to at least two (2) waterbodies.
- These roads are generally stable although some erosion is occurring at site-specific locales. Sedimentation in nearby streams and waterbodies is undetectable.

- Non-point source pollutants resulting from vehicle use are absorbed by gravel roads and are undetectable in nearby streams and waterbodies.
- Best management practices will be incorporated into the road design to minimize impacts to water resources.

Analysis:
Hard-surfacing 23-miles of gravel road would have adverse, long-term impacts on water quality due to increases in sedimentation resulting from erosion and non-point source pollutants (e.g., zinc, nickel) transported by sheet runoff. Impacts would be minor, when compared to existing conditions, at site-specific locales where sheet runoff is directed and consolidated (i.e., lakes, streams). The impacts associated with contamination are directly related to the amount and type of contamination distributed into a system and the type of system affected by it. Impacts would be greater in closed systems (i.e., lakes) where sediments and pollutants are likely to accumulate over time. Sedimentation prevents sunlight from reaching aquatic plants, impedes fish respiration, and affects fish spawning and nursery areas. Heavy metals are toxic to life forms at certain quantities. Best management practices (e.g., runoff controls) would be implemented in the design and construction of the paved road to minimize erosion and contain non-point source pollutants. The amount of erosion and non-point source pollution that would occur cannot be calculated.

Conclusions:
Under Alternative A, water quality would decline in streams and waterbodies where sedimentation and non-point source pollution is directed. Although the degree of decline currently cannot be quantified, the overall impact on water quality is expected to be minor due to best management practices implemented in the design and construction of the road. At the regional scale, Alternative A would have negligible impacts on water quality.

### 4.3.2 Biological Environment

**Vegetation**
Key Indicators:
- Loss of habitat

*Consequences of Maintaining and Improving Administrative Facilities on Vegetation*
No management direction is provided under Alternative A as it relates to administrative facilities (see Alternative B). As such, status quo management is anticipated and no impacts are expected.

*Consequences of Improving and Constructing Boat Launches on Vegetation*
No management direction is provided under Alternative A as it relates to boat launches (see Alternative B). As such, status quo management is anticipated and no impacts are expected.

*Consequences of Constructing and Converting Campgrounds on Vegetation*
Assumptions:

- A new twenty (20) vehicle campground no larger than one (1) acre in size would be constructed at Engineer Lake. The campground would be relocated to the bluff above the lake and possibly other locations in the area to accommodate the expansion project. Vegetation would be removed from the project area to facilitate development.
- Each campsite would be 1,440-square feet in size including associated parking.
- The Watson Lake project would neither diminish nor expand in size.

Analysis:
Implementation of Alternative A would consist of two projects: one associated with development of a new campground, and one associated with conversion of an existing campground to a day use area. The impacts associated with each project type are analyzed below:

*New Construction Project*
Engineer Lake Campground
Constructing a permanent, semi-hardened one (1) acre campground consisting of twenty (20) vehicle campsites would have adverse, long-term impacts on closed needleleaf forests of mature age due to removal of 28,800-square feet (0.66-acre) of that community type within the project area. Additional vegetation would be removed to facilitate development of a campground access road, though the length and alignment of the road has not been determined. Impacts would be minor at the local scale when compared to existing natural conditions because although 2/3 of the vegetation within the project area would be removed to facilitate development of permanent, semi-hardened vehicle campsites, the forest's ability to continue to provide ecological services for refuge resources would be supported by the surrounding forest community which is of the same type and age class. At the regional scale, impacts would be negligible because there are approximately 5,221-acres of closed needleleaf forests of mature age in the Skilak WRA, and implementation of Alternative A would remove less than 1% of that community type.

*Conversion Project*
Watson Lake Campground
Converting an existing campground to day use would have negligible impacts on wildlife habitat at the site-specific scale because the project area will not be reduced or expand in size and vegetation would not be affected.

Conclusion:
Under Alternative A, the acreage of mature needleleaf forests would decline by at least 28,800-square feet (0.66-acre). At the local scale, the degree of decline would be minor compared to existing natural conditions because the action would not have a detectable affect on the vegetative community's ability to fulfill its ecological function. Conversely, at the regional scale, Alternative A would have negligible impacts on vegetation because overall, less than 1% of mature needleleaf forests would be removed from the Skilak WRA.

*Consequences of Constructing Campsites on Vegetation*
No management direction is provided under Alternative A as it relates to campsites (see Alternative B). As such, status quo management is anticipated and no impacts are expected.

*Consequences of Improving and Constructing Day Use Areas on Vegetation*
No management direction is provided under Alternative A as it relates to day use areas (see Alternative B). As such, status quo management is anticipated and no impacts are expected.

*Consequences of Constructing a Nature Center on Vegetation*
Assumption:

- The project's footprint would be 2,000-square feet in size.

Analysis:
Constructing a permanent 2,000-square foot nature center at a previously undeveloped site would have adverse, long-term impacts on vegetation though the community type and age class affected by the management action is unknown because the management action proposes development of the facility outside the current administrative boundaries and a vegetation classification study has not been conducted for that area.

Conclusions:
Under Alternative A, the acreage of vegetation would decline by 2,000-square feet (0.05-acre). At the site-specific scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within the project area would be removed to facilitate development of a permanent nature center. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. Conversely, at the regional scale, Alternative A would have negligible impacts on wildlife habitat because of the limited amount of vegetation removed from the Skilak WRA overall as a result of this management action.

*Consequences of Improving and Constructing Parking Areas on Vegetation*
Assumptions:

- Action taken to construct a new parking area for the Visitor Contact Station (West Entrance) would include removal of vegetation to facilitate construction in a previously undeveloped area.
- Action taken to construct new parking areas at the Chatelain Lake Trailhead and Crushed Area/Marsh Lake Trailhead would have negligible impact on vegetation because these parking areas would be constructed in existing right-of-ways that are generally devoid of vegetation.
- Vehicle parking slots are 10' x 20' and RV/boat parking slots are 16' x 40' in size.
- Actions taken to rehabilitate parking areas at Egumen Lake, Engineer Lake, and the Nature Center (East Entrance) would not remove or impact vegetation in any way at these sites because the project areas would not be expanded or reduced in size.

Analysis:
Implementation of Alternative A would consist of six projects: three associated with construction of new parking areas, and three associated with rehabilitation of existing parking areas. The impacts associated with new construction and rehabilitation projects are analyzed below:

*New Construction Project*
Constructing a permanent parking area at the Visitor Contact Station (West Entrance) consisting of eight (8) vehicle sites and three (3) RV/boat sites would have adverse, long-term impacts on closed needleleaf forest of mature age due to removal of approximately 3,520-square feet (0.08-acre) of that community type. Impacts would be major at the site-specific scale when compared to existing natural conditions because all of the vegetation would be removed to facilitate development, and ecological services provided by that vegetation would no longer exist. At the local scale, impacts would be minor because the forest's ability to continue to provide ecological services would be supported by the surrounding forest community which is of the same type and age class. At the regional scale, impacts would be negligible because there are approximately 5,221-acres of closed needleleaf forests of mature age in the Skilak WRA, and implementation of Alternative A would remove less than 1% of that community type.

*Rehabilitation Projects*
Rehabilitating existing parking areas would have negligible impacts on wildlife habitat at the site-specific scale because the project area would not be expanded or reduced in size and vegetation would not be affected.

Conclusions:
Under Alternative A, the acreage of closed needleleaf forests would decline by 3,520-square feet (0.08-acre). At the site-specific scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within the project area would be removed to facilitate development of permanent parking areas. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. Conversely, at the regional scale, Alternative A would have negligible impacts on wildlife habitat because overall, less than 1% of mature needleleaf forests would be removed from the Skilak WRA.

*Consequences of Improving Roads on Vegetation*
Assumptions:

- Action taken to redesign the East and West Entrance of the Skilak Loop Road to conform to state and Federal highway standards would include removal of vegetation to facilitate construction in previously undeveloped areas.
- The alignment of the road has not been determined and the amount of vegetation to be removed can not be calculated.

Analysis:
Redesigning the East and West Entrances of the Skilak Loop Road to conform to state and Federal highway standards would have similar adverse, long-term impacts as those described under *Consequences of Constructing Parking Areas on Vegetation* except the communities impacted by the action include closed deciduous forests of intermediate age and closed needleleaf forests of mature age. At the regional scale, impacts would be negligible because there are approximately 2,130-acres of closed deciduous forests of intermediate age and 5,221-acres of closed needleleaf forest of mature age. Implementation of Alternative A would remove an insignificant amount of vegetation from both community types.

Conclusions:
Under Alternative A, the acreage of closed deciduous and needleleaf forests would decline though the amount of which cannot be calculated because the alignment of the road has not been determined. At the site-specific scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within the project area would be removed to facilitate development of a permanent road. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. Conversely, at the regional scale, Alternative A would have negligible impacts on wildlife habitat because overall, there will be a limited amount of vegetation removed from the Skilak WRA.

*Consequences of Constructing Sanitary Facilities on Vegetation*
Providing sanitary facilities would have negligible impacts on wildlife habitat at the site-specific scale because portable toilets would be provided in developed "over flow" camping areas that are devoid of vegetation.

*Consequences of Constructing Trails on Vegetation*
Assumptions:

- Action taken to construct trails would include removal of vegetation from previously undeveloped sites.
- Boardwalks would be constructed in wetlands, thus minimizing the impacts to vegetation.
- Trail clearing width equals 6-feet.

Analysis:
Constructing five (5) permanent trails totaling approximately 9.0-miles in length would have similar adverse, long-term impacts as those described under *Consequences of Constructing Parking Areas on Vegetation* except the action would impact approximately 285,120-linear square feet (6.5-acres) of wildlife habitat. The community types affected include mature open mixed forests, mature open and closed needleleaf forests, intermediate aged closed deciduous forests, and wetland communities.

Conclusion:
Under Alternative A, the acreage of wildlife habitat would decline by 285,120-square feet (6.5-acres). At the local scale, impacts would be minor because the forest's ability to continue to provide ecological services would be supported by surrounding forest community which is of the same type and age class. Conversely, at the regional scale, Alternative A would have negligible impacts on wildlife habitat because overall, there will be a limited amount of vegetation removed from the Skilak WRA.

*Consequences of Conducting Vegetation Management Activities on Vegetation*
Assumptions:

- Fire use would be the preferred management prescription over mechanical treatment due to the costs associated with mechanical treatment.
- Prescribed fire would be the preferred fire method over wildland fire use since 1) the Skilak WRA is identified as Full Suppression and action may be taken to extinguish or control a wildland fire, and 2) wildland fires are typically more severe than prescribed fires and as such have greater impacts on soils.
- The amount of habitat needed to sustain moose populations described in Alternative A is unknown.

Analysis:
Using fire to conduct vegetation management activities would have adverse, medium-term impacts on open and closed deciduous forests of intermediate age due to the use of prescribed fire to manage habitat for moose. The amount of habitat needed to sustain moose populations identified in Alternative A has not been determined consequently the amount of vegetation to be removed cannot be calculated. Impacts would be major at the local scale when compared to existing natural conditions because all of the vegetation would be removed and ecological services provided by that vegetation would no longer exist. It would take approximately one (1) to three (3) years for vegetation to reestablish itself depending on environmental conditions. Succession may be impeded by herbivores (e.g., moose, hare, etc) if populations exceed the carrying capacity of the areas managed. At the regional scale, impacts would be negligible because there are approximately 2,411-acres of intermediate aged deciduous forest in the Skilak WRA.

Conclusion:
Under Alternative A, the acreage of open and closed deciduous forests would decline, at least initially, as vegetation is removed from the project area to create moose habitat. The amount of decline cannot be calculated because the alternative does not state how much vegetation would be managed to sustain identified moose population objectives. At the local scale, impacts would be major compared to existing natural conditions because all of the vegetation would be removed and ecological services provided by that vegetation would no longer exist. In the long term, the acreage of deciduous forests would be consistent with that found prior to implementing the management action. Conversely, at the regional scale, Alternative A would have negligible impacts on wildlife habitat because overall, it is assumed there will be a limited amount of vegetation removed from the Skilak WRA.

*Conseuences of Constructing Viewing Facilities on Vegetation*
No management direction is provided under Alternative A as it relates to viewing facilities (see Alternative B). As such, status quo management is anticipated and impacts are not expected.

*Consequences of Constructing a Visitor Contact Station on Vegetation*
Assumptions:

- The project's footprint would be 500-square feet in size.

Analysis:
Construction of a 500-square foot facility would have similar adverse, long-term impacts as those described under *Consequences of Constructing Parking Areas on Vegetation* except those impacts would be observed over a 500-square foot area (0.01-acre).

Conclusions:
Under Alternative A, the acreage of closed needleleaf forests of mature age would decline over a 500-square foot area (0.01-acre). At the site-specific scale, impacts would be major compared to existing natural conditions because all of the vegetation within the project area would be removed to facilitate development of a permanent, hardened facility, and ecological services provided by that vegetation would no longer exist. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. Conversely, at the regional scale, Alternative A would have negligible impacts on wildlife habitat because overall, less than 1% of closed needleleaf forest of mature age would be removed from the Skilak WRA.

*Consequences of Constructing Wayside Pullouts on Vegetation*
Assumptions:

- Actions taken to construct new and rehabilitate existing wayside pullouts along Skilak Loop Road and the Sterling Highway would not remove vegetation because the facilities would be constructed in existing right-of-ways that are generally devoid of vegetation.

Conclusions:
Constructing new and rehabilitating existing wayside pullouts along the Skilak Loop Road and Sterling Highway would have negligible impacts on wildlife habitat at the site-specific and regional scale because the project areas will not be reduced or expand in size and vegetation would not be affected.

**Wildlife Resources**
Key Indicators:

- Abundance of wildlife.

*Consequences of Constructing Public Use Facilities on Wildlife*
Assumptions:

- Human activity causes disturbance to wildlife at varying degrees depending on the type of activity, intensity of the activity, timing of the activity, number of activities occurring simultaneously, and wildlife species impacted.
- Disturbance-related impacts include direct mortality (immediate, on-site death), indirect mortality (eventual, premature death), lowered productivity (reduced fecundity or survival rate), reduced habitat use, and stress.
- Public use facilities considered include campgrounds, nature center, trails, and the visitor contact station.

- Public use facilities not considered because they are associated with the road corridor or other public use facilities include parking areas, sanitary facilities, signs (interpretive panels, kiosks, etc), and waysides.
- The Nature Center would be constructed in a deciduous forest community type.

Analysis:
Implementation of Alternative A would construct nine (9) new public use facilities. The impacts associated with construction activities, habitat loss, and public use are analyzed below:

*Construction Impacts*
Constructing four (4) new public use facilities and five (5) new trails would have adverse, short-term impacts on wildlife abundance due to disturbance associated with such activities. Impacts would be moderate at the local scale when compared to existing conditions and would include direct and indirect mortality of some species, particularly small mammals with limited mobility; and lowered productivity of some species due to stress because construction would be conducted during breeding and/or rearing season. Most individuals would seek refuge from construction-related disturbance by moving into surrounding habitats. Effects would be greater at locations where heavy machinery is used to remove vegetation and facilitate development. Impacts associated with trail development would be less than those associated with development of permanent hardened sites because work would be conducted by a small trail crew using tools that produce lower noise levels. Impacts associated with converting an existing campground to day use would have negligible impacts on wildlife at the local scale because disturbance resulting from the use of heavy machinery would be similar to rates currently observed as a result of current vehicular use of the area.

*Habitat Loss Impacts*
Loss of approximately 6.5-acres of habitat would have adverse, long-term impacts on wildlife abundance due to displacement. Impacts would be minor at the local scale and would include direct and indirect mortality of individuals, particularly less mobile species, and/or of individuals unable to defend new territories in surrounding habitats. Individuals that successfully migrate to surrounding habitats but are unable to defend new territories in those habitats would experience lower productivity levels. Species particularly susceptible to impacts include red squirrel, hare, thrushes, and warblers. Negligible impacts would be expected on species that use identified community types but have larger home ranges because the management action would impact less than 1% of each community type and those species would be able to use surrounding habitats.

**Table 4.1 Acreage of Habitat Lost as a Result of Facilities Development**

| Facility | Habitat Type Affected | Acreage Loss |
|---|---|---|
| Campground | Needleleaf Forest | 0.66 |
| Nature Center | Deciduous Forest | 0.05 |
| Trails | Deciduous Forest<br>Mixed Forest<br>Wetlands | 1.09<br>4.3<br>0.18 |
| Visitor Contact Station | Needleleaf Forest | 0.10 |

*Public Use Impacts*
Adverse, long-term impacts ranging from minor to major intensity would occur on some species at the site-specific and local scale due to public use of previously undeveloped areas. The intensity of impacts observed would be directly related to the type and timing of the activity occurring and the wildlife species affected by it. Impacts resulting from increased human use and associated disturbance may include avoidance of preferred habitat areas, lower productivity, and indirect mortality resulting from stress. Habituation of human activity would be observed in some species, particularly bird species at developed sites, but most species, particularly large mammals (e.g., wolves, lynx, etc) would be susceptible to described impacts.

Conclusions:
Under Alternative A, wildlife abundance would decline due to noise disturbance, habitat lost, and increased public use. Although the degree of decline cannot be quantified, the overall impact of facilities development on wildlife abundance at the site-specific and local scale is expected to be moderate when compared to existing natural conditions. Conversely, at the regional scale, Alternative A would have negligible impacts on wildlife.

*Consequences of Improving Roads on Wildlife*
Assumptions:

- Action taken to hard-surface roads within the Skilak WRA would facilitate increases in traffic speed upon completion of the project, and traffic volume over time.
- Deciduous and needleleaf forest habitat would decline as a result of realignment of the Skilak Loop Road/Sterling Highway intersections though the degree of decline can not be calculated because the realignment has not been determined.

Analysis:
Hard-surfacing 23-miles of gravel road within the Skilak WRA would have adverse, long-term impacts on wildlife abundance due to increases in traffic volume and traffic speeds resulting from road improvements. Impacts would be moderate at the local scale when compared with existing conditions and would include road avoidance and direct and indirect mortality. Some wildlife species, particularly black and brown bears, wolves, moose, lynx, etc, would avoid areas adjacent to road corridors due to increases in vehicular use and associated noise. This would result in changes to wildlife movement patterns. Some individuals may choose to forego movement into preferred habitats all together while others may select different routes or change the timing of their movement based on traffic volume (i.e., wait for traffic to subside). Habituation of increased vehicular use would be expected of some wildlife species (e.g., moose, birds, etc). Attempts to cross the road would result in increased incidents of wildlife-vehicle collisions and direct mortality particularly during periods of high public use when more vehicles are in the area. Higher rates of wildlife-vehicle collisions would be expected in the western sector where the road alignment is relatively flat and straight and higher speeds would be expected. Species particularly susceptible to wildlife-vehicle collisions include moose, coyote, red fox, and hare.

Conclusions:
Under Alternative A, wildlife abundance would decline as a result of road improvements. Although the degree of decline can not be quantified, the overall impact of road improvements at the local scale is expected to be moderate when compared to existing conditions due to increases

in traffic volume and speed resulting in road avoidance in some species and increases in wildlife-vehicle collisions in others. Conversely, at the regional scale, Alternative A would have minor impacts on the abundance of some wildlife populations because wildlife-vehicle collisions would be expected to occur throughout the entire length of the road corridor.

*Consequences of Conducting Vegetation Management Activities on Wildlife*
Assumptions:

- Fire use would be the preferred management prescription over mechanical treatment due to the costs associated with mechanical treatment.
- Prescribed fire would be the preferred fire method over wildland fires use.
- The amount of habitat needed to sustain moose populations described in Alternative A is unknown.

Analysis:
Using fire to conduct vegetation management activities would have beneficial and adverse impacts of medium to long-term duration on the abundance of wildlife due to changes in succession from intermediate to early seral stage forests. Beneficial impacts would be major at the local scale when compared to existing conditions. Species directly impacted from increased forage generated from burning activities include snowshoe hare (charred bark, postfire sprouts), bear (berry production), and moose (aspen, birch regeneration). Burning activities would also provide indirect benefits to predators, such as lynx, red fox, coyote, and wolves because prey they depend upon for survival (i.e., small mammals and ungulates) would benefit from the management action.

Species adversely impacted by the management action would include thrushes and warblers due to loss of intermediate aged deciduous forests. Impacts would be major at the local scale because most if not all of the vegetation in the project area would be removed depending on the efficiency and pattern of the burn. At the regional scale, impacts would be negligible because although 96% of the area's intermediate aged deciduous forest would be impacted by the management action, thrushes and warblers use a diversity of mixed and deciduous forest age classes. There are approximately 27,806-acres of mixed and deciduous forests, ranging in age from early seral to climax, within the Skilak WRA (or 70.7% of the total area).

Conclusions:
Under Alternative A, wildlife abundance would change within the project area. Although the degree of change cannot be quantified, the overall impact is expected to range from minor to major when compared to existing conditions depending on the species impacted. At the local scale, herbivores and predators will generally benefit from the management action due to increased forage production, although some species of birds will be adversely impacted due to loss of habitat. At the regional scale, Alternative A would have negligible impacts on wildlife.

*Consequences of Implementing Wildlife Management Strategies on Wildlife*
Assumptions:

- Wildlife populations respond to a variety of environmental and human-related factors which occur within and outside the administrative boundaries of the Skilak WRA.

- The moose population in the Skilak WRA is within the natural range of variability.
- Small game populations in the Skilak WRA are believed to be within their range of variability.
- Small game species potentially impacted by the management action include grouse, snowshoe hare, and a variety of diving and sea ducks. Other small game species, including snipe, crane, and dabbling ducks generally migrate from the area prior to opening of hunting season.
- The number and diversity of small game harvested from the Skilak WRA is unknown, though the timing and method of harvest is thought to have limited impact on population numbers.
- Fur animal populations, except red fox populations, are believed to be within their range of variability.

Analysis:

*Moose*

Implementing existing moose management strategies would have negligible impacts on moose abundance at the regional scale because Alternative A does not propose a change to moose density objectives and a permitted firearm hunt would be determined on a bi-annual basis based upon achievement of those objectives.

*Small Game*

Implementation of existing management strategies would have negligible impacts on small game abundance at the regional scale because Alternative A does not propose a change in status quo management. Harvest rates of archery hunters are presumed to be relatively low and the abundance of harvestable populations, particularly spruce grouse, is considered to be healthy.

*Fur Animals*

Implementation of existing management strategies would have negligible impacts on fur animal abundance because Alternative A does not propose a change to status quo management and harvest of such species would not allowed.

Conclusions:

Under Alternative A, wildlife abundance would continue to fluctuate with periods of highs and lows as a result of ongoing changes in environmental conditions and human-related factors including existing wildlife management strategies. At the regional scale, Alternative A would have negligible impacts on wildlife abundance.

### 4.3.3 Human Environment

**Public Use Access**

Key Indicators:

- Number and condition of boat launches
- Number and condition of parking sites
- Miles and condition of roads
- Number of accessible months per year
- Miles of constructed trail

*Consequences of Rehabilitating and Constructing Boat Launches on Public Use Access*
No management direction is provided under Alternative A as it relates to boat launches (see Alternative B). As such, status quo management is anticipated and no impacts are expected.

*Consequences of Rehabilitating and Constructing Parking Areas on Public Use Access*
Assumptions:

- The condition and capacity of existing parking areas is not currently a limiting factor on public use access. Proposed rehabilitation projects are motivated by other concerns (e.g. erosion prevention, ease of maintenance), and new parking construction projects are all associated with proposed new facilities (e.g. trails/trailheads, visitor contact station, etc).
- Actions taken to rehabilitate parking areas at Egumen Lake, Engineer Lake, and the site of the proposed Nature Center (East Entrance) would not expand or reduced the size of current parking facilities.
- New parking areas would include: Chatelain Lake Trailhead – 6 vehicle sites; Crushed Area Trailhead – 6 vehicle sites; and the Visitor Contact Station (West Entrance) – 9 public vehicle sites and 2 staff parking sites.

Analysis:
Implementation of Alternative A would consist of six projects: three associated with construction of new parking areas, and three associated with rehabilitation of existing parking areas. The impacts associated with new construction and rehabilitation projects are analyzed below:

*New Construction Projects*
Constructing three (3) new parking areas would have beneficial, long-term impacts on public use access due to an increase in the number of parking areas provided. Impacts would be major at the site-specific scale when compared to existing conditions because proposed parking areas would provide twenty-one (21) parking spaces at locales where none are currently provided. Two (2) of parking areas would be associated with new trail developments; one along the Sterling Highway and one along the Skilak Loop Road. The third parking area would be associated with a Visitor Contact Station where information about recreation opportunities, including points of access, would be provided. At the regional scale, impacts would be minor because eighteen (18) non-campground related parking areas currently exist within the Skilak WRA and implementation of Alternative A would provide an additional three (3) bringing the total to twenty-one (21) parking areas overall.

*Rehabilitation Projects*
Rehabilitating three (3) existing parking areas would have adverse, short-term impacts of minor intensity at the site-specific scale when compared to existing conditions because parking areas would be closed while construction is being preformed. Long-term, beneficial impacts of minor intensity would occur from improvements that facilitate use and maintenance of the affected parking areas. Grading and hard-surfacing parking areas would facilitate snow-removal, effectively increasing the number of days per year that a parking space is useable; and marking individual sites (i.e. painting lines) would increase the capacity of a parking area without increasing its size.

Conclusions:
Under Alternative A, public use access would be improved by upgrading the condition of three (3) existing parking areas and increasing the number of public parking areas within the Skilak WRA. At the site-specific scale, the degree of improvement would be major when compared to existing conditions because twenty-one (21) parking spaces would be provided at three locations where none are currently provided. At the regional scale, the degree of improvement would be minor because the overall number of parking areas would increase by approximately 17%.

*Consequences of Improving Roads on Public Use Access*
Assumptions:

- Approximately 23-miles of road, including the Skilak Loop Road and all related access roads, would be improved and maintained year-round.
- Improvements would include grading, hard-surfacing (e.g., chip seal, asphalt, etc.) and year-round maintenance.
- The current condition of the Skilak Loop Road is a deterrent to motorists, especially in mid-summer when it can be bumpy and dusty, and in winter when accumulated snow makes the road impassible for most highway vehicles.
- Improvements would facilitate year-round vehicular use and traffic volume would increase over time.

Analysis:
Hard-surfacing 23-miles of gravel road would have adverse, short-term impacts on public use access due to construction work associated with implementation of the management action which would result in disruption of traffic flow. Impacts would be major at the site-specific scale when compared to existing conditions. The management action would have beneficial, long-term impacts on public use access due to improved road surfaces and associated year-round maintenance. Impacts would be major at the local and regional scales. Access to all portions of the WRA would be enhanced, with the greatest effects occurring in mid-summer (when traffic volume can degrade the road surface), winter (when maintenance of the current road surface is minimal), and at sites that are furthest from the Sterling Highway (where the current condition of the Skilak Loop Road has the greatest deterrent effect for highway motorists). The number of months per year that the Skilak WRA would be accessible to normal highway vehicles would increase from approximately eight (mid-March to mid-November) to 12 months due to increased maintenance.

Conclusions:
Under Alternative A, public use access would be improved by hard-surfacing 23-miles of road. At the local scale, the degree of improvement would be major when compared to existing conditions because more vehicles, and a wider variety of vehicles (e.g., rental cars, motorcycles, large RVs, buses, etc), would be able to access the road corridor year-round. At the regional scale, the degree of improvement would be major because Alternative A would indirectly facilitate access beyond the road corridor to portions of the Skilak WRA accessible only by foot or horse.

*Consequences of Constructing Trails on Public Use Access*
Assumptions:

- Travel off-trail within much of the Skilak WRA is extremely difficult due to terrain and vegetation characteristics; most visitors rely on existing trails for foot access.
- Existing trails are in high demand because there are relatively few designated trails in Alaska, particularly in boreal forest settings.
- New trails will be constructed according to accepted standards for tread width and gradient, and seasonally maintained so that they remain passable for target users.

Analysis:
Constructing five (5) new trails would have beneficial, long-term impacts on public use access due to an increase in the number of trail-related access points and miles of trails provided. Impacts would be major at the local scale compared to existing conditions because proposed trail segments would provide an additional nine (9.0) miles of trail to four (4) locations which are currently difficult to access (i.e., Blizzard Lake, Marsh Lake, Kelly Lake, and Chatelain Lake). At the regional scale, impacts would be major compared to existing conditions because an additional five (5) trail-related access points (i.e., trailheads) would be provided which would increase the total number from 12 to 17.

Conclusions:
Under Alternative A, public use access would be improved by increasing the number of trail-related access points and miles of trail provided. At the local scale, the degree of improvement would be major when compared to existing conditions because trails would provide access to locations currently difficult to access. At the regional scale, the degree of improvement would be moderate because overall trail mileage would increase from 19.5 to 28.5 miles in length (a 32% increase) and the number of trail-related access points would increase from 12 to 17 (a 29% increase).

**Recreation Opportunities**
Key Indicators:

- Number and type of wildlife viewing facilities
- Number and type of interpretation/education facilities
- Number and type of campsites
- Number of day-use areas
- Types of different wildlife-dependent recreation activities available

*Consequences of Administrative Boundaries on Recreation Opportunities*
Continuation of status quo management within current administrative boundaries would have negligible impacts on recreation opportunities because such opportunities would not be enhanced or diminished as a result of the management action. As a result, current opportunities would be expected.

*Consequences of Constructing Bulletin Boards/Kiosks and Interpretive Panels on Recreation Opportunities*

Assumptions:

- Bulletin boards/kiosks are currently located at all nine Skilak WRA campgrounds, 10 trailheads, and the West Entrance. Alternative A would construct five bulletin boards at the following new sites: 1) Bottenintnin Lake Day Use Area, 2) Chatelain Lake Trailhead Parking Area, 3) Marsh Lake Trailhead Parking Area, 4) Nature Center Parking Area, and 5) Visitor Contact Station (West Entrance).
- Bulletin boards/kiosks may contain some interpretive information, but their primary purpose is to provide general Refuge and site/facility-specific information (e.g. information about opportunities at the site).
- Interpretive panels are currently located at nine different sites within the Skilak WRA. Alternative A would construct panels at six new locations: 1) Bottenintnin Lake Day Use Area, 2) East Entrance Parking Area, 3) Jean Creek Culvert Wayside, 4) Lower Jean Lake Wayside, 5) Marsh Lake Trailhead Parking Area, and 6) West Entrance Parking Area.

Analysis:

*Bulletin Boards*

Constructing five (5) new bulletin boards would have beneficial, long-term impacts on recreation opportunities due to an increase in the amount of information being provided about the diversity and location of such opportunities. Impacts would be major at the site-specific scale when compared to existing conditions because no information is currently provided at those sites. At the regional scale, impacts would be minor because the addition of five new bulletin boards would increase the total number of bulletin boards throughout the Skilak WRA from 20 to 24.

*Interpretive Panels*

Constructing interpretive panels at six (6) locations would have beneficial, long-term impacts on education-based recreation opportunities due to an increase in information being provided about refuge resources and management programs. Impacts would be major at the site-specific scale when compared to existing conditions because no information is currently provided at those sites. At the regional scale, impacts would be moderate because the addition of six interpretative sites would increase the number of sites throughout the Skilak WRA from 9 to 15.

Conclusions:

Under Alternative A, recreation opportunities would improve by providing additional bulletin boards and creating more interpretive sites. At the site-specific scale, the degree of improvement would be major when compared to existing conditions because five (5) bulletin boards and six (6) interpretive sites would be provided at locations where there are currently none. At the regional scale, the degree of improvement would be moderate because the number of bulletin boards and interpretive sites throughout the Skilak WRA would increase by 20% and 70% respectively.

*Consequences of Constructing Campgrounds on Recreation Opportunities*
Assumptions:

- A new twenty (20) vehicle campground no larger than one (1) acre in size would be constructed at Engineer Lake.
- There is a shortage of vehicle campsites available during high public use periods and any increase in the number of vehicle sites provided would be used during those periods.

Analysis:
Constructing a one (1) acre campground consisting of twenty (20) vehicle campsites would have beneficial, long-term impacts on camping and related recreation opportunities. Impacts would be major at the local scale when compared to existing conditions because seventeen (17) more campsites would be provided then currently available at that location. At the regional scale, impacts would be minor because the addition of seventeen more vehicle campsites would increase the total number sites throughout the Skilak WRA from 93 to 110.

Conclusions:
Under Alternative A, recreation opportunities would improve as a result of providing additional vehicle campsites at the Engineer Lake campground. At the local scale, the degree of improvement would be major when compared to existing conditions because the overall number of vehicle campsites at that location would increase from 3 to 20 (a 85% increase). At the regional scale, the degree of improvement would be minor because the overall number of vehicle campsites throughout the Skilak WRA would increase by 15%.

*Consequences of Converting a Campground to a Day Use Area on Recreation Opportunities*
Assumptions:

- Although the Watson Lake Campground is outside the administrative boundaries of the Skilak WRA, it provides services to Skilak visitors and is analyzed here as a related facility.

Analysis:
Converting the Watson Lake Campground to a day use area would have adverse, long-term impacts on camping opportunities. Impacts would be major at the local scale when compared to existing conditions due to a loss of three (3) easily accessible and commonly used vehicle campsites at that location. The action would have beneficial, long-term impacts on day users. Impacts would be major at the local scale because the facility is easy to access from the Sterling Highway, there are a variety of recreation opportunities that day users can enjoy at Watson Lake (e.g., canoeing (lake and stream), fishing, hunting, wildlife viewing, etc), and day users that could not use the area previously due to its relatively small size and limited design would have an additional location to recreate at.

Conclusion:
Under Alternative A, user groups would change as a result of converting a campground to a day use area, but recreation opportunities would not. At the local scale, the degree of change would be major when compared to existing conditions because the facility would no longer accommodate overnight stays and camping-related user groups would lose three (3) easily accessible and commonly used vehicle campsites. At the same time, day users would benefit from the management action because a new facility would be constructed for their use. At the

regional scale, the degree of change would be minor because more vehicle campsites would be constructed under Alternative A (*see Alternative A: Consequences of Constructing a Campground on Recreation Opportunities*) than lost as a result of it, and day use areas would increase by 25%.

*Consequences of Constructing a Nature Center on Recreation Opportunities*
Assumptions:

- The nature center would replace the existing east entrance visitor contact station.
- The nature center would be open to the public and staffed year-round with paid employees and/or knowledgeable volunteers.
- The nature center would provide permanent interpretive exhibits as well as in-person interpretive programs that focus on wildlife and resources within the Skilak WRA and across Kenai Refuge.

Analysis:
Constructing a nature center would have beneficial, long-term impacts on education-based recreation activities and on recreation opportunities in general. Impacts would be major at the local and regional scales because the interpretive and education program would be substantially expanded as a result of the management action. Alternative A would create new opportunities for indoor and year-round interpretive activities, and the nature center would become an attractive destination for Kenai Refuge and Kenai Peninsula visitors alike.

Conclusions:
Under Alternative A, recreation opportunities would improve through development of a nature center along the Sterling Highway at the site of the current visitor contact station (east entrance). At the local and regional scale, the degree of improvement would be major because the Refuge's interpretation and education program would be enhanced beyond that currently provided at the visitor contact station and it would extend across and beyond Refuge boundaries.

*Consequences of Constructing Trails on Recreation Opportunities*
Assumptions:

- Travel off-trail within much of the Skilak WRA is extremely difficult due to terrain and vegetation characteristics; most visitors rely on existing trails for foot access.
- Trails facilitate participation in a variety of recreation opportunities including cross country skiing, fishing, photography, scenic viewing, small game hunting, and wildlife viewing.
- Proposed trails would provide access to four areas that are not currently accessible by foot (Blizzard, Kelly, Marsh, and Chatelain Lakes).

Analysis:
Constructing five (5) new trails would have similar beneficial, long-term impacts on recreation opportunities as those described under *Consequences of Constructing Trails on Public Access* except the diversity of habitats trails pass through would further enhance some recreation opportunities.

Conclusions:
Under Alternative A, recreation opportunities would be improved by increasing the number and length of trails that pass through a variety of vegetation communities. At the local scale, the degree of improvements would be major when compared to existing conditions because trails would facilitate a variety of opportunities at locations currently difficult to access. At the regional scale, impacts would be moderate when compared to existing conditions because opportunities would be enhanced on an additional nine (9.0) miles of trail that pass through three (3) forest communities, two (2) age classes, and a wetland complex.

*Consequences of Constructing a Visitor Contact Station on Recreation Opportunities*
Assumptions:

- The visitor contact station would be constructed at the west entrance of Skilak Loop Road. It would be seasonally staffed, with interpretive information and basic visitor information posted year-round.

Analysis:
Constructing a visitor contact station at the west entrance would have beneficial, long-term impacts on recreation opportunities by providing information to user groups about the diversity of such activities in the Skilak area. Impacts would be major at the regional scale when compared to existing conditions because the facility would increase the availability of information about Skilak WRA-wide recreation opportunities to a broader group of users. Services provided at the west entrance visitor contact station would be in addition to those provided by the east entrance visitor contact station (*Note: Alternative A proposes development of a nature center at the east entrance and would replace the existing visitor contact station at that location*). Although the west entrance visitor contact station would provide similar services as those offered at the east entrance, it would become the first point of contact for visitors traveling east toward Anchorage or Seward from Homer and/or Soldotna. As such, it would likely become the primary contact point and an important information resource for local residents wanting to recreate in the Skilak WRA.

Conclusions:
Under Alternative A, knowledge of recreation opportunities would improve through the distribution of information provided at the west entrance visitor contact station. At the regional scale, the degree of improvement would be major because the facility would provide information about recreation opportunities to a broader group of users, primarily local residents.

*Consequences of Constructing Wayside Pullouts on Recreation Opportunities*
Assumptions:

- Wayside pullouts would be located in scenic viewing areas that also facilitate wildlife viewing at a distance.
- The impacts of informational and interpretive signs provided at waysides are separate and distinct from the viewing opportunity provided.
- Scenic viewing opportunities are available from many locations within the Skilak WRA (e.g., from trails, developed campgrounds, etc), but formal waysides enhance

opportunities to view both scenery and wildlife by providing safe and convenient places for motorists to pull off the roadway.

Analysis:
Constructing three (3) wayside pullouts would have beneficial, long-term impacts on viewing and photography-related recreation opportunities. Initially, impacts would be moderate at the site-specific scale because motorists are able to stop on the road to view refuge resources. The benefits of having waysides for users to pull over would increase as traffic increases over time and stopping becomes more dangerous. At the regional scale, impacts would be major because the addition of three (3) new wayside pullouts would double the total number within the Skilak WRA, and the individual location and collective distribution of waysides would facilitate safe viewing of large portions of the area.

Conclusions:
Under Alternative A, vehicle-based viewing and photography opportunities would improve through the development of additional wayside pullouts. At the local scale, the degree of improvement would be moderate over existing conditions because facilities would provide safe and convenient points to pull off the road. At the regional scale, the degree of improvement would be major over existing conditions because the overall number of waysides would double from three (3) to six (6) with two developed along the Skilak Loop Road and one developed along the Sterling Highway.

*Consequences of Implementing Wildlife Management Strategies on Recreation Opportunities*
Assumptions:

- The primary goal of identified wildlife management strategies is to provide for wildlife viewing opportunities; the secondary goal is to provide for interpretation opportunities of those species, and the tertiary goal is to provide for a limited harvest of moose and small game without impacting the primary and secondary goal.
- The administrative boundary of the Skilak WRA would include 44,000-acres of land.
- To protect habitat quality, a firearm moose hunt would be allowed by permit (when moose population and/or sex ratio objectives are achieved) from September 15 to September 30 on 40,800-acres (or 92.7% of the total area). Use would be prohibited on 3,200-acres (or 7.3% of the total area) near roads and other facilities to ensure public safety.
- A small-game archery hunt would be allowed by general entry from October 1 through March 1.

Analysis:
Implementing existing wildlife management strategies would provide opportunities for a variety of recreation opportunities. The impacts associated with implementing these wildlife management strategies on recreation opportunities are analyzed below:

*Wildlife Viewing*
Continuing to implement wildlife management strategies would have negligible impacts on wildlife viewing opportunities at the regional scale because such opportunities would not be enhanced or diminished as a result of the management action. As a result, current opportunities

and levels of wildlife viewing would be expected.

*Archery Hunting*
Continuing to implement a small game archery hunt would have negligible impacts on archery hunting or wildlife viewing opportunities at the regional scale because small game populations are not expected to be adversely impacted by such harvesting methods and opportunities to harvest and view small game would persist. Displacement of some non-consumptive recreation users would continue to occur during small game hunting season each year though current levels of use would generally be expected.

*Firearm Hunting*
Continuing to implement a permitted moose hunt would have negligible impacts on moose hunting or wildlife viewing opportunities at the regional scale because moose population density and/or sex ratio objectives would not change as a result of the management action and hunting opportunities would be based on whether those objectives are achieved. Displacement of some non-consumptive recreation users would continue to occur during hunting season when permits are issued though current levels of use would generally be expected.

Conclusions:
Under Alternative A, recreation opportunities would continue at current levels because such opportunities would not be enhanced or diminished as a result of the management action. At the regional scale, Alternative A would have negligible impacts on recreation opportunities.

*Consequences of Constructing Wildlife Viewing and Photography Facilities on Recreation Opportunities*
No specific management direction is provided under Alternative A as it relates to viewing facilities (see Alternative B). As such, status quo management is anticipated and no impacts are expected.

### 4.3.4 Cumulative Impacts

Introduction
"Cumulative impact" is defined in the Council on Environmental Quality's NEPA regulations as the "impact on the environment that results from the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions" (40 CRF 1508.7). The purpose of the cumulative impact analysis is to identify the direct and indirect effects of the proposed action and its alternatives when added to the aggregate effects of past, present, and reasonably foreseeable future actions.

The Skilak WRA has been managed as a wildlife viewing and interpretation area for over twenty years as directed by guidance provided in the Kenai Refuge Comprehensive Conservation Plan (1985). Two additional plans, the Skilak Wildlife Recreation Area Species Management Plan (1986) and the Skilak Wildlife Recreation Area Public Use Facilities Plan (1988) provide specific management direction that "steps-down" from and implements the Comprehensive Conservation Plan's general direction. Implementation of these step-down management plans has had direct and indirect impacts on the physical, biological, and human environment. Those impacts, combined with those resulting from implementation of Alternative A, are analyzed

below. No major development actions have been identified within the boundaries of the Skilak WRA within the next 5 -10 years that would impact refuge resources. As a result, an analysis of the impacts associated with "reasonably foreseeable future actions" has been omitted here.

Physical Environment

Air quality, which currently suffers seasonal declines throughout the Skilak Loop Road corridor during periods of high vehicular use, would decline further due an increase in PM 2.5 and PM 10 resulting from increased vehicular traffic along the Skilak Loop Road throughout the year and vegetation management activities conducted during burning season (when environmental conditions permit). Soil resources, which currently suffer from compaction and erosion at site-specific locations where public use facilities have been constructed in the past (e.g., campgrounds, trails, etc) would be further adversely impacted under Alternative A with compaction and erosion expected at an additional thirteen (13) locations totaling some 232,810-square feet (5.3-acres). Hard-surfacing 23-miles of road and implementing vegetation management activities would have additional adverse impacts on soil resources at the site-specific and local scales. At the regional scale, the combination of impacts resulting from past management actions and those proposed under Alternative A would have negligible impacts on the physical environment.

Biological Environment

The composition and structural diversity of vegetation changed in the Skilak WRA as a result of natural (i.e., wildland fire) and human-related (i.e., mechanical crushing and prescribed fire) disturbance. These events and management actions were used specifically to enhance moose habitat, but the result netted beneficial and adverse impacts on other species as well. Expansion of the Hidden Lake and Upper Skilak Lake campgrounds reduced the acreage of wildlife habitat in the Skilak WRA, and habitat fragmentation resulted from development of the Burney's, Hideout Mountain, and Vista trails. Though these actions had moderate impacts on wildlife habitat at the local scale, their impacts were negligible at the regional scale.

Under Alternative A, vegetation management activities would continue to enhance moose habitat, but other species would benefit or be adversely impacted by the actions as well. Development of nine (9) additional public use facilities totaling some 319,940-square feet (7.3-acres) would further fragment and reduce the overall acreage of wildlife habitat beyond current levels. The majority of the development would occur along existing road corridors, though development of five (5) additional trails would bring the total number of linear features on the landscape to sixteen (16) which would impact 285,120-square feet (6.5-acres) of habitat. Hard-surfacing 23-miles of road would have additional adverse impacts on wildlife. These impacts, including an increase in wildlife-vehicle collisions, would be in addition to those currently observed along the Skilak Loop Road and Sterling Highway. At the regional scale, the combination of impacts resulting from past management actions and those proposed under Alternative A would have adverse impacts on the biological environment though these impacts are expected to be minor.

Human Environment

Recreation access was enhanced when access roads leading to major campgrounds were hard-surfaced, three (3) trails were developed, and boat launches were rehabilitated as a result of implementing the Public Use Facilities Plan. Related recreation opportunities were enhanced through development of those and additional facilities. Initiation of environmental education programs and the development of interpretive signs, bulletin boards, and kiosks fulfilled

interpretive and environmental education management goals for the area, and wildlife viewing opportunities were enhanced through implementation of wildlife management strategies identified in the Species Management Plan. Although firearm hunting was restricted, wildlife viewing opportunities were enhanced and the area provided a special opportunity for archery hunters seeking small game. These actions had major beneficial impacts on recreation access and opportunities at the site-specific, local, and regional scales.

Under Alternative A, recreation access would be further enhanced through hard-surfacing 23-miles of road within the Skilak WRA, constructing three (3) new parking areas, and developing five (5) new trails (which would bring the total number to seventeen (17)). Recreation and environmental education/interpretation opportunities would be enhanced through development of public use facilities at ten (10) sites, including development of a campground, day use area, nature center, visitor contact station, wayside pullouts, bulletin boards, and interpretive panels. Continuation of existing wildlife management strategies would have negligible impacts on recreation opportunities because these opportunities would not be enhanced or restricted as a result of status quo management. At the regional scale, the combination of impacts resulting from past management actions and those proposed under Alternative A would have moderate beneficial impacts on the human environment.

Conclusions

The combination of impacts resulting from past management actions and those proposed under Alternative A would have negligible impacts on the physical environment, minor adverse impacts on the biological environment and moderate beneficial impacts on the human environment at the regional scale.

## *4.4 Alternative B (Preferred Alternative)*

This alternative is the Regional Director's Preferred Alternative. It fulfills the plan's purpose and need as identified in Chapter 1 by identifying compatible recreation facilities and management programs designed to further enhance wildlife viewing, interpretation and photography opportunities in the Skilak WRA.

### 4.4.1 Physical Environment

**Air Quality**

Key Indicators:

- Air pollution emissions: fuel exhaust, particulate matter (PM 2.5 and PM 10), etc.

*Consequences of Road Improvements on Air Quality*

Assumptions:

- Approximately 23-miles of road, including the Skilak Loop Road and all related access roads, would be improved.
- The Vegetation Management Interpretive Drive would be one (1) mile long and unpaved.
- Improvements would facilitate use and traffic volume would increase over time.

- Particulate matter (PM 10 or particulate matter up to 10 microns in diameter) and exhaust emissions generated from vehicular use are the primary sources of air pollution in the Skilak WRA. The amount of particulate matter emitted varies depending on soil moisture, silt content, wind speed and other factors.

Analysis:
Implementation of Alternative B would have similar impacts as those describe in *Alternative A: Consequences of Road Improvements on Air Quality* except additional impacts would result from the development of the Vegetation Management Interpretive Drive. The impacts associated with the construction and future use of the Vegetation Management Interpretive Drive are analyzed below:

*Construction-Related Impacts*
Constructing a gravel road would have adverse, short-term impacts on air quality in addition to those described under Alternative A due to an increase in PM 10 resulting from soil disturbance during grading activities. Impacts would be of moderate intensity at the site-specific scale. Additional adverse, short-term impacts of moderate intensity would occur at the site-specific scale due to an increase in air pollution emissions resulting from diesel powered construction equipment used to conduct the work (i.e., graders).

*Future Use-Related Impacts*
Future use of the gravel road would have adverse, long-term impacts on air quality in addition to those described in Alternative A due to an increase in PM 10 resulting from vehicular use. Impacts would be of major intensity at the local scale during high use seasons. The effects of PM 10 on air quality would diminish if and when Skilak WRA roads are paved as proposed under this alternative. Additional adverse, long-term impacts of moderate intensity would occur on air quality due to an increase in fuel exhaust emissions as traffic volume increases over time, particularly during high use seasons.

Conclusion:
Under Alternative B, air quality would decline due to increases in PM 2.5 and PM 10 resulting from construction work and vehicular use of the Skilak Loop Road and Vegetation Management Interpretive Drive. At the local scale, the degree of decline would be moderate compared to existing conditions because PM 10 levels would increase along the Vegetation Management Interpretive Drive unless it is paved as part of the Skilak Loop Road improvement effort proposed under this alternative, and fuel exhaust emissions throughout all road corridors would increase as traffic volume increases over time. At the regional scale, Alternative B would have negligible impacts on air quality.

*Consequences of Conducting Vegetation Management Activities on Air Quality*
Assumptions:
- Fire use would be the preferred management prescription over mechanical treatment due to the costs associated with mechanical treatment.
- Prescribed fire use would be the preferred fire method over wildland fire use since the Skilak WRA is identified as Full Suppression and action may be taken to extinguish or control a wildland fire.

- Prescribed fire would be used in accordance with an approved fire management plan. Best available control measures, including reducing the amount of pollutants emitted or the impact of the pollutants emitted on sensitive locations, will be used to minimize emissions associated with prescribed fires.
- Fifty to one hundred acres will be burned per year when conditions permit.
- Fires emit air pollution emissions. The type and proportion of pollutants emitted varies widely due to fuel character, condition, and environment; and on fire behavior.
- Particulate matter generated from prescribe fire is predominantly PM 2.5 (particular matter up to 2.5 microns in diameter), or "fine particulates".

Analysis:
Implementation of Alternative B would have similar adverse, short-term impacts as those described under *Alternative A: Consequences of Conducting Vegetation Management Activities on Air Quality*. Because Alternative A does not specifically indicate the amount of land to be managed, it is impossible to determine whether implementation of Alternative B would have more or less impact than Alternative A.

Conclusion:
Under Alternative B, air quality would decline at the local scale when and where prescribed fire is used. Although the degree of decline can not be quantified, the overall impact is expected to be minor due to the limited size and restricted combustion conditions prescribed fires are conducted under. At the regional scale, Alternative B would have negligible impacts on air quality.

**Soil Resources**
Key Indicators:
- Physical soil characteristics: bulk density, soil permeability, water repellency, erosion

*Consequences of Maintaining and Improving Administrative Facilities on Soil Resources*
Assumptions:
- Finances would be secured to fund facility maintenance and enhancement.
- The facility's footprint would increase by 1,250-square feet.

Analysis:
Implementation of Alternative B would construct up to three (3) additional facilities at the administrative site totaling approximately 1,250-square feet. When combined with the existing 600-square foot facility, the administrative facility's footprint would be 1,850-square feet in size. Implementation of Alternative B would have adverse, long-term impacts on physical soil characteristics due to soil compaction occurring beneath the constructed facility. Impacts would be major at the site-specific scale when compared to existing natural conditions, and would result in complete loss of soil permeability and soil function beneath constructed facilities. Sheet runoff and erosion would be expected during the construction phase of the project if conducted under wet conditions, though the intensity of such impacts would be minimized using best management practices.

Conclusions:
Under Alternative B, the quality of soils would decline over a 1,250-square foot area where construction of new administrative facilities is proposed. At the site-specific scale, the degree of decline would be major when compared to existing natural conditions due to the placement of permanent hardened facilities on previously undeveloped sites. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Rehabilitating and Constructing Boat Launches on Soil Resources*
Assumptions:

- The new boat launch at Lower Jean Lake will be approximately 600-square feet in size.
- Actions undertaken to rehabilitate existing boat launches at Bottenintnin Lake and Engineer Lake are limited to grading and adding gravel.

Analysis:
Implementation of Alternative B would consist of up to three projects: one associated with development of a new boat launch, and two associated with rehabilitation of existing boat launches. The impacts associated with new construction and rehabilitation projects are analyzed below:

*Construction-Related Impacts*
Lower Jean Lake
Constructing a permanent, graveled boat launch totaling 600-square feet would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Constructing Campgrounds on Soil Resources* except the effects of soil compaction, loss of soil function, and erosion would be observed over a 600-square foot area.

*Rehabilitation-Related Impacts*
Bottenintnin and Engineer Lakes
Rehabilitating two (2) existing boat launches would have negligible impacts on physical soil characteristics at the site-specific scale because the project areas would not be expanded or reduced in size and current soil conditions would persist.

Conclusion:
Under Alternative B, the quality of soils would decline over a 600-square foot area where a new boat launch is proposed. At the site-specific scale, the degree of decline would be moderate when compared to existing natural conditions due to the placement of a permanent semi-hardened facility on a previously undeveloped site. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Constructing, Rehabilitating, and Restoring Campgrounds on Soil Resources*
Assumptions:

- A six (6) vehicle campground no larger than ¼-acre in size would be constructed at Engineer Lake. The campground would be relocated to the bluff above the lake. Vegetation would be removed from the project area, soils would be graded, and gravel would be added to access roads and campsites to minimize erosion.

- Five (5) vehicle campsites totaling no more than ¼-acre in size would be constructed at the Kelly Lake Campground. Vegetation would be removed from the project area, soils would be graded, and gravel would be added to newly developed campsites to minimize erosion.
- Each campsite would be 1,440-square feet in size including associated parking.
- The Peterson Lake Campground rehabilitation project would not expand the footprint of the existing campground. Vegetation would not be removed from the project area. Soils would be graded, and gravel would be added to the project area to minimize erosion.
- The existing Lower Jean Lake campground would be closed to public access. Some management actions (e.g., tilling) might be implemented to expedite recovery, but in general, natural processes would be used to restore the site to a natural condition.

Analysis:
Implementation of Alternative B would have similar impacts as those describe in *Alternative A: Consequences of Constructing and Converting Campgrounds on Soil Resources* except additional impacts would result from restoration work proposed as part of this alternative. Alternative B would consist of four projects: two associated with development of new campgrounds; one associated with rehabilitation of an existing campground; and one associated with restoration of an existing site. The impacts associated with new construction, rehabilitation, and restoration projects are analyzed below:

*Construction-Related Impacts*
Engineer Lake Campground
Constructing a permanent, semi-hardened, one (1) acre campground consisting of six (6) vehicle campsites (or fourteen (14) vehicle campsites less than that proposed under Alternative A) would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Constructing and Converting Campgrounds on Soil Resources* except the effects of soil compaction, loss of soil function, and erosion would be observed at six (6) vehicle sites (or 4,800-square feet) as opposed to twenty (20) vehicle sites (or 16,000-square feet) proposed under Alternative A.

Kelly Lake Campground
Constructing five (5) additional permanent, semi-hardened campsites would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Constructing and Converting Campgrounds on Soil Resources* except the effects of soil compaction, loss of soil function, and erosion would be observed over eight (8) vehicle campsites (or 6,400-square feet) as opposed to three (3) vehicle campsites currently existing.

*Rehabilitation Project*
Peterson Lake Campground
Rehabilitation of an existing campground would have negligible impacts on physical soil characteristics because the project areas would not be expanded or reduced in size.

*Restoration Project*
Lower Jean Lake Campground
Restoring an existing three (3) vehicle campground at Lower Jean Lake would have beneficial, long-term impacts on soil resources. Impacts would be major at the site-specific scale when compared to existing developed conditions. Soil compaction and water repellency would

diminish and permeability and soil function would increase. Although sheet runoff and erosion would increase initially (depending on weather conditions), such impacts would diminish over time as vegetation reestablishes itself on site.

Conclusion:
Under Alternative B, the quality of soil resources would decline at Engineer and Kelly Lake campgrounds where a total of eleven (11) new vehicle campsites totaling 8,800 square feet (or less than ¼-acre) and associated access roads are proposed. The amount of decline would be less than Alternative A where seventeen (17) additional vehicle sites totaling 13,600 square feet (or nearly 1/3-acre) are proposed for construction at Engineer Lake. Soil resources would remain consistent with current conditions at Peterson Campground where rehabilitation work is proposed, and improve at Lower Jean Lake Campground where restoration efforts are proposed. At the site-specific scale, the degree of decline resulting from campground developments would be moderate due to the placement of permanent semi-hardened campsites on previously undeveloped sites. The degree of improvement resulting from campground restoration would be major at the site-specific scale. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Constructing Campsites on Soil Resources*
Assumptions:

- An access trail originating from a developed parking area and up to two (2) hardened walk-in campsites at Kelly Lake Campground and one (1) hardened walk-in campsite at Peterson Lake Campground will be constructed.
- No more than two (2) backcountry campsites would be provided along the Skilak Lake Long Distance Trail. No more than three (3) backcountry campsites would be provided along the Seven Lakes Long Distance Trail.
- Campsites would be no larger than 800-square feet in size.
- Vegetation will be removed from specific areas to establish the location of designated campsites. Gravel may be added as a protective cap to campsites located at campgrounds, but will not be used at "backcountry" campsites.

Analysis:
Constructing permanent, semi-hardened campsites would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Constructing and Converting Campgrounds on Soil Resources* except the effects of soil compaction, loss of soil function, and erosion would be observed at no more than eight (8) locations where campsites are constructed. Erosion would be limited by adding gravel to three (3) campsites located at Kelly and Peterson campgrounds.

Conclusion:
Under Alternative B, the quality of soil resources would decline at eight (8) locations totaling no more than 6,400-square feet (or 2/10-acre). At the site-specific scale, the degree of decline would be moderate when compared to existing natural conditions due to the placement of hardened and semi-hardened facilities on previously undeveloped sites. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Rehabilitating and Constructing Day Use Areas on Soil Resources*
Assumptions:

- Vegetation would be removed from no more than 2-acres of Lower Jean Lake's north shore, and soils would be graded and compacted to construct a new day use area and associated access road.
- Soils would be graded at Bottenintnin Lake and Engineer Lake project sites.

Analysis:
Implementation of Alternative B would consist of three projects: one associated with construction of a new day use area, and two associated with rehabilitation of existing developed sites. The impacts associated with new construction and rehabilitation projects are analyzed below:

*New Construction Project*
Lower Jean Lake Day Use Area
Constructing a permanent, semi-hardened day use area would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Constructing and Converting Campgrounds on Soil Resources* except the effects of soil compaction, loss of soil function, and erosion would be observed over a two (2) acre area.

*Rehabilitation Projects*
Bottenintnin Lake Group Day Use Area and Engineer Lake Day Use Area
Rehabilitating day use areas would have negligible impacts on physical soil characteristics at the site-specific scale because the project areas would not be expanded or reduced in size.

Conclusion:
Under Alternative B, the quality of soil resources would decline over a two (2) acre area at the Lower Jean Lake Day Use Area. At the site-specific scale, the degree of decline would be major when compared to existing natural conditions due to placement of a permanent, semi-hardened facility on a previously undeveloped site. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Constructing an Environmental Education Complex on Soil Resources*
Assumption:

- The project's footprint would be 12,000-square feet in size.

Analysis:
Constructing a 10,000-square foot Boreal Forest Lands Research and Management Training Facility and a 2,000-square foot Nature Center would similar adverse, long-term impacts as those described under *Alternative A: Consequences of Constructing a Nature Center on Soil Resources* except the effects of soil compaction and loss of soil function would be observed over a 12,000-square foot area as opposed to a 2,000-square foot area as proposed under Alternative A.

Conclusion:
Under Alternative B, the quality of soil resources would decline over a 12,000-square foot area (0.23-acre) where construction of an Environmental Education Complex is proposed. At the site-specific scale, the degree of decline would be major when compared to existing natural conditions due to the placement of permanent hardened facilities on a previously undeveloped

site. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Constructing an Interpretive Trail on Soil Resources*
Assumptions:

- The project footprint would be 6' X 5,280'.
- Asphalt, or some similar product, would be used as a cap to facilitate accessibility by the disabled.

Analysis:
Constructing a permanent one (1) mile long disability accessible trail would have adverse, long-term impacts on physical soil characteristics due to soil compaction occurring beneath the constructed trail. Impacts would be major at the local scale when compared to existing conditions, and would result in complete loss of soil permeability and soil function. Soil permeability would decrease and water repellency would increase over that found in existing natural conditions due to the application of an impermeable surface used to facilitate access by the disabled. Sheet runoff and erosion would be expected during the construction phase of the project if conducted under wet conditions, though the intensity of such impacts would be minimized using best management practices.

Conclusion:
Under Alternative B, the quality of soil resources would decline on 31,680-square feet (or approximately ¾-acre). At the local scale, the degree of decline would be major when compared with existing natural conditions due to the placement of a paved trail on a previously undeveloped site. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Rehabilitating and Constructing Parking Areas on Soil Resources*
Assumptions:

- Action taken to construct new parking areas would include vegetation removal and grading.
- Three of the seven parking areas proposed under Alternative B are also proposed under Alternative A (Chatelain Lake Trailhead, Crushed Area or Moose Habitat Enhancement Trailhead, Visitor Contact Station (West Entrance)). Impacts at these locations would be the same under both alternatives.
- New parking areas located at East Entrance (Sterling/Skilak Intersection), Lower Jean Lake Day Use Area, Moose Habitat Enhancement Trailhead, Mox/Chatelain Lakes Trailhead, and Vegetation Management Interpretive Drive would have 4 vehicle and 2 RV/boat sites (2,080-square feet) each. The Pack Lake Environmental Education Complex parking area would provide parking for both the Nature Center and Boreal Forests Management and Research Institute and would have 26 vehicle and 15 RV/boat sites (14,800-square feet). The Visitor Contact Station (West Entrance) would have 6 vehicle, 3 RV/boat, and 2 staff parking sites (3,520-square feet).

- Half of all the parking sites proposed for development, and more than half of all the RV/boat sites proposed (or 14,800-square feet of parking) would be located at the Pack Lake Environmental Education Complex.

Analysis:
Implementation of Alternative B would consist of eight projects: seven associated with construction of new parking areas, and one associated with rehabilitation of an existing parking area. The impacts associated with new construction and rehabilitation projects are analyzed below:

*New Construction Projects*
Constructing seven (7) permanent, semi-hardened parking areas consisting of fifty-two (52) total vehicle sites and 28 RV/boat sites would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Constructing and Converting Campgrounds on Soil Resources* except the effects of erosion would diminish at five parking areas (Moose Habitat Enhancement Trailhead, Visitor Contact Station (West Entrance), East Entrance, Vegetation Management Interpretive Drive, and Pack Lake Environmental Education Complex) if and when the Skilak Loop Road is paved as proposed under this alternative. Alternative B proposes development of four (4) more parking areas than Alternative A. As a result, impacts would be observed over 28,720-square feet (0.7-acres) as opposed to 7,680-square feet (or 0.2-acres) proposed under Alternative A.

*Rehabilitation Project*
Rehabilitation of an existing parking area at Engineer Lake would have negligible impacts on physical soil characteristics at the site-specific scale because the project area will not be expanded or reduced in size.

Conclusion:
Under Alternative B, the quality of soil resources would decline at seven (7) sites totaling 28,720-square feet (0.7-acres). One of these sites, the Pack Lake Environmental Education Complex parking area, would be 14,800-square feet (or 1/3-acre). The combined size of the remaining sites would be 13,900-square feet. At the site-specific scale, the degree of decline would be moderate when compared with existing natural conditions due to placement of permanent semi-hardened parking areas in previously undeveloped areas. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Constructing and Improving Roads on Soil Resources*
Assumptions**:**

- Road improvements along 23-miles of roads (i.e., Skilak Loop Road and all related access roads) would include grading and hard-surfacing (e.g., chip seal, asphalt, etc).
- The Vegetation Management Interpretive Drive would be 1-mile long and unpaved.

Analysis:
In addition to road improvements described under Alternative A, Alternative B would construct a graveled interpretive drive totaling approximately 1-mile in length. When combined with roads currently existing, total road length as of result of implementing Alternative B would be approximately 24-miles or one (1) mile more than that proposed under Alternative A. Implementation of Alternative B would have similar adverse, long-term impacts as those

describe in *Alternative A: Consequences of Improving Roads on Soil Resources* except the effects of soil compaction, loss of soil function, and erosion would also be observed along the Vegetation Management Interpretive Drive. These effects would diminish if the gravel road is paved as part of the Skilak Loop Road improvement project proposed under this alternative.

Conclusion:
Under Alternative B, the quality of soils would decline along 24-miles of road. At the local scale, the degree of decline would be major throughout the entire road network when compared with existing natural conditions due to hard-surfacing the Skilak Loop Road and associated access roads and constructing a permanent gravel road (1-mile long) in a previously undeveloped site. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Providing Sanitary Facilities on Soil Resources*
Assumptions:

- Double vault facilities (14' x 12') would be constructed at Bottenintnin Lake, Pack Lake, and the Visitor Contact Station (West Entrance).
- Single vault facilities (14' x 6') would be constructed at Lower Jean Lake and the Mox/Chatelain Lakes Trailhead.

Analysis:
Constructing five (5) permanent sanitary facilities ranging from 84-square feet to 168-square feet in size would have similar adverse, long-term impacts as those described under *Alternative B: Consequences of Maintaining and Improving Administrative Facilities on Soil Resources* except effects of soil compaction and loss of soil function would be observed over 700-square feet.

Conclusions:
Under Alternative B, the quality of soil resources would decline at five (5) sites totaling approximately 700-square feet. The degree of decline would be major at the site-specific scale when compared to existing natural conditions due to the placement of permanent hardened facilities on previously undeveloped sites. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Constructing Trails on Soil Resources*
Assumptions:

- Soil impacts are the result of compaction and abrasion that occurs during construction and use.
- Trail tread width would be 4-feet wide.

Analysis:
Constructing 29.7-miles of trails (or 20.7-miles more than that proposed under Alternative A) would have similar adverse, long-term impacts on soil resources as those described under *Alternative A: Consequences of Constructing Trails on Soil Resources* except the effects of soil compaction and erosion would be observed on 627,264-square feet (14.4-acres) of trail as opposed to 190,080-square feet (4.7-acres) proposed under Alternative A.

Conclusion:
Under Alternative B, the quality of soil resources would decline on 29.7-miles of trails (627,264-square feet) as opposed to 9.0-miles of trails (190,080-square feet) proposed under Alternative A. Although the degree of decline cannot be quantified, the overall impact of trail development on soil resources at the local scale is expected to be moderate when compared to existing natural conditions. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Conducting Vegetation Management Activities on Soil Resources*
Assumptions:

- Prescribed fire use would be the preferred management prescription over mechanical treatment due to the costs associated with mechanical treatments.
- Prescribed fire would be the preferred fire method over wildland fire use since 1) the Skilak WRA is identified as Full Suppression and action may be taken to extinguish or control a wildland fire, and 2) wildland fires are typically more severe than prescribed fires and as such have greater impacts on soils.
- Prescribed fire would be used in accordance with an approved fire management plan.
- Soil impacts are also the result of fire severity (i.e., peak temperatures and duration) associated with prescribed or wildland fire use.

Analysis:
Implementation of Alternative B would have similar adverse, medium-term impacts as those described under *Alternative A: Consequences of Conducting Vegetation Management Activities on Soil Resources*. Because Alternative A does not specifically indicate the amount of land to be managed, it is not possible to determine whether implementation of Alternative B would have more or less impacts when compared to Alternative A.

Conclusion:
Under Alternative B, the quality of soil resources would decline on approximately 375-acres over the life of the plan. Although the degree of decline cannot be quantified, the overall impact on soil resources at the local scale is expected to range from minor to moderate depending on the management prescription used. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Constructing Viewing Facilities on Soil Resources*
Assumptions:

- Photo blinds are approximately 4’ X 4’ in size.

Analysis:
Implementation of Alternative B would have similar adverse, long-term impacts as those describe in *Alternative B: Consequences of Maintaining and Improving Administrative Facilities on Soil Resources* except the effects of soil compaction and loss of soil function would be observed at two locations totaling approximately 16-square feet each.

Conclusion:
Under Alternative B, the quality of soil resources would decline on 32-square feet. At the site-specific scale, the degree of decline would be major when compared with existing natural conditions due to the placement of permanent hardened facilities on previously undeveloped sites. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

*Consequences of Constructing a Visitor Contact Station on Soil Resources*
Assumptions:

- The size of the project's footprint would be 500-square feet in size.

Analysis:
Implementation of Alternative B would have similar adverse, long-term impacts as those describe in *Alternative B: Consequences of Maintaining and Improving Administrative Facilities on Soil Resources* except the effects of soil compaction and loss of soil function would be observed over a 500-square foot area.

Conclusion:
Under Alternative B, the quality of soil resources would decline over a 500-square foot area where construction of a Visitor Contact Station is proposed. At the site-specific scale, the degree of decline would be major compared to existing natural conditions due to placement of a permanent hardened facility on a previously undeveloped site. Conversely, at the regional scale, Alternative B would have negligible impacts on soil resources.

**Water Quality**
Key Indicators:

- Sedimentation
- Non-point source pollutants: petroleum products, heavy metals

*Consequences of Road Improvements on Water Quality*
Implementation of Alternative B would have the same adverse, long-term impacts as those described under *Alternative A: Consequences of Road Improvements on Water Quality* because Alternative B does not propose a change in current management.

### 4.4.2 Biological Environment

**Vegetation**
Key Indicators:

- Loss of wildlife habitat

*Consequences of Maintaining and Improving Administrative Facilities on Vegetation*
Assumptions:

- Finances would be secured to fund facility maintenance and enhancement.

- The facility's footprint would increase by 1,250-square feet.

Analysis:
Constructing up to three (3) additional facilities at the administrative site would have adverse, long-term impacts on closed mixed forest of mature age due to removal of approximately 1,250-square feet (0.03-acres) of that community type to facilitate development. Impacts would be major a the site-specific scale when compared to existing conditions because all the existing vegetation at the project site would be removed and ecological services provided by that vegetation would no longer exist. At the local scale, impacts would be minor because the forest's ability to continue to provide ecological services would be supported by the surrounding forest community which is of the same type and age class. At the regional scale, impacts would be negligible because there are approximately 3,223-acres of this community type in the Skilak WRA, and implementation of Alternative B would remove less than 1% of it.

Conclusions:
Under Alternative B, the acreage of closed mixed forest of mature age would decline by approximately 1,250-square feet (0.03-acre). At the site-specific scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within the 1,250-square foot project area would be removed to facilitate development of permanent administrative facilities. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. At the regional scale, the degree of decline would be negligible because overall, less than 1% of closed mixed forest would be removed from the Skilak WRA.

*Consequences of Improving and Constructing Boat Launches on Vegetation*
Assumptions:
- The new boat launch at Lower Jean Lake would be approximately 600-square feet in size.
- Actions taken to rehabilitate boat launches at Bottenintnin Lake and Engineer Lake would not remove or impact vegetation in any way because the project areas would not be expanded or reduced in size.

Analysis:
Implementation of Alternative B would consist of up to three projects: one associated with development of a new boat launch, and two associated with rehabilitation of existing boat launches. The impacts associated with new construction and rehabilitation projects are analyzed below:

*New Construction Project*
Lower Jean Lake
Constructing one (1) new boat launch would have similar adverse, long-term impacts as those described under *Alternative B: Consequences of Maintaining and Improving Administrative Facilities on Vegetation* except approximately 600-square feet of closed mixed forest would be impacted at the site-specific scale. At the regional scale, impacts would be negligible because there are approximately 3,223-acres of closed mixed forest in the Skilak WRA, and implementation of Alternative B would remove less than 1% of it.

*Rehabilitation Projects*
Bottenintnin and Engineer Lakes
Rehabilitation of existing boat launches at Bottenintnin and Engineer lakes would have negligible impacts on wildlife habitat at the site-specific scale because the project areas would not be expanded or reduced in size.

Conclusion:
Under Alternative B, the acreage of closed mixed forest of mature age would decline by approximately 600-square feet (0.01-acre). At the site-specific scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within the 600-square foot project area would be removed to facilitate development of a permanent boat launch. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. At the regional scale, the degree of decline would be negligible because overall, less than 1% of closed mixed forest would be removed from the Skilak WRA.

*Consequences of Constructing, Rehabilitating, and Restoring Campgrounds on Vegetation*
Assumptions:

- A six (6) vehicle campground no larger than ¼-acre in size would be constructed at Engineer Lake. The campground would be relocated to the bluff above the lake. Vegetation would be removed from the project area to facilitate development.
- Five (5) vehicle campsites totaling no more than ¼-acre in size would be constructed at the Kelly Lake Campground. Vegetation would be removed from the project area to facilitate development.
- Each campsite would be 1,440-square feet in size including associated parking.
- The Peterson Lake Campground rehabilitation project would not expand the footprint of the existing campground and vegetation would not be removed from the project area.
- The existing Lower Jean Lake campground would be closed to public access. Some management actions (e.g., tilling) might be implemented to expedite recovery, but in general, natural processes would be used to restore the site to a natural condition.

Analysis:
Implementation of Alternative B would consist of four projects: two associated with development of new campgrounds; one associated with rehabilitation of an existing campground; and one associated with restoration of an existing site. The impacts associated with new construction, rehabilitation, and restoration projects are analyzed below:

*New Construction Projects*
Engineer Lake Campground
Construction of a new campground consisting of six (6) vehicle campsites (or fourteen (14) vehicle campsites less than that proposed under Alternative A) would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Constructing and Converting Campgrounds on Vegetation* except Alternative B would require approximately 8,640-square feet (0.2-acre) of mature closed needleleaf forests removed from the project area as

opposed to 28,800-square feet (0.66-acre) proposed under Alternative A.

Kelly Lake Campground
Construction of five (5) additional vehicle campsites would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Constructing and Converting Campgrounds on Vegetation* except Alternative B would require approximately 7,200-square feet (0.16-acre) of mature closed needleleaf forests removed from the project area.

*Rehabilitation Project*
Peterson Lake Campground
Rehabilitation of an existing campground would have negligible impacts on wildlife habitat because the project areas would not be expanded or reduced in size.

*Restoration Project*
Lower Jean Lake Campground
Restoring three (3) existing vehicle campsites would have beneficial, long-term impacts on closed mixed forest as vegetation reestablishes itself. Impacts would be major at the site-specific scale when compared to existing developed conditions. Implementation of Alternative B would close the existing Lower Jean Lake Campground to public access which would allow the area to recover naturally over time. It is anticipated a mixed forest community would recover after public access is closed. The amount of recovery is unknown because the size of the existing campground has not been determined.

Conclusion:
Under Alternative B, the acreage of closed needleleaf forest would decline by at least 15,840-square feet (0.36-acre). At the site-specific scale, the degree of decline would be major compared to existing natural conditions because a majority of the vegetation within two project areas would be removed to facilitate development of permanent vehicle campsites. Conversely, mixed forests would improve over time as the Lower Jean Lake Campground recovers, though the amount of which can not be determined. Conversely, at the regional scale, the degree of decline would be negligible because overall, less than 1% of either community type would be affected by the management action.

*Consequences of Constructing Campsites on Vegetation*
Assumptions:

- An access trail originating from a developed parking area and up to two (2) hardened walk-in campsites at Kelly Lake Campground and one (1) hardened walk-in campsite at Peterson Lake Campground will be constructed.
- No more than two (2) “backcountry” campsites would be provided along the Skilak Lake Long Distance Trail. No more than three (3) “backcountry” campsites would be provided along the Seven Lakes Long Distance Trail.
- Vegetation will be removed from specific areas to establish the location of designated campsites.
- Campsites would be no larger than 800-square feet in size.

Analysis:
Implementation of Alternative B would have similar adverse, long-term impacts as those

described under *Alternative A: Consequences of Constructing and Converting Campgrounds on Vegetation* except Alternative B would require approximately 6,400-square feet (0.15-acre) of vegetation to be removed to facilitate development of permanent campsites. This would include 2,400-square feet of mature closed needleleaf forest at Kelly / Peterson Lake Campgrounds, 2,400-square feet of mature mixed forest along the Skilak and Seven Lakes Long Distance Trails, 800-square feet of early mixed forest along the Skilak Lake Long Distance Trail, and 800-square feet of intermediate needleleaf forest along the Seven Lakes Long Distance Trail. Implementation of Alternative B would remove less than 1% of these community types from the Skilak WRA.

Conclusion:
Under Alternative B, the acreage of needleleaf and mixed forests would decline by approximately 3,200-square feet each. At the site-specific scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within each of the project areas would be removed to facilitate development of permanent campsites. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. At the regional scale, the degree of decline would be negligible because overall, less than 1% of each community type would be removed from the Skilak WRA.

*Consequences of Improving and Constructing Day Use Areas on Vegetation*
Assumptions:

- Action taken to construct a new day use area at Lower Jean Lake's north shore would include removal of vegetation to facilitate construction in a previously undeveloped area. The project's footprint would not exceed two (2) acres.
- Action taken to rehabilitate day use areas at Bottenintnin and Engineer lakes would not remove or impact vegetation in any way because the project areas would not be expanded or reduced in size.

Analysis:
Implementation of Alternative B would consist of three projects: one associated with construction of a new day use area, and two associated with rehabilitation of existing developed sites. The impacts associated with new construction and rehabilitation projects are analyzed below:

*New Construction Project*
Lower Jean Lake Day Use Area
Constructing a permanent day use area along the north shore of Lower Jean Lake would have similar adverse, long-term impacts as those described under *Alternative B: Consequences of Maintaining and Improving Administrative Facilities on Vegetation* except approximately 87,120-square feet of closed mixed forest would be removed from the project site. At the regional scale, impacts would be negligible because there are approximately 7,871-acres of this community type in the Skilak WRA, and implementation of Alternative B would remove less than 1% of it.

*Rehabilitation Projects*

Bottenintnin Lake Group Day Use Area and Engineer Lake Day Use Area

Rehabilitation of day use areas would have negligible impacts on vegetation at the site-specific scale because the project areas would not be expanded or reduced in size.

Conclusion:

Under Alternative B, the acreage of closed mixed forest would decline by approximately 87,120-square feet (2-acres). At the site-specific scale, the degree of decline would be major compared to existing natural conditions because a majority of the vegetation within the project area would be removed to facilitate development of a permanent day use area. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. At the regional scale, the degree of decline would be negligible because overall, less than 1% of closed mixed forest would be removed from the Skilak WRA.

*Consequences of Constructing an Environmental Education Complex on Vegetation*

Assumption:

- The project's footprint would be 12,000-square feet in size.

Analysis:

Constructing a 10,000-square foot Boreal Forest Lands Research and Management Training Facility and a 2,000-square foot Nature Center would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Constructing a Nature Center on Vegetation* except Alternative B would require removal of an additional 10,000-square feet (0.23-acre) of closed mixed forest of mature age. At the regional scale, impacts would be negligible because there are approximately 3,223-acres of this community type in the Skilak WRA, and implementation of Alternative B would remove less than 1% of it.

Conclusion:

Under Alternative B, the acreage of mature closed mixed forest would decline by approximately 12,000-square feet (0.28-acre). At the site-specific scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within the 12,000-square foot project area would be removed to facilitate development of a permanent environmental education complex. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. At the regional scale, the degree of decline would be negligible because overall, less than 1% of closed mixed forest would be removed from the Skilak WRA.

*Consequences of Constructing an Interpretive Trail on Vegetation*

Assumptions:

- The project footprint would be 6' X 5,280'.

Analysis:

Construction of a one (1) mile long disability accessible trail would have adverse, long-term impacts on open mixed forest of mature age due to removal of approximately 31,680-square feet (0.73-acres) of that community type to facilitate development. Impacts would be major a the site-

specific scale when compared to existing conditions because all the existing vegetation at the project site would be removed and ecological services provided by that vegetation would no longer exist. At the local scale, impacts would be minor because the forest's ability to continue to provide ecological services would be supported by the surrounding forest community which is of the same type and age class. At the regional scale, Alternative B would have negligible impacts because there are approximately 7,409-acres of this community type in the Skilak WRA, and implementation of Alternative B would remove less than 1% of it.

Conclusion:
Under Alternative B, the acreage of mature open mixed forest would decline by approximately 31,680-square feet (0.73-acre). At the site-specific scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within the one (1) mile long project area would be removed to facilitate trail construction. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. At the regional scale, the degree of decline would be negligible because overall, less than 1% of mature open mixed forest would be removed from the Skilak WRA.

*Consequences of Improving and Constructing Parking Areas on Vegetation*
Assumptions:

- Action taken to construct four (4) of seven new parking areas would include removal of vegetation to facilitate construction in previously undeveloped areas. These projects are located at the East Entrance (Sterling/Skilak Intersection), Lower Jean Lake Day Use Area, Pack Lake Environmental Education Complex, Vegetation Management Interpretive Drive, and Visitor Contact Station (West Entrance-Sterling/Skilak Intersection).
- Action taken to construct two (2) of seven new parking areas would have negligible impact on vegetation because these parking areas would be constructed in existing right-of-ways that are generally devoid of vegetation. These projects are located at the Moose Habitat Enhancement Trailhead and Mox/Chatelain Lakes Trailhead.
- Action taken to construct a new parking area at the Lower Jean Lake Day Use Area has been analyzed as part of *Alternative B: Consequences of Constructing Day Use Areas on Vegetation*.
- Vehicle parking slots are 10' x 20' and RV/boat parking slots are 16' x 40' in size.
- The Pack Lake Environmental Education Complex would provide parking for the Nature Center and Boreal Forests Management and Research Institute, and would contain 26 vehicle and 15 RV/boat slots totaling 14,800-square feet in size.
- The Visitor Contact Station (West Entrance – Skilak/Sterling Intersection) parking area would contain 6 vehicle, 3 RV/boat, and 2 staff slots totaling 3,520-square feet in size.
- The East Entrance (Skilak/Sterling Intersection), Lower Jean Lake Day Use Area, Moose Habitat Enhancement Trailhead, Vegetation Management Interpretive Drive, and Mox/Chatelain Lake Trailhead parking areas would contain 4 vehicle and 2 RV/boat slots totaling 2,080-square feet each.

Analysis:
Constructing four (4) new parking areas consisting of forty-two (42) vehicle sites and twenty-two (22) RV/boat sites would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Improving and Constructing Parking Areas on Vegetation* except Alternative B would require approximately 22,480-square feet (0.5-acre) of vegetation removed from the Skilak WRA as opposed to 3,520-square feet (0.08-acre) proposed under Alternative A. Sixty-four (64) percent of all parking proposed under Alternative B would be located at the Pack Lake Environmental Education Complex. Vegetation communities affected by the action include mature closed mixed forest (14,800-square feet (0.33-acre)), mature closed needleleaf forest (3,520-square feet (0.08-acre)), intermediate age deciduous forest (2,080-square feet (0.04-acre), and intermediate aged closed mixed forest (2,080-square feet (0.04-acre).

*Rehabilitation Projects*
Engineer Lake Day Use Area
Rehabilitating an existing parking area would have negligible impacts on vegetation at the site-specific scale because the project area would not be expanded or reduced in size and vegetation would not be affected.

Conclusions:
Under Alternative B, the acreage of mature closed mixed forest would decline by 14,800-square feet (0.33-acre). In addition, 3,520-square feet of mature closed needleleaf, 2,080-square feet of intermediate age deciduous, and 2,080-square feet of intermediate age closed mixed forests would decline. At the site-specific scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within each of the four (4) project areas would be removed to facilitate development of parking areas. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. At the regional scale, the degree of decline would be negligible because less than 1% of each community type would be removed from the Skilak WRA.

*Consequences of Constructing and Improving Roads on Vegetation*
Assumptions:

- Action taken to redesign the East and West Entrance of the Skilak Loop Road to conform to state and Federal highway standards would include removal of vegetation to facilitate construction in a previously undeveloped area.
- The Interpretive Drive would be 20’ wide to facilitate two-way traffic.

Analysis:
Implementation of Alternative B would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Improving Roads on Vegetation* plus additional adverse, long-term impacts would be observed on open mixed forest of intermediate age due to removal of approximately 105,600-square feet (2.4-acres) of that community type to facilitate development of a self-guided interpretive drive. Impacts would be major at the local scale when compared to existing natural conditions because all of the existing vegetation would be removed and ecological services provided by that vegetation would no longer exist. At the regional scale, Alternative B would have negligible impacts because there are 9,417-acres of this community type in the Skilak WRA, and implementation of Alternative B would remove less than 1% of it.

Conclusions:
Under Alternative B, vegetation would decline as identified in Alternative A plus the acreage of open mixed forest would decline by 105,600-square feet (2.4-acres). At the site-specific and local scales, the degree of decline would be major compared to existing natural conditions because all of the vegetation within the project areas would be removed to facilitate development of two road projects. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. At the regional scale, Alternative B would have negligible impacts on vegetation because overall, there will be a limited amount of vegetation removed from the Skilak WRA.

*Consequences of Constructing Sanitary Facilities on Vegetation*
Assumptions:

- Double vault facilities (14' x 12') would be constructed at Pack Lake and the Visitor Contact Station (West Entrance).
- Single vault facilities (14' x 6') would be constructed at Lower Jean Lake Day Use Area.
- Action taken to construct sanitary facilities at Bottenintnin Lake and the Mox/Chatelain Lakes Trailhead would not remove vegetation because these locations are either currently developed (Bottenintnin Lake Group Day Use Area) or are generally devoid of vegetation (Sterling Highway right-of-way).

Analysis:
Construction of three (3) sanitary facilities would have adverse, long-term impacts on vegetation due to removal of approximately 252-square feet of closed mixed and 168-square feet of closed needleleaf forests to facilitate development. Impacts would be major at the site-specific scale when compared with existing natural conditions because all the existing vegetation at the project site would be removed and ecological services provided by that vegetation would no longer exist. At the local scale, impacts would be minor because the forest's ability to continue to provide ecological services would be supported by the surrounding forest community which is of the same type and age class. At the regional scale, impacts would be negligible because there are approximately 3,223-acres of mature closed mixed forest and 5,221-acres of mature closed needleleaf forests in the Skilak WRA, and implementation of Alternative B would remove less than 1% of either community type.

Conclusions:
Under Alternative B, the acreage of closed mixed and needleleaf forests would decline by 252-square feet and 168-square feet respectively or 420-square feet total. At the site-specific scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within each of the three (3) project areas would be removed to facilitate development of permanent sanitary facilities. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. At the regional scale, the degree of decline would be negligible because overall, less than 1% of each community type would be removed from the Skilak WRA.

*Consequences of Constructing Trails on Vegetation*
Assumptions:

- Action taken to construct trails would include removal of vegetation from previously undeveloped sites.
- Trail clearing width would equal 6-feet.

Analysis:
Implementation of Alternative B would construct 29.7-miles of trails (or 20.7-miles more than that proposed under Alternative A). Alternative B would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Constructing Trails on Vegetation* except vegetation would be removed from 940,896-square feet (21.6 acres) of trail as opposed to 285,120-square feet (6.5 acres) proposed under Alternative A.

Conclusion:
Under Alternative B, vegetation would decline on 940,896-square feet (21.6-acres) as a result of trail development. The amount of decline would be more than Alternative A where 285,120-square feet (6.5-acres) would be impacted. At the local scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within each trail corridor would be removed to facilitate trail construction. Conversely, at the regional scale, the degree of decline would be negligible because of the limited amount of wildlife habitat removed from the Skilak WRA overall as a result of this management action.

*Consequences of Conducting Vegetation Management Activities on Vegetation*
Implementation of Alternative B would have the same adverse, medium-term impacts as those described in *Alternative A: Consequences of Conducting Vegetation Management Activities on Vegetation* except impacts would be observed over 375-acres during the life of this plan if weather conditions, funding and personnel resources permit implementation of management action.

*Consequences of Constructing Viewing Facilities on Vegetation*
Assumptions:

- Action taken to construct two (2) viewing platforms (one each at Marsh and Upper Ohmer lakes) and two (2) photo blinds (one each at Egumen and Rock lakes) would include removal of vegetation to facilitate construction at previously undeveloped sites.
- Action taken to construct viewing platforms at Engineer, Kelly and Peterson lakes, and a viewing tower along the Vegetation Management Interpretive Drive would have negligible impact on vegetation because facilities would be constructed at developed sites that are generally devoid of vegetation.
- The viewing platforms would be no larger than 12’x12’ in size; photo blinds would be approximately 4’x 4’ in size.

Analysis:
Constructing two (2) viewing platforms and two (2) photo blinds at undeveloped sites would have adverse, long-term impacts on open, closed, and woodland needleleaf forests and closed mixed forests of mature age due to removal of approximately 320-square feet from four (4)

project areas. Impacts would be major at the site-specific scale when compared with existing natural conditions because all of the existing vegetation at the project sites would be removed and ecological services provided by that vegetation would no longer exist. At the local scale, impacts would be minor because the forest's ability to continue to provide ecological services would be supported by the surrounding forest community which is of the same type and age class. There are approximately 1,098-acres of open needleleaf forest, 5,221-acres of closed needleleaf forest, and 1,007-acres of woodland needleleaf forest of mature age; and 3,223-acres of closed mixed forest of mature age in the Skilak WRA. At the regional scale, impacts would be negligible because implementation of Alternative B would remove less than 1% from each of the various communities.

Conclusions:
Under Alternative B, the acreage of open, closed, and woodland needleleaf forest communities would decline by 304-square feet, and closed mixed forest would decline by 16-square feet. At the site-specific scale, the degree of decline would be major compared to existing natural conditions because all of the vegetation within four (4) project areas would be removed to facilitate development of permanent viewing facilities. At the local scale, the degree of decline would be minor because the surrounding forest community, which is the same age and community type as that impacted by the management action, would continue to provide ecological services. At the regional scale, the degree of decline would be negligible because overall, less than 1% of each community type would be removed from the Skilak WRA.

*Consequences of Constructing a Visitor Contact Station on Vegetation*
Implementation of Alternative B would have the same adverse, long-term impacts as those described in *Alternative A: Consequences of Constructing a Visitor Contact Station on Vegetation* because Alternative B does not propose a change in current management.

*Consequences of Constructing Wayside Pullouts on Vegetation*
Rehabilitating an existing wayside pullouts along the Skilak Loop Road would have negligible impacts on vegetation at the site-specific and regional scale because the project areas will not be reduced or expand in size and wildlife habitat would not be affected.

**Wildlife**
Key Indicators
- Abundance of wildlife

*Consequences of Constructing Public Use Facilities on Wildlife*
Assumptions:
- Human activity causes disturbance to wildlife at varying degrees depending on the type of activity, intensity of the activity, timing of the activity, number of activities occurring simultaneously, and wildlife species impacted.

- Disturbance-related impacts include direct mortality (immediate, on-site death), indirect mortality (eventual, premature death), lowered productivity (reduced fecundity or survival rate), reduced habitat use, and stress.
- Public use facilities considered include campgrounds, campsites, day use areas, environmental education complex, trails, viewing facilities (platforms, blinds) not associated with the road corridor, and the visitor contact station.
- Public use facilities not considered because they are associated with the road corridor or other public use facilities include boat launches, parking areas, sanitary facilities, signs (interpretive panels, kiosks, etc), and waysides.

Analysis:
Implementation of Alternative B would have similar impacts as those described in *Alternative A: Consequences of Constructing Public Use Facilities on Wildlife* except impacts would be associated with construction and public use of eleven (11) facilities and seven (7) trails (including one disabled accessible interpretive trail). The impacts associated with construction activities, habitat loss, and public use are analyzed below:

*Construction Impacts*
Constructing eleven (11) public use facilities and seven (7) trails would have similar adverse, short-term impacts as described in *Alternative A: Consequences of Constructing Public Use Facilities on Wildlife* except impacts would be observed more often (due to a greater number of projects) and, in some cases, over a longer period of time due to length of some construction projects (e.g., environmental education complex).

*Habitat Loss Impacts*
Loss of approximately 23.3-acres of habitat, or 16.2-acres more than that lost under Alternative A, would have similar adverse, long-term impacts as described under *Alternative A: Consequences of Constructing Public Use Facilities on Wildlife* except Alternative B would result in more habitat loss and linear features on the landscape than that proposed under Alternative A. Trail development would account for 96% of all habitat loss (22.3-acres) resulting from the management action. Alternative B would impact 16.7-acres of habitat more than Alternative A which would have beneficial and adverse impacts on various wildlife species.

**Table 4.2 Acreage of Habitat Lost as a Result of Facilities Development**

| Facility | Habitat Type Affected | Acreage Loss |
|---|---|---|
| Campsites | Mature Needleleaf<br>Mature Mixed Forest<br>Intermediate Needleleaf<br>Early Mixed | .05<br>.05<br>.01<br>.01 |
| Campground | Mature Needleleaf | .20 |
| Environmental Education Complex | Mature Mixed Forest | .61 |
| Interpretive Trail | Mature Mixed Forest | .73 |
| Trails | All | 21.6 |
| Viewing Facilities:<br>Blinds<br>Platforms | <br>Mature Mixed<br>Mature Needleleaf<br>Mature Mixed | <br>.001<br>.01<br>.01 |
| Visitor Contact Station | Mature Needleleaf | .01 |

*Public Use Impacts*
Public use would have similar adverse, long-term impacts as described under *Alternative A: Consequences of Constructing Public Use Facilities on Wildlife* except impacts would be observed at more locales under Alternative B than Alternative A due to a greater number of public use facilities provided. Alternative B proposes seven (7) public use facilities and 21.7-miles of trail more than that proposed under Alternative A.

Conclusions:
Under Alternative B, wildlife abundance would decline where public use facilities are constructed. Although the degree of decline cannot be quantified, the overall impact of facilities development on wildlife at the site-specific and local scale is expected to be moderate when compared to existing natural conditions due to noise disturbance, habitat loss, and increased public use. Conversely, at the regional scale, Alternative A would have negligible impacts on wildlife abundance.

*Consequences of Constructing and Improving Roads on Wildlife*
Assumptions:

- Action taken to hard-surface roads within the Skilak WRA would facilitate increases in traffic speed upon completion of the project, and traffic volume over time.
- Action taken to construct an Interpretive Drive would facilitate vehicular use of an abandoned roadbed.

Analysis:
Implementation of Alternative B would have similar adverse, long-term impacts as those described under *Alternative A: Consequences of Improving Roads on Wildlife* except construction of appropriate wildlife crossings (e.g., tunnels, bridges, and structures designed to direct and slow wildlife crossings at specific locations) would reduce wildlife-vehicle collisions along the Skilak Loop Road. Additional adverse, long-term impacts would be observed as a result of constructing a 1-mile long Interpretive Drive along an abandoned roadbed located at MP 2.0 of the Skilak Loop Road. Impacts would be minor at the local scale when compared to existing conditions because the graveled condition of the new road corridor would limit vehicular use and control traffic speeds similar to current conditions on the Skilak Loop Road. Wildlife-vehicular collisions would be expected though limited, and resulting impacts to wildlife abundance would be less than those expected along the hard-surfaced Skilak Loop Road as proposed under this alternative.

Conclusions:
Under Alternative B, wildlife abundance would decline as a result of Skilak Loop Road improvements and construction of an additional gravel road. Although the degree of decline can not be quantified, the overall impact of road improvements at the local scale is expected to be moderate when compared to existing conditions due to increases in traffic volume and speed resulting in road avoidance in some species and increases in wildlife-vehicle collisions in others. Conversely, at the regional scale, Alternative B would have minor impacts on the abundance of some wildlife because wildlife-vehicle collisions would be expected to occur throughout both road corridors with more occurring along the hard-surfaced Skilak Loop Road.

*Consequences of Conducting Vegetation Management Activities on Wildlife*
Assumptions:

- Fire use would be the preferred management prescription over mechanical treatment due to the costs associated with mechanical treatment.
- Prescribed fire would be the preferred fire method over wildland fires use.
- The management action would affect no more then 100-acres a year.
- Implementation of the management action would be determined by a number of factors including weather conditions, and funding and personnel availability.

Analysis:
Implementation of Alternative B would have similar beneficial and adverse, medium to long-term impacts as those described under *Alternative A: Consequences of Conducting Vegetation Management Activities on Wildlife* except habitat impacts would be limited to 375-acres over the life of this plan if weather conditions, funding and personnel resources permitted implementation of management action.

Conclusions:
Under Alternative B, wildlife abundance would change within the project area. Although the degree of change cannot be quantified, the overall impact is expected to range from minor to major when compared to existing conditions depending on the species affected. At the local scale, herbivores and predators will generally benefit from the management action due to increased forage production, although some species of birds will be adversely impacted due to loss of habitat. At the regional scale, Alternative B would have negligible impacts on wildlife abundance.

*Consequences of Implementing Wildlife Management Strategies on Wildlife*
Implementing Alternative B would have similar negligible impacts as those described under *Alternative A: Consequences of Implementing Wildlife Management Strategies on Wildlife* because Alternative B does not propose a change in current management.

### 4.4.3 Human Environment

**Public Use Access**

Key Indicators:

- Number and condition of boat launches
- Number and condition of parking sites
- Miles of constructed trail
- Miles and condition of roads
- Number of accessible months per year

*Consequences of Rehabilitating and Constructing Boat Launches on Public Use Access*
Assumptions:

- Without boat launches, it would be prohibitively difficult to access portions of the Skilak WRA.
- The existing boat launch at Lower Jean Lake Campground is functional and provides access in its current state, but use is limited because the campground does not provide any day use parking and only three vehicle campsites are provided.
- There is demand for access to Lower Jean Lake, particularly during high use periods.
- Existing boat launches at Bottenintnin and Engineer Lakes are functional and provide access in their current condition. Actions undertaken to rehabilitate existing boat launches would be limited to grading and adding gravel.

Analysis:
Implementation of Alternative B would consist of three projects: one associated with construction of a new boat launch, and two associated with rehabilitation of existing boat launches.

*New Construction Project*
Constructing a new gravel boat launch at the Lower Jean Lake Day Use Area would have beneficial, long-term impacts on public use access. Impacts would be moderate at the site-specific scale because the day use area would provide more parking than currently available at the Lower Jean Lake Campground and more people would be able to access the lake.

*Rehabilitation Projects*
Rehabilitating two (2) existing boat launches at Bottenintnin and Engineer lakes would have negligible impact on public use access as long as the work is performed at a time when the launches would not otherwise be used (e.g. in the late spring when most snow has melted but the lakes are still frozen over). Existing boat launches are functional and provide access in their current condition.

Conclusion:
Under Alternative B, public use access would improve by constructing a new boat launch and upgrading the condition of two existing boat launches. At the site-specific scale, the degree of improvement would be moderate when compared to existing conditions because more people would be able to access Lower Jean Lake. At the regional scale, the degree of improvement would be minor because there would be no net increase in the actual number of boat launches provided just the ability to access an existing one.

*Consequences of Improving and Constructing Parking Areas on Public Use Access*
Assumptions:

- The condition and capacity of existing parking areas is not currently a limiting factor for public use access.
- Six new parking sites would be constructed at each of the following locations: East Entrance (Sterling/Skilak Intersection), Lower Jean Lake Day Use Area, Moose Habitat Enhancement Trailhead, Mox/Chatelain Lakes Trailhead, and Vegetation Management Interpretive Drive.

- The Pack Lake Environmental Education Complex parking area would provide parking for both the Nature Center and Boreal Forests Management and Research Institute and would have a combined 41 parking sites.
- The Visitor Contact Station (West Entrance) would have nine public parking sites.
- Actions taken to rehabilitate the parking area at Engineer Lake would not expand or reduce the size of the parking area.

Analysis:
Implementation of Alternative B would consist of eight projects: seven associated with construction of new parking areas, and one associated with rehabilitation of an existing parking area.

*New Construction Projects*
Constructing seven (7) new parking areas would have beneficial, long-term impacts on public use access due to an increase in the number of parking areas and overall number of parking spaces provided. Impacts would be major at the site-specific scale when compared to existing conditions because proposed parking areas would provide eighty (80) parking spaces at six (6) locations where none currently are provided. Alternative B would provide fifty-nine (59) more parking spaces than Alternative A at three (3) additional locations. More than half of the parking site provided would be located at the Pack Lake Environmental Education Complex.

*Rehabilitation Project*
Rehabilitating an existing parking area at Engineer Lake would have adverse, short-term impacts on public use access. Impacts would be minor at the site-specific scale due to closures occurring while work is being performed. Over the long-term, minor beneficial impacts would occur from improvements that facilitate maintenance and use of the affected parking sites.

Conclusions:
Under Alternative B, public use access would improve by upgrading the condition of one existing parking area and substantially increasing the total number of public parking spaces within the Skilak WRA. At the site-specific scale, the degree of improvement would be major when compared to existing conditions because proposed projects would facilitate access to new portions of the Skilak WRA. At the regional scale, the degree of improvement would be major because Alternative B would increase the total number of parking spaces within the Skilak WRA by nearly 40% (i.e., from 212 to 292 parking spaces).

*Consequences of Constructing and Improving Roads on Public Use Access*
Implementing Alternative B would have similar beneficial, long-term impacts as those described under *Alternative A: Consequences of Improving Roads on Public Use Access* except impacts would be observed over 24-miles of road due to construction of a 1-mile long Vegetation Management Interpretive Drive.

*Consequences of Constructing Trails on Public Use Access*
Assumptions:
- Travel off-trail within much of the Skilak WRA is extremely difficult due to terrain and vegetation characteristics; most visitors rely on existing trails for foot access.

- Skilak WRA trails are in high demand because there are relatively few designated trails in Alaska, particularly in boreal forest settings.
- New trails will be constructed according to accepted standards for tread width and gradient, and seasonally maintained so that they remain passable for target users.
- New trails will create several connecting loops, making it possible to traverse substantial portions of the Skilak WRA on multi-day hiking routes.

Analysis:
Constructing twenty (20) trail segments to complete designation of six (6) distinct trails totaling approximately 40-miles in length would have beneficial, long-term impacts on public use access. Impacts would be major at the local scale compared to existing conditions because proposed trail segments would provide an additional 20.7-miles of trail to six (6) locations which are currently difficult to access. These areas include 1) Blizzard Lake and the north shore of Skilak Lake, 2) Bottenintnin Lake, 3) the interior sector of the Skilak WRA including Marsh and Pack lakes, 4) Mox and Chatelain lakes, 5) the mountainous area between Vista, Skilak Lookout, and Hidden Creek trails, and 6) the mountainous area between the Burney's and Hideout Mountain trails. At the regional scale, impacts would be major compared to existing conditions because an additional eleven (11) trail-related access points (i.e., trailheads) would be provided which would increase the total number from 12 to 23. Alternative B provides 11.5-miles of more trail and six (6) additional trail-related access points than Alternative A.

Conclusions:
Under Alternative B, public use access would be improved by increasing the number of trail-related access points and miles of trail provided. At the local scale, the degree of improvement would be major when compared to existing conditions because trails would provide access to locations currently difficult to access. At the regional scale, the degree of improvement would be major because overall trail mileage would increase from 19.5 to 40-miles in length and the number of trail-related access points would increase from 12 to 23.

**Recreation Opportunities**

Key Indicators:
- Number and type of interpretation/education facilities
- Number and type of campsites
- Number of day-use sites
- Number and type of wildlife viewing facilities
- Types of different wildlife-dependent recreation activities available

*Consequences of Constructing Bulletin Boards/Kiosks and Interpretive Facilities on Recreation Opportunities*

Assumptions:
- Bulletin boards/kiosks are currently located at all nine Skilak WRA campgrounds, 10 trailheads, and the West Entrance. Alternative B would construct bulletin boards/kiosks at six locations.

- The Moose Habitat Enhancement Trailhead is the same as the Crushed Area Trailhead described under Alternative A.
- Bulletin boards/kiosks may contain some interpretive information, but their primary purpose is to provide general Refuge and site/facility-specific information (e.g., information about opportunities at the site).
- Interpretive panels are currently located at nine different sites within the Skilak WRA. Alternative A would construct panels at ten locations.
- A self-guided Vegetation Management Interpretive Loop Drive would be constructed.
- A disability-accessible Interpretive Trail would be constructed.

Analysis:
Implementation of Alternative B would consist of constructing bulletin boards/kiosks, interpretive panels, an interpretive drive, and an interpretive trail. The impact associated with new construction of these facilities is analyzed below:

*Bulletin Boards/Kiosks*
Constructing bulletin boards at six (6) locations would have similar beneficial, long-term impacts on information-based recreation opportunities as those described under *Alternative A: Consequences of Constructing Bulletin Boards/Kiosks and Interpretive Panels on Recreation Opportunities* except impacts would be observed at four of the five locations identified under Alternative A plus at the Burney's Trailhead and East Entrance (Skilak Loop Road / Sterling Highway Intersection) Parking Area. At the site-specific scale, impacts would be major when compared to existing conditions because no information is currently provided at proposed sites. At the regional scale, impacts would be minor because the addition of six new bulletin boards would increase the total number throughout the Skilak WRA from 20 to 26 (or one more than the total proposed under Alternative A).

*Interpretive Panels*
Constructing interpretive panels at ten (10) locations would have similar beneficial, long-term impacts on education-based recreation opportunities as those described under *Alternative A: Consequences of Constructing Bulletin Boards/Kiosks and Interpretive Panels on Recreation Opportunities* except impacts would be observed at ten (10) locations as opposed to six (6) locations proposed under Alternative A. At the site-specific scale, impacts would be major when compared to existing conditions because no information is provided at proposed sites. At the regional scale, impacts would be major because the addition of ten interpretive sites would more than double the number of sites throughout the Skilak WRA from 9 to 19.

*Interpretive Loop Drive*
Constructing a 1-mile long interpretive loop drive would have beneficial, long-term impacts on education-based recreation opportunities. Impacts would be major at the local and regional scale because a self-guided drive would create an extended interpretive opportunity that would not be available under Alternative A, and add substantially to the overall range of interpretive opportunities within the Skilak WRA.

***Interpretive Trail***
Constructing a 1-mile long disability accessible interpretive trail would have beneficial, long-term impacts on education-based recreation opportunities. Impacts would be major at the local

and regional scale, particularly for disabled visitors, because the trail would provide a rare recreation opportunity to travel an accessible trail and simultaneously enjoy some natural history interpretation. The trail would also create an extended interpretive opportunity that would not be available under Alternative A and add substantially to the overall range of interpretive opportunities within the Skilak WRA.

Conclusions:
Under Alternative B, education-based recreation opportunities would improve with development of additional bulletin boards/kiosk and interpretive panels, as well as construction of an interpretive loop drive and disability accessible interpretive trail. At the site-specific scale, the degree of improvement would be major when compared to existing conditions because sixteen (16) new sites within the Skilak WRA would have facilities provided where there are currently none. At the regional scale, the degree of improvement would be major because bulletin boards and interpretive sites throughout the Skilak WRA would increase by 30% and 100% respectively and two new types of interpretive facilities (i.e., an interpretive drive and an interpretive trail) would increase the scope and range of opportunities throughout the Skilak WRA.

*Consequences of Constructing, Rehabilitating, and Restoring Campgrounds, Campsites, and Day-Use Areas on Recreation Opportunities*
Assumptions:

- Construction and rehabilitation work at Engineer Lake Campground, Kelly Lake Campground, and Peterson Lake Campground would result in a net increase of eight (8) new vehicle campsites at those locations. The current condition of sites at these locations is a deterrent to visitors who might otherwise use them.
- The current location of the Engineer Lake Campground would be converted to a day use area when the campground is relocated to the bluff above the lake.
- The current condition of the Bottenintnin Lake Group Day Use Area is a deterrent to visitors who might otherwise use that site.
- There is unmet demand for walk-in (tent) camping sites along the Sterling Highway that would be met by two proposed sites at Kelly Lake Campground and one at Peterson Lake Campground.

Analysis:
Implementation of Alternative B would construct and rehabilitate campgrounds, walk-in campsites, and day use areas. The impacts of constructing and rehabilitating these facilities are analyzed below:

*Campgrounds*
Constructing a new campground at Engineer Lake, rehabilitating and enlarging the campground at Kelly Lake, and rehabilitating the Peterson Lake Campground would have beneficial, long-term impacts on camping and related recreation opportunities. Impacts would be moderate at the local scale when compared to existing conditions because the Engineer Lake Campground would double in size from three (3) to six (6) vehicle campsites; the Kelly Lake Campground would increase from three (3) to eight (8) vehicle campsites (plus two (2) walk-in campsites would be constructed); and the Peterson Lake Campground would be rehabilitated to designate assigned parking for the existing four (4) vehicle campsites (plus one (1) walk-in campsite would be

constructed). Although converting the Lower Jean Lake Campground to a day use area would result in a loss of three (3) vehicle campsites, Alternative B would result in a net increase of five (5) vehicle campsites overall bringing the total number of vehicle campsites from 93 to 98 (or twelve sites less than Alternative A). At the regional scale, impacts would be minor when compared to existing conditions.

*Campsites*
Constructing two (2) new walk-in campsites at Kelly Lake Campground, one (1) new walk-in campsite at Peterson Lake Campground, and up to two (2) walk-in campsites along each of the two long distance trails (i.e., Skilak Lake, Seven Lakes) would have beneficial, long-term impacts on recreation opportunities. Impacts would be major at the site-specific scale when compared to existing conditions because such facilities are not currently provided at those locations. At the regional scale, impacts would be moderate because although the number of walk-in campsites associated with campgrounds would double from two to four, the overall number of walk-in sites would increase by seven (four of which would be in the backcountry) bringing the total number from 14 to 21.

*Day Use Areas*
Constructing two (2) day use areas at Engineer Lake and Lower Jean Lake, and rehabilitating the Bottenintnin Lake Day Use Area would have beneficial, long-term impacts on recreation opportunities. Impacts would be major at the site-specific scale when compared to existing conditions because facilities would be provided at two locations where there currently are none and rehabilitation work would provide new amenities at Bottenintnin Lake (e.g., pavilion, restrooms, etc). At the regional scale, impacts would be moderate because the number of day use areas would increase from 3 to 5. Alternative B provides one more day use area then Alternative A.

Conclusions:
Under Alternative B, recreation opportunities would improve as a result of providing additional campgrounds, campsites and day use areas. At the local scale, the degree of improvement would be major when compared to existing conditions because seven (7) new walk-in campsites and two (2) new day use areas would be provided at locations where there currently are none. At the regional scale, the degree of improvement would be moderate because vehicle campsites would increase from 93 to 98, walk-in campsites would increase from 14 to 21, and day use areas would increase from 3 to 5.

*Consequences of Constructing an Environmental Education Complex on Recreation Opportunities*
Assumptions:

- The Nature Center portion of the EE complex would be identical to the nature center proposed in Alternative A except that it would be located at Pack Lake rather than at the East Entrance.
- The Boreal Forestlands Research and Management Training Facility would be open to public visitation and special public events. However, the facility would primarily be intended for use by working resource professionals.

Analysis:
Constructing an Environmental Education Complex at Pack Lake would have similar beneficial, long-term impacts on recreation opportunities as those described under *Alternative A: Consequences of Constructing a Nature Center on Recreation Opportunities*.

Conclusions:
Under Alternative B, recreation opportunities would improve through development of an environmental education complex which would include a nature center and research facility. At the local and regional scale, the degree of improvement would be major because the Refuge's interpretation and education program would be enhanced beyond that currently provided at the visitor contact station and it would extend across and beyond Refuge boundaries.

*Consequences of Expanding Education and Outreach Programs on Recreation Opportunities*
Assumptions:

- Demand for environmental education ranger programs is greater than what is currently offered and will likely continue to increase over time.
- Environmental education and outreach programs fulfill one of the Refuge's founding purposes as described in legislation.
- Ranger programs and outreach programs increase awareness of recreation opportunities and an appreciation for the Refuge setting, mission, and management actions.
- The relative impact of an in-person ranger program is greater than an interpretive panel or other static display.
- The relative impact of outreach materials (brochures, etc.) may be greater than or similar to an interpretive panel or other static display, depending on the media format and delivery mechanism.

Analysis:
Increasing the type, number, and duration of ranger programs and outreach materials would have beneficial, long-term impacts on recreation opportunities. Impacts would be major at the regional scale when compared to existing conditions because given public participation in ranger programs has grown quickly in recent years (i.e., from 1,863 in 2003 to 2,630 in 2005) it is likely that a 20% increase in such programs would likely result in an immediate increase in participation by nearly that amount. The impact of outreach materials is harder to estimate because it is highly dependent on the specific message, format, and target audience. Nevertheless, over the long-term an expanded outreach campaign would likely have at least moderate beneficial impacts on awareness and appreciation for recreation opportunities within the Skilak WRA.

Conclusions:
Under Alternative B, education-based recreation opportunities would improve through the development of additional ranger programs and outreach programs. At the regional scale, the degree of improvement would be major compared to existing conditions because the alternative proposes a 20% increase in programs that would run throughout the year and an increase in the type of outreach materials produced.

*Consequences of Constructing Trails on Recreation Opportunities*
Assumptions:

- Travel off-trail within much of the Skilak WRA is extremely difficult due to terrain and vegetation characteristics; most visitors rely on existing trails for foot access.
- Skilak WRA trails are in high demand because there are relatively few designated trails in Alaska, particularly in boreal forest settings.
- New trails will be constructed according to accepted standards for tread width and gradient, and seasonally maintained so that they remain passable for target users.
- New trail segments will create several connecting loops, making it possible to traverse substantial portions of the Skilak WRA on multi-day hiking routes.

Analysis:
Constructing twenty (20) new trail segments that would result in the formation of 40-miles of trail in the Skilak WRA would have beneficial, long-term impacts on recreation opportunities. Impacts would be major at the regional scale when compared to existing conditions because the trail network would link existing trails segments that are currently isolated from one another. The network would also provide access to portions of the Skilak WRA that currently have no foot access (e.g. the northwest shore of Skilak Lake and the interior region between Engineer and Marsh Lakes). It would consist of two (2) long distance trails (over 10-miles long each), four (4) family loop trails (under 1.5-miles long each), a loop trail associated with a day use area, two (2) high elevation trails, access to "backcountry" lakes, and numerous points of entry/exit. The combined effect of the new trails would be to create a functional trail *system* that provides access to additional destinations and allows for a variety of recreation activities that would not otherwise be available including multi-day, loop hiking with associated opportunities for extended wildlife observation and photography.

Conclusions:
Under Alternative B, recreation opportunities would improve due to development of a new trail system. At the regional scale, the degree of improvement would be major due to development of a 40-mile trail system. The trail system would not only provide access to areas of the Skilak WRA that are currently difficult to visit, but it would provide for a variety of day and multi-day backpacking trips that afford visitors increased opportunities to access a variety of locations which would facilitate wildlife viewing and photography opportunities.

*Consequences of Constructing a Visitor Contact Station on Recreation Opportunities*
Implementing Alternative B would have the same beneficial, long-term impacts on recreation opportunities as those described under *Alternative A: Consequences of Constructing a Visitor Contact Station on Recreation Opportunities* because Alternative B does not propose a change from current management.

*Consequences of Implementing Wildlife Management Strategies on Recreation Opportunities*
Assumptions:

- The primary goal of identified wildlife management strategies is to provide for wildlife viewing opportunities; the secondary goal is to provide for interpretation opportunities of

those species, and the tertiary goal is to provide for a limited harvest of moose and small game without impacting the primary or secondary goals.

- The administrative boundary of the Skilak WRA would be extended to the eastern Refuge boundary to include 497-acres of land between the Upper Kenai River and the Sterling Highway. It would also be extended to the western Refuge boundary to include 8,243-acres of land beginning 100 yards from the north shore of Skilak Lake and the Lower Kenai River from the Lower Skilak Campground and Skilak Loop Road west along the Sterling Highway. As a result, the administrative boundary of the Skilak WRA would include 52,750-acres of land.
- In the eastern expansion (i.e., 497-acres), status quo management of firearm use would be maintained.
- In the western expansion (i.e., 8,243-acres) and on lands currently designated within the boundaries of the Skilak WRA, firearm use would be allowed by permit only from September 15 through September 30 when moose population and/or sex ratio objectives are achieved. When permits are issued, firearm use would be prohibited on 5,620-acres (or 10.7% of the total area) near roads and other facilities to ensure public safety.
- In the western expansion (i.e., 8,243-acres) and on lands currently designated within the boundaries of the Skilak WRA, a small-game archery hunt would be allowed by general entry from October 1 through March 1.
- In the western expansion (i.e., 8,243-acres) and on lands currently designated within the boundaries of the Skilak WRA, status quo management of trapping would be maintained.
- To facilitate duck hunting opportunities, firearm use would be allowed by general entry on 545-acres between the north shore of Skilak Lake and the Lower Kenai River from the Lower Skilak Lake Campground to the western Refuge boundary.

Analysis:
Implementation of Alternative B would maintain existing wildlife management strategies, though management would be applied to an additional 8,243-acres within expanded boundaries of the Skilak WRA (i.e., the western expansion area). Therefore, the consequences of implementing current wildlife management strategies are solely related to their application on additional acres included within the expanded administrative boundary. The impacts of implementing existing wildlife management strategies on additional acres and the effects of those actions on wildlife viewing, hunting, and trapping opportunities are analyzed below:

*Wildlife Viewing*
Implementing current wildlife management strategies within the expanded boundary of the Skilak WRA would have beneficial, long-term impacts on wildlife viewing opportunities. Impacts would be minor at the regional scale when compared to existing conditions because – although an additional 8,243-acres in the western sector of the Skilak WRA which are currently open to firearm hunting would be closed to such except by permit – the area receives limited use by non-consumptive users because public use facilities are limited. Non-hunting wildlife viewers that might otherwise be displaced from these areas during firearm hunting season(s) would be able to visit; and the likelihood of hunting-related impacts on the presence and behavior of wildlife would be greatly reduced.

Impacts would be negligible within the eastern expansion because these lands are currently closed to hunting by refuge regulation and would remain so under Alternative B.

*Archery Hunting*
Implementing current wildlife management strategies within the expanded boundary of the Skilak WRA would have beneficial, long-term impacts on archery hunting opportunities. Impacts would be moderate at the regional scale when compared to existing conditions because an additional 8,243-acres in the western sector of the Skilak WRA – acreage that is currently open to firearm hunting - would be closed to such (except by permit during a two week period in September when moose population and/or sex ratio objectives are achieved). As a result, archery hunting opportunities would increase due to reduced competition for small game from firearm hunters.

Impacts would be negligible within the eastern expansion because these lands are currently closed to hunting by refuge regulation and would remain so under Alternative B.

*Firearm Hunting*
Implementing current wildlife management strategies within the expanded boundary of the Skilak WRA would have adverse, long-term impacts on firearm hunting opportunities. Impacts would be major at the regional scale when compared to existing conditions because the expansion would close an additional 8,243-acres in the western sector of the Skilak WRA to all firearm hunting except for a permitted moose hunt when moose population and sex/ratio objectives are achieved. When a permitted hunt is allowed, it would only be for a two week period in September and firearm use would be closed within ¼-mile of existing and proposed facilities.

Impacts would be negligible within the eastern expansion because these lands are currently closed to hunting by refuge regulation and would remain so under Alternative B.

*Trapping*
Implementing current wildlife management strategies within the expanded boundary of the Skilak WRA would have adverse, long-term impacts on trapping opportunities. Impacts would be major at the regional scale when compared to existing conditions because the expansion would close an additional 8,243-acres in the western sector of the Skilak WRA to such opportunities.

Conclusions:
Under Alternative B, recreation opportunities would change on 8,243-acres within the western sector of the Skilak WRA as a result of changes made to its administrative boundaries. Although the degree of change cannot be quantified, the overall impacts on wildlife viewing, hunting, and trapping is expected to be moderate at the regional scale when compared to existing conditions because wildlife viewing and archery hunting opportunities would improve and firearm hunting and trapping opportunities would decline as a result of expanding the area's administrative boundaries.

*Consequences of Constructing Wildlife Viewing Facilities on Recreation Opportunities*
Assumptions:

- Access to the Marsh Lake platform would be provided by the proposed Seven Lakes Long Distance Loop Trail.

- Viewing facilities with associated developments (e.g. interpretive panels) provide a "developed viewing opportunity" that is qualitatively different from "undeveloped viewing opportunities" currently available throughout the Skilak WRA.
- Viewing towers and spotting scopes allow for wildlife viewing that would not be possible from the ground and/or with the unassisted ("naked") eye.
- Photography blinds at Egumen Lake and Upper Ohmer Lake would facilitate taking pictures of wildlife that might otherwise be easily disturbed by the presence of photographers.

Analysis:
Constructing five (5) viewing platforms, two (2) photo blinds, one (1) viewing tower, and four (4) spotting scopes would have beneficial, long-term impacts on developed recreation opportunities. Impacts would be major at the site-specific scale when compared to existing conditions because such facilities are not currently provided at proposed sites and a new type of viewing opportunity would be provided at those sites. Conversely, the proposed action would have adverse, long-term impacts on undeveloped viewing opportunities. Impacts would be minor at the regional scale because such opportunities are virtually unlimited in the Skilak WRA presently (e.g., along trails, road corridors, lakes and shorelines, etc). At the regional scale, the net effect of viewing facilities proposed under Alternative B would be beneficial because they would enhance the overall opportunity to see and photograph wildlife, and would also provide a variety of new developed viewing opportunities that are not currently available in the Skilak WRA.

Conclusions:
Under Alternative B, recreation opportunities would improve through development of an assortment of viewing facilities including platforms, photo blinds, viewing towers and spotting scopes. At the site-specific scale, the degree of improvement would be major because presently there are no such facilities available for public use at identified locations. At the regional scale, the degree of improvement would be major because a variety of new developed viewing opportunities would be provided that are currently not available anywhere within the Skilak WRA.

### 4.4.4 Cumulative Impacts

Physical Environment

Under Alternative B, air quality would decline beyond current levels due to increases in PM 2.5 and PM 10 resulting from construction work and vehicular use of the Skilak Loop Road and Vegetation Management Interpretive Drive. Additional declines would result from vegetation management activities conducted during burning season (when environmental conditions permit). Soil resources would be adversely impacted beyond current levels with compaction and/or erosion occurring at an additional forty-two (42) locations (including 20 trail segments) totaling some 798,666-square feet (18.4-acres). Constructing and/or hard-surfacing 24-miles of road and implementing vegetation management activities would have additional adverse impacts on soil resources at the site-specific and local scales. At the regional scale, the combination of impacts resulting from past management actions and those proposed under Alternative B would have negligible impacts on the physical environment.

Biological Environment

The composition and structural diversity of vegetation changed in the Skilak WRA as a result of natural (i.e., wildland fire) and human-related (i.e., mechanical crushing and prescribed fire) disturbance. These events and management actions were used specifically to enhance moose habitat, but the result netted beneficial and adverse impacts on other species as well. Expansion of the Hidden Lake and Upper Skilak Lake campgrounds reduced the acreage of wildlife habitat in the Skilak WRA, and habitat fragmentation resulted from development of the Burney's, Hideout Mountain, and Vista trails. Though these actions had major impacts on wildlife habitat at the local scale, their impacts were negligible at the regional scale.

Under Alternative B, vegetation management activities would enhance moose habitat, but other species would benefit or be adversely impacted by the action as well. Development of twenty-five (25) public use facilities totaling some 178,610-square feet (4.1-acres) would further fragment and reduce the overall acreage of wildlife habitat beyond current levels. The majority of the development would continue to occur along existing road corridors, though some development would occur in previously undeveloped sites (e.g., the Pack Lake Environmental Education Complex, Vegetation Management Interpretive Drive, etc). Constructing twenty (20) new trail segments and a new 1-mile road, in addition to the existing Skilak Loop Road, would bring the total number of linear features on the landscape to fourteen (14) which would impact 1,046,496-square feet (24.0-acres) of habitat. Hard-surfacing 23-miles of existing road would have adverse impacts including an increase in wildlife-vehicle collisions. These impacts would be in addition to those currently observed along the Skilak Loop Road and Sterling Highway. At the regional scale, the combination of impacts resulting from past management actions and those proposed under Alternative B would have minor adverse impacts on the biological environment.

Human Environment

Recreation access was enhanced when access roads leading to major campgrounds were hard-surfaced, three (3) trails were developed, and boat launches were rehabilitated as a result of implementing the Public Use Facilities Plan. Related recreation opportunities were enhanced through development of those and additional facilities. Initiation of environmental education programs and the development of interpretive signs, bulletin boards, and kiosks fulfilled interpretive and environmental education management goals for the area, and wildlife viewing opportunities were enhanced through implementation of wildlife management strategies identified in the Species Management Plan. Although firearm hunting was restricted, wildlife viewing opportunities were enhanced and the area provided a special opportunity for archery hunters seeking small game. These actions had major beneficial impacts on recreation access and opportunities at the site-specific, local, and regional scales.

Under Alternative B, recreation access would be enhanced beyond current levels through road developments and associated improvements, the development of a trail system, and construction of parking areas and a boat launch. Recreation and environmental education/interpretation opportunities would be enhanced beyond current levels through education programs and the development of new public use facilities at twenty-five (25) sites. Public use facilities would include an additional campground, day use areas, "walk-in" campsites, environmental education complex, visitor contact station, sanitary facilities, and bulletin boards/kiosks and interpretive panels. A variety of outreach materials would be created and the Refuge's "ranger programs" would increase in number and duration throughout the year. Expanding the administrative

boundaries to include an additional 8,750-acres would further wildlife viewing and archery hunting opportunities, but firearm hunting opportunities would be reduced. At the regional scale, the combination of impacts resulting from past management actions and those proposed under Alternative B would have major beneficial impacts on the human environment.

Conclusions

The combination of impacts resulting from past management actions and those proposed under Alternative B would have negligible impacts on the physical environment, minor adverse impacts on the biological environment and major beneficial impacts on the human environment at the regional scale.

## *4.5 Alternative C*

This alternative combines development of public use facilities and related programs identified in Alternative B with enhanced firearm hunting opportunities. Alternative C fulfills the plan's purpose and need as identified in Chapter 1 by enhancing wildlife viewing, interpretation and photography opportunities and considering implementation of other wildlife-dependent recreation opportunities. Alternative B and Alternative C differ from each other only in the type and location of hunting opportunities allowed. As such, this analysis will focus on the consequences of allowing a firearm harvest of small game and fur animals on wildlife abundance and recreation opportunities.

### 4.5.1 Biological Environment

**Wildlife Resources**

Key Indicators:

- Abundance of wildlife.

*Consequences of Implementing Wildlife Management Strategies on Wildlife*

Assumptions:

- Small game populations in the Skilak WRA are believed to be within their range of variability.
- Small game species potentially impacted by the management action include grouse, snowshoe hare, and a variety of diving and sea ducks. Other small game species, including snipe, crane, and dabbling ducks generally migrate from the area prior to opening of hunting season.
- Fur animal populations, except red fox populations, are believed to be within their range of variability.
- Harvest rates are higher under a firearm prescription than an archery only prescription.

Analysis:

*Small Game*

Initiating a small game firearm hunt would have adverse, long-term impacts on the abundance of snowshoe hare, grouse, and some duck species. Impacts would be moderate at the regional scale

when compared to existing conditions because harvest rates would be greater than harvest rates under existing management prescriptions (i.e., archery only).

*Fur Animals*
Initiating a fur animal firearm hunt would have adverse, long-term impacts on the abundance of coyote, lynx, red fox, and red squirrels. Impacts would be moderate at the regional scale when compared to existing conditions because harvest of these species is currently not allowed in the Skilak WRA and a change in management would have a substantial impact on wildlife abundance when compared to the existing condition.

Conclusions:
Under Alternative B, the abundance of small game and fur animal populations would decline as a result of initiating a firearm hunt of those species. Although the degree of decline cannot be quantified, the overall impact of initiating a firearm hunt at the regional scale is expected to be moderate when compared to existing conditions due to increases in harvest levels.

### 4.5.2 Human Environment

**Recreation Opportunities**

Key Indicators:

- Types of wildlife-dependent recreation activities.

*Consequences of Allowing Firearm Harvest of Small Game and Fur Animals on Recreation Opportunities*

Assumptions:

- The administrative boundary of the Skilak WRA would be extended to the eastern Refuge boundary to include 497-acres of land between the Upper Kenai River and the Sterling Highway. It would also be extended to the western Refuge boundary to include 8,243-acres of land beginning 100 yards from the north shore of Skilak Lake and the Lower Kenai River from the Lower Skilak Campground and Skilak Loop Road west along the Sterling Highway. As a result, the administrative boundary of the Skilak WRA would include 52,750-acres of land.
- A small game and fur animal firearm hunt would be allowed by general entry from October 1 to March 1 on lands currently designated within the boundary of the Skilak WRA except use would be prohibited on 17,180-acres (or 32.6% of total area) near roads and other facilities to ensure public safety.
- A small-game archery hunt would be allowed by general entry from October 1 through March 1.
- There is sufficient demand for small game and fur animal hunting within the Skilak WRA that firearm hunters would become a visible presence during the open season. As such, visitors would be equally likely to encounter firearm hunters and non-hunters.

Analysis:
Implementation of Alternative C would change existing wildlife management strategies by allowing a firearm hunt of small game and fur animals. It would also expand the administrative boundaries of the area and change firearm discharge regulations to ensure public safety. The

impacts associated with resulting changes on wildlife viewing, hunting, and trapping opportunities are analyzed below:

*Wildlife Viewing*

Implementing a small game and fur animal firearm hunt within the Skilak WRA would have adverse, long-term impacts on wildlife viewing opportunities. Impacts would be moderate at the regional scale when compared to existing conditions because the action would open 35,570-acres (or 67.4% of the total area) to firearm hunting from October 1 to March 1. As a result, the wildlife viewing experience and the behavior and presence of not only small game and fur animals, but wildlife in general, would be affected by the action. Under current management, the Skilak WRA provides one of the few accessible places within Kenai Refuge where visitors can avoid the sites and sounds of hunting activities (except for a two week period in September during years when a moose hunt is permitted to protect habitat quality). Visitors attracted to the area specifically because firearm use is prohibited would be displaced for six (6) months of the year as a result of Alternative C. In addition, firearm hunting would adversely impact wildlife viewing opportunities by diminishing wildlife abundance, and making wildlife (more) wary of human presence and therefore more difficult to view. In the most accessible viewing areas — along roads, near campgrounds, trailheads, and other public use facilities — impacts would be partially mitigated by expansion of the firearm discharge exclusion zone from ¼-mile (under Alternative A) to ½-mile around facilities and ¼-mile from roads (under Alternative C) (see *Firearm Hunting* below). Non-consumptive users would be able to recreate without having safety concerns in those areas (17,180-acres or 32.6% of the area).

*Archery Hunting*

Implementing a small game and fur animal firearm hunt would have adverse, long-term impacts on archery hunting opportunities. Impacts would be moderate at the regional scale when compared to existing conditions because the nature of the archery hunt experience and likelihood of success would change due to competition with firearm hunters. On about 2/3 of the Skilak WRA or 35,570-acres (67.4% of the area) the opportunity to participate in archery hunting would remain as is, but the nature of the experience and likelihood of success would change due to competition with firearm hunters. Archery hunters attracted to the “archery-only” aspect of the Skilak WRA would be displaced, however, this effect would be partially mitigated by expansion of the firearm discharge exclusion zone from ¼-mile (under Alternative A) to ½-mile around facilities and ¼-mile from roads (under Alternative C). Archery hunters would be able to hunt without direct competition from firearm hunters in those areas (17,180-acres or 32.6% of the area).

*Firearm Hunting*

Implementing a small game and fur animal firearm hunt would have beneficial, long-term impacts on firearm hunting opportunities. Impacts would be major at the regional scale when compared to existing conditions because 35,570-acres (67.4% of the area) would be opened to firearm hunting of small game and fur animals – an actively not currently allowed.

Alternative C would also have adverse, long-term impacts on firearm hunting opportunities. Impacts would be major at the regional scale when compared to existing conditions because the firearm discharge restriction would close 17,180-acres (verses 3,200-acres under Alternative A) along roadways and around public use facilities to enhance public safety during hunting season. In years when moose permits would be issued (determined upon achievement of moose

population and/or sex ratio objectives) approximately 14,000-acres currently open to firearm moose hunting by permit under Alternative A would be closed under Alternative C.

Conclusions:
Under Alternative C, firearm hunting opportunities would improve and archery hunting and wildlife viewing opportunities would decline. Although the degree of change cannot be quantified, the overall impact at the regional scale is expected to be moderate for all opportunities analyzed. At the extra-regional (or refuge-wide) scale, Alternative C would have adverse, long-term impacts of moderate intensity on the variety of recreation opportunities provided because although firearm hunting is allowed on all of the Refuge, there are no other areas solely dedicated to wildlife viewing and few other areas are found where archery hunters do not have to compete with firearm hunters.

### 4.5.3 Cumulative Impacts

Physical Environment

Same as Alternative B.

Biological Environment
Same as Alternative B except the abundance of coyote, red fox, lynx, snowshoe hare, red squirrel, grouse, and some duck species would decline beyond current levels as a result of initiating a firearm hunt of small game and fur animals. At the regional scale, the combination of impacts resulting from past management actions and those proposed under Alternative C would have moderate adverse impacts on the biological environment.

Human Environment
Same as Alternative B except wildlife viewing opportunities would decline beyond current levels as a result of initiating a firearm hunt of small game and fur animals. At the regional scale, the combination of impacts resulting from past management actions and those proposed under Alternative C would have moderate adverse impacts on the human environment.

Conclusions
The combination of impacts resulting from past management actions and those proposed under Alternative C would have negligible impacts on the physical environment, moderate adverse impacts on the biological environment, and moderate adverse impacts on the human environment.

## *4.6 Relationship Between Short-Term Uses of the Environment and Long-Term Productivity*

Under the No Action Alternative (Alternative A) and the Service's Preferred Alternative (Alternative B) the primary short-term uses of the Refuge would be wildlife viewing, environmental education, interpretation, and photography. Under Alternative C, the primary short-term use of the Refuge would be the same as those described under Alternative A and Alternative B plus firearm hunting of small game and fur animals would be allowed. Monitoring and regulation of harvested fish and wildlife populations by ADF&G and the Service would ensure the long-term productivity of such populations under all of the alternatives proposed in

this plan, and none of the short-term uses described would affect the long-term productivity of refuge resources or intact ecosystems.

## *4.7 Irreversible and Irretrievable Commitment of Resources*

An irreversible commitment of resources means that nonrenewable resources are consumed or destroyed. Examples include the destruction of cultural resources by other management activities and mineral extraction that consumes nonrenewable minerals. There are no irreversible commitments of resources made under any of the alternatives proposed in this plan.

An irretrievable commitment of resources represents trade-offs (opportunities foregone) in the use and management of natural resources. Examples include expenditure of funds, loss of production, or restrictions on resource use. Alternative A, B, and C propose firearm restrictions to ensure public safety around facilities, and in the case of Alternative C, around roads. Alternatives A, B, and C also propose restrictions on moose hunting opportunities based on population and/or sex ratio objectives; and Alternative A and B propose closures on small game and fur animal hunting opportunities. These actions are proposed to ensure abundant, less wary wildlife populations so the area's wildlife viewing and photography goals, as identified in the Refuge's Comprehensive Conservation Plan, are achieved.

## *4.8 Summary of Environmental Consequences By Alternative*

**Table 4.3 Summary of Environmental Consequences by Alternative**

| Resource / Opportunity | Alternative A (No Action Alternative) | Alternative B (Preferred Alternative) | Alternative C |
|---|---|---|---|
| Air Quality | General Impacts – Declining quality at the local scale due to increases in PM 2.5 when vegetation management activities occur; additional declines due to increases in PM 10 throughout Skilak Loop Rd. with increasing vehicular use.<br><br>Regional Scale Impacts – Negligible | General Impacts – Same as Alternative A plus additional increases in PM 2.5 and PM 10 due to development of an additional 1-mile long road.<br><br>Regional Scale Impacts – Negligible | Same as Alternative B. |
| Soil Resources | General Impacts – Declining quality at 13 locations totaling 5.3-acres due to compaction, erosion, and loss of soil function; additional declines associated with Skilak Loop Rd. improvements and vegetation management activities.<br><br>Regional Scale Impacts – Negligible | General Impacts – Same as Alternative A except impacts observed at 42 locations (including 20 trail segments) totaling 18.4-acres, and due to development of an additional 1-mile long road.<br><br>Regional Scale Impacts – Negligible | Same as Alternative B. |
| Water Quality | General Impacts – Declining quality at the site-specific scale due to increases in sedimentation and non-point source pollution originating from the Skilak loop Rd.<br><br>Regional Scale Impacts – Negligible | Same as Alternative A. | Same as Alternative A. |
| Vegetation (Wildlife Habitat) | General Impacts – Declining quality on 13.8-acres due to construction of public use facilities and trails. Linear features on the landscape increase to 16.<br><br>Regional Scale Impacts – Negligible | General Impacts – Same as Alternative A except impacts observed on 28.1-acres. Linear features on the landscape increase to 14.<br><br>Regional Scale Impacts – Negligible | Same as Alternative B. |

| Resource / Opportunity | Alternative A (No Action Alternative) | Alternative B (Preferred Alternative) | Alternative C |
|---|---|---|---|
| Wildlife Abundance | General Impacts – Declining abundance at the site-specific and local scales due to increases in disturbance, habitat loss, and public use associated with facility development and road improvement.<br><br>Regional Scale Impacts – Minor Adverse Long-term | General Impacts – Same as Alternative A except impacts would be observed at more locations due to additional facilities development and construction of an additional 1-mile long road.<br><br>Regional Scale Impacts – Minor Adverse Long-term | General Impacts – Same as Alternative B except additional declines would be observed in small game and fur animal abundance due to initiation of a firearm hunt and resulting increases in harvests.<br><br>Regional Scale Impacts – Moderate Adverse Long-term |
| Recreation Access | General Impacts – Enhanced access due to improvements made to the Skilak Loop Rd, parking area developments, and development of five trails totaling 9-miles in length.<br><br>Regional Scale Impacts – Moderate Beneficial Long-term | General Impacts – Enhanced access due to development of a new 1-mile long road, improvements made to the Skilak Loop Rd, parking area and boat launch developments, and development of a 40-mile long trail network.<br><br>Regional Scale Impacts – Major Beneficial Long-term | Same as Alternative B. |
| Recreation Opportunities | General Impacts – Enhanced opportunities due to development of public use facilities at 10 locations. Developments would include a campground, day use area, nature center, visitor contact station, wayside pullouts, bulletin boards/kiosks, and interpretive panels.<br><br>Regional Scale Impacts – Moderate Beneficial Long-term | General Impacts – Enhanced opportunities due to development of public use facilities at 25 locations, an increase in environmental education programs and outreach materials provided year-round, and an expansion of the area's administrative boundaries. Developments would include a campground, day use areas, walk-in campsites, an environmental education complex, visitor contact station, sanitary facilities, bulletin boards/kiosks, and interpretive panels.<br><br>Regional Scale Impacts – Major Beneficial Long-term | General Impacts – Wildlife viewing and archery hunting opportunities would decline during a six month period when a firearm hunt of small game and fur animals is initiated.<br><br>Regional Scale Impacts – Moderate Adverse Long-term |

# Chapter 5: Implementation

The budget/funding process of the National Wildlife Refuge System is structured so that the Refuge System submits funding requests to Congress through the U.S. Fish and Wildlife Service and the Department of Interior. Wildlife refuges develop projects or programs to meet management objectives, develop a monetary figure to accomplish the project/program, and assign a station priority. The projects are then entered into a national database; regional and national offices assign priorities as they develop annual funding requests submitted to the Department. Consequently, there are no means for a wildlife refuge to accurately predict when a project or program may receive funding. Kenai Refuge's priorities for implementing proposed management actions identified in Alternative B (Preferred Alternative) are listed below by issue:

***Issue 1: How can the Service enhance wildlife viewing and photography opportunities within the Skilak WRA?***

| Action | Schedule | Priority |
|---|---|---|
| **Administrative Boundaries**<br>Same as Alternative A plus all lands between the Upper Kenai River and the Sterling Highway from the Refuge's easternmost boundary to the Skilak Loop Road; and all lands between the north shore of the Skilak Lake from the Lower Skilak Lake Campground and the Lower Kenai River to the Skilak Loop Road west along the Sterling Highway to the westernmost boundary of the Refuge would be included in the Skilak WRA. | Immediately upon plan approval, ADFG and the Service will propose adjustment of the administrative boundaries to the State of Alaska Board of Game | 1 |
| **Human Health and Safety**<br>Existing human health and safety regulations would be implemented. | Immediately upon plan approval. | 1 |
| **Trails**<br>Construct the following trail segments to develop a total of six (6) trails:<br>1) Bottenintnin Lake Day Use Area Trail<br>2) Hideout Mountain Scenic Trail<br>• Connect Burney's Trail to Hideout Mountain Trail via 1.5-mile connector trail | Immediately upon plan approval, these facilities will be entered into the appropriate funding database. | <br><br>1<br>1 |

| Action | Schedule | Priority |
|---|---|---|
| 3) Kenai River Extension Trail<br>• Construct 1-mile trail initiating from the end of the existing Kenai River Trail southwest towards, but not to, Hidden Creek/Skilak Lake. | | 2 |
| 4) Skilak Lake Long Distance Trail<br>• Connect existing Hidden Creek Trail to existing Skilak Lookout Trail<br>• Connect existing Skilak Lookout Trail to existing Vista Trail<br>• Construct a Lower Ohmer Lake Campground Family Loop Trail<br>• Connect Upper Skilak Lake Campground to Lower Ohmer Lake Campground Family Loop Trail<br>• Connect Upper Skilak Lake Campground to Blizzard Lake<br>• Construct a Blizzard Lake Family Loop Trail<br>• Connect Blizzard Lake Family Loop Trail to the Moose Habitat Enhancement Loop Trailhead on the Skilak Loop Road<br>• Connect Blizzard Lake Family Loop Trail to the Lower Skilak Lake Campground | | 2 |
| 5) Seven Lakes Long Distance Loop Trail<br>• Construct a Moose Habitat Enhancement Loop Trail off the Skilak Loop Road<br>• Connect the Moose Habitat Enhancement Loop Trail to Marsh Lake<br>• Connect Marsh Lake to Egumen/Peterson/Kelly Lakes<br>• Connect Egumen/Peterson/Kelly Lakes trail to existing Seven Lakes Trail<br>• Connect Seven Lakes Trail to the Pack Lake Environmental Education Complex<br>• Connect the Pack Lake Environmental Education Complex to the Moose Habitat Enhancement Loop Trailhead | | 2 |
| 6) Mox/Chatelain Lake Trail<br>• Sterling Highway Trailhead Parking Area to Mox Lake<br>• Connect Mox Lake to Chatelain Lake<br>• Connect Mox Lake to existing Seven Lake Trail | | 2 |
| **Vegetation Management**<br>Initiate vegetation management activities at the following two (2) locations: 1) Moose Habitat Enhancement Loop Trail northwest of Pack Lake Environmental Education Complex, and 2) Vegetation Management Interpretive Drive along the Skilak Loop Road. Treatment will be conducted on approximately 50-100 acres per year when conditions permit. | Immediately upon plan approval, these activities will be entered into the appropriate funding database. | 1 |

| | | |
|---|---|---|
| **Viewing Facilities**<br>1) Viewing platforms would be constructed at the following five (5) locations:<br>• Engineer Lake (west shore)<br>• Kelly Lake (north shore)<br>• Marsh Lake (east shore)<br>• Peterson Lake (south shore)<br>• Upper Ohmer Lake (east shore)<br>• Rock Lake (east shore) | Immediately upon plan approval, these facilities will be entered into the appropriate funding database. | 2 |
| 2) Photo blinds would be constructed at the following two (2) locations:<br>• Egumen Lake (north shore) | Same as above. | 1 |
| 3) A viewing tower with spotting scopes would be constructed along the Vegetation Management Interpretive Drive. | Same as above. | 2 |
| 4) Spotting scopes would be provided at the following three (3) locations:<br>• Hidden Creek Wayside Pullout<br>• Skilak Lake/Redoubt Mountain Wayside Pullout<br>• Marsh Lake Viewing Platform | Same as above. | <br>1<br>1<br>2 |
| 5) Track Trap<br>Refuge biologists, public use specialists, and maintenance personnel would consider and evaluate the feasibility of developing a facility at an appropriate location within the Skilak WRA. | Within 1 year of plan approval, staff will initiate assessments of a minimum of four sites; after 1 year of evaluations, site will be designated, and developed before Labor Day of the same year | 1 |
| **Wildlife Management**<br>*Moose:* Managed to provide for a variety of public use opportunities and to achieve natural resource goals. Firearm harvest by permit only; plus re-evaluate moose population objectives as needed. | Immediately upon plan approval. | 1 |
| *Small Game:* During the period October 1 to March 1, each year, harvest of small game by bow and arrow would be allowed. | The Service will propose this regulatory change to the Alaska Board of Game immediately upon plan's approval. | 1 |
| *Fur Animals*: Harvest not allowed. | The Service will propose this regulatory change to the Alaska Board of Game immediately upon plan's approval. | 1 |
| **Wayside Pullouts**<br>An undeveloped wayside pullout at MP 12.6 along the Skilak Loop Road (i.e., Skilak Lake/Redoubt Mountain) would be enhanced. | Immediately upon plan approval, this facility will be entered into the appropriate funding database. | 1 |

***Issue 2. How can the Service enhance environmental education and interpretation opportunities within the Skilak WRA?***

| Action | Schedule | Priority |
|---|---|---|
| **Bulletin Boards & Kiosks**<br>Bulletin boards or kiosks would be provided at the following six (6) locations:<br>• Bottenintnin Lake Group Day Use Parking Area<br>• Burney's Trailhead Parking Area<br>• East Entrance Parking Area<br>• Moose Habitat Enhancement Loop Trailhead Parking Area<br>• Mox/Chatelain Trailhead Parking Area<br>• Visitor Contact Station Parking Area (West)<br><br>Existing bulletin boards would be upgraded to kiosks at the following five (5) locations:<br>• Hidden Creek Trailhead<br>• Hideout Mountain Trailhead<br>• Kenai River Trailhead (West)<br>• Skilak Lookout Trailhead<br>• Vista Trailhead | Immediately upon plan approval, these structures will be entered into the appropriate funding database.<br><br>Immediately upon plan approval, these structures will be entered into the appropriate funding database | 2<br>1<br>1<br>2<br>2<br>1<br><br>2<br>2<br>2<br>2<br>2 |
| **Environmental Education Complex**<br>An Environmental Education Complex consisting of two buildings – a 2,000 square foot Nature Center, and a 10,000 square foot Boreal Forest Lands Research and Management Training Facility – would be constructed west of Pack Lake off of the Skilak Loop Road at MP 8.8. | Immediately upon plan approval, these facilities will be entered into the appropriate funding database. | 1 |
| **Environmental Education "Ranger" Programs**<br>Campfire programs and Discovery Hikes offered by Refuge personnel would be increased by 20% and offered year-round, including the shoulder seasons (September – May). | Immediately upon plan approval, additional staff positions to accomplish these program increases will be entered into the appropriate funding database. | 1 |
| **Interpretive Panels**<br>Interpretive panels would be provided at the following ten (10) locations:<br>• Engineer Lake Day Use Area Platform (West Shore)<br>• Kelly Lake Viewing Platform (North Shore)<br>• Lower Jean Lake Day Use Area (North Shore)<br>• Lower Ohmer Lake Family Loop Trailhead<br>• Marsh Lake Viewing Platform (East Shore)<br>• EE Complex Disability-Accessible Interpretive Trail<br>• Peterson Lake Viewing Platform (South Shore)<br>• Skilak Lake/Redoubt Mountain Wayside | Immediately upon plan approval, these facilities will be entered into the appropriate funding database. | 2<br>2<br>2<br>2<br>2<br>2<br>2<br>1 |

| | | |
|---|---|---|
| • Upper Ohmer Lake Viewing Platform<br>• Vegetation Management Interpretive Loop Drive | | 1<br>2 |
| **Interpretive Drive**<br>A self-guided Vegetation Management Interpretive Loop Drive would be constructed along the Skilak Loop Road at MP 2.0. | Immediately upon plan approval, this facility will be entered into the appropriate funding database. | 2 |
| **Interpretive Trail**<br>A disability-accessible Interpretive Trail (1.0 mile) would be constructed at the Pack Lake Environmental Education Complex. | Immediately upon plan approval, this facility will be entered into the appropriate funding database. | 2 |
| **Outreach Materials and Media for Visitor Orientation**<br>A variety of outreach materials (e.g., brochures, pamphlets, etc) and media formats (e.g., audio tapes, CD, DVD, MP3) will be developed and used to educate visitors about the Skilak WRA. | Immediately upon plan approval, these program enhancements will be entered into the appropriate funding database. | 1 |

***Issue 3. How can the Service provide recreation support projects within the Skilak WRA?***

| Action | Schedule | Priority |
|---|---|---|
| **Administrative Facility**<br>The existing Administrative Facility located off the Skilak Loop Road at MP 5.3 will be maintained and enhanced as needed. The following amenities will be considered:<br>• 500-square foot seasonal office space<br>• 350-squaare foot shop<br>• 1,000-square foot housing for Visitor Services staff | Immediately upon plan approval, these facilities will be entered into the appropriate funding database. | 1 |
| **Boat Launches**<br>The existing boat launches at Bottenintnin Lake Group Day Use Area and Engineer Lake Day Use Area will be improved. Through a cooperative effort with State of Alaska Department of Transportation, construct a boat launch at the Lower Jean Lake Day Use Area (north shore). | Immediately upon plan approval, these facilities will be entered into the appropriate funding database, and the Service will initiate discussions with state DOT staff to request appropriate development funds for this project. | 1<br>1 |
| **Campgrounds**<br>The following campground-related work would be implemented:<br>• Relocate the Engineer Lake Campground to the bluff above the lake to include designation of six (6) vehicle camping sites<br>• Rehabilitate the Kelly Lake Campground to include designation of eight (8) vehicle camping sites<br>• Rehabilitate the Peterson Lake Campground to include designation of four (4) vehicle camping sites | Immediately upon plan approval, these facilities will be entered into the appropriate funding database, if not already entered. | 1<br>1<br>1 |

| | | |
|---|---|---|
| To address public safety concerns associated with entry and exit from/to the Sterling Highway at Lower Jean Lake the existing campground would be replaced, through a cooperative effort with the State of Alaska Department of Transportation, with a day use area and related projects located on the lake's north shore | Immediately upon plan approval, these facilities will be entered into the appropriate funding database. Additionally, the Service will initiate discussions with state DOT staff to request appropriate development funds for this project. | 1 |
| **Hardened Campsites ("Walk-in" and "Backcountry" Campsites)**<br>Two (2) hardened "walk-in" campsites would be provided at Kelly Lake Campground, and one (1) hardened "walk-in" campsite would be provided at Peterson Lake campground.<br><br>To protect refuge resources, hardened "backcountry" campsites would be identified and developed for voluntary use along the Skilak Lake Long Distance Trail and Seven Lakes Long Distance Loop Trail. Campsites would be no closer than 0.5 mile apart. | Immediately upon plan approval, these facilities will be entered into the appropriate funding database, if not already entered. | 1<br><br>2 |
| **Day Use Areas**<br>• Rehabilitate the Bottenintnin Lake Group Day Use Area<br>• Convert the Engineer Lake Campground to a day use area after the new campground is constructed<br><br>To address public safety concerns associated with entry and exit from/to the Sterling Highway at Lower Jean Lake, the existing campground would be replaced, through a cooperative effort with the State of Alaska Department of Transportation, with a day use area and related projects located on the lake's north shore. | Immediately upon plan approval, these facilities will be entered into the appropriate funding database, if not already entered.<br><br>Immediately upon plan approval, these projects will be entered into the appropriate funding database. Additionally, the Service will initiate discussions with state DOT staff to request appropriate development funds for this project. | 2<br>1<br><br>1 |
| **Parking Areas**<br>1) Rehabilitate the existing Engineer Lake Campground parking area.<br>2) Construct parking areas at<br>• Moose Habitat Enhancement Loop Trailhead<br>• Pack Lake Environmental Education Complex<br>• Vegetation Management Interpretive Drive.<br>3) Through a cooperative effort with State of Alaska Department of Transportation, parking areas would be constructed at the following four locations:<br>• East Entrance (Skilak Loop/Sterling Highway Intersection)<br>• Lower Jean Lake Day Use Area<br>• Mox/Chatelain Lakes Trailhead<br>• West Entrance (Skilak Loop/Sterling Highway Intersection) | Immediately upon plan approval, these facilities will be entered into the appropriate funding database, if not already entered.<br><br>Immediately upon plan approval, these facilities will be entered into the appropriate funding database. Additionally, the Service will initiate discussions with state DOT staff to request appropriate development funds for these projects | 1<br><br>2<br>1<br>2<br><br>1<br>2<br>2<br>1 |

| | | |
|---|---|---|
| **Roads**<br>Through cooperative efforts with the State of Alaska Department of Transportation and other appropriate agencies the following road-related enhancements would be implemented:<br>• Rename the Skilak Loop Road – the "Skilak Loop Wildlife Drive"<br>• Redesign the east and west entrances to conform to Federal and State Highway standards<br>• Obtain the Skilak Loop Road right-of-way and pursue funds to rehabilitate and increase year-round maintenance<br>• Construct a self-guided Vegetation Management Interpretive Drive off the Skilak Loop Road at MP 2.0. | Immediately upon plan approval, these projects will be entered into the appropriate funding database except where noted below.<br>• Immediately upon plan approval.<br>• The Service will initiate discussions with state DOT staff to request appropriate development funds for this project<br>• Immediately upon plan approval.<br>• Immediately upon plan approval this facility will be entered into the appropriate funding database. | <br><br>1<br><br>1<br><br>1<br><br>2 |
| **Sanitary Projects**<br>Sanitary projects would be provided at the following five (5) locations:<br>• Bottenintnin Lake Group Day Use Area<br>• Lower Jean Lake Day Use Area<br>• Mox/Chatelain Lakes Trailhead,<br>• Pack Lake Environmental Education Complex, and<br>• Visitor Contact Station (West Entrance)<br>The frequency of servicing sanitary projects will be increased during the highest visitor use months, and will occur weekly during the shoulder season (September – May). | Immediately upon plan approval, these facilities will be entered into the appropriate funding database.<br><br>Immediately upon plan approval, funds to increase staff to maintain these facilities will be entered into the appropriate funding database. | <br><br>2<br>2<br>2<br>1<br>1<br>1 |
| **Signs (Information, Direction, Location)**<br>• "Binocular" wildlife viewing logo or a specially designed Skilak WRA logo would be placed on the Sterling Highway<br>• Improved Visitor Contact Station signs would be designed<br>• "Welcome to the Skilak WRA" monuments would be constructed at the East and West Entrances<br>• Information/direction signs along the Skilak Loop Road would be enhanced<br>• Milepost markers would be provided along the Skilak Loop Road. | Immediately upon plan approval, these facilities will be entered into the appropriate funding database. | 1<br><br>1<br>1<br><br>1<br><br>1 |
| **Visitor Contact Station**<br>One (1) 500-foot Visitor Contact Station would be constructed at the West Entrance. Information would be provided year-round including periods when the facility is not attended by staff. | Immediately upon plan approval, this facility will be entered into the appropriate funding database. | 1 |

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# Appendix A: Preparers

| Name | Agency / Title | Expertise / Function | Degree(s) | Experience (Yrs) |
|---|---|---|---|---|
| Rob Campellone | USFWS Regional Office / Natural Resources Planner | Planning Team Leader | BS Environmental Science<br>MS Natural Resources Management | Natural Resources Planning (10) & Land Management (3) |
| Brian Glaspell | USFWS Regional Office / Social Scientist | Recreation Management | BS Geography<br>MS Natural Resources Management<br>PhD Recreation / Wilderness Management | Social Aspects of Public Land and Natural Resources Management (12) |
| Bill Kent | USFWS Kenai Refuge / Supervisory Park Ranger | Visitor Services Management | BS Outdoor Recreation / Park Management | Refuge Recreation Management and Law Enforcement (27) |
| Thomas McDonough | ADF&G / Wildlife Biologist | Wildlife Biology | BS Zoology<br>MS Wildlife Biology | Wildlife Biology and Management (16) |
| Debbie Steen | USFWS Regional Office / Chief of Visitor Services | Visitor Services Specialist | BS Forestry<br>BS Recreation Management<br>BS Natural Resources Management | Natural Resources Management (5), Recreation Management (13), Management (4) |
| George Weekley | ADF&G / Natural Resources Specialist | State Coordination / Recreation Management | BS Environmental Science<br>MS Recreation / Natural Resources Management | Natural Resources Management (6) |

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