United States Department of Agriculture

Saddle Lakes Timber Sale

Draft Environmental Impact Statement

Forest Service	Tongass National Forest	Ketchikan-Misty Fiords Ranger District	R10-MB-740 September 2014

Acronyms

ACEP Advisory Council on Environmental Preservation
ACHP Advisory Council on Historic Preservation
ADEC Alaska Department of Environmental Conservation
ADF&G Alaska Department of Fish and Game
ADNR Alaska Department of Natural Resources
ANILCA Alaska National Interest Lands Conservation Act
APDES Alaska Pollutant Discharge Elimination System
ATM Access and Travel Management
BA Biological Assessment
BE Biological Evaluation
BMP Best Management Practice
CEQ Council on Environmental Quality
CFR Code of Federal Regulations
CFS Cubic feet per second
DBH Diameter at breast height
DEIS Draft Environmental Impact Statement
DHC Deer Model Habitat Capability
DOT&PF Department of Transportation & Public Facilities
DPS Distinct population segment
DZ Distance Zone
EFH Essential Fish Habitat
EIS Environmental Impact Statement
EPA Environmental Protection Agency
ESA Endangered Species Act
FACTS Forest Activities Tracking System
FASTR Financial Analysis Spreadsheet Tool residual value; NEPA economic analysis tool
FEIS Final Environmental Impact Statement
FRPA Forest Resources and Practices Act
FSH Forest Service Handbook
FSM Forest Service Manual
FY Fiscal year
GIS Geographical Information System
GMU Game Management Unit
GPS Global Positioning System
HSI Habitat Suitability Index
HUC Hydrologic Unit Code
IDT Interdisciplinary team
IRA Inventoried Roadless Area
LSTA Logging System and Transportation Analysis
LTF Log Transfer Facility
LUD Land Use Designation
LWD Large woody debris
MAF Marine Access Facility
MBF Thousand board feet
MIS Management Indicator Species
ML Maintenance Level
MMBF Million board feet
MMI Mass Movement Index
MOA Memorandum of Agreement
MOU Memorandum of Understanding
ML Maintenance level
MP Milepost
NEPA National Environmental Policy Act
NFMA National Forest Management Act
NFS National Forest System
NHPA National Historic Preservation Act
NMBF Net thousand board feet
NMFS National Marine Fisheries Service
NOA Notice of Availability
NOI Notice of Intent
NRIS Natural Resource Information System
OGR Old-growth reserve
OHV Off highway vehicle
OSI Other Species of Interest
POG Productive old-growth
R10 Region 10 (Alaska Region of Forest Service)
RAW Reasonable Assurance of Windfirmness
RCS Road Condition Survey
RMA Riparian Management Area
RMO Road Management Objectives
ROD Record of Decision
ROS Recreation Opportunity Spectrum
ROW Right-of-way
S&G Standards and Guidelines (Forest Plan)
SDM Size-density model
SEIS Supplemental Environmental Impact Statement
SHPO State Historic Preservation Officer
SIO Scenic Integrity Objective
SPCC Spill Prevention, Control and Countermeasure
TES Threatened, Endangered and Sensitive species
TTRA Tongass Timber Reform Act
USDA United States Department of Agriculture
USDI United States Department of the Interior
USFWS United States Fish and Wildlife Service
USGS United States Geological Survey
VAC Visual Absorption Capacity
VCU Value Comparison Unit
VPR Visual Priority Route
WAA Wildlife Analysis Area

Cover Photo: Saddle Lake.
Photograph by Rob Reeck, former Forest Service Planning Specialist.

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File Code: 1950
Date: August 21, 2014

Dear Planning Participant:

The Tongass National Forest is seeking comments on the Draft Environmental Impact Statement (DEIS) for the Saddle Lakes Timber Sale on the Ketchikan-Misty Fiords Ranger District, Tongass National Forest. The Forest Service analyzed five action alternatives and a No Action Alternative. Alternative 4 is the Forest Service's Preferred Alternative. The action alternatives range from 17 million board feet (MMBF) to 61 MMBF of timber, and propose up to 21 miles of new National Forest System (NFS) road construction, 12 miles of temporary road construction, and 11.1 miles of road reconditioning. Conventional and helicopter logging systems would be used.

This project is subject to the objection process pursuant to 36 CFR § 218 (March 27, 2013), and is not being authorized under the Healthy Forest Restoration Act (HFRA). Only individuals or entities (as defined by 36 CFR §218.2) who submit timely and specific written comments (as defined by 36 CFR §218.2) about this proposed project or activity during this or another public comment period established by the responsible official will be eligible to file an objection. Other eligibility requirements are defined by 36 CFR §218.25(a)(3) and include name, postal address, title of the project, and signature or other verification of identity upon request. Individual members of an entity must submit their own individual comments in order to have eligibility to object as an individual. A timely submission will be determined as outlined in 36 CFR §218.25(a)(4). It is the responsibility of the sender to ensure timely receipt of any comments submitted. Comments should be within the scope of the proposed action, have a direct relationship to the proposed action, and must include supporting reasons for the Responsible Official to consider (36 CFR §218.2). Those who provide specific written comments during any designated opportunity for public comment in accordance with36 CFR §218.5 will be eligible to participate in the objection process. Issues raised in objections must be based on previously submitted timely, specific written comments regarding the proposed project unless new information arises after designated opportunities (36 CFR §218.7).

Comments on this proposed project will be accepted for 45 days beginning on the first day after the date of publication of the Notice of Availability of the DEIS in the Federal Register. While a public notice will also be placed in the Ketchikan Daily News, the newspaper of record, the publication date of the NOA in the Federal Register is the exclusive means for calculating the 45-day comment period for a proposed action documented in a DEIS.

Specific written comments must be submitted to: Jeff DeFreest, Ketchikan-Misty Fiords District Ranger, USDA Forest Service, Ketchikan-Misty Fiords Ranger District, 3031 Tongass Ave., Ketchikan, AK 99901. Comments may also be e-mailed to: comments-alaska-tongass-ketchikan-mistyfiord@fs.fed.us with Saddle Lakes Timber Sale on the subject line. The fax number is (907) 225-8738. The office business hours for those submitting hand-delivered comments are 8:00 a.m. to 4:30 p.m., Monday through Friday, excluding holidays. Comments received in response to this solicitation, including names and addresses of those who comment, will be part of the public record for this proposed action and will become a matter of public record. Comments submitted anonymously will be accepted and considered, but those submitting anonymous comments will not be eligible for objection per 36 CFR §218.5.

A copy of the DEIS is available for review at the Ketchikan-Misty Fiords Ranger District, other Tongass National Forest Ranger Districts, and the Forest Supervisor's Office in Ketchikan. The Tongass National Forest no longer publishes unit and road cards as part of the DEIS; however, these documents are made available on the world-wide web at: http://www.fs.fed.us/r10/tongass/projects/projects.shtml. If you require a DVD (digital video drive) of the DEIS, or need additional information, please contact Daryl Bingham, District NEPA Planner, at 907-228-2148 or send your request to: darylabingham@fs.fed.us.

Sincerely,

FORREST COLE
Forest Supervisor

Saddle Lakes Timber Sale
Draft Environmental Impact Statement
United States Department of Agriculture
Forest Service Alaska Region

Lead Agency: USDA Forest Service
Tongass National Forest

Responsible Official: Forrest Cole, Forest Supervisor
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Abstract: The Forest Service proposes to harvest timber, build new roads and recondition roads, reconstruct the Shelter Cove LTF, modify a fish passage barrier, and grant a State of Alaska right-of-way (ROW) on National Forest System (NFS) lands in the Saddle Lakes project area. The project area is located on Revillagigedo Island about 14 miles northeast of Ketchikan, Alaska, between George and Carroll Inlets within the Ketchikan-Misty Fiords Ranger District (KMRD), on the Tongass National Forest.

The actions analyzed in this EIS are designed to implement the Tongass Land and Resource Management Plan (Forest Plan). The EIS describes and analyzes in detail six alternatives that provide differing outputs and responses to issues identified for this project. The action alternatives propose timber harvest using conventional (cable and shovel) and helicopter logging systems and either even-aged management (clearcut) or uneven-aged management (single-tree selection with 33 percent basal area removal) silvicultural systems; road construction and reconditioning; reconstruction of the Shelter Cove LTF; modification to a natural partial fish barrier at Salt Creek; and authorization of a State of Alaska ROW on NFS lands for construction, operation and maintenance of a public road. All newly constructed roads would be closed to motorized use after timber harvest except for the public road ROW authorized to the state. Forest Plan amendments are proposed to remove visual priority route designations and to modify the small old-growth reserve.

Summary

Introduction

The Forest Service has prepared this Draft Environmental Impact Statement (DEIS) to evaluate the potential impacts of timber harvesting and road construction, fish passage barrier modification for fish passage improvement, Shelter Cove LTF reconstruction, and a State of Alaska right-of-way on NFS lands in the Saddle Lakes project area. This DEIS is in compliance with the National Environmental Policy Act (NEPA) of 1969 as amended**,** the National Forest Management Act (NFMA), and other relevant federal and state laws and regulations.

Project Area

The project area is located on Revillagigedo Island about 14 miles northeast of Ketchikan, Alaska, between George and Carroll Inlets and covers 38,459 acres of National Forest System (NFS) lands and 3,557 acres of private lands (non-NFS lands). Three land use designations (LUDs) comprise about 91 percent of the project area; these consist of Modified Landscape, Timber Production and Old-Growth Habitat, Timber Production, in descending order of abundance. A fairly extensive road system already exists in the project area.

The project area is located in Value Comparison Units (VCUs) 7460, 7470, and 7530, and includes portions of the North Revilla (#526) and Carroll (#535) Inventoried Roadless Areas (IRAs). The IRAs comprise about 48 percent (18,597 acres) of the project area.

In implementing Forest Plan direction in accordance with the Council on Environmental Quality (CEQ) regulations (40 C.F.R. § 1500-1508), this DEIS answers the following eight questions (Schmidt 2012, pgs. 74-75):

1 - What action is proposed?

The proposed action for the Saddle Lakes Timber Sale is to harvest about 30 MMBF of timber on about 2,207 acres of forested lands by offering one or more timber sales, within the roaded land base. About 16 miles of NFS and temporary roads would be constructed, and about 11 miles of existing roads would be reconditioned. All newly constructed roads would be closed to motorized use after timber harvest except for the State of Alaska right-of-way (ROW) on NFS land (proposed NFS Road 8300280). Harvest would include both conventional (cable and shovel) and helicopter logging systems and would include even-aged and uneven-aged (33 percent basal area removal) silvicultural systems.

The proposed action would also reconstruct the Shelter Cove log transfer facility (LTF), modify a naturally occurring partial fish barrier, and authorize a 300-foot wide by about 1 mile ROW on NFS lands to the State of Alaska for construction, operation and maintenance of a single lane public road.

The proposed action and modifications made to it are discussed in more detail in Chapter 2. Alternatives

2 - Why is the project being proposed?

The Saddle Lakes Timber Sale is proposed at this time to respond to the goals and objectives identified by the Forest Plan (USDA 2008b, pp. 2-5 and 2-7) that guide timber management to support the local and regional economies of Southeast Alaska, while helping move the project area toward the desired conditions in that plan. The Forest Plan includes both forest-wide multiple use goals and objectives (USDA 2008b, Chapter 2) and land use designation (LUD) goals, objectives, and desired conditions (USDA 2008b, Chapter 3).

The need for the Saddle Lakes Timber Sale is described in this EIS as the underlying problem or opportunity to which the Forest Service is responding with the action. The underlying need for the Saddle Lakes Timber Sale comes from the Forest Service's obligation, subject to applicable law, to seek to provide a supply of timber from the Tongass National Forest that meets market demand annually and for the planning cycle. Seeking to meet timber demand for the Tongass National Forest is required by Section 101 of the 1990 Tongass Timber Reform Act (TTRA).

Southeast Alaska, and locally the Ketchikan area, has experienced a significant decline in timber industry employment, with employment dropping sharply in the 1990s, following the closure of the region's two pulp mills, and continuing to decrease over the past decade. This decline has been mirrored by a decline in regional sawmill production and reduced harvest levels forest-wide. Allowing the use of renewable timber resources would provide Southeast Alaska timber operators with the opportunity to generate and support jobs and income in the region (see Issue 1. Timber Economics in Chapter 1 and in Chapter 3).

In addition, given the relevant Forest Plan goals and objectives and based on analysis of existing conditions in the project area, the interdisciplinary team (IDT) identified the following opportunities in the Saddle Lakes project area:

1. There is an opportunity to provide an economic supply of sawtimber and other wood products to increase current levels of the wood products industry;
2. There is an opportunity to support employment in the timber and related industries that could contribute to the local and regional economies of Southeast Alaska;
3. There is an opportunity to improve forest health, growth, and productivity on commercial forest lands by implementing silvicultural practices that provide for regeneration and establishment of faster growing, disease and defect free young-growth stands; and
4. There is an opportunity to improve fish habitat.

Therefore, the Saddle Lakes Timber Sale is proposed at this time to respond to the stated purpose and need while moving the project area toward the desired conditions described in the Forest Plan.

The purpose of and need for project action is described in detail in Chapter 1 and in greater detail in Appendix A of this document (40 C.F.R. § 1502.13).

3 - What other action would meet the same need?

In addition to the proposed action, four action alternatives, each with differing outputs and responses, were designed to meet the need for the Saddle Lakes Timber Sale. A No Action Alternative is also included, and while it does not meet the need, it is described and analyzed in detail to provide a benchmark for comparing the magnitude of the environmental effects of the action alternatives (see 40 C.F.R. §§ 1502.14(d), 1508.25(b) (1)).

The following is a brief discussion of how the action alternatives would meet the need for the Saddle Lakes Timber Sale.

Alternative 1 (No Action)

Alternative 1 is the No Action Alternative in the EIS. Under this alternative, no timber harvest or road construction would take place at this time. As a result, this alternative would not meet the purpose and need for the project.

Alternative 2 (Proposed Action)

Alternative 2 would produce about 30 MMBF of timber by harvesting about 2,207 acres of old-growth and is projected to support 120 to 144 jobs (annualized jobs-years).

Alternative 3

Alternative 3 would produce about 17 MMBF of timber by harvesting about 1,012 acres of old-growth and is projected to support 68 to 82 jobs (annualized jobs-years).

Alternative 4 (Preferred Alternative)

Alternative 4 would produce about 51 MMBF of timber by harvesting about 2,424 acres of old-growth and is projected to support 203 to 243 jobs (annualized jobs-years).

Alternative 5

Alternative 5 would produce about 61 MMBF of timber by harvesting about 2,875 acres of old-growth and is projected to support 241 to 290 jobs (annualized jobs-years).

Alternative 6

Alternative 6 would produce about 40 MMBF of timber by harvesting about 2,138 acres of old-growth and is projected to support 161 to 194 jobs (annualized jobs-years).

A detailed comparison of the action alternatives is summarized in Chapter 2 - Comparison of Alternatives, and a full examination of issue comparison by alternative is provided in Chapter 3-Environment and Effects.

4 - What would it mean to not meet the need for project action?

Not meeting the need for the Saddle Lakes Timber Sale would mean that Forest Plan multiple use goals and objectives for timber and local and regional economies (USDA 2008b, pp. 2-7 and 2-5) would not be achieved in the Saddle Lakes project area, and would have to be achieved in other areas on the Tongass National Forest (see Appendix A – Reasons for Scheduling the Environmental Analysis of the Saddle Lakes Timber Sale).

5 - What are the effects of the project action, and alternative actions in comparative format?

Chapter 2- Alternatives introduces how the action alternatives meet the purpose and need for the project, and compares outputs, objectives and effects of the alternatives in terms of the significant issues. Significant environmental issues deserving of study were identified at an early stage, and the IDT developed alternatives to the proposed action to address these issues; Chapter 2 of this DEIS discusses and compares the alternatives by issue. See Table 3- Comparison of Alternatives by Issue. In addition to the action alternatives, a No Action Alternative is also described and analyzed in detail to provide a benchmark for comparing the magnitude of the environmental effects of the action alternatives.

Chapter 3 examines the existing condition and describes and analyzes in detail the effects or consequences of the project action and alternative actions on the human environment (40 C.F.R. §§ 1502.15, 1502.16, 1508.14). Effects are discussed in proportion to their significance in this EIS (40 C.F.R. § 1502.2 (b)). The following is a summary of effects in relation to the significant issues:

Issue 1 – Timber Economics and Issue 2 – Timber Availability

Under Alternative 1, there would be no timber volume available for sale through the Saddle Lakes Timber Sale, and therefore this alternative would not meet the purpose and need. The sale is intended to provide a supply of economic timber and designed to include sufficient units and volume to allow the Forest Service to adjust future timber sale offerings from the project area to meet fluctuating market conditions, to the extent possible.

Each of the five action alternatives responds to the need for a reliable, economic supply of sawtimber to meet market demand, support employment and benefit local and regional economies. The extent to which each alternative meets this need is correlated directly to the total volume of timber harvest for that alternative.

Alternative 5 would produce the most volume of timber, followed by Alternatives 4, 6, 2, and 3, in descending order. The volume proposed ranges from 17 MMBF to 61 MMBF. Total estimated direct employment ranges from 68-82 jobs (annualized job-years) under Alternative 3 to 241-290 jobs under Alternative 5, reflecting the relative volumes that would be made available under each alternative. The project would also support indirect jobs within the region.

For timber volume to contribute to the stated purpose, it must also be economically viable. Alternative 6 has the least economic risk under current market conditions, followed by Alternatives 4, 5, 3, and 2. The quantity of economically viable timber volume available at project implementation would depend on a number of factors. The full economic benefits of a given alternative may not be available under poor market conditions.

Issue 3 – Wildlife Habitat and Subsistence Use

Alternative 1 (No Action) would have no direct, indirect, or cumulative effects on wildlife or subsistence use associated with the Saddle Lakes Timber Sale. All action alternatives would result in a decrease in productive old-growth (POG) habitat. Effects vary by wildlife species, but existing habitat would be reduced, and historic habitat would be cumulatively reduced. Resulting impacts to biodiversity and landscape connectivity (fragmentation) would be greatest under alternatives that harvest the most volume using even-aged management (clearcut) harvest prescriptions. Alternative 5 would have the greatest adverse effects on wildlife, followed by Alternatives 4, 6, 2, and 3 in descending order. Alternative 5 would reduce POG further by modifying a small old-growth reserve (OGR) and relocating a portion of it into an inventoried roadless area (IRA), and making the vacated area available for timber management. Moving the OGR would require a Forest Plan amendment.

Reductions in POG would reduce habitat available for endemic species, migratory birds, and other old-growth associated species. Local reductions in populations may occur for these species, either through disturbance, habitat removal, or fragmentation, resulting in reduced dispersal and/or population isolation under all action alternatives.

Removal of low-elevation POG under all action alternatives would reduce the amount of available deer winter habitat. Further reductions in deer habitat under the action alternatives may result in local declines in the deer population, reducing the number of deer available to wolves, and reducing subsistence and sport deer hunter success. All action alternatives may have a significant possibility of a significant restriction on deer due to changes in access and demand.

All action alternatives would increase road density. Current road densities in the wildlife analysis areas (WAAs) coinciding with the project are higher than the Forest Plan recommended threshold of 0.7 to 1.0 mile per square mile. Increased road density indirectly affects wolves, as well as other harvested species (marten and black bears), by increasing human access which may lead to increased harvest rates. Currently, modeled deer densities in project area WAAs fall below the Forest Plan Standards and Guidelines of the 18 deer per square mile which is generally considered necessary to maintain sustainable wolf populations and meet hunter harvest demands (USDA 2008b p. 4-95).

Issue 4 – Scenery and Recreational Opportunities

Alternative 1 (No Action) would have no direct, indirect, or cumulative effects on scenery or recreational opportunities.

All action alternatives would result in changes to the scenic integrity in the project area due to timber harvest and road construction. Alternative 5 would have the greatest effects to scenery, followed by Alternatives 4, 6, 2, and 3, in descending order. Alternatives 4, 5, and 6 would not meet the Forest Plan Standards and Guidelines for scenery, or the goal of the Modified Landscape LUD to recognize scenic value in the project area. These alternatives would also exceed the recommended thresholds for total disturbance in Modified Landscape LUD. A Forest Plan amendment to remove Visual Priority Route (VPR) designations in and adjacent to the project area would be needed. For Alternative 4, the removal of four VPR designations would change the scenic integrity objectives (SIOs) of 1,285 acres of the project area, all to a lower SIO. Alternative 5 would remove five VPR designations and change the SIOs of 1,642 acres of the project area, all to a lower SIO. Alternative 6 would remove three VPR designations and change the SIOs of 743 acres of the project area, all to a lower SIO.

No changes to the existing Recreation Opportunity Spectrum (ROS) classes found in the Saddle Lakes project area would occur under Alternatives 2, 3, and 6. Alternatives 4 and 5 would require a change to the ROS class boundaries that equates to about a 1 percent decrease to the acres of the Semi-Primitive Non-Motorized class, with less than a 1 percent decrease to the acres of Semi-Primitive Motorized class under Alternative 5. Similar to the scenery impacts conclusions, Alternative 5 would have the greatest impacts to recreation opportunities, followed by Alternatives 4, 2, 6, and 3, in descending order. The State of Alaska right-of-way would result in additional miles of open road available to recreation users.

6 - What factors will be used when making the decision among alternatives?

Factors influencing the decision among alternatives include design and location of timber harvest, road construction - reconditioning, and socioeconomics. See Issues 1 through 4 and other resource concerns (also see the section Decision Framework in Chapter 1).

7 - Are there any ways to mitigate adverse effects that might occur from the action?

Possible adverse impacts may occur from implementing the actions proposed under each action alternative. Resource protection measures, guided by direction in the Forest Plan, have been developed to alleviate potential adverse effects of natural or human caused disturbances (see Appendix C - Forest Plan Standards and Guidelines, Best Management Practices (BMPs), and

Mitigation and Monitoring). Potential adverse effects, such as risks from windthrow to standing timber after harvest have been evaluated, and ways to minimize windthrow, such as windfirm buffers, are incorporated into harvest unit prescriptions, where needed. If any previously undocumented goshawk nests are discovered at any time prior to or during the implementation of this project, the appropriate protection measures would be used.

Resource specialists from the IDT used on-the-ground inventories, computer (GIS) data, and aerial photographs to prepare unit cards for each harvest unit in the unit pool for the project, and road cards for each segment of road (unit and road cards are located in the project record). The cards describe resource-specific implementation requirements (i.e., Standards and Guidelines and/or other required resource protection measures).

General mitigation common to all alternatives is described in Chapter 2 - Alternatives. A more-detailed discussion by issue and resource is included in Chapter 3 - Environment and Effects.

8 - What project monitoring is necessary?

Routine implementation monitoring is part of the administration of a timber sale contract. Reviews by resource staff specialists would be performed throughout project implementation.

A review of BMP implementation and effectiveness is conducted annually by Tongass National Forest staff, and may include Saddle Lakes units and roads (USDA 2008b Chapter 6). The results of BMP monitoring and other monitoring are summarized in an annual Tongass National Forest Monitoring and Evaluation Report. This report provides information about how well the management direction of the Tongass National Forest is being carried out, and measures the accomplishment of anticipated outputs, activities and effects.

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Chapter 1. Purpose of and Need for Action

Introduction

The Saddle Lakes Timber Sale Draft Environmental Impact Statement (DEIS) describes the anticipated effects of, and alternatives to, a proposed timber sale or sales on Revillagigedo Island (see Figure 1). It describes the "No-Action Alternative" (Alternative 1), the "Proposed Action" (Alternative 2), and four action alternatives for harvesting timber and constructing associated roads.

The 2008 Tongass National Forest Land and Resource Management Plan (hereafter referred to as the Forest Plan) together with applicable environmental laws and regulations provides direction for this project. The Forest Plan includes a glossary of key terms consistent with terms used in this document (USDA 2008b, Chapter 7). The Saddle Lakes Timber Sale proposes to move the project area from the existing condition to the desired condition as identified in the Forest Plan for land use designations that allow timber harvest.

The planning interdisciplinary team (IDT) used a systematic approach for analyzing the proposed project and alternatives to it, estimating the environmental effects, and preparing this DEIS. The planning process complies with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations. Planning was coordinated with the appropriate federal, state, and local agencies, and local federally recognized tribes. The public, agencies, and tribes were involved in the planning process through meetings, letters, and personal conversations.

The best available science is used in preparation of this DEIS. However, what constitutes best available science might vary over time and across scientific disciplines. This DEIS and the accompanying project record identify methods used, reference scientific and peer reviewed sources, discuss opposing views, and disclose incomplete or unavailable information, scientific uncertainty, and risk (see 40 C.F.R. §§ 1502.9(b), 1502.22, 1502.24).

The project record references the scientific information considered: papers, reports, literature reviews, review citations, academic peer reviews, science consistency reviews, and results of ground-based observations to validate best available science. This DEIS incorporates by reference (as per 40 C.F.R. § 1502.21) information contained in the project record, including specialist reports, unit and road cards, and other technical documentation. This DEIS also tiers to the 1997 Forest Plan Final Environmental Impact Statement (FEIS) and 2008 Forest Plan Amendment FEIS. Information from specialist reports has been summarized in Chapter 3. Affected Environment and Environmental Consequences. The project record is located at the Ketchikan-Misty Fiords Ranger District Office in Ketchikan, Alaska.

Document Organization

This DEIS describes the purpose and need, the identified alternatives, the environmental consequences of implementing the proposed action, a list of the IDT and references, and additional information on specific aspects of the proposed project.

Chapter 1 - Purpose and Need

Chapter 1 explains the purpose and need for the proposed action, discusses how the Saddle Lakes Timber Sale relates to the Forest Plan, and identifies the significant issues driving the DEIS analysis. Chapter 1 also describes public involvement, and the required federal and state permits, licenses, and certifications needed to implement the project, as well as applicable laws and Executive Orders that pertain to this project.

Chapter 2 - Alternatives

Chapter 2 describes the proposed action, compares alternatives to the proposed action including a No-action Alternative, and summarizes the environmental consequences by issue.

Chapter 3 – Affected Environment and Environmental Consequences

Chapter 3 describes the affected environment and evaluates the potential direct, indirect and cumulative environmental consequences of the proposed action and each management alternative likely to occur.

Chapter 4 - References and Lists

Chapter 4 contains the list of preparers, the DEIS distribution list, literature cited, and an index.

Appendices

Appendices A, B and C provide additional information on specific aspects of the project. Appendix A of this document provides information on how this project relates to the overall Tongass Timber Sale Program, and why the project is being scheduled at this time. Appendix B contains information on interrelated projects, which have been grouped as past, present, and reasonably foreseeable future actions which have been considered in the cumulative effects analysis. Appendix C is a list of applicable Forest Plan Standards and Guidelines, a description of applicable Best Management Practices, and mitigation and monitoring.

Location of Project Area

The project area is located on Revillagigedo Island, and is within the Ketchikan-Misty Fiords Ranger District, about 14 air miles northeast of Ketchikan, Alaska between George and Carroll Inlets. The Saddle Lakes project area encompasses 38,459 acres and includes National Forest System (NFS) lands, as well as Non-NFS land. Non-NFS lands are owned by the Cape Fox Corporation, State of Alaska Department of Natural Resources (ADNR), State of Alaska Mental Health Trust Authority (hereafter referred to as the Trust), and private landowners. The project area is partially roaded due to previous timber harvest. Elevation ranges from sea level to over 2,500 feet. Most of the Saddle Lakes project area is within value comparison units (VCUs) 7460, 7470 and 7530 (Figure 1). VCUs are comparable to large watersheds and generally follow major topographic divides. Portions of Wildlife Analysis Areas (WAAs) 406 and 407 are found within the project area. WAAs are divisions of land used by the Alaska Department of Fish and Game (ADF&G) for wildlife analysis.

There are about 53 miles of existing NFS roads and about 14 miles of decommissioned[1] temporary roads within the project area.

[1] Road decommissioning is defined as: “Activities that result in the stabilization and restoration of unneeded roadsto a more natural state.”

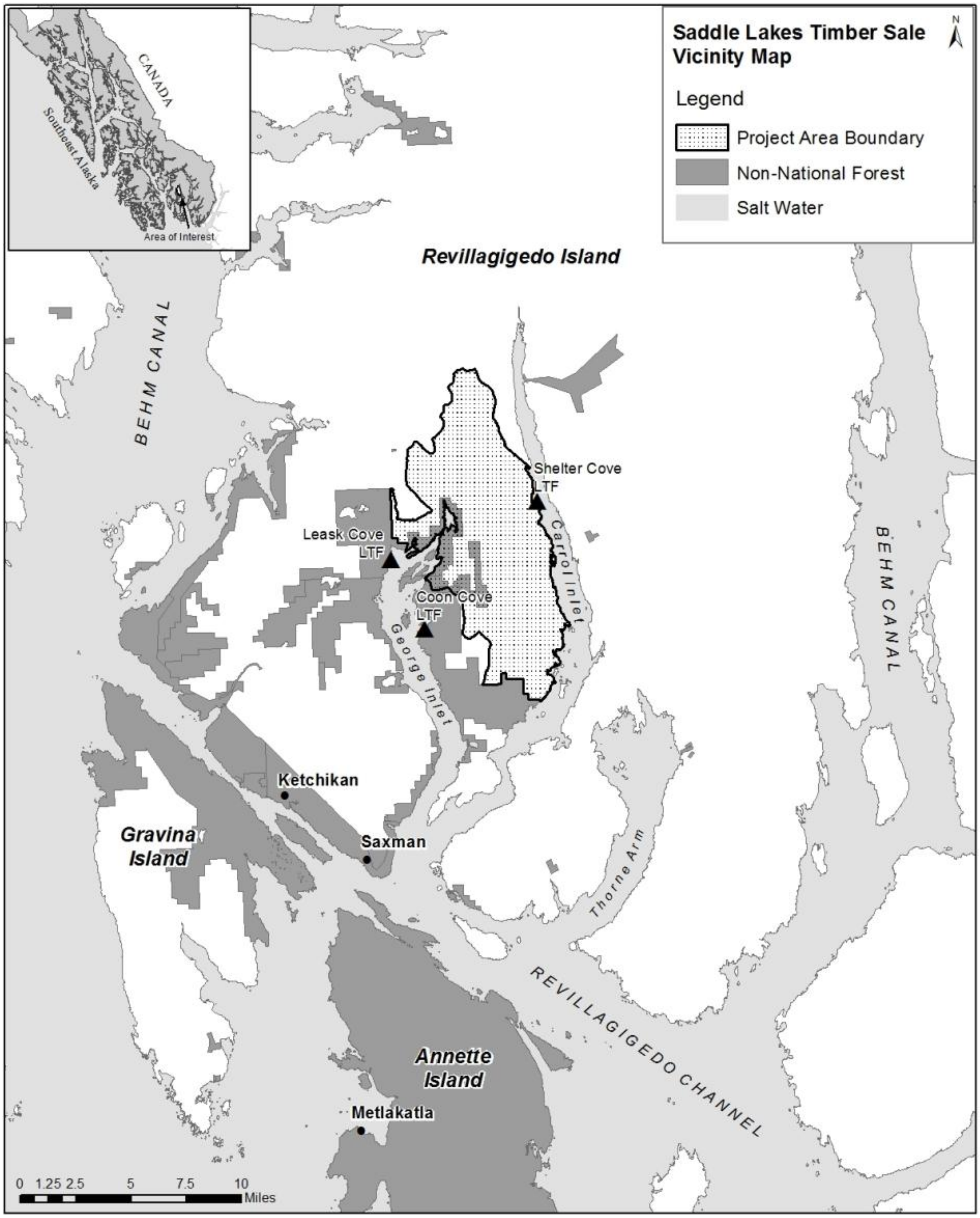

Figure 1. Vicinity map of the Saddle Lakes project area

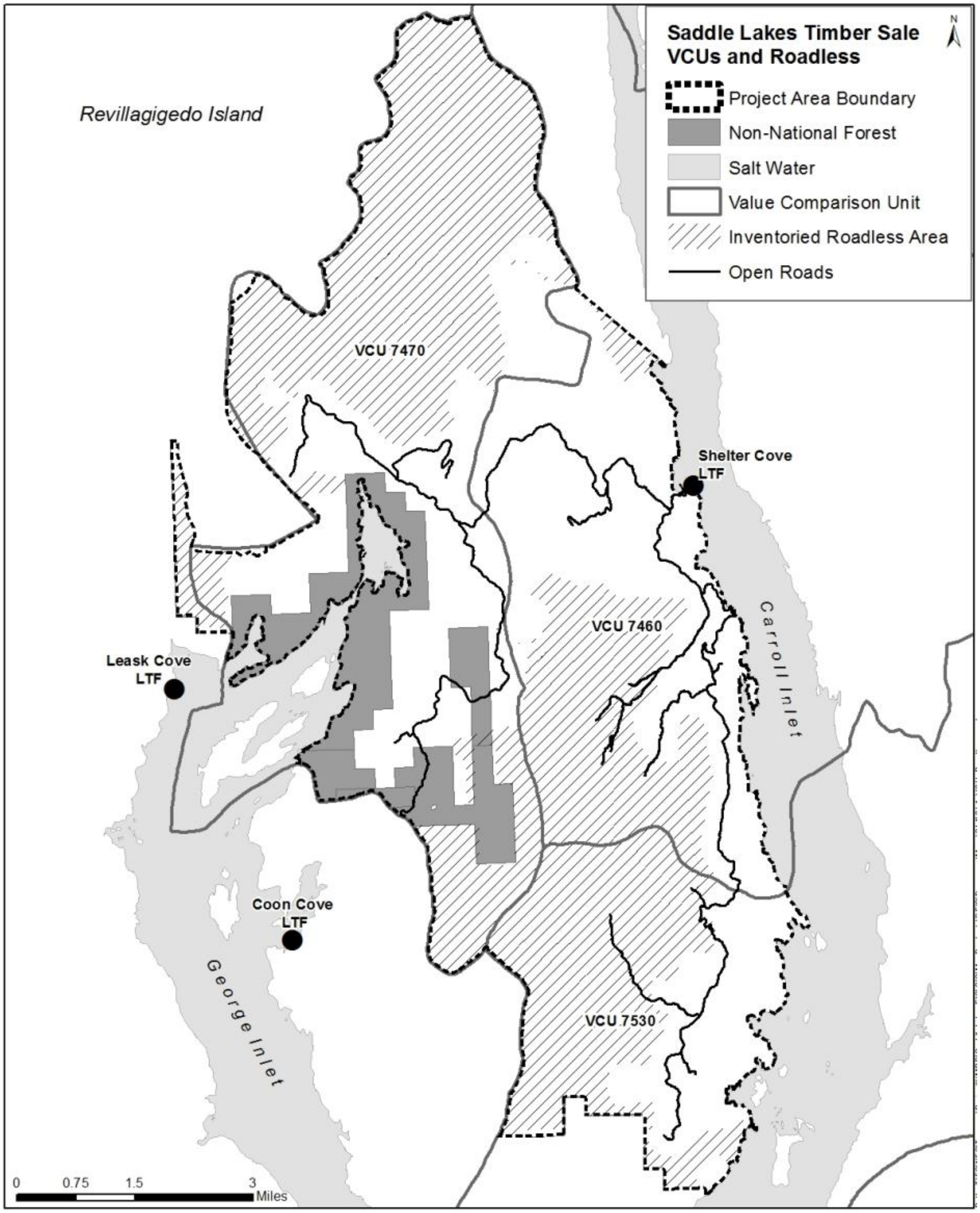

Figure 2. Value comparison units and inventoried roadless areas in the Saddle Lakes project area

Project Background

The Saddle Lakes project area was selected because timber harvest is allowed in Timber Production and Modified Landscape LUDs, and suitable timber is currently available for harvest. Further, the project area has an existing infrastructure of forest roads (53 miles) which would help to reduce the costs for accessing some of the proposed timber harvest units. The need to meet the demand for timber supply is explained in further detail in Chapter 3 and Appendix A of this DEIS.

Purpose and Need for the Action

CEQ regulations (40 C.F.R. §1502.13) state that the document shall briefly specify the underlying purpose and need to which the agency is responding. The PURPOSE is the goal or objective that the Forest Service is trying to achieve. The NEED is the underlying problem or opportunity to which the Forest Service is responding with the action.

Purpose

The purpose of the Saddle Lakes Timber Sale is to respond to the goals and objectives identified by the Forest Plan (USDA 2008b) that guide timber management to support the local and regional economies of Southeast Alaska. Forest-wide multiple-use goals and objectives that apply to this project include, but are not limited to:

Timber—Goals and Objectives (USDA 2008b, pg. 2-7):

- **Goal**: Provide for the continuation of timber uses and resources by the timber industry and Alaska residents.
- **Goal**: Manage the timber resource for production of saw timber and other wood products from suitable forest lands made available for timber harvest, on an even-flow, long-term sustained yield basis and in an economically efficient manner.
- **Objective**: Seek to provide an economic timber[2] supply sufficient to meet the annual market demand for Tongass National Forest timber, and the market demand for the planning cycle, up to a ceiling of [the Forest Plan's] allowable sale quantity (ASQ), which is 2.67 billion board feet in the first decade.
- **Objective**: Provide 2 to 3 years supply of volume under contract to local mills and then establish shelf volume [sale projects with completed NEPA and field work – ready to offer] to maintain flexibility and stability in the sale program.
- **Objective**: Review the timber sale program and work with state and other partners to implement changes that keep an "economic timber" perspective throughout the process and monitor the implementation of these reforms to ensure they are consistently employed across the Forest.

Local and Regional Economy—Goals and Objectives (USDA 2008b, pg. 2 -5):

- **Goal**: Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska.
- **Objective**: Support a wide range of natural resource employment opportunities within Southeast Alaska communities.

[2] Economic timber is defined as a sale of timber where the average purchaser can meet all contractual obligations, harvest and transport the timber to the purchaser's site, and have a reasonable certainty of realizing a profit from the sale.

Consistent with the forest-wide multiple-use goals and objectives, the Forest Plan also includes area-specific management prescriptions called Land Use Designations (LUDs), each with its own goals and objectives, and specific Standards and Guidelines (USDA 2008b, Chapter 3). The project area includes Timber Production, Modified Landscape, and Old-Growth Habitat LUDs.

The Tongass National Forest must comply with Section 101 of the Tongass Timber Reform Act (TTRA) which states:

> "…the Secretary [of Agriculture] shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle."

Need

The underlying need for the Saddle Lakes Timber Sale comes from the Forest Service's obligation under the TTRA. Forest-dependent communities in Southeast Alaska are facing social, economic, and environmental challenges. As the predominant land manager in Southeast Alaska, the Forest Service plays a critical role in the economic vitality of communities. Local residents rely heavily on natural resource-based industries. The region has experienced a significant decline in harvest levels, which has led to a decline in timber manufacturing and employment.

The Saddle Lakes Timber Sale is proposed at this time to respond to the need for a stable supply of timber from the Tongass National Forest. The Saddle Lakes Timber Sale is essential to providing an orderly flow of timber from suitable timber lands to purchasers of both large and small timber sales, sawmill operators, and value-added wood product industries in Southeast Alaska. These businesses contribute to the local and regional economies. This project would help provide a steady, economical supply of timber that would support local jobs, and help maintain a sustainable wood products industry in Southeast Alaska. Furthermore, it would provide "bridge" timber to help sustain current industry infrastructure and jobs in Southeast Alaska while the Tongass National Forest transitions to a young-growth based timber program (USDA 2013).

Using relevant Forest Plan goals and objectives, the Interdisciplinary Team (IDT) assessed the existing conditions in the Saddle Lakes project area. In comparing the existing conditions to the desired conditions, the IDT identified several opportunities:

1. There is an opportunity to provide a reliable economic supply of sawtimber and other wood products to increase and diversify current levels of the wood products industry;
2. There is an opportunity to provide for resource uses increasing natural resource employment opportunities that would contribute to the local and regional economies of Southeast Alaska;
3. There is an opportunity to improve forest stand health, growth and productivity on commercial forest lands by removing overmature stands and replacing them with faster growing, disease and defect free, young stands; and
4. There is an opportunity to improve fish habitat.

Proposed Action

The proposed action[3] is defined early in the planning process. It serves as a starting point for the environmental analysis, and gives the public and other agencies specific information on which to focus comments. Using these comments and information from preliminary analysis and scoping (see discussion of Significant Issues later in the chapter), the IDT develops alternatives to the proposed action. The alternatives are discussed in detail in Chapter 2.

The responsible official can modify a proposed action or alternatives as the analysis progresses as long as the analysis is done collaboratively and it is clear and obvious to anyone interested. It must also be properly documented (36 C.F.R. § 220.5 (e) (1)). Modifications to the proposed action are discussed and documented in Chapter 2.

The Saddle Lakes Timber Sale would establish a trend toward the desired conditions as described in the Forest Plan. This would be accomplished by responding to the underlying purpose and need (40 C.F.R. § 1502.13) with the following activities:

- Harvest about 30 million board feet (MMBF) of timber from about 2,207 acres of harvest units, using conventional (cable and shovel) and helicopter logging systems, and a combination of even-aged (1,055 acres; 100 percent basal area removal) and uneven-aged (1,152 acres; 33 percent basal area removal) silvicultural systems.
- Construct about 10 miles of NFS road to access timber harvest units which would be stored (i.e., closed) after timber harvest activities are completed.
- Construct about 6 miles of temporary road which would be decommissioned after timber harvest activities are completed.
- Recondition (i.e., re-opening and maintaining closed roads) up to 11 miles of existing NFS road which would be stored after timber harvest activities are completed.
- Reconstruct the Shelter Cove Log Transfer Facility (LTF) by replacing the existing native log bulkhead.
- Modify a naturally occurring partial fish barrier in lower Salt Creek. Explosives would be used to modify the barrier to create a series of low steps and resting pools. All in-channel work would be agreed upon with ADF&G – Division of Habitat.
- Authorize a 300-foot wide by 1 mile long Ketchikan to Shelter Cove right-of-way (ROW) easement on NFS lands to the State of Alaska for construction, operation and maintenance of a 14-foot wide public road (proposed NFS Road 8300280). This road would remain open to motorized use after timber harvest.

Relationship to the Forest Plan

The Forest Plan is based on an extensive forest-level analysis (USDA 2008c) and provides management direction for the Tongass National Forest. The Saddle Lakes Timber Sale analysis and subsequent implementation is designed to achieve the management direction of the Forest Plan as outlined in the purpose and need statement.

Project-level planning provides an additional opportunity (beyond development of the Forest Plan) for public participation. The Saddle Lakes Timber Sale DEIS is a project-level analysis; its scope is

[3] The proposed action is a proposal made by the Forest Service to authorize, recommend, or implement an action to meet a specific purpose and need (FSH 1909.15 Chapter 10).

confined to addressing the significant issues and disclosing the possible environmental effects of the project. The Saddle Lakes Timber Sale DEIS does not attempt to address Forest Plan decisions. However, the DEIS is consistent with applicable direction provided in the Forest Plan.

Forest Plan Land Use Designations

The Forest Plan uses land use designations (LUDs) to guide management of the NFS lands within the Tongass National Forest. Each LUD provides for a unique combination of activities, practices and uses. The Saddle Lakes project area includes three LUDs: Timber Production, Modified Landscape, and Old-growth Habitat (see Figure 3). Goals, objectives and desired conditions of each LUD are summarized below. The Forest Plan contains a detailed description of each LUD (USDA 2008b, Chapter 3). The Saddle Lakes project area also includes non- NFS lands (lands in state or private ownership). No Forest Service harvest or road building activities would occur on these lands. However, past and present and reasonably foreseeable future activities known on these lands are considered in the cumulative effects analysis (see Appendix B).

Table 1 summarizes the acreages and percentages of each LUD, and non-NFS lands (lands in state or private ownership) found within the Saddle Lakes project area.

Table 1. Land use designations and non-National Forest acreages and percentages in the Saddle Lakes project area

Measure	Timber Production LUD	Modified Landscape LUD	Old-growth Habitat LUD	Non-National Forest	Total
Project Area Acres	15,305	16,028	3,565	3,557	38,455
Project Area Percent	40%	42%	9%	9%	100%

Source: Tongass National Forest GIS, 2013. Numbers may not add up due to rounding.

Timber Production LUD

The focus of the Timber Production LUD is to emphasize sustained, long-term timber production. Timber harvest activities are located and designed to meet timber objectives.

Modified Landscape LUD

Management within Modified Landscape LUD emphasizes sustained, long-term timber production while minimizing the visibility of development in the foreground distance zone, and moderating the effects of development in the middle and background distance zones. This recognizes the scenic values of forested lands as viewed from identified Visual Priority Travel Routes and Use Areas (Forest Plan, Appendix F) and provides for modifying timber harvest practices accordingly by reducing the effects to scenery.

Old-Growth Habitat LUD

The focus of this LUD as related to this project is to maintain areas of old-growth forests and their associated natural ecological processes to provide habitat for old-growth associated resources. Timber harvest for timber management objectives is not compatible with this LUD.

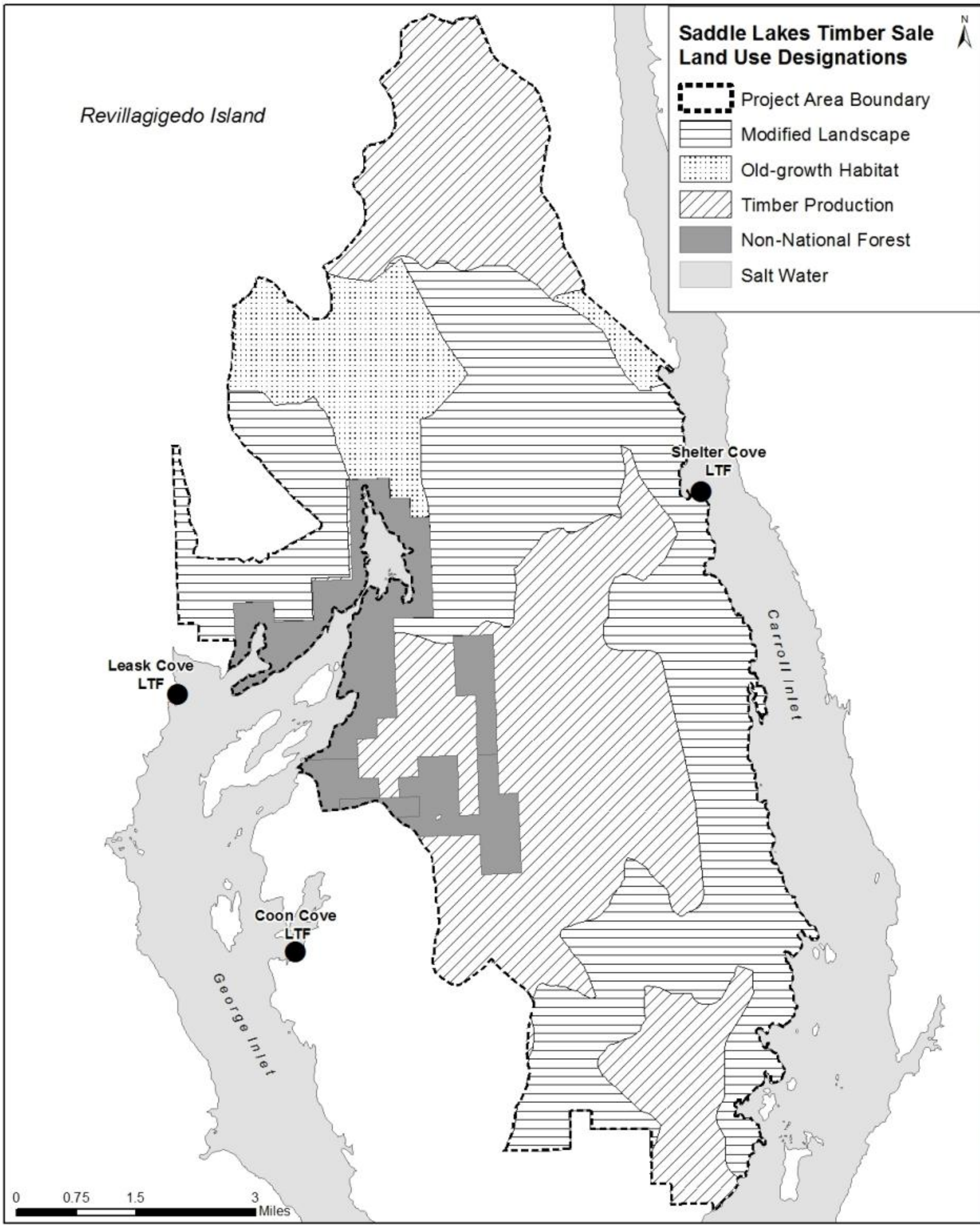

Figure 3. Land use designations in the Saddle Lakes project area

Relationship to the Access and Travel Management Plan

The Saddle Lakes DEIS incorporates by reference the decision of the Environmental Assessment (EA) for the KMRD Access and Travel Management Plan (ATM) (USDA 2008g). The KMRD ATM considered road management objectives (RMOs) for existing roads on the District. The RMOs of existing NFS roads within the Saddle Lakes project area were determined in the KMRD ATM. Newly constructed NFS roads and temporary roads are analyzed in this document.

Decision Framework

The responsible official for the decision on this project is the Forest Supervisor of the Tongass National Forest. Based on the environmental analysis in this EIS, the Forest Supervisor will decide whether and how to make timber available from the Saddle Lakes project area in accordance with Forest Plan goals, objectives and desired conditions. The Forest Supervisor will consider public comments, applicable laws, regulations and policies, and state his rationale in the Record of Decision. The decision will include the following:

- The estimated timber volume to make available from the project, as well as the location, design, and scheduling of timber harvest, road construction and reconditioning, reconstruction of the Shelter Cove LTF, and silvicultural practices to be used;
- Access management measures, including authorizing the State of Alaska ROW on NFS lands;
- Mitigation measures and monitoring requirements;
- Whether or not to modify a small old-growth reserve (OGR) within the project area, which would require a Forest Plan amendment;
- Whether or not to remove Visual Priority Routes (VPR) designations within the project area, which would require a Forest Plan amendment;
- Whether there may be a significant restriction on subsistence uses; and
- Whether to modify a natural fish barrier on Salt Creek.

Public Involvement

Public involvement is a key component of the planning process. The following paragraphs describe the public involvement activities that have occurred for the project area analysis.

Scoping

The Council on Environmental Quality (CEQ) defines scoping as "[a]n early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 C.F.R. § 1501.7). Among other things, the scoping process is used to invite public participation, to help identify public issues, and to obtain public comment at various stages of the EIS process. The intent of scoping is to focus the analysis on significant issues and reasonable alternatives. Although scoping is to begin early, it is really a process that continues until a decision is made.

The Saddle Lakes Timber Sale has been listed on the Tongass National Forest 5-Year Timber Sale Action Plan since June 2008, the Tongass National Forest public webpage since April 2012, and included in the Tongass National Forest Schedule of Proposed Actions since July 2012. These documents are available online (http://www.fs.usda.gov/tongass/).

Notice of Intent

A Notice of Intent (NOI) for the Saddle Lakes Timber Sale DEIS was published in the Federal Register (FR) on May 8, 2012 (77 FR 27013-27015). The 30-day comment period ended on June 7, 2012.

A corrected NOI was published on June 17, 2013 (78 FR 36164 – 36165). The corrected NOI was published because of the length of time that passed since the first Saddle Lakes Timber Sale NOI was published, and changes in the dates that the Draft and Final Environmental Impact Statements are expected. Additionally, the United States Department of Agriculture published a final rule on March 27, 2013 (78 FR 18481-18504) to establish a new process by which the public may file objections seeking predecisional administrative review of proposed projects and activities implementing land management plans documented with a Record of Decision or Decision Notice (reference 36 C.F.R. § 218). This new process replaces the administrative appeals process at 36 C.F.R. § 215.

Public Mailings

On May 2, 2012, a scoping notice seeking public comment on the Proposed Action for the Saddle Lakes Timber Sale was mailed to 89 individuals and groups that had previously shown interest in Forest Service projects in Southeast Alaska. This included federal and state agencies; Alaska Native organizations; municipal offices; businesses; interest groups; and individuals. A total of seven responses to this mailing were received. The comments are filed in the project record.

On June 7, 2013, an update letter was sent to the respondents who previously commented during the initial scoping of the NOI. The letter indicated the changes in the dates that the Draft and Final EIS are expected. The letter also indicated that the EIS was subject to the new objections process (36 C.F.R. § 218) rather than the former administrative appeals process (36 C.F.R. § 215).

On April 4, 2014, an update letter was sent to the respondents who previously commented during the initial scoping of the NOI to share some modifications the responsible official made to the proposed action, as well as to provide an update on the anticipated DEIS Notice of Availability (NOA). The responsible official can modify a proposed action or alternatives as the analysis progresses as long as the analysis is done collaboratively and it is clear and obvious to anyone interested. It must also be properly documented (36 C.F.R. § 220.5 (e)(1)).

Local News Media

A news article about the Saddle Lakes project was printed in the Ketchikan Daily News on May 7, 2012.

Consultation with Tribal Governments

Executive Orders 13084 and 13175 require that federal agencies consult with tribes during planning activities. Government-to-government consultation with federally recognized tribal governments and meetings with traditional tribal governments have taken place as follows:

- Prior to January 2012, the Ketchikan-Misty Fiords District Ranger and/or District staff periodically emailed or met with tribal committees of the Ketchikan Indian Community, Metlakatla Indian Community, and Organized Village of Saxman and provided information on the Saddle Lakes Timber Sale.
- Since January 2012, the Ketchikan-Misty Fiords District Ranger and/or District staff have met monthly with tribal councils of the Ketchikan Indian Community, Metlakatla Indian Community,

and Organized Village of Saxman and provided information and project updates on the Saddle Lakes Timber Sale.

Other Federal and State Agency Involvement

The Forest Service is committed to working closely with other federal and state agencies at all stages of planning, and is responsible for coordinating project reviews by other agencies. In some cases, the reviews are required because another agency has the authority to issue permits for a specific activity proposed by the Forest Service. In other cases, the reviews provide a time for dialogue with agencies responsible for ensuring that certain environmental conditions are met, such as clean water or healthy wildlife populations. This interagency communication helps provide information about area resources. This information is used to meet laws and regulations, develop alternatives and to identify ways to avoid or mitigate environmental effects. In many cases, an ongoing professional dialogue is maintained with these agencies throughout the planning process.

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) provides a general review in accordance with their responsibilities under NEPA, Section 309 of the Clean Air Act, and Section 402 of the Clean Water Act.

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) has authority for fisheries management, species protection, and habitat conservation activities derived primarily from the Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, and Endangered Species Act (ESA). This includes all marine life, anadromous salmon, and Essential Fish Habitat. The Forest Service consults with NMFS concerning possible effects to these species.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) is responsible for approving proposals to dredge or place fill materials in the coastal waters of the United States under Section 404 of the Clean Water Act. The USACE also has administrative authority over activities associated with wetlands. Any road construction in wetlands, or any fill or removal of material from streams, wetland, or marine environment is of interest to USACE, and the Forest Service must consider and reduce effects on those areas.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) has legal jurisdiction over a host of federal legal mandates including the Endangered Species Act, Federal Water Pollution Control Act ("Clean Water Act"), Migratory Bird Treaty Act, Bald Eagle Act, and Rivers and Harbors Act. The Forest Service has ongoing consultation with the USFWS to determine if the proposed project will affect threatened or endangered species.

State of Alaska

The State of Alaska was involved in the development of the Forest Plan and the Memorandum of Understanding (MOU) for Economic Timber Sales.

Several departments in the State of Alaska were invited to participate in the planning of this project. They provided general comments and suggestions, as well as specific reviews. These departments include:

Alaska Department of Environmental Conservation

The Alaska Department of Environmental Conservation (ADEC) is part of the interagency team to review OGRs and participates in cooperative water quality management through Section 319 of the Clean Water Act and a Memorandum of Agreement with the Forest Service (MOA 1992). ADEC also issues a certificate of compliance with Alaska Water Quality Standards under Section 401 of the Clean Water Act for log transfer facilities (LTFs).

Alaska Department of Fish and Game

The Forest Service and Alaska Department of Fish and Game (ADF&G) have responsibilities to cooperate in the common stewardship of fish and wildlife and their habitats on NFS lands. ADF&G is especially interested in instream activities and other fish, wildlife, and subsistence issues.

ADF&G and the Forest Service have a MOU to protect fish habitat and fish passage, and reach concurrence prior to conducting any instream activities (MOU 2009a). A Title 16 concurrence must be reached before any work occurs below the ordinary high water for fish-bearing water bodies that may use, divert, obstruct, pollute, or change the natural flow or bed of water bodies.

Discussions on wildlife habitat in regards to this project have occurred between representatives from ADF&G Wildlife Conservation and Habitat Divisions and the Forest Service. Further, ADF&G Wildlife Conservation has taken part in field reviews with Forest Service personnel of units and habitat within the Saddle Lakes project area.

There is a MOU between the State of Alaska and the Forest Service for implementing the Tongass Forest Plan and environmental analyses (MOU 2009b). An ADF&G Habitat Biologist works with Forest Service IDTs in the design and/or review of old growth and young growth commercial timber sales.

Alaska Department of Natural Resources

The Alaska Department of Natural Resources (ADNR) manages all state-owned land, water and natural resources, except for fish and game, on behalf of the people of Alaska. Within ADNR are several divisions and offices that reflect its major programs.

Division of Forestry

The Division of Forestry (DOF) manages forests for multiple uses and the sustained yield of renewable resources for the State of Alaska. The DOF is also involved in a MOU between the State of Alaska and the Forest Service for implementing the Tongass Forest Plan and environmental analyses (MOU 2009b). A State Forester also works with Forest Service planning IDTs in the design and/or review of old growth and young growth commercial timber sales. The DOF assisted in reconnaissance of the Saddle Lakes project area, and consultation with the IDT regarding economic timber harvest.

Division of Mining, Land, and Water

The Division of Mining, Land, and Water (DMLW) issues tideland permits and the lease or easement necessary for the log transfer facility (LTF) sites.

Office of Project Management and Permitting

The Office of Project Management and Permitting (OPMP) provides overall coordination for the state’s comments for federal projects in the State of Alaska. Because of the complexity and potential impact of these projects on multiple divisions or offices, OPMP acts as a single primary point of contact. OPMP has a coordinator who acts as single primary point of contact for Tongass National Forest projects.

Division of Parks and Outdoor Recreation
Alaska Office of History and Archeology

The Alaska Office of History and Archeology carries out the responsibilities of the State Historic Preservation Officer (SHPO). The SHPO is responsible for participating in the review of federal, state, and local undertakings that may affect historic properties.

Under the terms of the existing Programmatic Agreement with the SHPO and the Advisory Council on Historic Preservation (USDA 2010), it was determined by the Forest Service Archeologist on September 18, 2013, with concurrence by the SHPO on September 30, 2013, that no historic properties would be affected by any of the proposed alternatives.

Federal and State Permits, Licenses, and Certifications

Various permits are required before implementation of the project. The permits that may be needed and authorizing agencies are listed below:

U. S. Army Corps of Engineers (USACE)

- Discharge approval of dredged or fill material into waters of the United States (Section 404 of the Clean Water Act of 1977, as amended).
- Approval of construction of structures or work in navigable waters of the United States (Section 10 of the Rivers and Harbors Act of 1899).
- For road construction a 404 permit from the USACE is not necessary because roads constructed as part of this project are for silvicultural purposes and follow the 33 C.F.R. § 323 guidelines and Best Management Practices (BMPs) to avoid and minimize impacts to wetlands.
- The proposed fish passage enhancement project at Salt Creek would require a 404 permit from the USACE.

U. S. Environmental Protection Agency (EPA)

- National Pollutant Discharge Elimination System review (Section 402 of the Clean Water Act). Should it be determined that a NPDES permit is required for this project, the Forest Service will comply with any applicable NPDES permitting requirements.

State of Alaska, Department of Environmental Conservation (ADEC)

- Certification of compliance with Alaska Water Quality Standards (Section 401 Certification).
- Solid Waste Disposal Permit (Section 402 of the Clean Water Act).
- Renewal of an Alaska Pollutant Discharge Elimination System (APDES) general permit AKG-70-1000 allowing for the discharge of bark and wood debris associated with in-water log transfer and log storage.

State of Alaska, Department of Natural Resources (ADNR)

- Authorization for occupancy and use of tidelands and submerged lands at Shelter Cove.

State of Alaska, Department of Fish and Game, Habitat Division (ADF&G)

- A Title 16 concurrence must be reached before any instream work occurs below the ordinary high water of any fish-bearing water bodies. This includes culvert replacement or removal and instream fish barrier modification.

Issues

The Council on Environmental Quality (CEQ) explains that issues may be identified through scoping, and that only significant issues must be the focus of the environmental document (40 C.F.R. §§ 1501.7(a)(2), 1501.7(a)(3), 1502.1, and 1502.2(b)). Issues for the Saddle Lakes Timber Sale were identified through internal Forest Service staff and externally through public scoping with interested and affected members of the public, federal and state agencies, tribal governments, and organizations. Issues are best identified during scoping early in the process to help set the scope of the actions, alternatives, and effects to consider. Due to the iterative nature of the NEPA process, additional issues may come to light at any time.

For the purpose of Forest Service NEPA analysis, an “issue” is a point of disagreement, debate, or dispute with a proposed action based on some anticipated environmental effect. An issue is more than just a position statement, such as disagreement with timber harvest on NFS lands. An issue:

- has a cause and effect relationship with the proposed action or alternatives;
- is within the scope of the analysis;
- has not been decided by law, regulation, or previous decision; and
- is agreeable to scientific analysis rather than conjecture.

The IDT used a systematic process to analyze all comments received during scoping to identify issues. Both internal and external scoping comments received were considered for this project. The Forest Service received seven scoping response letters, from which 177 individual comments were generated. Each comment or issue was discussed and evaluated to determine whether the comment or issue is:

- addressed by Forest Plan LUDs;
- addressed through implementation of Forest Plan Standards and Guidelines and Best Management Practices (BMPs);
- addressed through implementation of project-specific mitigation measures;
- addressed during processes or analyses routinely conducted by the IDT;
- addressed through spatial location of actions during alternative design;
- used to drive or partially drive an alternative;
- beyond the scope of the project; and
- other requests or comments.

The issues identified were categorized as either significant or non-significant. This process was used to ensure that all significant issues were identified, and that all other issues and concerns were meaningfully considered in this analysis. Similar issues were combined into one statement where appropriate. Results of the IDT issue identification process and a summary of all scoping comments are available in the project record.

Significant Issues

Significant issues are those related to significant or potentially significant effects caused directly or indirectly by implementing the proposed action. The term “significant issues” is used when there may be a cause-effect relationship between a proposed action and a significant effect, and the disclosure of that effect is documented in an EIS (FSH 1909.15 Chapter 10, Section 12.41).

The following issues were determined to be significant and within the scope of the project decision. Significant issues were used to highlight significant effects or unintended consequences that may occur from the modified proposed action, providing opportunities during the analysis to explore alternative ways to meet the purpose and need while reducing adverse effects. Chapter 2 of this DEIS discusses and compares these alternatives in terms of the significant issues.

Units of measure are defined to identify how each alternative responds to a significant issue. The measures chosen were quantitative where possible; predictable; responsive to the issue; and linked to cause- effect relationships. These measures describe how the alternative affects the resource or resources central to the issue.

Issue 1. Timber Economics

Issue Statement: An economical timber sale would support the local and regional economies of Southeast Alaska.

Lack of a steady supply of economic timber can adversely affect the viability of Southeast Alaska’s forest products industry and the ability of the industry to contribute to the diversity and stability of local and regional economies. The Saddle Lakes project is one component of this supply. To compare the alternatives, analyses included the quantity and quality of timber offered costs of road construction, reconstruction and maintenance, and costs associated with logging systems and silvicultural prescriptions. A broader discussion about the Tongass National Forest timber program is in Appendix A of this EIS.

Units of Measure:

- Indicated advertised rate (dollars per MBF);
- Acres by logging system (shovel, cable, helicopter);
- Volume of timber by species (net sawlog and net utility wood, in MBF and MMBF);
- Road construction/reconditioning costs and LTF costs (dollars per MBF);
- Logging costs (dollars per net MBF removed, without utility);
- Total production costs (stump-to-mill, roads, and manufacturing costs in millions of dollars); and
- Employment supported by the project (number of annualized jobs).

Issue 2. Timber Availability

Issue Statement: Availability of timber within the project area that is allowed to be harvested under the Forest Plan affects a stable supply of timber to meet local and regional timber demand.

Issue 2 addresses concerns about the availability of timber within the project area. This was most recently described in the 2008 Forest Plan Amendment FEIS (USDA 2008c, p. A-5) as Key Issue 2:

"The Tongass National Forest needs to seek to provide a sufficient timber supply to meet the market demand and help maintain a vibrant economy in Southeast Alaska."

This project proposes two amendments to the 2008 Forest Plan. One involves relocating a portion of small old-growth habitat reserve LUD into the North Revilla Inventoried Roadless Area. This action would provide additional suitable timberlands (USDA 2008b, p. A-1) within the project area. The other proposed amendment would remove Visual Priority Route (VPR) designations, in order to meet less-restrictive Forest Plan Standards and Guidelines. As a result, additional even-aged management and larger harvest units could be prescribed at this time, thereby increasing the timber harvest volume for this project.

Units of Measure:

- Changes in acres of suitable timberlands due to modification of the small old-growth reserve; and
- Changes in acres by Scenic Integrity Objective levels.

Issue 3. Wildlife Habitat and Subsistence Use

<u>Issue Statement:</u> Timber harvest and road construction, combined with past management activities, would affect wildlife habitat and could affect subsistence use.

Public and agency comments, as well as internal scoping, expressed concerns about project effects on wildlife and wildlife habitat and old-growth connectivity, and subsistence use in the project area. Of special concern are project effects on deer because of their importance to wolves and subsistence users. The project area includes low-elevation (less than 1,500 feet), old-growth habitat important for old-growth dependent wildlife species. Removing old-growth habitat fragments wildlife habitat and leads to a loss of old-growth connectivity.

Because of its proximity to the residents of Ketchikan and Saxman, the Saddle Lakes project area is considered an important deer hunting area for these communities. The cumulative effects on old-growth habitat associated with additional harvest, combined with past harvest and increasing road density were noted concerns.

Units of Measure (Issue 3A: Wildlife Habitat):

- Percent reduction from historic and existing acres of habitat by wildlife species (using size-density model [SDM] habitat classifications) at the Value Comparison Unit (VCU), and/or Wildlife Analysis Area (WAA) scale;
- Connectivity/Fragmentation in the project area by alternative (corridor analysis, reduction of POG acres, change in patch size);
- Open and total road density (miles per square mile) at analysis scales specific to wolf and marten requirements; and
- Deer model habitat capability (DHC) and density.

Unit of Measure (Issue 3B: Subsistence Use):

- Deer abundance and competition estimated by hunter demand as a percent of DHC.

Issue 4. Scenery and Recreational Opportunities

Issue Statement: Timber harvest and road construction could affect the scenery and recreational opportunities in the Saddle Lakes project area.

Internal concerns were expressed regarding the effects that timber harvest would have on areas visible from Visual Priority Routes and Use Areas (VPRs). The five VPRs in or adjacent to the project area include: planned Saddle Lakes Recreation Area (see Figure 9), Harriet Hunt (Ketchikan) to Shelter Cove Connection Road, Shelter Cove Boat Ramp, Carroll Inlet, and George Inlet. Changes to recreational opportunities may occur because of road construction and timber harvest.

Internal concerns were expressed regarding the planned Saddle Lakes Recreation Area, which is the most likely place in the project area for dispersed camping, kayaking and canoeing. The proposed easement would provide the needed link across National Forest Service lands to allow the State to connect the community of Ketchikan to the Shelter Cove LTF and the opportunities for recreation in that area.

Units of Measure (Scenery):

- Acres of timber harvest by silvicultural prescription within areas of High and Moderate Scenic Integrity Objective (SIO);
- Miles of road construction within project areas of High and Moderate SIO;
- Acres of timber harvest by silvicultural prescription within the planned Saddle Lakes Recreation Area viewshed; and
- Project area acres that will change SIO if Visual Priority Routes (VPR) designations are removed.

Unit of Measure (Recreation):

- Changes to Recreation Opportunity Spectrum (ROS) system classification (acres).

In addition to these units of measure, a qualitative discussion of the project's effects on the recreational opportunities and experience in the project area is included.

Issues and Concerns Considered Non-Significant

While many issues may arise during scoping, not all of the issues raised warrant analysis in an EIS. NEPA documents must concentrate on the issues truly significant to the action in question, rather than amassing needless detail (40 C.F.R. § 1500.1(b)). This ensures that the analysis and documentation is focused primarily on the issues related to significant or potentially significant effects and the decision to be made.

The CEQ regulations direct the Forest Service to identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (1506.3), narrowing the discussion of these issues in the statement to a brief presentation of why they will not have a significant effect on the human environment or providing a reference to their coverage elsewhere (40 C.F.R. § 1501.7(a) (3)).

The following issues and concerns were discussed and evaluated, but determined to be non-significant and were not used to drive alternatives. The rationale for why these issues were determined to be non-significant is included below.

Aquatic Habitat (Fisheries/Hydrology/Watersheds)

External concerns were expressed that the cumulative effects of past and proposed harvest, and existing and proposed roads in the project area may increase sedimentation and stream temperatures, and impact aquatic habitat. The project area includes a number of streams and lakes, and contains both high quality anadromous and resident fish habitat. Concerns regarding protection of water resources will be addressed through implementation of Forest Plan Standards and Guidelines and Best Management Practices (BMPs) (see Appendix C) and during processes or analyses routinely conducted by the IDT. See the Aquatics section in Chapter 3.

Sensitive and Rare Plants – Pacific Silver Fir

One external comment requested that units containing Pacific silver fir (*Abies amabilis*) should not be harvested. During internal scoping for this project, effects of timber harvest on Pacific silver fir was initially considered as a significant issue due to the fact that the project area is the northern extent of its range in the Pacific Northwest. Specifically, regeneration of Pacific silver fir was the central issue. This issue was addressed during alternative design and after analysis (see rare plant resource report, Dillman 2014) was dropped from further consideration. The proposed action was designed to minimize impacts to Pacific silver fir by including uneven-aged management (33 percent basal area removal) silvicultural systems.

After vegetation field surveys for the occurrence of Pacific silver fir in the project area and its overall distribution forest-wide, it was determined that implementation of Forest Plan Standards and Guidelines would address the regeneration concerns raised during internal scoping. Forest Plan Standards and Guidelines direct the Forest Service to "avoid, minimize, or mitigate adverse effects to rare plant populations (PLA1, III.C. pg. 4-41)." While this conifer is designated "rare" according to Alaska Natural Heritage Program (ANHP) database, it is officially designated as "rare or uncommon in the state" and is "demonstrably secure globally."

Clearcutting

One external comment expressed concerns regarding clearcutting that economic considerations alone do not justify clearcut prescriptions. Other external commenters expressed concerns that clearcutting was necessary for sale economics. The Forest Service will seek to reduce clearcutting when other harvest cutting methods will meet land management objectives per Forest Plan LUD objectives. When clearcutting is determined to be the appropriate logging system, justification will be provided. The Silviculture section in Chapter 3 provides a discussion about the justification for clearcutting.

Climate Change

External comments expressed concerns about the uncertainties of climate change, including climate change effects on the natural regeneration of yellow cedar, and greenhouse gas emissions resulting from project activities. One external respondent asked that the Forest Service follow the updated (June 2012) CEQ Federal Greenhouse Gas Accounting and Reporting Guidance (part of President Obama's Executive Order 13514) that establishes requirements for federal agencies in calculating and reporting GHG emissions associated with agency operations. Upon review of this CEQ guidance, GHG emissions resulting from the Saddle Lakes Timber Sale are considered Scope 3 GHG emissions. As stated in this guidance, "While agencies are not required to report emissions related to their vendors and contractors at this time, agencies may Voluntarily begin to identify their vendor and contractor (supply chain) emissions." Currently the Agency does not have an accepted tool for analyzing all GHG emissions.

This issue was addressed during processes or analyses routinely conducted by the IDT. In January 2009, national guidance was developed for the Forest Service to address climate change in project-level NEPA analyses. Complete quantifiable information about project effects on global climate change is not currently possible and is not essential to a reasoned choice among alternatives (USDA 2009a), but a qualitative analysis of climate change is provided in the Air Quality and Climate Change section in Chapter 3.

Deferred Road Maintenance

External concerns were expressed that within the Saddle Lakes project area there are deferred road maintenance and culvert issues, and repair should be included as part of the project. Road reconditioning is heavier maintenance of an existing (Maintenance Level 1) road, in storage to restore the road to the original constructed standard for use during timber harvest operations. Road reconditioning is included on up to 11.1 miles of existing National Forest System road in the project area and may include culvert replacement, surface rock replacement and subgrade repair. Additional maintenance of NFS roads in the project area may occur before, during, and after this project analysis. The Forest Service Maintenance Management System provides a systematic process for field units to effectively and efficiently manage their road maintenance programs. Road maintenance of existing NFS roads is an ongoing process that occurs on a periodic basis. The Tongass National Forest prepares an annual road maintenance plan (FSM 7732.11) that establishes priorities to ensure that available funding is directed to the highest priority work. Normally this type of work is determined to fit the category of routine repair and maintenance of roads that do not individually or cumulatively have a significant effect on the quality of the human environment and may be categorically excluded (FSH 1909.15, 32.1.12). Any effects from ongoing road maintenance work are included in the effects analysis for this project. Road maintenance is discussed in the Transportation section in Chapter 3.

Soils and Slope Stability

External comments expressed concerns regarding proposed timber harvest and road building on steep slopes, especially as it pertains to slope stability, erodible soils and potential increased sedimentation (see Aquatic Habitat above), and windfirmness of stands. These concerns will be addressed through implementation of Forest Plan Standards and Guidelines and BMPs (see Appendix C). This issue was addressed during analyses routinely conducted by the IDT. The effects of timber harvest and road construction on the soils resource is analyzed in the Soils section in Chapter 3 of this DEIS.

Other Resource Considerations

Other resource concerns are important, but were not used to drive the development of alternatives. Other resource considerations in this analysis are listed below. A detailed discussion of the effects to various other resources and protection measures can be found in the individual resource reports located in the project planning record. These resource considerations are summarized in Chapter 3 of this DEIS and include the following:

- Air Quality and Climate Change
- Aquatic Resources
- Environmental Justice
- Heritage Resources
- Invasive Plants
- Inventoried Roadless Areas
- Lands and Minerals
- Plants
- Silviculture
- Socioeconomics
- Soils
- Transportation
- Wetlands

Applicable Laws and Executive Orders

Shown below is a partial list of federal laws and executive orders pertaining to project-specific planning and environmental analysis on federal lands. While most pertain to all federal lands, some of the laws are specific to Alaska. Disclosures and findings required by these laws and orders are contained in Chapter 3 of this DEIS.

- Alaska Native Claims Settlement Act (ANCSA) of 1971;
- Alaska National Interest Lands Conservation Act (ANILCA) of 1980;
- American Indian Religious Freedom Act of 1978;
- Archeological Resource Protection Act of 1979;
- Bald and Golden Eagle Protection Act of 1940 (as amended);
- Clean Air Act of 1970 (as amended);
- Clean Water Act (CWA) of 1977 (as amended);
- Endangered Species Act (ESA) of 1973 (as amended);
- Executive Order 11593 (Cultural Resources);
- Executive Order 11988 (Floodplains);
- Executive Order 11990 (Wetlands);
- Executive Order 12898 (Environmental Justice);
- Executive Order 12962 (Aquatic Systems and Recreational Fisheries);
- Executive Order 13007 (Indian Sacred Sites);
- Executive Order 13175 (Government-to-Government Consultation);
- Executive Order 13443 (Facilitation of Hunting Heritage and Wildlife Conservation);
- Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended);
- Magnuson-Stevens Fishery Conservation and Management Act of 1996;
- Marine Mammal Protection Act of 1972;
- Migratory Bird Treaty Act of 1918 (as amended);
- Multiple-Use Sustained-Yield Act (MUSYA) of 1960;
- Native American Graves Protection and Repatriation Act (NAGPRA) of 1990;
- National Environmental Policy Act (NEPA) of 1969 (as amended);
- National Forest Management Act (NFMA) of 1976 (as amended);
- National Historic Preservation Act (NHPA) of 1966 (as amended);
- National Transportation Policy (2001);
- Organic Act of 1897;
- Rivers and Harbors Act of 1899;
- Tongass Timber Reform Act (TTRA) of 1990

Availability of the Project Record

An important consideration in preparing this DEIS is the reduction of paperwork specified in 40 C.F.R. § 1500.4. This DEIS provides sufficient site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and ways to mitigate the impacts. The project record contains documentation of the NEPA process, and analysis of the effects of the project.

The DEIS is available online at http://www.fs.fed.us/r10/tongass/projects/projects.shtml or copies of this DEIS may be obtained from the Ketchikan-Misty Fiords Ranger District. Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Ketchikan-Misty Fiords Ranger District office in Ketchikan, Alaska.

Reference documents, such as the Forest Plan and the Forest Plan FEIS are available for review at Forest Service offices throughout Southeast Alaska, including the Forest Supervisor's office in Ketchikan. The Forest Plan is available on-line (see Tongass National Forest website).

Map and Data Disclaimers

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Chapter 2. Alternatives

Introduction

This chapter describes and compares the alternatives considered by the Forest Service for the Saddle Lakes Timber Sale. The chapter includes a discussion of how the alternatives were developed, monitoring and other features common to all action alternatives, a description and map of each alternative considered in detail, and a comparison of these alternatives focusing on the significant issues identified in the interdisciplinary process. Alternative 4 is identified as the Preferred Alternative.

NEPA directs the Forest Service to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources…" (42 U.S.C. § 4332). In addition, the CEQ regulations require agencies to "rigorously explore and objectively evaluate all reasonable alternatives…" as well as those other alternatives, which are eliminated from detailed study with a brief discussion of the reasons for eliminating them. (40 C.F.R. § 1502.14 (a)).

Based on the information and analysis described in the Affected Environment and Environmental Consequences sections in Chapter 3, Chapter 2 presents the environmental impacts of the proposal and alternatives in comparative form. This comparison is intended to sharply define the issues and provide a clear basis for choice among options by the decision maker and the public (40 C.F.R. § 1502.14).

Alternative Development

An alternative is a set of activities designed to meet the purpose and need for the project as described in Chapter 1. The purpose and need statement helps define the range of alternatives. The range of alternatives explores alternative means of meeting the purpose and need for this project.

The proposed action (Alternative 2) is one approach to meeting the purpose and need for the project and was developed during the early planning phase of this project. The planning phase included completing a Logging System and Transportation Analysis (LSTA) for the project area (USFS 2007). During and after the 2007 analysis, the suitable and available timber in the project area was divided into logical harvest settings. These groups of settings were used to create the harvest unit pool. In addition, the roads needed to access the harvest unit pool were identified. Survey of these units and the roads is ongoing. A number of units and roads were dropped because they were determined to be uneconomical or inconsistent with Forest Plan direction.

Alternative 2 was modified based on: scoping comments, internal comments from the IDT and Responsible Official, additional field verification, storm damage to the Shelter Cove Log Transfer Facility (LTF), and ongoing collaboration between the Forest Service and the State of Alaska regarding the proposed Ketchikan to Shelter Cove Road. Table 2 summarizes these modifications.

Table 2. Modifications to the proposed action

Measure	As Scoped	As Modified	Change
Harvest acres	2,613 acres	2,207 acres	-406 acres
Volume	33 MMBF	30 MMBF	-3 MMBF
Total road construction	19 miles	16 miles	-3 miles
NFS road	9.3 miles	10 miles	+0.7 mile
Temporary road	9.2 miles	6 miles	-3.2miles
Road reconditioning	N/I	10.8 miles	+10.8 miles
Shelter Cove LTF	existing Shelter Cove LTF	reconstruct Shelter Cove LTF	New Action
Fish enhancement	N/I	fish passage partial barrier modification at Salt Creek	New Action
State of Alaska ROW[1/]	N/I	300 feet x approx.1 mile ROW	New Action

Notes: MMBF = million board feet; N/I = Not Included; ROW = Right-of-Way
1/ State of Alaska ROW on NFS lands

Forest Service resource specialists make up the interdisciplinary team (IDT). The IDT considered various alternatives to the proposed action to provide a reasonable range of options for meeting the purpose and need for the action. Alternatives were designed to address the issues identified during scoping (see Chapter 1), and to meet Forest Plan Standards and Guidelines (see Appendix C) and applicable laws. Within this range, various combinations of alternatives can be considered in determining the selected alternative.

In response to comments received during the Saddle Lakes scoping process, the responsible official asked the IDT to investigate maximizing available timber in the roaded portions of inventoried roadless areas (IRAs), and redesigning the OGRs to exclude any roaded portions. Harvesting timber in the roaded portion of the IRAs was eliminated from detailed analysis. Since the Forest Plan allows for modification of the size and location of an OGR (USDA 2008b, Appendix K), an alternative to maximize timber availability was developed that includes harvest units in the roaded portion of the current small OGR in VCU 7470.

On March 12, 2013, a project-level review was conducted by an Interagency Review Team comprised of U.S. Fish and Wildlife Service (USFWS), Alaska Department of Fish and Game (ADF&G), and Forest Service biologists. The Interagency Review Team reviewed the locations of the OGR with regard to roadless areas and their biologically preferred locations. The OGR was relocated to be wholly within the North Revilla IRA and the resulting area designated as Modified Landscape LUD.

Alternatives Considered but Eliminated from Detailed Analysis

Several alternatives were considered during the planning process, but have not been included in this DEIS for detailed study. Federal agencies are required by NEPA to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 C.F.R. § 1502.14 (a)). Public comments and internal scoping provided suggestions for alternatives in response to the proposed action, and for meeting the purpose and need of the project. Some of these alternatives were considered to be outside of the scope of this project, already decided by a law, regulation, or the Forest Plan, irrelevant to the decision to be made, or not supported by scientific or factual evidence.

These alternatives are described briefly below, along with the reasons for not considering them further in detail.

Timber Harvest from Roaded Portion of Roadless Areas

As part of Alternative 5 the IDT looked at maximizing timber harvest, including harvest within the roaded portion of the 2001 Inventoried Roadless Areas (IRAs) to address Issue 2 (Timber Availability). The IDT determined that there are approximately 250 acres of potential harvest units within roaded IRAs. Harvesting units in the roaded portion of the IRAs was eliminated from detailed analysis because the 2001 Roadless Area Conservation Rule prohibits timber harvest in IRAs, and does not meet the exceptions outlined in 36 C.F.R. § 294.13 (b)(4). This aspect of Alternative 5 was eliminated from further consideration.

On March 26, 2014 the Ninth Circuit Court of Appeals reversed the District Court's decision concerning the exemption of the Tongass National Forest from the Roadless Rule, remanding the case to the District Court to decide whether a supplemental EIS is required for the Tongass exemption. At the present time, the Roadless Rule remains in effect in Alaska because the Ninth Circuit's order in *Organized Village of Kake v. USDA, No. 11-35517*, is not yet final.

Rare and Sensitive Plants Alternative – Pacific Silver Fir

As discussed under Issues and Concerns Considered Non-Significant in Chapter 1, harvest and regeneration of Pacific silver fir was initially considered as a significant issue (see Chapter 1) and therefore an alternative was considered. Implementation of Forest Plan Standards and Guidelines will minimize adverse effects to other sensitive and rare plant populations and address any concerns. Therefore, this alternative was eliminated from detailed analysis.

Small Sales Alternative

One respondent requested that a small sales alternative be considered. Unit packaging is a contracting decision; not part of a NEPA decision. The timber volume in any action alternative could be separated administratively into timber sales of varying size and complexity. Each action alternative includes many harvest units suitable for small timber sale offerings. Therefore, creating an alternative was not necessary. Additionally, an alternative solely designed to provide timber for small sales was determined not to be consistent with the project's purpose and need to contribute to a long-term supply of economic timber for the timber industry on the Tongass National Forest (including both large and small operators), in a manner that is consistent with the multiple-use goals and objectives of the Forest Plan.

Items Common to All Action Alternatives

The following components are included in the action alternatives:

Road Management

All Saddle Lakes action alternatives have been analyzed using the same road management objectives (RMOs) for existing National Forest System (NFS) roads as the Ketchikan-Misty Fiords Ranger District Access and Travel Management Plan (KMRD ATM) Environmental Assessment (EA) analysis (USDA 2008g) and determined by the decision on the EA. The Saddle Lakes Timber Sale also analyses any proposed NFS roads for access and travel management requirements. All new construction would be from the existing road system. All new NFS roads and reconditioned roads would be closed to public motorized use except for about 1 mile of newly constructed NFS Road

8300280 within the proposed State of Alaska ROW. All temporary roads would be decommissioned after timber harvest.

Road reconditioning is heavier maintenance and restoration of an existing stored (Maintenance Level 1) road to the original constructed standard for use during timber harvest operations. Road reconditioning is needed on up to 11.1 miles of existing National Forest System road and may include culvert replacement, surface rock replacement and subgrade repair. All new fish stream crossings will provide fish passage.

Windthrow and Reasonable Assurance of Windfirmness Buffers

Silvicultural prescriptions considered the need for the addition of reasonable assurance of windfirmness (RAW) buffers. RAW buffers provide additional protection to riparian management areas (RMAs) that may be affected by windthrow. This is in addition to each Forest Plan minimum stream buffer prescribed on Class I, II, and III streams.

Log Transfer Facilities

There are two existing LTFs in or near the project area; one at Shelter Cove and the other at Leask Cove. The Shelter Cove LTF is owned and permitted by the Forest Service, and would be used to transport logs. Storms in 2013 damaged the Shelter Cove LTF enough to require reconstruction. Reconstruction would include replacement of the log bulkhead.

The Leask Cove LTF is not federally owned. The State of Alaska Division of Forestry (DOF) has applied for a long-term authorization. Agreements would need to be sought by the purchaser, as well as permits from regulatory agencies to use this LTF. All action alternatives were developed using the FASTR financial tool to evaluate the use of the Shelter Cove LTF for domestic processed wood. Export timber would be transported via water from Shelter Cove to Leask Cove, which is an approved export point to ship the wood out of state.

Fish Passage Barrier Modification

A fish passage barrier modification at lower Salt Creek (ADF&G Anadromous Catalog # 101-45-10380), is proposed to allow improved access for coho salmon and steelhead to about 5 miles of upstream habitat and 73 acres of lake habitat. The 60 foot long cascade is located 0.25 mile above the intertidal zone, and is about 12 feet in vertical height. Coho salmon and steelhead can pass this naturally occurring partial barrier at only certain flows. Modifying the barrier will allow improved access for these fish at all flow stages. Explosives would be used to modify the barrier, creating a series of low step and resting pools for upstream fish migration.. All in-channel work would be agreed upon with the ADF&G – Division of Habitat and the USACE.

State of Alaska Right-of-Way on NFS Lands

The State of Alaska Department of Transportation and Public Facilities (ADOT&PF) has requested approval from the Forest Service to build, operate, and maintain about 1 mile of road that would connect the currently isolated Shelter Cove road system to the community of Ketchikan via the Revilla Road, and the White River and Leask Lake road systems. The Forest Service would approve this section of road through an easement that would be 300 feet wide. The exact alignment of the road is unknown; it is anticipated to align with NFS Road 8300280, which is proposed for construction in varying lengths under the action alternatives (see action alternative descriptions and maps) to access units 44, 106, 107, and 304. This section of new road would remain open to the public. This road does not go through IRAs. Connecting to the Shelter Cove road system is not necessary for the Saddle

Lakes Timber Sale project; since there is already access to the Shelter Cove LTF, it is not a connected action. If the road is constructed prior to or during the Saddle Lakes timber sale, it may be used to haul timber to a different LTF.

Best Management Practices

Best Management Practices (BMPs) are methods, measures, or practices to prevent or reduce water pollution, including but not limited to structural and non-structural controls, operation and maintenance procedures, other requirements and scheduling and distribution of activities (Forest Service Handbook 2509.22, Region 10 Soil and Water Conservation Handbook). They are the result of extensive efforts between the Forest Service and the State of Alaska to identify practices that will ensure that timber harvest activities minimize soil erosion and protect aquatic habitat. BMPs, as applied to unit harvest and roads, are described in the unit and road cards located in the project record.

In 2012, the USDA Forest Service published National Core BMPs. Appendix C contains a crosswalk that shows how the National Core BMPs correspond to the R10 BMPs.

Alternatives Considered in Detail

In addition to the proposed action (Alternative 2), four action alternatives are analyzed in the DEIS. The action alternatives were developed in response to significant issues and to provide a reasonable range of alternatives providing a clear basis for choice among options. A No-Action Alternative is also analyzed. Alternatives maps are provided in a separate map packet.

Figure 4 and Figure 5 provide a visual comparison of the logging systems and silvicultural systems by alternative.

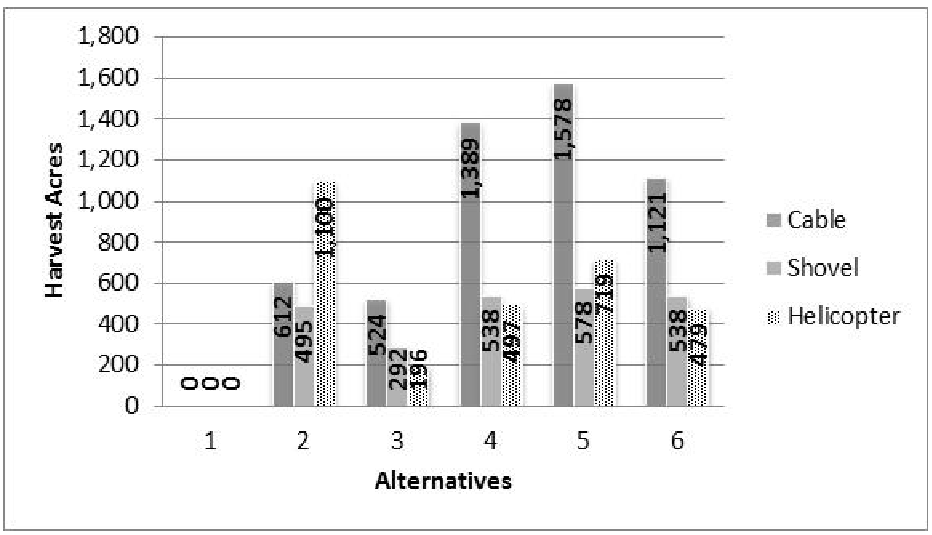


Figure 4. Comparison of logging system by alternative

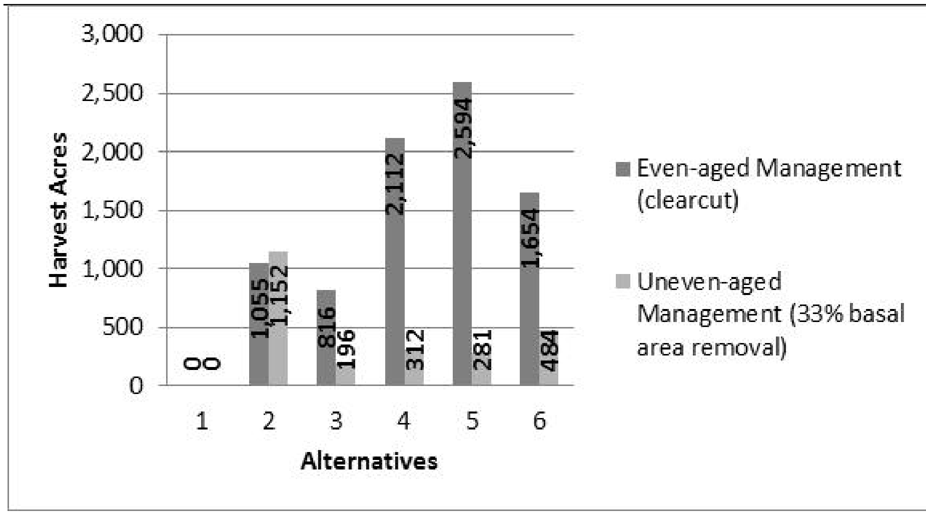


Figure 5. Comparison of silvicultural system by alternative

Alternative 1 (No Action)

Under the No-Action Alternative, no activities proposed by this project would be implemented, and the Saddle Lakes Timber Sale would not take place. Current and on-going management activities would continue. Changes might occur through current management direction (i.e., road maintenance), natural processes, or other management decisions in the future. This alternative does not preclude timber harvesting from other areas at this time or from the Saddle Lakes project area at some time in the future.

The CEQ regulations require a no-action alternative (40 C.F.R. §§ 1502.14 (d), 1508.25 (b) (1)). Unlike the action alternatives, the no-action alternative does not meet the purpose and need for the project. However, the no-action alternative provides a benchmark, enabling the Responsible Official to compare the magnitude of environmental effects of the action alternatives.

Alternative 2 (Proposed Action)

Objectives and Design Criteria: Alternative 2 was designed to harvest timber in the roaded land base in the Timber Production and Modified Landscape LUDs. Silvicultural prescriptions were developed to meet Scenic Integrity Objectives (SIOs) for the project area. Alternative 2 was also designed to avoid or minimize adverse effects to Sensitive and Rare Plants. Further, Alternative 2 was designed to maintain old growth connectivity corridors between OGRs, and wildlife elevational corridors within the Modified Landscape LUD.

Timber Harvest: Alternative 2 would harvest 30.4 MMBF of old-growth timber on 2,207 total acres. This alternative proposes 1,055 acres of even-aged management (clearcut) using conventional (cable and shovel) logging systems, as well as 1,152 acres of uneven-aged management (single-tree selection with 33 percent basal area removal) using shovel and helicopter logging systems. Helicopter logging would be used for about 50 percent of the acres.

Roads: Alternative 2 would construct 15.8 miles of road; 10.2 miles of new NFS road and 5.6 miles of temporary road. About 0.4 miles of the NFS Road 8300280 would be constructed within the State of Alaska ROW. Road reconditioning is proposed on 10.8 miles of stored NFS road.

Alternative 3

Objectives and Design Criteria: Alternative 3 addresses Issue 3 (Wildlife Habitat and Subsistence Use) and Issue 4 (Scenic Integrity and Recreational Opportunities) while allowing for economic timber harvest. Alternative 3 was developed to maintain wildlife habitat and landscape connectivity. Under this alternative, impacts to wildlife were minimized by selecting logging system and silviculture prescriptions that would result in less old-growth removal and less road construction. Old-growth landscape connectivity corridors are maintained between OGRs, and wildlife elevational corridors are maintained within the Modified Landscape LUD.

The prescriptions chosen for Alternative 3 also reduce impacts to scenery, which minimizes effects on current and future recreational opportunities in the project area and meet Scenic Integrity Objectives (SIOs) for Modified Landscape LUDs.

Timber Harvest: Alternative 3 would harvest 17.1 MMBF of old-growth timber on 1,012 total acres. This alternative proposes 816 acres of even-aged management (clearcut) using conventional logging systems, as well as 196 acres of uneven-aged management (single-tree selection with 33 percent basal area removal) using helicopter logging systems. Helicopter logging would be used for about 19 percent of the acres.

Roads: Alternative 3 would construct 11.7 miles of road; 6.7 miles of new NFS road and 5.0 miles of temporary road. About 0.4 mile of the new NFS Road 8300280 would be constructed within the State of Alaska ROW on NFS lands. Road reconditioning is proposed on 7.7 miles of stored NFS road.

Alternative 4 – Preferred Alternative

Objectives and Design Criteria: Alternative 4 addresses Issue 1 (Timber Economics) and Issue 2 (Timber Availability). Alternative 4 was designed to maximize timber harvest from an economical unit pool outside of IRAs and OGRs.

As designed, Alternative 4 does not meet Forest Plan Scenery Standards and Guidelines and would require a Forest Plan amendment to remove four of the five VPR designations in or adjacent to the project area.

Timber Harvest: Alternative 4 would harvest 51.0 MMBF of old-growth timber on 2,424 total acres. This alternative proposes 2,112 acres of even-aged management (clearcut) using conventional (cable and shovel) logging systems, as well as 312 acres of uneven-aged management (single-tree selection with 33 percent basal area removal) using cable and helicopter logging systems. Helicopter logging would be used on about 21 percent of the acres.

Roads: Alternative 4 would construct 29.4 miles of road; 19.6 miles of new NFS road and 9.8 miles of temporary road. About 1 mile of the new NFS road (Road 8300280) would be constructed within the State of Alaska ROW. Road reconditioning is proposed on 10.8 miles of stored NFS road.

Alternative 5

Objectives and Alternative Design Criteria: Alternative 5 addresses Issue 2 (Timber Availability). Alternative 5 was designed to maximize timber harvest in the Timber Production and Modified Landscape LUDs. The small OGR in VCU 7470 would be relocated within the North Revilla IRA, and the vacated area would be designated as Modified Landscape LUD where timber harvest is allowed. Alternative 5 maximizes the amount of conventional (cable and shovel) logging systems using even-aged management (clearcut).

As designed, Alternative 5 does not meet Forest Plan Scenery Standards and Guidelines and would require a Forest Plan amendment to remove four of the five VPR designations in or adjacent to the project area. Alternative 5 would also require a Forest Plan amendment to modify the small OGR.

Timber Harvest: Alternative 5 would harvest 60.7 MMBF of old-growth timber on 2,875 total acres. This alternative includes 2,594 acres of even-aged management (clearcut) using cable and shovel logging systems, as well as 281 acres of uneven-aged management (33 percent basal area removal) using cable, shovel, and helicopter logging. Helicopter logging would be conducted for about 25 percent of the acres.

Roads: Alternative 5 would construct 32.3 miles of road; 20.6 miles of new NFS road and 11.7 miles of temporary road. About 1 mile of the new NFS Road 8300280) would be constructed within the State of Alaska ROW. Road reconditioning is proposed on 11.1 miles of stored NFS road.

Alternative 6

Objectives and Alternative Design Criteria: Alternative 6 addresses Issue 1 (Timber Economics), Issue 2 (Timber Availability), and Issue 4 (Scenic Integrity and Recreational Opportunities) and. Similar to Alternative 4, Alternative 6 was designed to maximize timber harvest from an economical unit pool outside of IRAs and OGRs, while reducing impacts to the visual and recreation resources in the planned Saddle Lakes Recreation Area VPR. This alternative leaves logical settings within the recreation area for potential future harvest and entry.

As designed, Alternative 6 does not meet Forest Plan Scenery Standards and Guidelines unless there was a Forest Plan amendment to remove three of the five VPR designations in or adjacent to the project area.

Timber Harvest: Alternative 6 would harvest 40.5 MMBF of old-growth timber on about 2,138 total acres. This alternative proposes 1,654 acres of even-aged management (clearcut) using cable and shovel logging systems, and 484 acres of uneven-aged management (single-tree selection with 33 percent basal area removal) using cable and helicopter logging systems. Helicopter logging would be used on about 22 percent of the acres.

Roads: Alternative 6 would construct 24.5 miles of road; 16.3 miles of new NFS road and 8.2 miles of temporary road. About 1 mile of the new NFS Road 8300280 would be constructed within the State of Alaska ROW on NFS lands. Road reconditioning is proposed on 10.8 miles of stored NFS road.

Comparison of Alternatives

This section compares outputs and provides a summary of the effects of implementing each alternative in terms of the significant issues. Table 3 presents a direct comparison of the alternatives. This table is summarized from Chapter 3, which should be consulted for a full understanding of these and other environmental consequences.

Table 3. Comparison of alternatives by issue

Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Issue 1: Timber Economics						
Timber Volume by Species	**Millions of Board Feet (MMBF)**					
Sitka spruce	0	3.9	2.2	6.6	7.8	5.2
Hemlock	0	13.9	7.8	23.4	27.8	18.6
Western Redcedar	0	5.8	3.3	9.8	11.6	7.8
Alaska Yellow-cedar	0	3.5	2.0	5.9	7.1	4.7
Total Sawtimber Volume	0	27.2	15.3	45.7	54.3	36.3
Total Utility Volume	0	3.2	1.8	5.3	6.4	4.2
Total Volume ((Sawtimber **Utility)**	**0**	**30.3**	**17.1**	**51.0**	**60.7**	**40.5**
Logging System	**Acres**					
Cable	0	612	524	1,389	1,578	1,121
Shovel	0	495	292	538	578	538
Helicopter	0	1,100	196	497	719	479
Total Harvest Acres	**0**	**2,207**	**1,012**	**2,424**	**2,875**	**2,138**
Road Construction and Reconditioning	**Miles**					
New NFS Road	0	10.2	6.7	19.6	20.6	16.3
New Temporary Road	0	5.6	5.0	9.8	11.7	8.2
Total New Road Construction	0	15.8	11.7	29.4	32.3	24.5
Road Reconditioning of Stored NFS Roads	0	10.8	7.7	10.8	11.1	10.8
Financial Efficiency Analysis (Limited Export Policy & Domestic Processing)						
Financial Efficiency Analysis	**Dollars per Thousand Board Feet (MBF)**					
Indicated Advertised Rate	$0	-$14.05	-$12.08	-$2.00	-$4.66	$3.62
Road Construction, Reconditioning and LTF Reconstruction Costs	$0	$81	$105	$91	$84	$95
Logging Costs (cost/MBF net removed)	$0	$273	$246	$252	$262	$241

Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
	Dollars (in millions)					
Total Production Costs (stump-to-mill, roads, and manufacturing costs)	$0	$17.7	$10.0	$29.3	$35.0	$23.1
Financial Efficiency Analysis (Domestic Processing)						
Financial Efficiency Analysis	**Dollars per Thousand Board Feet (MBF)**					
Indicated Advertised Rate	$0	-$70.73	-$104.52	-$95.15	-$97.91	-$89.71
Road Construction, Reconditioning and LTF Reconstruction Costs	$0	$81	$105	$91	$84	$95
Logging Costs (cost/MBF net removed)	$0	$273	$246	$252	$262	$241
Total Production Costs (stump-to-mill, roads, and manufacturing costs)	$0	$19,870,891	$11,689,070	$34,522,468	$41,223,979	$27,260,063
Employment	**Number of Annualized Jobs Supported**					
Total Jobs Estimated(Current R10 Policy)	0	121	68	203	241	161
Limited Export Policy & Domestic Processing)	0	145	81	243	290	194

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Effects of Visual Priority Route (VPR) Designation Removal	**Acres**					
Harvest in Areas that decreases in Scenic Integrity Objective (SIO)	0	0	0	1,285	1,642	743
Harvest in Areas with no change in Scenic Integrity Objective (SIO)	0	2,207	1,012	1,139	1,233	1,395
Project Area that decreases in Scenic Integrity Objective (SIO)	0	0	0	8,270	8,750	6,810
Additional Suitable timberlands available for harvest due to modification of the small Old-Growth Reserve in VCU 7470						
Old-Growth Forest	0	0	0	0	322	0
Issue 3: Wildlife Habitat and Subsistence Use						
Issue 3A: Wildlife Habitat						
Cumulative Change to Deer Habitat on All Land Ownerships						
Historic Deep Snow Winter Habitat (high-POG ≤800’ elevation on south aspect)	**Percent Reduction From Historic Acres**					

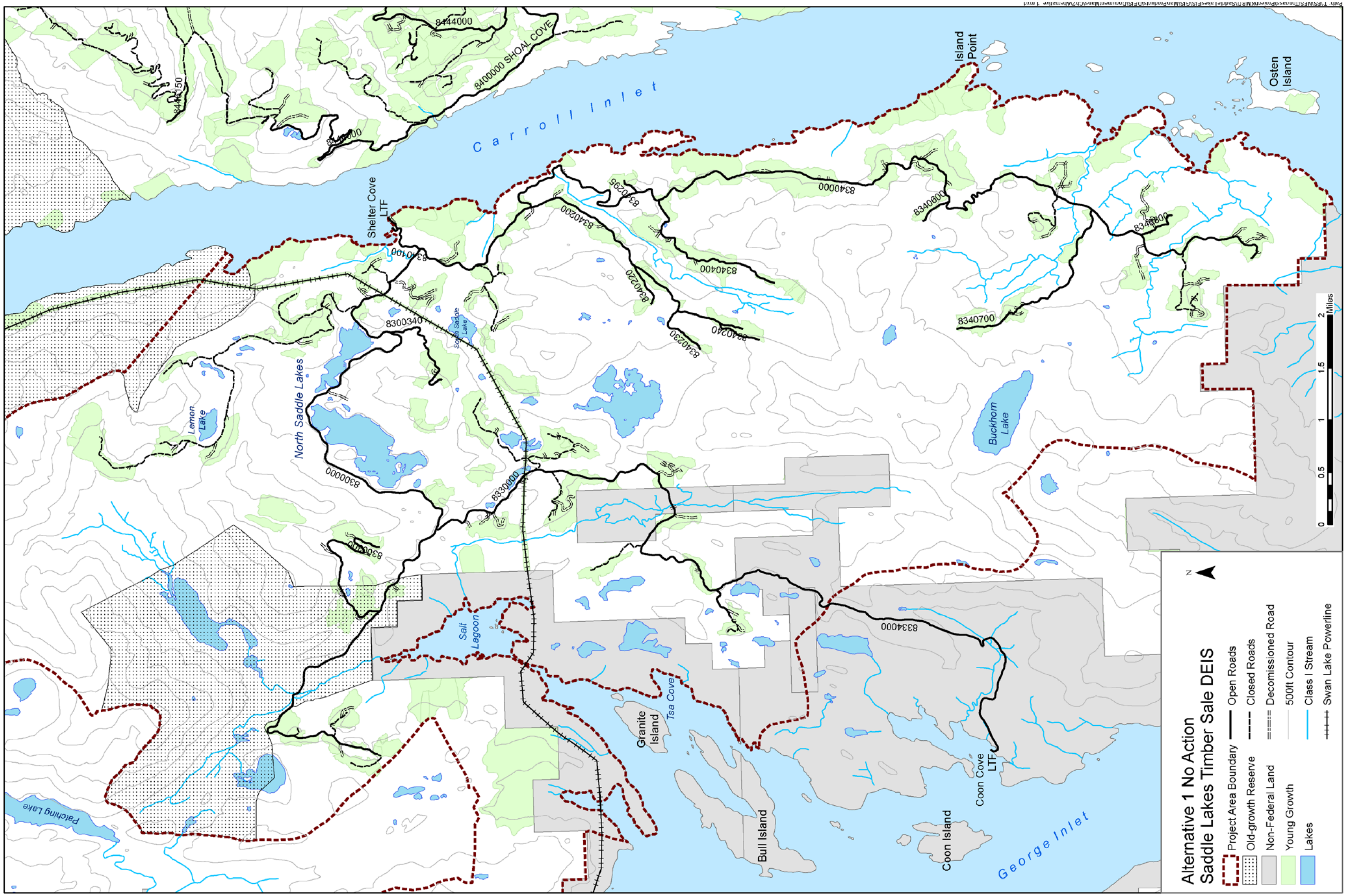
Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
WAA 406 - 4,194 acres	-33.8%	-35.1%	-34.0%	-34.9%	-35.1%	-34.6%
WAA 407 - 1,937 acres	-38.4%	-39.9%	-39.2%	-41.5%	-43.3%	-41.5%
Historic Average Winter Habitat (POG ≤1,500' elevation)	**Percent Reduction From Historic Acres**					
WAA 406 - 54,385 acres	-21.8%	-23.9%	-22.5%	-24.1%	-24.7%	-23.8%
WAA 407 - 28,932 acres	-19.2%	-21.9%	-20.8%	-22.1%	-23.0%	-21.8%
Historic Non-winter Habitat (all habitats except older young-growth)	**Percent Reduction From Historic Acres**					
WAA 406 - 125,078 acres	-9.9%	-11.0%	-10.3%	-11.1%	-11.5%	-11.0%
WAA 407 - 61,000 acres	-9.1%	-10.5%	-10.0%	-10.6%	-11.1%	-10.5%
Cumulative Change in Deer Model Habitat Capability (DHC) on All Land Ownerships						
1954 Theoretical Number of Deer	**Percent Reduction in DHC Since 1954 (at stem exclusion)**					
WAA 406 – 3,568	-31.4%	-32.8%	-31.8%	-33.0%	-33.4%	-32.7%
WAA 407 – 2,465	-58.7%	-60.3%	-59.6%	-60.6%	-61.3%	-60.5%
Cumulative Effects on Wolves on All Land Ownerships						
1954 Deer Model Deer Density	**Deer Density Compared to Historic Deer Density (deer/mi^2 at stem exclusion)**					
WAA 406 – 18 deer/mi^2	12.3	12.1	12.3	12.1	12.0	12.1
WAA 407 - 24 deer/mi^2	9.7	9.4	9.6	9.3	9.2	9.4
Total Road Density	**Road Density (mi/mi^2)**					
WAA 406	1.5	1.6	1.5	1.6	1.6	1.6
WAA 407	2.0	2.1	2.1	2.1	2.2	2.1
Cumulative Change to Black Bear Habitat on All Land Ownerships						
Historic POG Within 500-feet of Class I fish streams	**Percent Reduction From Historic Habitat Acres**					
WAA 406 - 8,944 acres	-20.1%	-21.8%	21.1%	-21.8%	-22.2%	-21.9%
WAA 407 - 6,244 acres	-40.2%	-41.0%	-40.2%	-40.9%	-41.6%	-40.9%
Cumulative Change to Mountain Goat Habitat on All Land Ownerships						
Historic POG Within 1,300-feet of a cliff (50 degree slope or greater)	**Percent Reduction From Historic Habitat Acres**					
WAA 406 – 47,600 acres	-18.4%	-19.4%	-18.6%	-19.5%	-19.8%	-19.2%

Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
WAA 407 – 24,279 acres	-26.9%	-28.9%	-28.0%	-29.1%	-29.7%	-28.8%
Cumulative Change to American Marten Habitat on All Land Ownerships						
Historic Winter Habitat- High POG < 1500' in elevation	**Percent Reduction From Historic Habitat Acres**					
VCU 7460 – 12,639 acres	-42.1%	-45.1%	-42.7%	-45.6%	-46.0%	-45.0%
VCU 7470 – 7,353 acres	-37.0%	-42.6%	-39.8%	-43.3%	-45.5%	-42.7%
VCU 7530 – 10,830 acres	-42.6%	-43.1%	-42.8%	-43.1%	-43.7%	-43.1%
Historic Year-round Habitat - POG	**Percent Reduction From Historic Habitat Acres**					
VCU 7460 - 19,967 acres	-27.4%	-31.7%	-28.5%	-32.3%	-33.3%	-31.3%
VCU 7470 – 12,278 acres	-23.2%	-29.5%	-27.0%	-30.1%	-32.1%	-29.4%
VCU 7530 – 18,401 acres	-25.2%	-26.6%	-26.0%	-26.6%	-27.2%	-26.7%
Over 30 Percent Clearcut?						
VCU 7460	No	Yes	No	Yes	Yes	Yes
VCU 7470	No	Yes	No	Yes	Yes	No
VCU 7530	No	No	No	No	No	No
Total Road Density <1,500'	**Road Density** (mi/mi^2)					
VCU 7460	2.2	2.3	2.2	2.5	2.5	2.4
VCU 7470	1.5	1.8	1.8	2.0	2.1	1.9
VCU 7530	1.8	1.9	1.8	1.9	1.9	1.9
Cumulative Change to Brown Creeper Habitat on All Land Ownerships						
Interior Habitat by VCU	**Percent Reduction of Historic Habitat**					
VCU 7460 – 10,983 acres	-72.2%	-75.4%	-73.2%	-75.8%	-75.9%	-75.5%
VCU 7470 – 6,363 acres	-51.8%	-55.7%	-54.5%	-56.0%	-58.3%	-55.8%
VCU 7530 – 8,248 acres	-68.2%	-68.5%	-68.4%	-68.4%	-68.5%	-68.5%
Cumulative Change to Hairy Woodpecker Habitat on All Land Ownerships						
High-POG Habitat by VCU	**Percent Reduction of Historic Habitat**					
VCU 7460 – 14,455 acres	-37.9%	-40.5%	-38.4%	-41.0%	-41.2%	-40.4%
VCU 7470 – 7,750 acres	-35.1%	-40.5%	-37.8%	-48.5%	-50.5%	-40.5%
VCU 7530 – 11,523 acres	-40.3%	-40.7%	-40.5%	-46.1%	-46.6%	-40.7%

Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Cumulative Change to Red-breasted Sapsucker Habitat on All Land Ownerships						
Low and Medium POG Habitat by VCU	**Percent Reduction of Historic Habitat**					
VCU 7460 – 5,512acres	0%	-8.5%	-2.6%	-9.5%	-12.1%	-7.5%
VCU 7470 – 4,527 acres	-2.7%	-10.7%	-8.5%	-11.3%	-13.1%	-10.4%
VCU 7530 – 6,878 acres	0%	-3.0%	-1.6%	-2.9%	-3.6%	-3.1%
Cumulative Change to Red Squirrel Habitat on All Land Ownerships						
POG Habitat by VCU	**Percent Reduction of Historic Habitat**					
VCU 7460 – 19,967 acres	-27.4%	-31.7%	-28.5%	-32.3%	-33.3%	-31.3%
VCU 7470 – 12,278 acres	-23.2%	-29.5%	-27.0%	-30.1%	-32.1%	-29.4%
VCU 7530 – 18,401 acres	-25.2%	-26.6%	-26.0%	-26.6%	-27.2%	-26.7%
Cumulative Change to River Otter Habitat on All Land Ownerships						
POG Habitat within beach buffers and 500' of Class I or II fish streams by VCU	**Percent Reduction of Historic Habitat**					
VCU 7460 – 8,218 acres	-29.7%	-34.1%	-31.3%	-34.2%	-34.9%	-33.3%
VCU 7470 – 6,378 acres	-32.6%	-36.0%	-34.5%	-36.5%	-37.8%	-36.5%
VCU 7530 – 13,288 acres	-31.5%	-32.6%	-32.1%	32.5%	-33.0%	-32.6%
Cumulative Change to Vancouver Canada Goose Habitat on All Land Ownerships						
Muskeg, NPOG, and Hydric POG by VCU	**Percent Reduction of Historic Habitat**					
VCU 7460 –12,126 acres	0%	-3.9%	-1.6%	-4.5%	-5.9%	-4.2%
VCU 7470 – 7,674 acres	0%	-3.0%	-2.5%	-3.2%	-3.9%	-3.1%
VCU 7530 – 15,557 acres	0%	-1.1%	-0.6%	-1.1%	-1.5%	-1.2%
Cumulative Change to Red-backed Vole Habitat on All Land Ownerships						
POG Habitat by VCU	**Percent Reduction of Historic Habitat**					
VCU 7460 – 19,967 acres	-27.4%	-31.7%	-28.5%	-32.3%	-33.3%	-31.3%
VCU 7470 – 12,278 acres	-23.2%	-29.5%	-27.0%	-30.1%	-32.1%	-29.4%
VCU 7530 – 18,401 acres	-25.2%	-26.6%	-26.0%	-26.6%	-27.2%	-26.7%
Cumulative Change to Goshawk Habitat on All Land Ownerships						
Historic Nesting Habitat by VCU – High and medium POG <1.000' elevation	**Percent Reduction of Historic Habitat**					
VCU 7460 – 12,196 acres	-36.5%	-41.5%	-37.6%	-42.0%	-43.0%	-40.8%

Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
VCU 7470 – 8,864 acres	-32.7%	-39.8%	-36.9%	-40.6%	-43.1%	-40.6%
VCU 7530 – 14,696 acres	-42.6%	-43.9%	-43.3%	-43.9%	-44.5%	-44.0%
Historic Foraging Habitat by VCU – POG <1.000’ elevation	**Percent Reduction of Historic Habitat**					
VCU 7460 – 13,297 acres	-35.5%	-39.4%	-35.0%	-40.0%	-41.2%	-38.8%
VCU 7470 – 9,582 acres	-30.3%	-37.3%	-34.6%	-38.1%	-40.5%	-38.1%
VCU 7530 – 16,299 acres	-38.5%	-40.1%	-39.4%	-40.1%	-40.7%	-40.2%
Change to Old-Growth Reserves						
Old-Growth Reserves	**Meets Comparable Achievement of Old-Growth Goals and Objectives**					
IRT determination of Small OGR VCU 7470	Yes	Yes	Yes	Yes	No	Yes
Connectivity						
Elevational Connectivity in Modified Landscape LUD	**Number of identified corridors**					
Maintained in current condition	6	2	6	1	1	1
Reduced in quality	0	3	0	0	0	1
Eliminated	0	1	0	5	5	4
Issue 3B: Subsistence Use						
Estimated Deer Harvest as a Percent of Adjusted Deer Model Habitat Capability (DHC)						
1954 Theoretical Number of Deer	**Hunter Demand at stem exclusion (Percent of Historic DHC)**					
WAA 406 – 2,284	12%	12%	12%	12%	12%	12%
WAA 407 – 1,578	22%	23%	22%	23%	23%	23%
Issue 4: Scenery and Recreational Opportunities						
Issue 4A: Scenery						
Acres of Harvest within High Scenic Integrity Objective (SIO)						
Silvicultural Method	**Acres of Harvest in High SIO**					
Even-aged Management (Clearcut)	0	0	0	0	173	0
Uneven-aged management (Partial-cut)	0	0	0	0	4	0

Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Acres of Harvest within Moderate Scenic Integrity Objective (SIO)						
Silvicultural Method	**Acres of Harvest in Moderate SIO**					
Even-aged Management (Clearcut)	0	129	171	774	921	530
Uneven-aged management (Partial-cut)	0	589	27	148	61	185
Road Construction Within High and Moderate Scenic Integrity Objective (SIO)						
SIO	**Miles of Road Construction**					
High	0	0	0.1	0.2	0.2	0.2
Moderate	0	3.8	3.5	11.9	12.2	9.7
Timber Harvest Within the Saddle Lakes Recreation Area (Planned Use Area)						
Silvicultural Method	**Acres of Harvest**					
Even-aged Management (Clearcut)	0	6	0	462	526	215
Uneven-aged Management (Single-tree selection with 33% basal area removed)	0	400	32	109	62	132
Total Harvest	**0**	**406**	**32**	**571**	**588**	**347**
Effect of Visual Priority Route (VPR) Designation Removal						
Decrease in Scenic Integrity Objective (SIO)	**Acres**					
Project Area	0	0	0	8,270	8,750	6,810
Greater George/Carroll Inlet Area	0	0	0	13,920	14,930	10,900
Issue 4B: Recreational Opportunities						
Changes to the Recreation Opportunity Spectrum (ROS)						
ROS Class	**Change in ROS Acres from Existing**					
Semi-Primitive Non-Motorized	0	0	0	-70	-70	0
Semi-Primitive Motorized	0	0	0	0	-41	0
Roaded Modified	0	0	0	70	111	0


Alternative 1 No Action
Saddle Lakes Timber Sale DEIS
Project Area Boundary
Old-growth Reserve
Non-Federal Land
Young Growth
Lakes
Open Roads
Closed Roads
Decommissioned Road
500ft Contour
Class I Stream
Swan Lake Powerline
Miles
0
0.5
1
1.5
2
Carroll Inlet
George Inlet
Shelter Cove LTF
Coon Cove LTF
Island Point
Osten Island
North Saddle Lakes
Lemon Lake
Buckhorn Lake
Salt Lagoon
Tsa Cove
Granite Island
Bull Island
Coon Island
Patching Lake
8400000 SHOAL COVE
8444000
8340000
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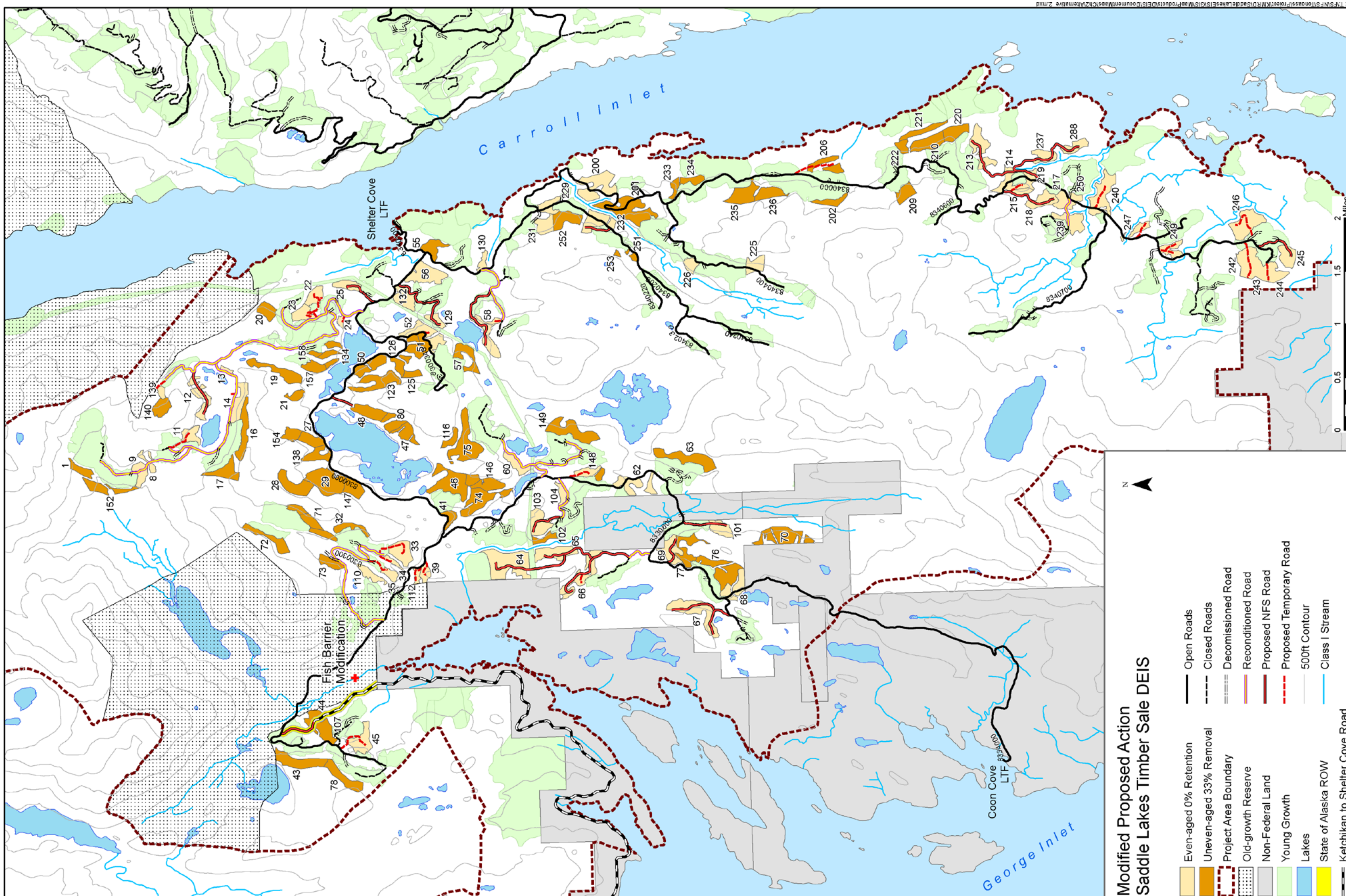
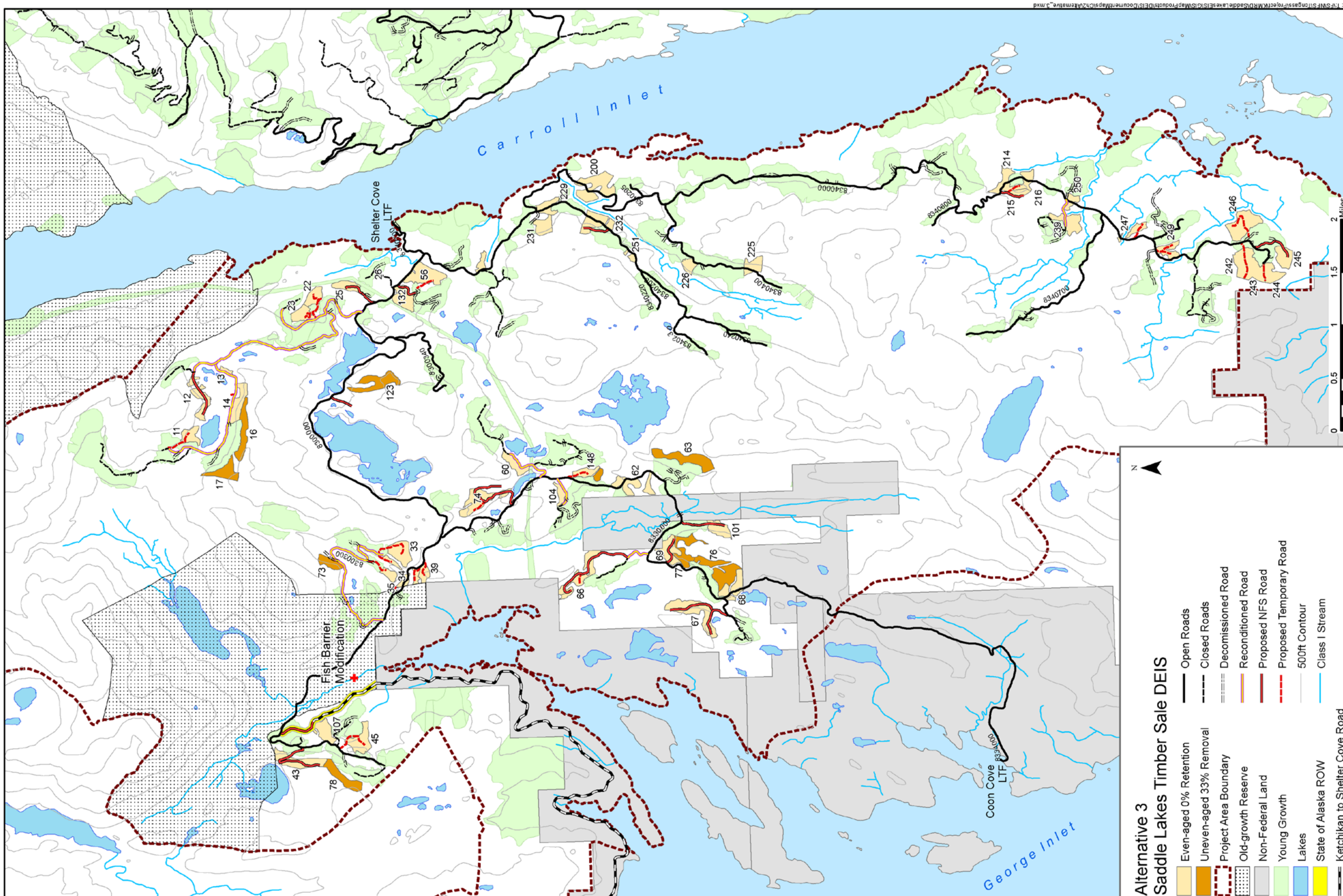
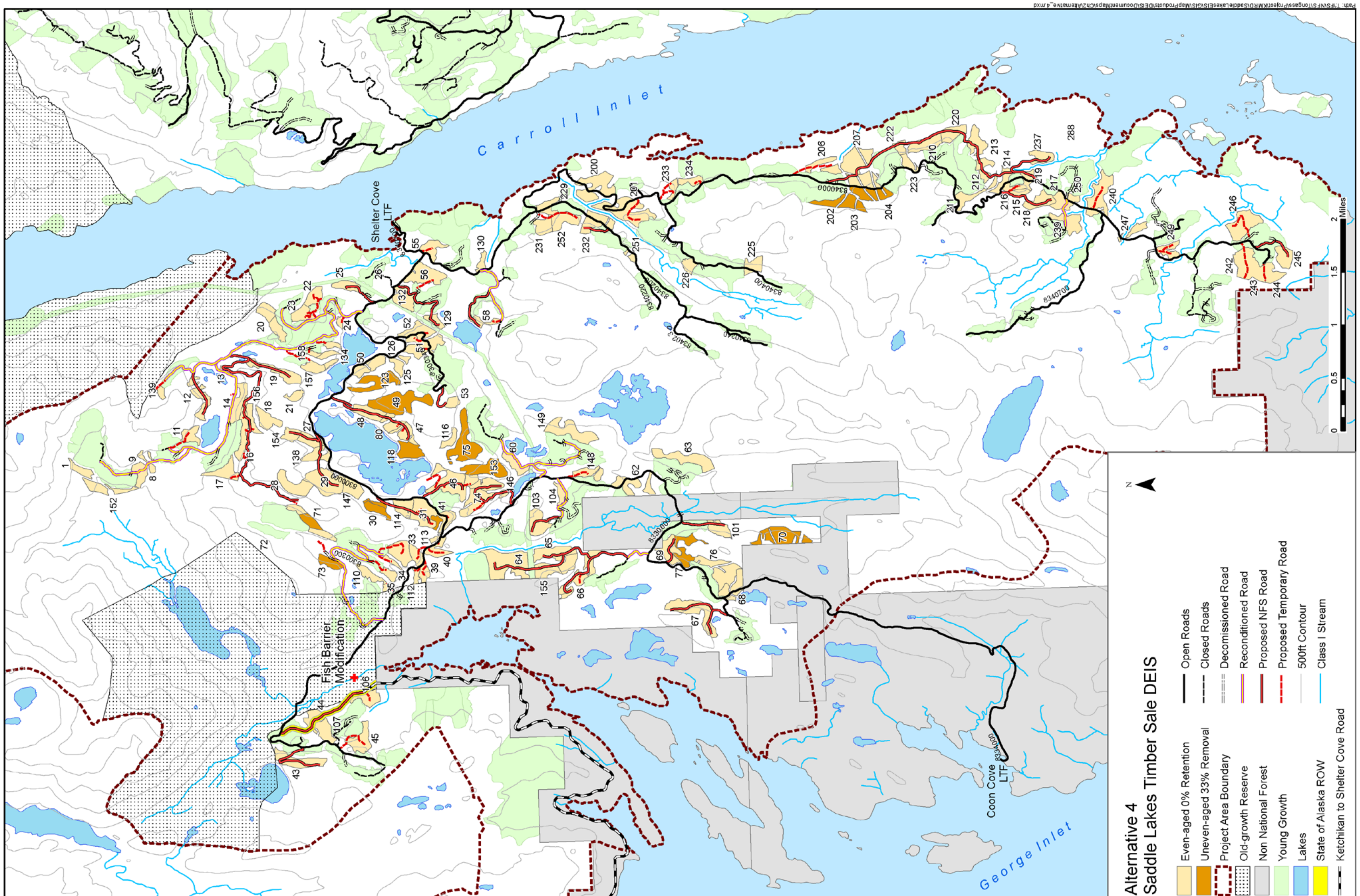
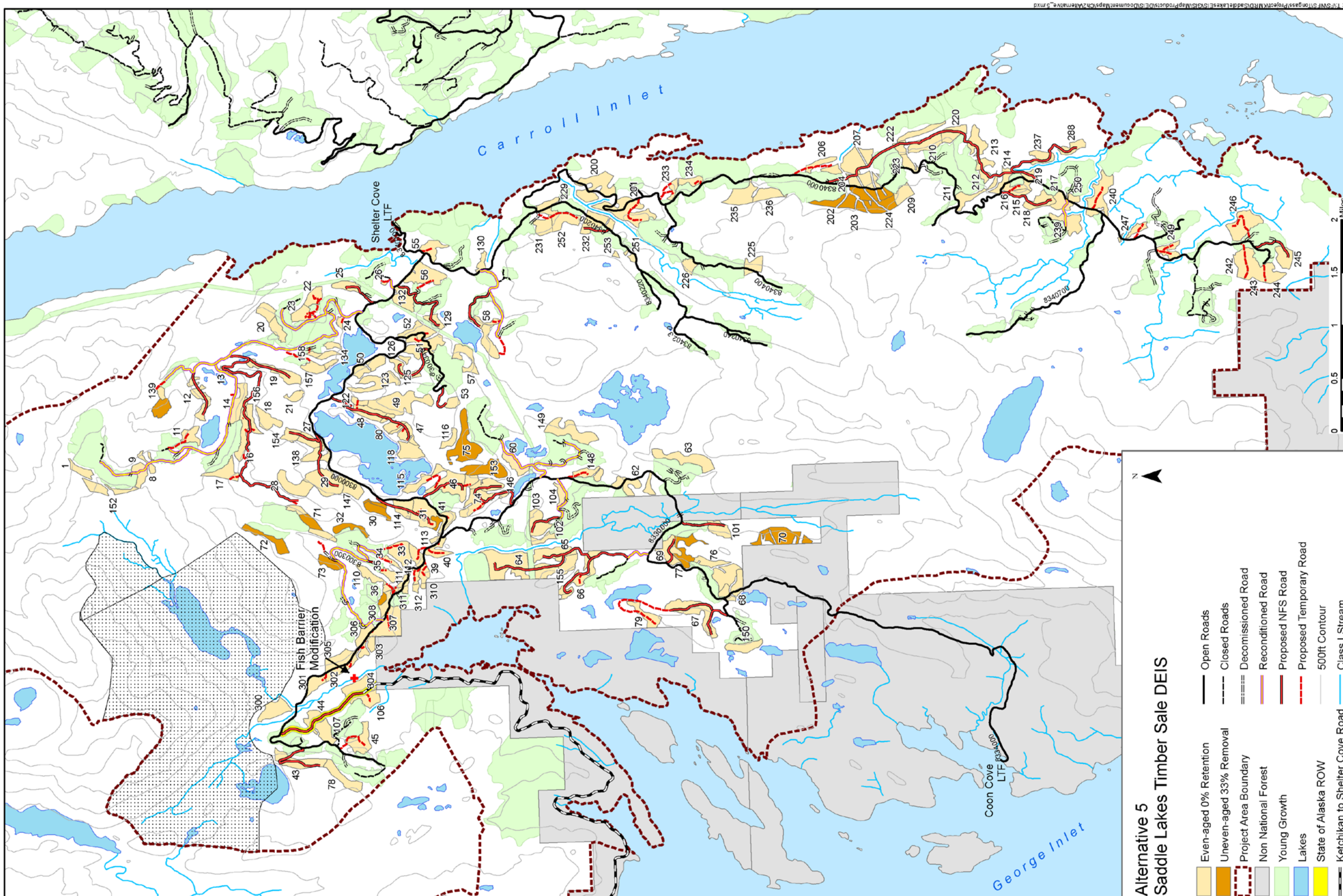
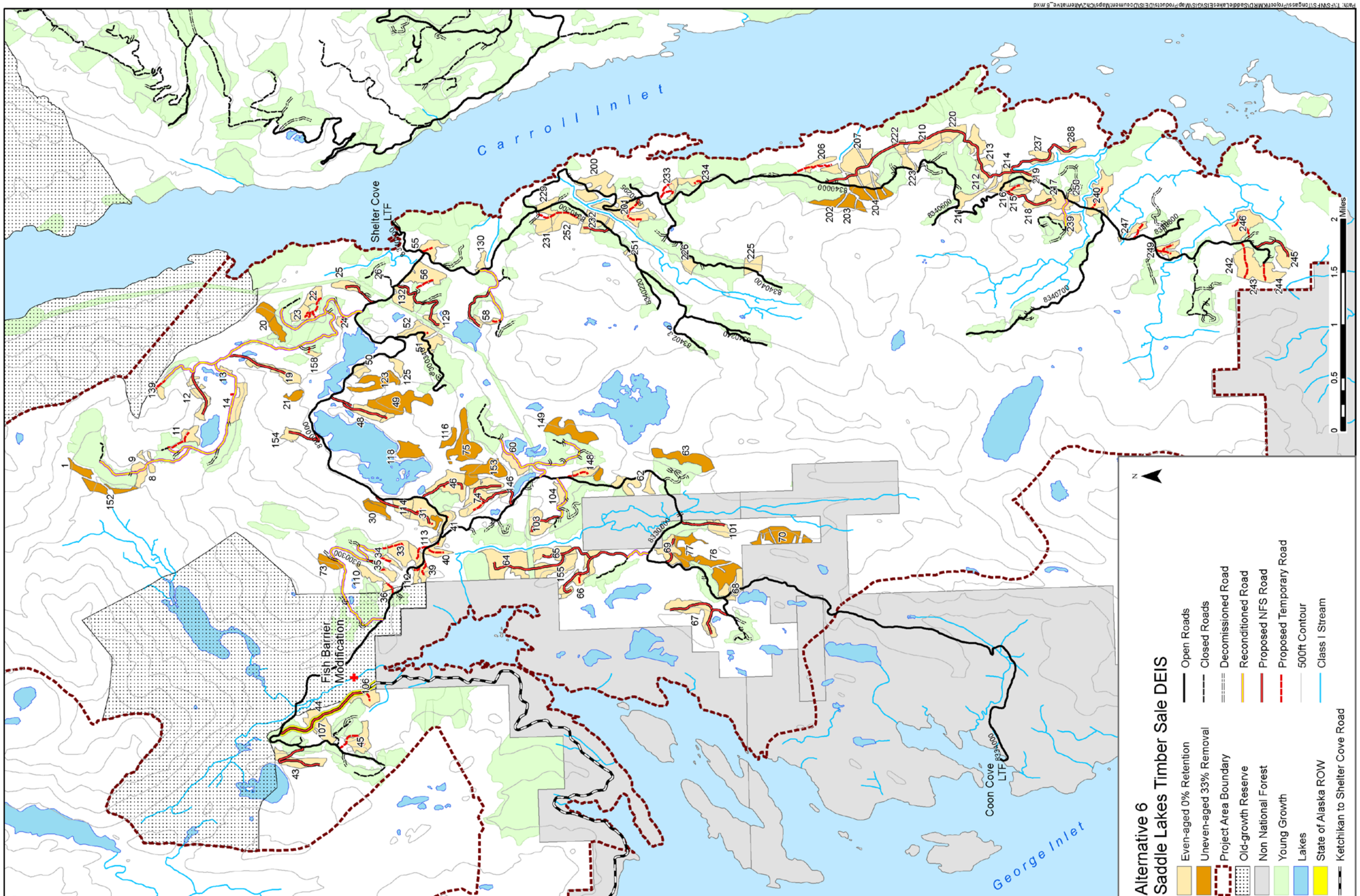

Modified Proposed Action
Saddle Lakes Timber Sale DEIS
Even-aged 0% Retention
Uneven-aged 33% Removal
Project Area Boundary
Old-growth Reserve
Non-Federal Land
Young Growth
Lakes
State of Alaska ROW
Ketchikan to Shelter Cove Road
Open Roads
Closed Roads
Decommissioned Road
Reconditioned Road
Proposed NFS Road
Proposed Temporary Road
500ft Contour
Class I Stream
Miles
0 0.5 1 1.5 2
N
Carroll Inlet
George Inlet
Shelter Cove LTF
Coon Cove LTF
Fish Barrier Modification


Alternative 3
Saddle Lakes Timber Sale DEIS
Even-aged 0% Retention
Uneven-aged 33% Removal
Project Area Boundary
Old-growth Reserve
Non-Federal Land
Young Growth
Lakes
State of Alaska ROW
Ketchikan to Shelter Cove Road
Open Roads
Closed Roads
Decommissioned Road
Reconditioned Road
Proposed NFS Road
Proposed Temporary Road
500ft Contour
Class I Stream
N
0 0.5 1 1.5 2 Miles
Carroll Inlet
George Inlet
Shelter Cove LTF
Coon Cove LTF
Fish Barrier Modification


Alternative 4
Saddle Lakes Timber Sale DEIS
Even-aged 0% Retention
Uneven-aged 33% Removal
Project Area Boundary
Old-growth Reserve
Non National Forest
Young Growth
Lakes
State of Alaska ROW
Ketchikan to Shelter Cove Road
Open Roads
Closed Roads
Decommissioned Road
Reconditioned Road
Proposed NFS Road
Proposed Temporary Road
500ft Contour
Class I Stream
Carroll Inlet
George Inlet
Shelter Cove LTF
Coon Cove LTF
Fish Barrier Modification
Miles


Alternative 5
Saddle Lakes Timber Sale DEIS
Even-aged 0% Retention
Uneven-aged 33% Removal
Project Area Boundary
Non National Forest
Young Growth
Lakes
State of Alaska ROW
Ketchikan to Shelter Cove Road
Open Roads
Closed Roads
Decomissioned Road
Reconditioned Road
Proposed NFS Road
Proposed Temporary Road
500ft Contour
Class I Stream
0 0.5 1 1.5 2 Miles
N
Carroll Inlet
George Inlet
Shelter Cove LTF
Coon Cove LTF
Fish Barrier Modification


Alternative 6
Saddle Lakes Timber Sale DEIS
Even-aged 0% Retention
Uneven-aged 33% Removal
Project Area Boundary
Old-growth Reserve
Non National Forest
Young Growth
Lakes
State of Alaska ROW
Ketchikan to Shelter Cove Road
Open Roads
Closed Roads
Decomissioned Road
Reconditioned Road
Proposed NFS Road
Proposed Temporary Road
500ft Contour
Class I Stream
Miles
Carroll Inlet
George Inlet
Shelter Cove LTF
Coon Cove LTF
Fish Barrier Modification

Chapter 3. Affected Environment and Environmental Consequences

Introduction

This chapter describes the existing natural and physical environment (referred to as the human environment) of the Saddle Lakes project area that may be affected by the alternatives under consideration (Affected Environment). These descriptions are followed by a discussion and analysis of the anticipated direct, indirect, and cumulative impacts of the alternatives under consideration (Environmental Consequences). The analysis in this DEIS focuses on the significant issues that highlight significant effects or unintended consequences that may occur from the alternatives under consideration. These issues include effects to timber economics and timber availability, wildlife and subsistence use, and scenic integrity and recreational opportunities. Effects are quantified where possible, and qualitative discussions are also included. The analysis of potential impacts of the alternatives under consideration includes implementation of applicable Forest Plan Standards and Guidelines, Forest Service Best Management Practices, and recommended mitigation described in this chapter and in Appendix C.

Discussions of resources and potential effects use existing information included in the Forest Plan, other project environmental analyses, project-specific resource reports, agency and scientific studies, and related information. Where applicable, such information is briefly summarized and incorporated by reference to minimize duplication. The project record includes all project-specific analysis information, including resource reports, literature cited, documentation of field investigations, and information resulting from public involvement efforts.

Land Divisions

The land area of the Tongass National Forest has been divided in several different ways to describe the resources. Divisions vary by resource since the relationship of each resource to geographic conditions and zones varies. Land divisions important for the effects analysis are briefly described.

Land Use Designations

The Forest Plan uses land use designations (LUDs) to guide management of National Forest System (NFS) lands within the Tongass National Forest. The project area includes three LUDs: Timber Production, Modified Landscape, and Old-Growth Habitat. These are discussed in Chapter 1 of this DEIS (see also Figure 3).

Project Area

The project area was mapped by the interdisciplinary team (IDT) to define the boundary of the area in which the project will occur. The project area is about 38,459 acres in size. Included in the project area are 3,557 acres of non-NFS lands. The non-NFS lands are owned by the Cape Fox Corporation, State of Alaska, Alaska Mental Health Trust Authority, and private landowners.

Value Comparison Units

Value comparison units (VCUs) are distinct geographic areas, each encompassing a drainage basin containing one or more large stream systems. Boundaries usually follow major watershed divides. The Saddle Lakes project area is located within VCUs 7460, 7470, and 7530 (see Figure 2).

Game Management Units

Game management units (GMUs) are geographical areas defined by the Alaska Department of Fish and Game (ADF&G) to manage wildlife populations. Legal hunting and trapping regulations govern each unit. The Saddle Lakes project area is located in GMU 1A.

Wildlife Analysis Areas

Wildlife analysis areas (WAAs) are land divisions used by the ADF&G for wildlife analysis. The Saddle Lakes project area falls within WAAs 406 and 407 (see Figure 7).

Watersheds

A watershed refers to the area that contributes water to a drainage or stream and to the portion of a forest in which all surface water drains to a common point. Watersheds can range from tens-of-acres that drain a single, small intermittent stream, to many thousands-of-acres for a stream that drains hundreds of connected intermittent and perennial streams. The watersheds used for this analysis were delineated by the US Geological Survey according to a national hierarchy of Hydrologic Unit Codes (HUC). In coastal areas, the ocean is considered the common point, so some of these units drain unconnected streams into the ocean. See Figure 15 and Figure 16.

Inventoried Roadless Areas

Inventoried roadless areas (IRAs) are undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act. Portions of the North Revilla (#526) and Carroll (#535) IRAs, as identified by the 2001 Roadless Rule, are found within the Saddle Lakes project area (see Figure 17).

Biogeographic Province

This designation refers to 21 ecological subdivisions of Southeast Alaska identified by generally distinct ecological, physiogeographic, and biogeographic features. Plant and animal species composition, climate, and geology within each province are generally more similar within than among adjacent provinces. The Saddle Lakes project area is located within biogeographical providence #15, Revilla Island/Cleveland Peninsula.

Ecological Subsection

Ecological subsections are mid-sized terrestrial ecosystems (10-1,000 mi^2). They further refine biogeographical provinces based on similar ecological characteristics (e.g., landforms, streams, vegetation, soils, and wetlands). The Saddle Lakes project area is located within the Traitors Cove Metasediments Ecological Subsection (Nowacki et al. 2001).

Analyzing Effects

Environmental consequences are the resulting effects of implementing an alternative on the human environment (40 C.F.R. § 1508.14). The EIS must describe and provide the analysis of environmental effects of the proposed action and each alternative analyzed in detail (40 C.F.R. § 1502.16). The "environmental consequences" section is devoted largely to a scientific analysis of the direct and indirect environmental effects of the proposed action and of each of the alternatives (CEQ 1981, Question 7a). The terms effects and impacts are used synonymously (40 CFR §1508.8)

Assumptions for Analysis

The following general assumptions apply to all resources included in the analysis:

- All uneven-aged management would remove up to 33 percent of the stand's pre-treatment basal area.
- The Shelter Cove LTF would be used to transport timber from the project area.
- All new and reconditioned NFS roads would be closed (except for road 8300280), and all new temporary roads would be decommissioned at the end of silvicultural activities.
- The State of Alaska ROW on NFS land is not a connected action.
- Timber stand initiation phase occurs between 0-25 years, and stem exclusion phase occurs between 26-150 years.

If applicable, other resource assumptions will be included at the beginning of each issue or resource section. If none are included, the general assumptions apply.

How the Effects of the Alternatives Were Evaluated

Within each issue and resource area, applicable direct and indirect effects were evaluated. Cumulative effects, unavoidable adverse effects, and resource commitments lost or cannot be reversed were also evaluated for all alternatives being considered in this DEIS. These effects are defined as follows:

- Direct effects – Those effects caused by the action and occur at the same time and in the same general location as the action (40 CFR §1508.8).
- Indirect effects – Those effects that occur at a different time or in a different location than the action to which the effects are related (40 CFR §1508.8).
- Cumulative effects – Those effects on the environment that result from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7).
- Interrelated projects are defined for the Saddle Lakes DEIS as activities that could potentially interact with the alternatives being considered in a manner that could result in cumulative impacts. Interrelated projects have been grouped as past, present, and reasonably foreseeable future actions. See Appendix A – Reasons for Scheduling the Environmental Analysis of the Saddle Lake Project.
- Unavoidable adverse effects – Those effects that could occur as a result of implementing any of the action alternatives. Some of these effects would be short-term, while others would be long-term.
- Irreversible commitments – Those commitments that cannot be reversed, except perhaps in the extreme long term. This term applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to factors, such as soil productivity, renewable only over long periods of time.
- Irretrievable commitments – Those commitments (e.g., timber production) lost for a period of time. The commitment is irretrievable rather than irreversible because future entries could harvest those areas if they are still classified as part of the suitable timber base.

Available Information

Much of the Tongass National Forest resource data resides in an electronic database formatted for a geographic information system (GIS). Resource specialists conducted field inventories starting in 2008. Some field investigations are still underway and the results of some studies are still being incorporated. The IDT resource specialists used GIS software (ArcMap) to assist in the analyses of these data. GIS data is available in tabular (numerical) and map formats. For this DEIS, all the maps, and most of the numerical analyses, are based on GIS resource data supported by field inventories.

Incomplete and Unavailable Information

The Council on Environmental Quality regulations provide direction on how to proceed with the preparation of a DEIS when information is incomplete or unavailable (40 CFR §1502.22). None of the incomplete or unavailable information identified was critical to the impact analysis.

It should be noted that there is incomplete knowledge about many of the relationships and conditions of wildlife, fish, forests, climate change, jobs, and communities. The ecology, inventory, and management of a large forest area is a complex and developing science. The biology of fish and wildlife species prompts questions about population dynamics and habitat relationships; and the interaction of resource supply, the economy, and communities is the subject matter of an inexact science. However, the basic data and central relationships are sufficiently well-established in the respective sciences for the deciding official to make a reasoned choice between the alternatives, and to adequately assess and disclose the possible adverse environmental consequences.

Other Resources

Resources Not Present

The following resource is not present and not affected by the Saddle Lakes Timber Sale. Therefore, analysis of this resource is not carried forward in this DEIS.

Karst Resources

The Forest Geologist and the project Soils Scientist reviewed the proposed action and determined that karst and cave resources are not present in the Saddle Lakes project area.

Resources Likely to be Unaffected

In addition to the significant issues, several resources and resource uses in the project area are likely to remain unaffected by the Saddle Lakes Timber Sale, or would not be affected to a significant degree. Even though significant effects are not anticipated, these resources are briefly discussed in the sections of this chapter which follow the significant issues, to the extent that measurable effects or differences between the alternatives are present. These resources and resource uses include:

- Air Quality and Climate Change
- Environmental Justice
- Heritage Resources
- Lands and Minerals

Floodplains

Executive Order 11988 directs Federal agencies to avoid, to the extent possible, adverse impacts associated with the occupancy and modification of floodplains. This project does not propose floodplain occupancy. Roads crossing floodplains have been designed to pass floods in accordance with BMP 14.17 (FSH 2509.22). Road cards provide site specific details.

Major floodplains are mapped as soil units: There are 820 acres of mapped floodplains in the Saddle Lakes project area, 95 acres of which have been previously harvested. These floodplain areas have re-vegetated and pose no future man-induced sedimentation risk, and with time will return to their full function. About 0.6 mile of roads have been built on mapped floodplains in the past and constitute a permanent loss of floodplains.

No mapped floodplains are found within any of the proposed activity areas for any action alternative. Further, none of the action alternatives propose new road construction or timber harvest on floodplains in the analysis area. Because there will be no actions taken within mapped floodplains in the analysis area, there will be no direct or indirect effects. Because there are no direct or indirect effects to mapped floodplains from any of the action alternatives, there will be no cumulative effects. Small un-mapped floodplains may be present within RMAs and may be crossed by new road construction. Roads crossing these areas have been designed to pass floods and minimize effects in accordance with BMP 14.17 (FSH 2509.22) as depicted on road cards.

Issue 1: Timber Economics

Issue Statement: An economical timber sale would help support the local and regional economies of Southeast Alaska.

Lack of a steady supply of economic timber can adversely affect the viability of Southeast Alaska's forest products industry and the ability of the industry to contribute to the diversity and stability of local and regional economies. The Saddle Lakes project is one component of this supply. To compare the alternatives, analyses included the quantity and quality of timber offered costs of road construction, reconstruction and maintenance, and costs associated with logging systems and silvicultural prescriptions. A broader discussion about the Tongass National Forest timber program is in Appendix A of this EIS.

Units of Measure

The following units of measure were used to evaluate effects of the proposed action and compare alternatives:

- Indicated advertised rate (dollars per MBF);
- Acres by logging system (shovel, cable, helicopter);
- Volume of timber by species (net sawlog and net utility wood, in MBF and MMBF);
- Road construction/reconstruction costs and LTF costs (dollars per MBF);
- Logging costs (dollars per net MBF removed, without utility);
- Total Production Costs (stump-to-mill, roads, and manufacturing costs in millions of dollars), and production costs per MBF per net removed; and
- Employment supported by the project (number of annualized jobs).

Methodology

Financial Efficiency Analysis is required by USDA FS Handbook, R10, Supplement 2409.18-2013-1. The Financial Analysis Spreadsheet Tool – RV (FASTR), October 21, 2013 version, was used to process and analyze data for comparison of costs and benefits associated directly with implementation of the Saddle Lakes project.

The FASTR model uses logging costs and manufacturing costs developed for the Alaska Region (R10) timber sale appraisal program. Costs reflect production studies and data collected from timber harvest contract purchasers in Southeast Alaska. Timber Volume estimates by species were developed for each harvest unit based on a combination of site-specific Common Stand Exam data collected from plots throughout the project area, including proposed units, during 2011 to 2013. The FASTR model was used to provide an indication of sawlog and utility volume by species (net MBF). Net volumes by alternative were calculated using FASTR.

Direct logging and sawmill employment and income, are generated by FASTR, and are estimates only of direct income and employment that would be supported from activities for any timber harvested from the Saddle Lakes project. Therefore, financial efficiency analyses should be considered solely as a tool for comparing the alternatives. Indirect benefits are not estimated due to the small scale of the project and the size of the affected communities. Because of direct, indirect, induced, and multiplier effects, total economic impacts of the action alternatives will be greater than shown in this analysis.

FASTR outputs are intended for initial planning purposes, and provide a useful gauge of current economic conditions for a timber sale. The FASTR model was used to provide an indication of the indicated advertised rate, sawlog and utility volume by species, road construction/reconstruction and LTF costs, logging costs, total selling value (lumber and export log sales) and total production costs. These data are useful as units of measure to compare relative differences between alternatives and may not reflect absolute values. Merchantable timber from harvest units, and road right-of-way timber located on NFS lands will be cruised to determine its quantity, quality and value for the contract. The final contract appraisal will include selling values, cost information, and a profit and risk allowance posted from the most recent quarterly update bulletin to determine the advertised value at the time of offering.

Analysis Area

The NFS lands in the Saddle lakes project area are considered the analysis area for the financial efficiency analysis since that is where the value of the timber considered in the analysis is located. Although timber from other land ownerships within the area may influence the value of the timber to some purchasers, this is not incorporated into this analysis. Also, timber from this project may be split into several contracts or combined with timber from other projects.

Also, this analysis is limited to a snapshot in time based on available information and does not speculate on timber market fluctuations. At the time of the appraisal, the value of the timber or costs may increase or decrease.

The cumulative effects analysis area considers the whole Tongass National Forest, which combines the timber from various projects into the Tongass timber program. Contracts are usually not restricted to bidders from a distinct geographic area and can include bidders outside of Southeast Alaska, including bidders from the rest of the United States. In addition to the timber managed by the Forest Service, the State of Alaska (Division of Forestry (DOF), Alaska Mental Health Trust Authority (AMHTA), and the University of Alaska), and Alaska Native Corporations also support the Southeast Alaska timber industry.

Affected Environment

Various factors affect timber sale economics including species composition and quality, timber volume, silvicultural system, logging systems, road construction, and hauling and towing distances. The ability to export timber that is surplus to Alaskan needs or is not suitable to current Alaska manufacturing facilities also can increase the value of the timber.

Forest Products Industry in Southeast Alaska

The forest products industry has been a part of the economy of Southeast Alaska since settlement, with sharp growth in the 1950s due to the start of pulp mills. Employment in the forest products industry began to decline with the termination of the long-term sale contracts in 1994 and 1997, with subsequent closure of the Ketchikan Pulp Company mill in 1997. The forest products industry in

Southeast Alaska currently consists of individual- and family-owned sawmills and independent logging businesses.

The two currently operating medium-sized mills in Southeast Alaska are Viking Lumber Company located in Klawock and Icy Straits Lumber Company located in Hoonah. Viking Lumber Company currently has timber under contract with the Tongass National Forest on Kupreanof Island and Prince of Wales Island. The timber under contract by the Icy Straits Lumber Company is on Chichagof Island. Alcan Forest Products, LLC (ALCAN), based in Ketchikan purchases timber contracts on the Tongass National Forest but does not have a processing facility. Timber purchased by ALCAN is either sold for domestic processing or sold exported under current Alaska Regional policy.

Other small mills are located throughout Southeast Alaska. The mills closest to the project area include Tongass Forest Enterprises in Ketchikan, and operators on Prince of Wales Island in the towns of Thorne Bay, Craig, Klawock, Coffman Cove, and Edna Bay. As of May 2014, there were about 43 different operators with timber under contract.

Currently, the timber industry in Southeast Alaska is based predominantly on the harvest and processing of old-growth timber. The transition to the harvest of young-growth timber is underway and is largely dependent when the young-growth timber is large enough to produce an economic product and when there is enough interest by the current industry. Manufacturing young-growth timber would involve refitting most of the mills in Southeast Alaska.

Employment

Based on forest products employment data for the period 2002 through 2011 total timber industry employment in Southeast Alaska dropped from 512 jobs to 262 jobs (Table 4).

Table 4. Forest products industry employment in Southeast Alaska, 2002 through 2011

Year	Tongass Logging[1/]	Tongass Sawmill[1/]	Total Tongass-Related Employment	Other Sawmill	Other Logging	Total Other Timber Employment	Total Industry Employment
2002	63	110	173	40	299	339	512
2003	108	91	199	64	298	362	561
2004	82	95	177	53	220	273	450
2005	88	96	184	52	263	315	499
2006	81	77	158	46	217	263	421
2007	44	70	114	63	225	288	402
2008	52	70	122	24	118	142	265
2009	48	39	87	19	110	129	216
2010	61	46	107	7	133	140	247
2011	62	47	109	3	150	153	262

Source: Alaska Department of Labor, Kilborn et al. (2004), Brackley et al. (2006b), Brackley and Crone (2009), Alexander and Parrent (2010), Alexander (2011), Alexander (2012), Alexander and Parrent (2012), and Parrent (2012). Data on file with: Regional Economist, Ecosystems Planning, USDA Forest Service, PO Box 21628, Juneau, AK 99802-1628

1/ Estimated based on the ratio of Tongass timber harvest to total timber harvest in Southeast Alaska.

Alaska Region Limited Export Shipment Policy and Domestic Processing

Market demand for softwood logs and lumber is highly variable. For instance, the U.S. economic downturn that began in 2007, and the concurrent decline in the U.S. housing market resulted in dramatically reduced demand for U.S. logs and lumber. Similarly, China's economic growth slowed in 2011, resulting in reduced demand for U.S. log exports (Flynn, 2012). The 2008 Forest Plan

Amendment FEIS, Volume II, Appendix G, describes the latest timber demand procedures and projections (USDA 2008c). The estimated market demand is calculated annually as discussed in Appendix A of this document.

Between 2007 and 2013, the range of export was from 15.6 to 50.6 percent of Tongass National Forest timber harvests were shipped as logs, to foreign and domestic markets. These exports contribute substantially to the economic stability of Alaskan timber exporters (Flynn 2012). This shows in increased log exports from Tongass National Forest timber contracts from 2008 to 2012, due to foreign export prices that have been high enough to allow greater profits from log exports than from log processing in Alaska mills (Roos et. al. 2010; Alexander and Parrent 2012). In 2013, export was 21.9 percent indicating better domestic prices, although no trend can be determined yet.

In March 2007, the Alaska Regional Forester approved the limited interstate shipment policy, which allowed certain unprocessed spruce and hemlock logs to be appraised for shipment to domestic markets (the Lower 48 states). This hemlock-spruce export authorization was designed to offset the extended decline in U.S. housing construction coupled with a decline in lumber orders and selling values. In 2008, this policy was expanded to allow foreign export for existing contracts if a premium was paid for certain species. The policy was expanded in November 2009 for all contracts. In 2009, a foreign market appraisal was established for use on timber sales to reflect export values for spruce and hemlock (USDA Forest Service 2011a). The 2009 limited export policy is still in effect and allows hemlock and spruce export equal to 50 percent of total sale sawlog volume plus 100 percent export of Alaska yellow-cedar. Alaska yellow-cedar is considered surplus to the Alaskan market and can be requested for 100 percent export. Exceptions can be made for export when no local mill exists for the type of timber in a contract.

Timber volume is not pre-authorized for export. If a purchaser desires to ship timber to domestic destinations outside the state of Alaska or export timber overseas, they are required to apply for a permit from the Regional Forester after the contract is awarded.

The Alaska Region (R10) monitors the need for export annually. This policy allows timber contracts with a higher proportion of lower grade hemlock and spruce to have a greater chance of appraising positive, while also allowing local timber purchasers and manufacturers options to stay in business and be poised to commence operations when market conditions improve.

Silvicultural Systems

The choice of silvicultural system affects the financial return from a timber sale. Implementation of uneven-aged management has higher logging costs and affects larger areas than would be needed for the same harvest volume under an even-aged system (USDA 2008c). Intensive silvicultural systems that employ even-aged prescriptions will lead to the production of high quality timber in the shortest timeframe and increase total forest yields over time (Stocker 2003). Uneven-aged systems are used when most economically practical, such as where high-cost helicopter yarding is utilized due to higher cost road construction and haul, or where resource specific mitigations are required. Refer to the Silviculture section for more information on prescriptions.

Logging Systems

Cable and shovel yarding are considered conventional methods, and are substantially less expensive than helicopter yarding. Conventional methods require road access and are most economically efficient for even-aged silvicultural systems. Uneven-aged silvicultural systems require additional time to move equipment and cables which add operational costs. Shovel yarding is the least costly logging system and is best suited for gentle terrain and yarding distances less than about 500 feet. Cable yarding is best suited for steeper slopes and allows longer yarding distances. Some areas cannot be accessed cost-effectively by conventional methods due to expensive road construction or because of inadequate log suspension required for resource protection. In these areas, helicopter yarding is used. Helicopter systems are typically twice as expensive as conventional systems and may negatively affect financial efficiency. All methods require a landing area where logs are loaded on trucks. In addition, helicopters require service landings for maintenance and fueling.

Roads, Rock Quarries, Log Transfer and Export Facilities

Road construction and reconditioning involve substantial costs and strongly affect timber sale economics. Transportation costs, including towing or barging of logs, are a large percentage of a timber purchaser’s costs in Southeast Alaska. By using the most cost-effective transportation system while maintaining the appropriate design standards to meet resource requirements, these costs can be reduced. There are about 53 miles of existing National Forest System (NFS) roads and about 33 rock quarries in the project area. Refer to the Transportation Resource Report for more information on roads, rock quarries, LTFs and sort yards.

The Shelter Cove marine access facility (MAF) consists of a seaplane and boat float, a barge loading and unloading ramp, a sort yard, and a log transfer facility (LTF). The LTF is a single level, native log bulkhead with about a one acre sort yard attached to it within an existing rock pit. Storms in 2013 damaged the Shelter Cove LTF, and the lower logs of the bulkhead have deteriorated enough to require the reconstruction of the bulkhead, or the replacement of the bulkhead with a ramp.

A site located at Coon Cove about 3 miles southwest of the project area on State of Alaska lands was historically used as a LTF for timber sales in the vicinity (see Figure 1). However, the bulkhead has been removed, and this site has largely been restored to its original contours. To use this site as a LTF, the timber purchaser would have to make a substantial investment in reconstruction, and would have to obtain an Army Corps 404 permit, a tideland easement, solid waste permits, water permits, and perform a bark dive survey. Therefore, this site was not included in this project analysis.

Two nearby export facilities, Ward Cove and Leask Cove have been both approved by the Alaska Regional Forester FSH 2409.15-2009-1). These facilities can be used to load logs on barges for out of state shipment. Logs from the Saddles Lakes Timber Sale project could be transferred to barges at these points if not taken directly to an Alaskan mill.

There is also an existing sort yard and LTF located on State of Alaska lands at Leask Cove. Completion of the proposed State of Alaska road (Ketchikan to Shelter Cove) would provide a connection to an existing road that accesses the Leask Cove sort yard and LTF. Because it is uncertain whether the connection of this road would be completed, only the Shelter Cove LTF was considered for the transport of logs in this analysis.

Forest Service Costs

The Forest Service incurs environmental analysis and documentation costs including field inventory, data analysis, public involvement, and preparation of documents that satisfy the requirements of NEPA. This cost is considered to be a ‘sunk’ cost that applies equally to all alternatives, including the no action alternative and does not provide any comparison of the alternatives. Sale preparation costs include unit layout, cruising, appraisal, and contract development. Sale administration consists of administering the timber sale contract from the time the sale is awarded until the sale is completed. Engineering support consists of planning and timber sale contract administration activities associated with new facility and road construction, use of existing facilities and road maintenance.

Environmental Consequences

Direct effects for timber sale economics are estimated using quantifiable measures or indicators, as supported by the FASTR financial analysis tool (run January 8, 2014). These outputs show a relative comparison for alternatives and are intended solely as a tool for initial planning purposes. The alternative with the highest indicated advertised rate will generate the highest return on investment, and represents the alternative with the least economic risk. However, as production costs and selling values fluctuate, so will the indicated advertised rate.

No analysis was done to break out the most valuable timber units or divide the timber volume from an alternative into several sales since the combinations would be numerous and may change to meet markets and operators. The production costs (used throughout the following comparisons) are total production costs for an action alternative, divided by total sawlog volume (cost per NMBF sawlog, based on FASTR analyses). Production costs in the direct effects are the sum of logging and transportation costs, road costs, and manufacturing costs under the current R10 limited export policy.

Effects Common to All Action Alternatives

Positive Appraisals

Under current Congressional direction (Public Law 113, House Report 3547, Section 410) no timber sale in the Alaska Region with a volume greater than 500 MBF shall be advertised if the indicated advertised rate is deficit when using a residual value appraisal. Sales with volumes under 500 MBF currently do not require a residual value appraisal and can be advertised using established standard rates.

Shelter Cove LTF Reconstruction

All action alternatives estimated haul costs to the Shelter Cove LTF. Reconstruction of the Shelter Cove LTF bulkhead to repair storm damage is estimated at $60,000. This estimate does not change between alternatives and represents a fixed cost that would be distributed over the proposed volume of each alternative. Higher timber volumes would therefore help distribute this cost on a per-MBF basis. LTF reconstruction cost, combined with road construction and reconstruction costs, is shown by alternative in

Opportunities for Small Sales

Due to the project area's geographic location, it may be economically feasible for several small mills on Revillagigedo and Prince of Wales Islands to purchase small sales from the project area or to utilize surplus material made available from a larger mill or purchaser in their vicinity. There are several small mills in Thorne Bay that process volumes ranging from 30 MBF to 600 MBF yearly (Alexander and Parrent 2012). However, costs of rafting or barging to these small mills could be prohibitively high, because their fixed costs are distributed over a smaller volume of timber.

For the purposes of this analysis, a small sale is considered to be approximately 1 MMBF or less. Timber volume in any of the action alternatives could be administratively separated into both large and small sales. Each action alternative includes some harvest units that could be logged by cable or ground-based systems. However, an alternative could not be subdivided into only small sales since the cost of road construction to some units could not be supported or the higher cost of helicopter logging.

Utility Volume

Tongass National Forest timber sale contracts typically include a provision specifying that the purchaser has the option of not removing utility logs from harvest units. Utility material does not meet minimum requirements for saw timber (net log scale is 50 percent or less of gross scale) and is primarily suitable for low-value chips. Utility logs are uneconomical because revenues do not cover the costs of felling, yarding and transport. Therefore, use of sawlog volume (gross volume minus utility Volume) is a more meaningful metric for assessing the value of a timber sale.

Direct and Indirect Effects

Timber Sale Financial Efficiency Analysis

Comparisons of the alternatives were analyzed two ways to consider both the Alaska Region Limited Export Policy and 100 percent domestic processing. Assumptions used for export policy scenario were:

1. Maximum allowed export of hemlock and spruce;
2. All western redcedar would be domestically processed; and
3. All Alaska yellow-cedar would be exported.

Assumptions used for the domestically processing scenario were:

1. All hemlock, spruce and western redcedar would be domestically processed; and
2. All Alaska yellow-cedar would be exported.

Alaska yellow-cedar would be 100 percent exported under both scenarios since yellow-cedar has been determined by the Secretary of Agriculture to be surplus to the domestic processing under36 CFR 223.200.

Table 5 shows a summary of the units of measure under the current R10 Export Policy. A mix of foreign and Alaska markets were used for the financial analysis for each alternative. The percentage of western hemlock appraised to foreign markets was determined by achieving the maximum percentage of foreign export volume allowed for each alternative under the current export policy. This percentage ranged from 2 to 3 percent appraised to Alaska markets depending on alternative, with the remainder being appraised to foreign markets.

The domestic processing scenario in Table 5 summarizes total selling value, total production costs, and indicated advertised rates for each alternative. Under this scenario, timber volumes and logging costs are the same as under the current R10 limited export scenario by alternative. Differences in logging costs per MBF between alternatives are associated with those alternatives that have a greater percentage of helicopter yarding systems and uneven-aged management, due to higher logging costs incurred through utilizing these systems. Differences in road costs between alternatives are due to either more road construction or reconstruction or less timber volume to offset the miles of road.

Total selling values, total production costs, and production costs per MBF increase under the domestic processing scenario. These across-the-board increases in production costs are due to higher local manufacturing costs and increased tow costs. The estimated one-way tow distance to Viking Mill in Klawock from the Shelter Cove LTF is about 230 miles. This is the closest sawmill capable of processing the entire volume of timber from an alternative. The tow distance to the Leask Cove export location is about 33 miles from the Shelter Cove LTF. The increase in selling values is not great enough to offset the production costs due to the value of the manufactured products. These factors make the indicated advertised rates more deficit under a domestic processing scenario for all action alternatives.

Without the option of allowable export, or a substantial change in market conditions, prospective timber sale purchasers will not likely have an economic incentive to bid on a timber contract because of increased risk and decreased profit, or the contract may not even be offerable. If a timber sale does not sell, then no timber industry jobs would be supported.

For the comparison of the alternatives, the values from the FASTR analysis completed used the maximum export policy as assumptions. The relative ranking of the alternatives for the domestic processing scenario are the same as for the export policy scenario. The volume exported will be determined by the purchasers at the time of harvest and could fall within the range between the two analyses.

Table 5. Timber financial efficiency analysis for the Saddle Lakes Project Area

Value	Alternative					
	Alt 1.	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Both Export Policy and Domestic Processing Scenarios						
Logging Costs (cost /MBF net Removed)	$0	$273	$246	$252	$262	$241
Road Construction /Reconditioning and LTF Costs (cost /NMBF Sawlog)	$0	$81	$105	$91	$84	$95
Export Policy Scenario						
Total Selling Value (lumber and export log sales)	$0	$20,650,902	$11,623,143	$34,697,843	$41,282,699	$27,597,404
Total Production Costs [1/]	$0	$17,739,198	$9,953,014	$29,256,903	$34,953,627	$23,065,930
Production (costs /MBF net removed)	$0	$653	$652	$641	$643	$635
Indicated Advertised Rate (cost /MBF)[2/]	$0	-$14.05	-$12.08	-$2.00	-$4.66	$3.62
Domestic Processing Scenario						
Total Selling Value (lumber and export log sales)	$0	$21,473,648	$12,074,204	$36,101,687	$42,952,961	$28,713,971
Total Production Costs[1/]	$0	$19,870,891	$11,689,070	$34,522,468	$41,223,979	$27,260,063
Production (costs/ MBF net removed)	$0	$732	$765	$756	$759	$751
Indicated Advertised Rate (cost /MBF)[2/]	$0	-$70.73	-$104.52	-$95.15	-$97.91	-$89.71

Source: FASTR financial analysis tool, October 21, 2013 version.

Notes: All volumes are in net thousand board feet (NMBF)

1/ Total production costs are logging and transportation costs (stump to mill), roads costs, and manufacturing costs.

2/ - indicates a negative value.

Projected Employment and Income

Direct employment and income from logging, sawmilling, transportation and other services are estimated by converting net sawlog timber volume (MMBF net sawlog) to Southeast Alaska annualized jobs and income (employment coefficients for the period 2007 to 2010, Alexander 2012). An annualized job is one job for one year (Alexander, et. al, 2010). Since some of these jobs are seasonal or intermittent, this may not equate to the number of full-time jobs.

Based on data from the USDA Forest Service Alaska Region Economist (Alexander, 2013), Tongass National Forest harvests considering the export policy support an average of the following regional annualized jobs: 2.26 logging jobs per MMBF net sawlog volume, 2.68 sawmilling jobs per MMBF, and 1.53 jobs per MMBF in transportation and other services. Using the domestic processing scenario described above, regional annualized jobs supported include: 2.26 logging jobs per MMBF, and 2.68 sawmilling jobs per MMBF, and 0.62 jobs per MMBF in transportation and other services. The higher number of jobs per MMBF in supported in the transportation sector for the export scenario is due to those jobs, such as stevedoring and other out-of-state barging. However, because timber sales with allowable export would supply a lower volume of logs to local sawmills, and the number of manufacturing jobs in Southeast Alaska would be less.

Table 6 shows projected Alaskan employment and income from logging, sawmilling, transportation and other services utilizing current R10 Export Policy. Table 7 provides the same analysis assuming current R10 Export policy is not utilized.

Table 6. Estimated project employment and income utilizing R10 export policy[1/]

Employment Measure	Alternative					
	Alt.1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Local annualized jobs in logging	0	61	35	103	123	82
Local annualized jobs in sawmilling	0	27	15	45	53	36
Local annualized jobs in transportation and other services[2/]	0	32	18	55	65	43
Total Local Annualized Jobs Supported[3/]	0	121	68	203	241	161
Direct Income	$0	$6,434,354	$3,621,309	$10,815,264	$12,867,753	$8,602,068

Source: FASTR financial analysis tool, October 21, 2013 version.

1/ Assumes 100 percent Alaska yellow-cedar export plus hemlock /spruce export equal to 50 percent total sale net sawlog volume.

2/ Transportation and other services include towing, independent trucking, stevedoring, scaling, quality control, and marketing.

3/ Totals may not add due to rounding generated by the FASTR financial analysis tool

Table 7. Estimated project employment and income utilizing domestic processing[1/]

Employment Measure	Alternative					
	Alt.1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Local annualized jobs in logging	0	61	35	103	123	82
Local annualized jobs in sawmilling	0	63	36	106	127	85
Local annualized jobs in transportation and other services[2/]	0	20	11	34	40	27
Total Local Annualized Jobs Supported[3/]	0	145	81	243	290	194
Direct Income	$0	$6,898,406	$3,878,806	$11,597,568	$13,798,655	$9,224,316

Source: FASTR financial analysis tool, October 21, 2013 version.

1/ Assumes 100 percent Alaska domestic processing of hemlock /spruce /western red cedar and 100 percent export of Alaska yellow cedar.

2/ Transportation and other services include towing, independent trucking, stevedoring, scaling, quality control, and marketing.

3/ Totals may not add due to rounding generated by the FASTR financial analysis tool

Timber Volume

Differences in timber harvest economics can be attributed to multiple factors, including:

- timber volume/species composition;
- silvicultural prescriptions;
- logging systems;
- miles of road construction;
- haul and tow distances to the final mill destination.

Western hemlock accounts from 46 to 51 percent of the total volume under the action alternatives, with western redcedar ranging from 19 percent to 21 percent, Sitka spruce from 13 and 14 percent, and Alaska yellow-cedar from 12 to 13 percent. Pacific silver fir, red alder, and shore pine comprise about 1 percent of the total gross volume. Timber volume estimates are reported in Table 8.

Table 8. Timber volume estimates from the Saddle Lakes Project area by species and alternative

Species	Volume (NMBF)[1/]					
	Alt 1.	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Sitka Spruce Sawlog Volume	0	3,906	2,197	6,568	7,814	5,224
Western Hemlock Sawlog Volume	0	13,911	7,822	23,388	27,826	18,602
Western Red cedar Sawlog Volume	0	5,817	3,271	9,779	11,635	7,778
Alaska Yellow Cedar Sawlog Volume	0	3,527	1,983	5,929	7,055	4,716
Total Sawlog Volume	0	27,161	15,272	45,664	54,330	36,319
Total Utility Volume	0	3,173	1,784	5,334	6,352	4,243
Total Volume (Sawlog and Utility)	0	30,334	17,056	50,998	60,682	40,562
Volume (MMBF)[2/]						
Total Volume (Sawlog and Utility)	0	30.3	17.1	51.0	60.7	40.6

Source: FASTR financial analysis tool, October 21, 2013 version.

1/ Net Thousand Board Feet (NMBF). Data may not add up exactly due to rounding and may be reported differently by other resources.

2/ Million Board Feet (MMBF).

Silvicultural Systems

All action alternatives propose both even-aged and uneven-aged management. Proposed use of uneven-aged systems should be diligently planned, as they involve higher costs and there is a risk of degradation of the potential future value of a stand by applying these systems. Refer to the Silviculture Resource Report for information on prescriptions.

Individual harvest units may not always be economical to harvest by themselves, but managing stands containing defective, lower value timber will result in increased future timber yields. This is due to silvicultural practices that result in managed stands with subsequently higher growth rates and increased volume productivity. Harvesting higher-value units within the same timber sale will result in a greater financial return, and can compensate for costs associated with harvesting lower-value harvest units. Table 9 lists the proposed harvest acres by logging system by alternative.

Table 9. Acres by silvicultural system, prescription, and logging system for the Saddle Lakes Timber Sale

Silvicultural System	Silvicultural Prescription	Logging system	Acres by Alternative					
			Alt.1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Even-aged Management	Clearcut	Cable	0	612	524	1,384	1,573	1,116
		Shovel	0	443	292	538	578	538
		Helicopter	0	0	0	190	443	0
Even-aged Total			**0**	**1,055**	**816**	**2,112**	**2,594**	**1,654**
Uneven-aged Management	Single-tree Selection (up to 33 percent removal of the basal area)	Cable	0	0	0	5	5	5
		Shovel	0	52	0	0	0	0
		Helicopter	0	1,100	196	307	276	479
Uneven-aged Total			**0**	**1,152**	**196**	**312**	**281**	**484**
Total Acreage			**0**	**2,207**	**1,012**	**2,424**	**2,875**	**2,138**

Source: FASTR financial analysis tool, October 21, 2013 version.

Logging systems

All action alternatives propose use of ground-based (conventional) cable and shovel logging systems, and helicopter yarding. Conventional methods require road access, are substantially less expensive than helicopter yarding, and are most economically efficient for even-aged silvicultural systems. For conventional logging systems, the estimated average felling, bucking, and yarding costs are $224.70 per MBF net removed (without removal of utility wood), across all action alternatives.

Analysis for this project indicate that costs of utilizing helicopter systems are projected to exceed costs of conventional logging systems by an average of about 78 percent on a per MBF basis for all action alternatives, even when accounting for additional road-building costs associated with conventional logging. For helicopter logging systems, the estimated average felling, bucking, and yarding costs from FASTR are $399.09 per net MBF (with optional removal of utility wood), across all alternatives. Table 9 displays acres by Silvicultural System, Prescription, and Logging system for each action alternative.

Landings

Optimum landing design represents a balance between a minimum size that will allow for safe operation of all equipment with additional space for handling and storage of logs, while minimizing construction costs and potential environmental impacts. Landings are located, designed, and constructed to minimize soil erosion and water quality degradation (Region 10 BMP 13.10; FSH 2509.22). During implementation of the Saddle Lakes timber contracts, landing size, location, and construction specifications must be agreed upon by Forest Service timber sale administrator and the timber purchaser.

Typical yarder landings vary in size from a wide spot in the road for small mobile yarders, to about 0.2 acres for a large (90-foot) tower yarder and are usually adjacent to a cable unit. In general, yarder landings for the Saddle Lakes project will need to accommodate a medium (50 to 70-foot) tower yarder, and would likely be less than 0.1 acres in size. In shovel yarding harvest units, it is likely that those roads which access the harvest units will be used as continuous landings, thereby eliminating additional landing construction costs.

Two types of landings are associated with helicopter logging: log landings and service landings. Log landings are used for laying down turns of logs, processing and storing logs, and loading log trucks. A minimum of a 100-foot by 200-foot roadside landing provides a drop zone, a safety zone, and a decking area. These landings are not within the unit, but located on a nearby road system. Service landings provide a safe landing zone for the helicopter, in addition to trailers, a pad, a fuel truck, and a lift truck to fuel and perform minor maintenance. Dimensions of service landings vary from one to two acres and it is estimated that no more than three service landings would be required for the project for any alternative.

Helicopter turn time is the time it takes a helicopter to go from the landing, pick up a load of logs and return to the landing and deliver the logs. The shortest helicopter turn-times are the most economical and therefore the location of these landings will be determined during contract administration.

Table 10 shows estimated numbers of landings by action alternative and yarding method potentially necessary to facilitate yarding. Some landings may be used for multiple units, which would minimize construction costs and potential environmental impacts, and improve economic feasibility. Therefore actual numbers of landings by action alternative may be fewer than shown in Table 10.

Table 10. Estimated numbers of landings by action alternative and yarding method necessary to facilitate yarding

Landing Type	Number of Landings by Alternative					
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Shovel	0	32	24	35	41	35
Cable Yarder	0	77	55	136	169	118
Helicopter Log Landing	0	21	12	14	19	16

Source: Tongass National Forest GIS.

Roads

Road construction and reconditioning involve substantial costs, and strongly affect timber sale economics. Table 5 shows the road construction and reconstruction cost by MBF while Table 11 shows proposed miles of road and overall cost. By using the most cost-effective transportation system while maintaining the appropriate design standards to meet resource requirements, these costs can be reduced.

Road costs used in the timber economic analysis are based on Road Cost Calculations provided in Appendix B of the Transportation Resource Report. Proposed road construction was designated as either NFS or temporary based on future access needs. Construction of proposed roads (NFS and temporary) would provide access for yarding and landing logs, and provide transportation routes connected to the existing road infrastructure. Shelter Cove LTF was used to determine haul distances (and therefore estimated costs) for the Saddle Lakes project. Refer to the Transportation Resource Report for more information on roads, rock quarries, LTFs and sort yards.

Table 11. Proposed Road construction and reconditioning costs by alternative

Road Construction / Reconditioning		Alternative					
		Alt.1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Proposed NFS Road	Miles	0	10.2	6.7	19.6	20.6	16.3
	Cost	$0	$1,406,147	$899,541	$2,841,422	$2,999,501	$2,340,626
Proposed Temporary Road	Miles	0	5.6	5.0	9.8	11.7	8.2
	Cost	$0	$658,343	$579,980	$1,151,814	$1,391,860	$969,671
Road Reconditioning[1/] (maintenance of closed roads)	Miles	0	10.8	7.7	10.8	11.1	10.8
	Cost	$0	$86,400	$61,600	$86,400	$88,800	$86,400
Total	Miles	0	15.8	11.7	29.4	32.3	24.5
	Cost	$0	$2,150,890	$1,541,121	$4,079,636	$4,480,161	$3,396,697

Source: Road Cost Calculations provided in Appendix B of the draft Transportation Resource Report (Powell 2013).

1/ Road reconditioning is considered road maintenance of an existing road and therefore is not included in the total miles of road construction.

In some years, public works funds are available to pay for all or portions of NFS road construction or reconstruction costs for roads that will be used in long-term administration of the Tongass National Forest. Although availability of this funding would greatly improve the economic feasibility of the project, it was not analyzed because of the uncertainty of the amount and availability.

Tow Costs

Transportation of logs accounts for a large percentage of costs a purchaser incurs during the life of a timber sale in Southeast Alaska, and tow costs represent the largest percentage of transportation costs on the Saddle Lakes project. Tow costs were assessed for two scenarios: 1) towing 100 percent of timber volume to the Viking Mill in Klawock from the Shelter Cove Log Transfer Facility (LTF) for domestic processing; and 2) towing all allowable export volume to the export facility at Leask Cove, while towing only the domestically processed volume to Klawock. The estimated one-way tow distance to Klawock from the Shelter Cove LTF is about 230 miles. The one-way distance to Leask Cove is about 33 miles. The average estimated tow cost for all action alternatives is $104 per MBF (Net Sawlog) towing all volume to Klawock. When the export facility at Leask Cove is utilized, the average drops to $72 per MBF (Net Sawlog, data from FASTR financial analysis tool, run January 8, 2014). Substantially higher production costs are associated with maximizing domestic processing, due primarily to increased tow costs to Klawock.

Forest Service Costs

The Forest Service administrative costs were estimated for the Saddle Lakes Project. Total administrative costs are about $104 per MBF, broken down as follows: $48 per MBF for environmental analysis and documentation (NEPA planning), $21 per MBF for sale preparation, $12 per MBF for sale administration and $23 per MBF for engineering support (Vermillion 2013). The numbers presented in Table 12 compare relative differences between alternatives.

Table 12. Estimated Forest Service costs and Revenues by alternative

Forest Service Costs	Alternative					
	Alt.1	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**
Sale Preparation	$0	$564,411	$317,357	$948,893	$1,128,971	$754,715
Sale Administration	$0	$330,824	$186,016	$556,185	$661,736	$442,369
Engineering Support	$0	$615,746	$346,322	$1,035,198	$1,231,655	$823,359
Total Forest Service Costs	$0	$1,510,981	$849,695	$2,540,276	$3,022,362	$2,020,443
Alaska Region limited export policy						
Total Indicated Advertised Value	$0	- $381,698	- $184,525	- $91,186	- $511,548	$131,421
Net Value [1/]	$0	-$1,892,679	-$1,034,220	-$2,631,462	-$3,533,910	-$1,889,022
Domestic Processing						
Total Indicated Advertised Value	$0	- $1,921,079	- $1,596,249	- $4,345,086	- $5,319,610	- $3,258,069
Net value[1/]	$0	-$3,432,060	-$2,445,944	-$6,885,362	-$8,341,972	-$5,278,512

Source: FASTR financial analysis tool, October 21, 2013 version.
[1/]Total Indicated Advertised Value minus Total Forest Service Costs

The above financial efficiency analysis compares those cost and benefits for each alternative that can be quantified in terms of actual dollars spent or received in the project area. This type of analysis does not account for non-market benefits, opportunity costs, individual values, or other values, benefits, and costs, because these non-market values are not easily quantifiable. Therefore, financial efficiency analysis is merely a tool decision-makers can use to gain information about trade-offs between costs and benefits.

Alternative 1

Under Alternative 1, no timber management or road construction would occur in the project area on NFS lands. There would be no additional contribution to the local and regional economies of Southeast Alaska, and there would be no additional support to the local or regional forest products industry employment from the project area from NFS lands. Local employment would not be affected.

Alternative 2

Compared to the other action alternatives, Alternative 2 has the highest production costs per unit volume, about $653 per MBF sawlog volume. This is due primarily to a higher percentage of the volume proposed for harvest using helicopter systems and uneven-aged management. Summary of direct and indirect effects under current R10 Export Policy includes:

- Timber harvest on about 2,207 acres, and provides about 27 MMBF sawlog volume. Alternative 2 has more harvest volume than proposed under Alternative 3, and less harvest volume than proposed under Alternatives 4, 5, and 6.
- Shovel, cable, and helicopter logging systems. Proposes the largest land area for helicopter yarding of any action alternative, 1,100 acres.
- About 15.8 miles of new road construction, the second lowest of the action alternatives behind Alternative 3.
- The lowest estimated road construction/reconstruction and LTF costs per net MBF of any Alternative: $81 per MBF.
- The highest estimated logging costs per net MBF removed of all the action alternatives: $273 per MBF.
- The most negative indicated advertised rate of the action alternatives: -$14.05 per MBF.
- Supports 121 total local annualized jobs and about $6.4 million dollars in direct income are expected under Alternative 2. This represents more jobs and income than Alternative 3, but fewer jobs and less direct income than provided by Alternatives 4, 5, and 6.

Alternative 3

Compared to the other action alternatives, Alternative 3 has the second highest total production costs per unit volume, about $652 per MBF sawlog volume. This is due primarily to higher road construction/reconstruction, and LTF costs per harvested net timber volume removed ($/NMBF sawlog). Summary of direct and indirect effects under current R10 Export Policy includes:

- Timber harvest on about 1,012 acres, and provides about 15 MMBF sawlog volume, the least harvest volume proposed of any action alternative. Consequently Alternative 3 would have the least potential to contribute to timber industry employment or support local and regional economies.
- Shovel, cable, and helicopter logging systems. Proposes the smallest land area for helicopter yarding of any alternative: 196 acres. However, this alternative also proposes to harvest the fewest number of acres of any action alternative.
- About 11.7 miles of new road construction, the fewest miles of any action alternative.
- The highest estimated road construction/reconstruction and LTF costs per net MBF of any Alternative: $105 per MBF. Largely this is due to the same fixed LTF construction cost spread over the smallest volume.
- Lower estimated logging costs per net MBF removed than Alternatives 2, 4, and 5. These costs are equivalent to Alternative 6 logging costs per net MBF removed: $246 per MBF.
- The second most negative indicated advertised rate of the action alternatives: -$12.08 per MBF.
- Supports the fewest jobs and direct income of any action alternative, with 68 total local annualized jobs and about $3.6 million in direct income.

Alternative 4

Compared to the other action alternatives, Alternative 4 has the second lowest total production cost per unit volume, about $641 per MBF sawlog volume. Summary of direct and indirect effects under current R10 Export Policy includes:

- Timber harvest on about 2,424 acres, and provides about 46 MMBF sawlog volume, more harvest volume than proposed under any alternative except Alternative 5. Alternative 4 has the second highest potential to contribute to a timber supply sufficient to meet market demand, and affect local and regional economies.

- Shovel, cable, and helicopter logging systems. Proposes 497 acres of helicopter yarding.
- About 29.4 miles of new road construction, the second most of the action alternatives behind Alternative 5.
- Higher estimated road construction/reconstruction and LTF costs per net MBF than Alternatives 2 and 5, and lower costs than Alternatives 3 and 6: $88 per MBF.
- Higher estimated logging costs per net MBF removed than Alternatives 3 and 6, and lower costs than Alternatives 2 and 5: $252 per MBF.
- A lower indicated advertised rate than Alternative 6, but a higher rate than any of the other action alternatives: -$2.00 per MBF.
- Supports the most local jobs and direct income of any alternative, except Alternative 5, with 203 total local annualized jobs and about $10.8 million dollars in direct income.

Alternative 5

Compared to the other action alternatives, Alternative 5 has lower production costs per unit volume than Alternatives 2 and 3, and higher production costs per unit volume than Alternatives 4 and 6, about $643 per MBF sawlog volume. Summary of direct and indirect effects under current R10 Export Policy includes:

- Timber harvest on about 2,875 acres, and provides about 54 MMBF sawlog volume. Alternative 5 has more harvest volume than proposed under any alternative, and has the highest potential to contribute to timber industry employment or support local and regional economies.
- Shovel, cable, and helicopter logging systems. Proposes 719 acres of helicopter yarding.
- About 32.3 miles of new road construction, the most proposed road construction of any alternative.
- The second lowest estimated road construction/reconstruction and LTF costs per net MBF of any alternative: $84 per MBF.
- The second highest estimated logging costs per net MBF removed of all the action alternatives: $262 per MBF.
- A higher indicated advertised rate than Alternatives 2 and 3, but a lower indicated advertised rate than Alternatives 4 and 6: -$4.66 per MBF.
- Supports the most local jobs and direct income of any alternative, with 241 total local annualized jobs and about $12.9 million dollars in direct income.

Alternative 6

Compared to the other action alternatives, Alternative 6 has the lowest production costs per unit volume, about $635 per MBF sawlog volume. Summary of direct and indirect effects under current R10 Export Policy includes:

- Timber harvest on about 2,138 acres, and provides about 36 MMBF sawlog volume. Alternative 6 produces the third highest total timber volume of the alternatives.
- Shovel, cable, and helicopter logging systems. Proposes 479 acres of helicopter yarding.
- About 24.5 miles of new road construction, which is more than Alternatives 2 and 3 but less than Alternatives 4 and 5.

- The second highest estimated road construction/reconstruction and LTF costs per net MBF of any alternative: $91 per MBF.
- The lowest estimated logging costs per net MBF removed than all other action alternatives: $241 per MBF.
- The highest indicated advertised rate of any alternative: $3.62 per MBF.
- Supports fewer local jobs and less direct income than Alternatives 4 and 5: 161 total local annualized and about $8.6 million dollars in direct income.

Cumulative Effects

Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the timber economics cumulative effects analysis.

Alternative 1

Under Alternative 1, timber operators in Southeast Alaska would have no opportunity to bid on timber in the Saddle Lakes project area at this time, and would need to obtain timber for processing from other sources, if available. Other potential sources of timber in Southeast Alaska include the Tongass National Forest, the State of Alaska, and Native Corporation lands.

Alternatives 2, 3, 4, 5, and 6

Volume from the Saddle Lakes project area, in combination with other timber sales offered on the Tongass National Forest and on State of Alaska and Native Corporation lands, would likely contribute to the long-term timber supply and enhanced stability of local and regional economies. Timber harvests from the Tongass National Forest have averaged about 26 percent of the volume harvested in Southeast Alaska during the past decade.

Providing investors an assurance of a steady supply of timber will be critical in the multi-year timber program on the Tongass National Forest. Over the past decade, timber harvest on the Tongass averaged about 37 MMBF per year. Because most market conditions would support a sustained annual Tongass timber harvest of 238 MMBF per year, maximizing harvested timber volume from the Saddle Lakes project while minimizing per unit costs would achieve this project’s primary objective of helping to provide a timber supply adequate to meet annual market demand for Tongass National Forest.

The State of Alaska Department of Transportation and Public Facilities (ADOT & PF) is currently planning to extend the Ketchikan road system from the end of Revilla Road near Harriet Hunt Lake to Shelter Cove on Carroll Inlet (ADOT & PF, 2012). Completion of this road would provide a connection between the project area and the Leask Cove sort yard and LTF. As a result, costs of transporting forest products from the project area and other operational costs could be reduced increasing the probability of an economically viable Saddle Lakes Timber Sale.

Estimates provided by the State of Alaska Division of Forestry (personal communication from State of Alaska Division of Forestry, with input from ALCAN Forest Products LLP, 2014) indicate that economic benefits of the Ketchikan to Shelter Cove Road to timber purchasers would probably be substantial. Reductions in costs of towing, fuel, equipment repairs, transportation, logging camps, and overhead such as workers compensation insurance could reduce operator costs. Based on both scenarios, the FASTR analyses for the Preferred Alternative, Alternative 4, stump-to-mill costs could be reduced by about $19 per MBF for the export scenario, and $4 per MBF for the domestic-only processing scenario (net removed without utility).

The proposed administrative land exchange between the AMHTA and the Forest Service could increase future timber harvest volume within the project area on state-acquired lands.

Due to poor domestic markets and high domestic manufacturing costs, indicated advertised rate is lower under a domestic processing scenario for all action alternatives than under the export policy scenario. Alternatives 4 and 5 have the greatest potential to contribute to a timber supply, and thus to affect local and regional economies. Alternative 2 yields the highest value for timber volume available under the domestic processing scenario, under current market conditions. Alternative 6 yields the highest value for the timber volume under the export scenario.

Issue 2. Timber Availability

Issue Statement: Availability of timber within the project area that is allowed to be harvested under the Forest Plan affects a stable supply of timber to meet local and regional timber demand.

Issue 2 addresses concerns about the availability of timber within the project area. This was most recently described in the 2008 Forest Plan Amendment FEIS (USDA 2008c, p. A-5) as Key Issue 2: "The Tongass National Forest needs to seek to provide a sufficient timber supply to meet the market demand and help maintain a vibrant economy in Southeast Alaska."

This project proposes two amendments to the 2008 Forest Plan. One involves relocating a portion of small old-growth habitat reserve (OG LUD) into the North Revilla Inventoried Roadless Area. This action would provide about 322 acres of additional suitable timberlands (USDA 2008b, p. A-1) within the project area. The other proposed amendment would remove Visual Priority Route (VPR) designations, in order to meet less restrictive Forest Plan scenery standards and guidelines. As a result, additional even-aged management and larger harvest units could be prescribed at this time, thereby increasing the timber harvest volume for this project.

Units of Measure:

The following units of measure were used to evaluate effects of the proposed action and compare alternatives:

- Changes in acres of suitable timberlands where timber harvest is allowed because of Forest Plan LUD allocations; and
- Changes in acres by Scenic Integrity Objective levels.

Methodology

The Forest Plan Appendix A describes the process followed to identify timberlands on the Tongass National Forest suitable for timber production (USDA 2008b). First, lands legally and practicably capable of timber production are classified as tentatively suitable timberlands. Then, because of Forest Plan Standards and Guidelines and Land Use Designations that do not allow timber management, the Forest Plan further classifies whether tentatively suitable timberlands are suitable for commercial harvest. This process is also displayed in the Silviculture section.

GIS data were used to determine acres of suitable timberlands and acres of forestland withdrawn from timber production.

Analysis Area

The analysis area for timber availability is the project area.

Affected Environment

The Saddle Lakes Project Area contains about 38,459 acres. National Forest System (NFS) lands within the project area comprise about 34,903 acres. Timberlands physically unsuitable for timber management comprise about 54 percent of NFS lands within the project area.

Young-growth stands account for 3,747 acres of the suitable forest land in the project area. However, there is not a market for the available young-growth forest products within the project area at this time.

Combined, the North Revilla and Carroll Inventoried Roadless Areas (IRAs) comprise about 18,537 acres (about 48 percent) within the project area. Within this area, there are 4,659 acres categorized as tentatively suitable timberlands within Timber Production and Modified Landscape LUDs. No harvest was proposed in IRAs as part of the Saddle Lakes Timber Sale project due to the decision of the District Court to vacate the Tongass Exemption of the 2001 Roadless Rule in March 2011. Therefore, no harvest was proposed in IRAs with this project.

Within the project area, and outside IRAs, there are 4,846 acres categorized as suitable timberlands within Timber Production and Modified Landscape LUDs. Suitable timberlands within the Saddle Lakes Project Area are summarized by LUD in Table 13.

Table 13. Suitable timberland acres in the Saddle Lakes project area

LUD	Suitable Old Growth Timberlands	Suitable Young Growth Timberlands	Suitable Old Growth Timberlands outside IRAs	Suitable Young Growth Timberlands outside IRAs
Modified Landscape	5,517	1,954	3,472	1,845
Timber Production	3,987	1,101	1,374	926
Old Growth Habitat	0	0	0	0
Totals	9,504	3,747	4,846	2,771

Source: Tongass National Forest GIS

Environmental Consequences

Estimates of direct, indirect, and cumulative effects for any proposed LUD acreage change are quantified by GIS. Changes in acreage by SIO classification are also quantified by GIS.

Direct and Indirect Effects

Modification of the small OGR

Alternative 5 addresses timber availability for Saddle Lakes by proposing to move a portion of the small OGR in VCU 7470. The vacated area (roaded portions of the current OG Old-growth Habitat LUD) would be designated as Modified Landscape LUD, a development LUD where timber harvest is allowed. This modification would increase suitable and available timberland in the project area by 322 acres (Table 14).

Table 14. Additional suitable timberlands available for harvest due to modification of the small Old-growth Reserve

Measurement Criteria	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Old-growth forest	0	0	0	0	322[1/]	0

Source: Tongass National Forest GIS

1/ Proposed Forest Plan Amendment to move the OGR into the North Revilla IRA and classify the current roaded portion as Modified Landscape LUD.

Removal of the Visual Priority Route Designation

Alternatives 4, 5, and 6 propose to remove three or more VPR designations through a Forest Plan Amendment (see Issue 4a). The adopted SIOs required under the Forest Plan Scenery Standards and Guidelines would allow more visual disturbance. See Issue 4a for a description of SIOs. Although the volume of suitable and available timber does not change, this amendment would allow even-aged management (e.g., clearcut silvicultural systems) on a greater number of acres. To estimate the effects, the difference in acres of suitable and available timber that changed from the Moderate SIO to the Very Low SIO is used as a relative indication of available timber volume (Table 15)

Table 15. Effects of Visual Priority Route designation removal (Alternatives 4, 5 and 6) for the Saddle Lakes Timber Sale Project

Alternative	Acres of Harvest in Areas that Decrease in SIO	Acres of Harvest in Areas with no change in SIO	Project Area Acres that decrease in SIO
2	0	2.027	0
3	0	1,012	0
4	1,285	1,139	8,270
5	1,642	1,233	8,750
6	743	1,395	6,810

Source: Tongass National Forest GIS

Cumulative Effects

Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the timber availability cumulative effects analysis.

Alaska Mental Health Trust Authority Land Exchange

Alaska Mental Health Trust Authority (AMHTA) has proposed an administrative land exchange with the USDA Forest Service in the project area. If implemented, about 8,170 acres of NFS lands located in the project area would fall under the administration of the AMHTA. These lands could be available for harvest and include 4,142 acres of old-growth forest and 1,284 acres of young-growth forest.

Issue 3. Wildlife Habitat and Subsistence Use

Issue Statement: Timber harvest and road construction, combined with past management activities, would affect wildlife habitat and could affect subsistence use.

Issue 3A. Wildlife Habitat

Public and agency comments, as well as internal scoping, expressed concerns about project effects on wildlife and wildlife habitat and old-growth connectivity, and subsistence use in the project area. Of special concern are project effects on deer because of their importance to wolves and subsistence users. The project area includes low-elevation (less than 1,500 feet), old-growth habitat important for old-growth dependent wildlife species. Removing old-growth habitat fragments wildlife habitat and leads to a loss of old-growth connectivity.

Because of its proximity to the residents of Ketchikan and Saxman, the Saddle Lakes project area is considered an important deer hunting area for these communities. The cumulative effects on old-growth habitat associated with additional harvest, combined with past harvest and increasing road density were noted concerns.

Units of Measure:

The following units of measure were used to evaluate effects of the proposed action and compare alternatives:

- Percent reduction from historic and existing acres of habitat by wildlife species (using size-density model [SDM] habitat classifications) at the Value Comparison Unit (VCU), and/or Wildlife Analysis Area (WAA) scale;
- Connectivity/Fragmentation in the project area by alternative (corridor analysis, reduction of POG acres, change in patch size);
- Open and total road density (miles per square mile) at analysis scales specific to wolf and marten requirements; and
- Deer model habitat capability and density.

Methodology

The wildlife effects analysis focuses on the impacts of timber sale activities on old-growth habitat and the effects on management indicator species (MIS), other wildlife species of interest, and habitat connectivity in the Saddle Lakes project area. A variety of methods were used to identify and analyze potential effects of the Saddle Lakes Timber Sale on wildlife including the following: past surveys, aerial photo interpretation, wildlife computer models, GIS analysis, field reconnaissance, input from field crews and other federal and state agencies. Local knowledge and scientific literature were used for further information regarding species occurrence in the area and habitat requirements.

During the project planning process, wildlife habitat within the entire unit pool was assessed and representative samples of units and the surrounding area visited. Field reconnaissance focused on walk through surveys and incidental observations, but included vocalized call station protocol to update existing goshawk information.

Edge effects were calculated using information from Concannon's thesis work on the Tongass as the best available information. It is unknown how well this data correlates to individual species such as brown creeper. Research by Kissling and Garton (2008) that specifically looked at avian species detected too few brown creepers to analyze buffer width.

The Size Density Model (SDM) GIS layer was used to classify wildlife habitat. This model has been shown to be 70 percent accurate at the forest level.

For purposes of the analysis, stand initiation phase is 0 to 25 years and stem exclusion phase is 26 to 150 years.

For the Saddle Lakes analysis, the deer model was used, following the Oct 2011 direction, for average winter carrying capacity for direct, indirect, and cumulative effects. Relevant projects in the foreseeable future were discussed qualitatively since final design features are not available.

Analysis conclusions are based on professional judgment using information provided by forest staff, knowledgeable scientists and ecologists, and relevant references and technical literature citations. Local ADF&G biologists were contacted for information regarding the status of species, habitats, and special habitat features in the Saddle Lakes vicinity.

Incomplete and Unavailable Information

Complete wildlife surveys have not been conducted for the entire Saddle Lakes area or larger Wildlife Analysis Areas (WAAs 406 and 407). Surveys are labor intensive and cost prohibitive to obtain project specific data. Likewise, no wildlife population data is available from ADF&G. Field reconnaissance identified several inconsistencies with the SDM database, but data is anticipated to fall within the 70 percent accuracy range. Information for non-NFS (state or private) lands is based upon the best information available, but data is lacking for some areas.

Local information from research conducted within Saddle Lakes or on Revillagigedo Island was sought in all cases, but local studies have not yet been conducted for many of the species or species groups addressed in this report. Peer reviewed, published literature from Southeast Alaska is limited or non-existent for many of the MIS species. Much of the available information for Southeast Alaska is from Forest Service reports, ADF&G reports, and MS or PhD theses.

Since data is lacking, peer reviewed information from other areas was used to support conclusions. Information from Alaska was utilized first, followed by British Columbia and the Pacific Northwest. Other research was used to document similar findings across a species range. It is unknown how well information from other areas applies to the Saddle Lakes area.

Existing information is sufficient to determine changes to habitat and draw generalized conclusions from identified habitat relationships. Given the data limitations, actual populations may vary considerably from those predicted by this analysis. However, the approach used provides the best estimate of general population effects in response to habitat change.

Analysis Area

The Saddle Lakes project area falls within portions of WAAs 406 and 407 and form the broader landscape boundary of the wildlife effects analysis. Saddle Lakes contains portions of three value comparison units (VCUs): 7460, 7470, and 7530. WAA 406 and VCUs 7460 and 7530 are bisected by Carroll Inlet.

Only National Forest System (NFS) lands were used for direct effects analysis. WAAs 406 and 407 were used to assess direct and indirect effects on deer, wolves, bear, and mountain goat due to their larger home range sizes. WAAs were specifically delineated to encompass areas used by larger, wide-ranging mammal species. VCUs are used in this analysis to address direct and indirect effects on other species with smaller home ranges.

All ownerships were used for cumulative effects analysis in accordance with the cumulative effects definition (40 C.F.R. § 1508.7). Cumulative effects consider relevant past, present and reasonably foreseeable future activities (see Appendix B). The Saddle Lakes project area is not part of the State of Alaska's wolf eradication intensive management proposal, but falls within the same game management unit (GMU 1A).

Affected Environment

Topography and Climate

Topography within the Saddle Lakes area is characterized by high, generally steep mountains interspersed with lowland muskeg and scrub. Elevations range from sea level to over 3,100 feet in elevation. The highest peaks occur in the northern portion of the project area where numerous peaks over 2,000 feet in elevation form the east, west, and north boundary. Peaks on the southern portion of the project area are generally lower. The dominant ridge running north/south between North Saddle and Buckhorn Lakes rises up to 2,300 feet elevation, but most other peaks are less than 2,000 feet. Proposed units in the Saddle Lakes timber sale are at low elevation; only six units extend above 1,500 feet elevation. Therefore, most units are within winter range habitat.

Low-elevation old-growth habitat (less than or equal to 800 feet elevation) supports many wildlife species during high-snow winters or as year-round habitat. Old-growth forest at intermediate elevations provides transitional range for migratory deer, additional year-round range for resident deer during low-snow winters, and year-round habitat for other species. Higher-elevation habitat (greater than 1,500 feet) provides summer habitat.

Climate is generally characterized as mild winters with snow, cool summers, and year-round rainfall. The greatest percentage of precipitation occurs in the form of rain, with October generally being the wettest month. Snow, or snow mixed with rain, may occur as early as October. Based upon long-term yearly averages, Albert and Schoen (2007) classified northern Saddle Lakes as intermediate snow accumulation with low snow in the south and around George Inlet.

Biodiversity

Biological diversity on an ecosystem or landscape scale can be described in terms of three components: composition (the numbers and types of species, plant communities, and smaller ecosystems within an area), structure (the vertical and horizontal spatial arrangement of communities and ecosystems across a landscape), and function (the interactions between plant and animal species). The biological diversity associated with old-growth forests has long been recognized as important within the Tongass National Forest, and the old-growth forest is the ecosystem most affected by timber management activities on the Tongass (USDA 2008c, p. 3-137).

Most wildlife species on the Tongass inhabit old-growth forest or prey on species that inhabit old growth forests (USDA 2008c, p. 3-220). Roughly 150 bird species are thought to occur annually on Revillagigedo Island, in the Ketchikan area (Heinl and Piston 2009). Based on information in MacDonald and Cook (2007, 2009), 24 mammalian species are known to occur on Revillagigedo Island.

WAAs 406 and 407 contain typical Southeast Alaska coastal temperate rain forest vegetation (see Silviculture and Botany sections for details). Forested areas are primarily old-growth with inclusions of past harvest (i.e., young-growth).

Old-growth stands on the Tongass are generally greater than 150 years old (USDA 2008b, p. 3-137; Capp et al. 1992). The greatest variations in stand structure, including multi-storied canopies important to many wildlife species, occur in stands greater than 200 years old (Alaback 1982).

Following complete removal of the overstory, it may take 300 years or more for a stands in Southeast Alaska and Northern coastal British Columbia to develop old growth ecological characteristics (see Orians and Schoen 2013, discussion under photo 12). Old-growth forested habitat on the Tongass is divided into two major classifications.

1. Productive old growth (POG) or commercial timber capable of supporting at least 20 cubic feet of industrial wood per acre per year or having greater than 8,000 board feet per acre of standing volume.
2. Un-productive old growth (herein NPOG) or areas with at least 10 percent tree cover that otherwise meet old growth definitions, but which generally contain smaller, more open canopy trees not capable of producing 20 cubic feet per acre per year.

As old-growth forest is harvested, it transitions through several ecological changes. Within five years of being clearcut, plants respond to the unrestricted sunlight producing an abundance of forage that reaches maximum biomass at approximately 12 to 19 years post-logging (Alaback 1982). By the time these regenerating stands reach 20 to 30 years, naturally regenerating conifers have become large enough to create interlocking canopies that shade out understory plants. As the canopy becomes denser, these young even-aged conifers almost completely eliminate understory plants creating a “stem exclusion” phase that may last for more than 150 years (Alaback and Tappeiner 2002, Person and Brinkman 2013).

Source Habitat and Sink Habitat

In population studies, source habitat is generally considered to be high-quality habitat (based upon local characteristics of forage, vegetation structure, etc.) where births exceed deaths, whereas sink habitat is considered to be low-quality habitat deaths exceed births (Forman 1995). Source and sink dynamics consider the spatial linkage of population dynamics where high-quality habitat provides excess individuals that maintain population densities, through migration, within low-quality habitats (Congdon and Dunham 1997)

Size-Density Model

A representation of wildlife habitats within the analysis area was generated from the mapping of forest vegetation using the size-density model (SDM). SDM habitat classifications are shown in Table 16 and are described in detail in the Forest Plan FEIS (USDA 2008c, pp. 3-139 through 3-142 and 3-231, Caouette and DeGayner 2008, Krosse and O’Connor 2009). These habitat groupings were used to analyze effects (see MIS Section below).

Table 16. Size-density model habitat classifications found in the Saddle Lakes project area

Habitat	SDM Veg Code[1/]
POG	SD4H, SD4N, SD4S, SD5H, SD5N, SD5S, SD67
High-POG	SD5N, SD5S, SD67
Medium-POG	SD4N, SD4S, SD5H
Low-POG	SD4H
Large Tree POG	SD67
NPOG	UF, F99
Forested muskeg	FM
Non-forested	NF, X99
Young (<26 year old) second growth	HS1, HS2, S1, S2
Older second growth (stem exclusion)	HS3, S3

1/ Stand Density Model (SDM) uses timber volume class, hydric soil class, and aspect to characterize forest structure. These attributes were correlated with the stand density index and mean quadratic diameter to derive the various SDM categories.

POG comprised almost half (49 percent) of the historic (1954) vegetation on NFS lands within WAAs 406 and 407, followed by Non-POG (NPOG) (28%), lower elevation non-forested openings or muskegs (18%), high elevation (greater than 2000 feet) non-forested muskeg or alpine habitat (3%), and pre-1954 harvest or natural disturbance (less than 1%).

Past activities have altered the amount of available old growth habitat for wildlife. Changes are shown for NFS lands in Table 17. Specific patch size, and structural requirements vary by species.

Table 17. Change in historic acres of POG Saddle Lakes VCUs and WAAs, NFS lands only

Habitat	Historic NFS Acres VCUs 7460/7470/7530	Current NFS Acres VCUs	Percent Change	Historic NFS Acres WAA 406/407	Current NFS Acres WAAs	Percent Change
High-POG ≤800' elev.	18,366	9,904	-46%	26,984	17,193	-36%
High-POG ≤1500' elev.	28,340	17,018	-40%	45,655	32,032	-30%
POG ≤1500' elevation	41,529	30,207	-27%	69,974	56,351	-19%
High-POG	31,213	19,711	-37%	52,033	37,851	-27%
Moderate-POG	11,407	11,407	0%	22,464	22,463	<1%
Low-POG	3,711	3,711	0%	6,613	6,613	0%
POG	46,331	34,829	-18%	81,110	66,928	-17%
Interior POG[1/]	23,186	7,960	-66%	36,858	18,824	-49%
Large Tree POG-SD67	unknown	1,927	unknown	unknown	5,998	unknown
Unproductive Old Growth (UF,F99)	17,500	17,500	0%	46,215	46,215	0%
Forested muskeg	7,995	7,995	0%	17,197	17,197	0%
Non-forested (NF, X99)	3,202	3,202	0%	18,979	18,979	0%
Young (<26 year old) second growth	69	5,719	+	177	7,486	+
Older (26+ year old) second growth	235	6,088	+	484	7,357	+

1/ Based upon vegetative and climatic edge effect distances for Southeast Alaska (Concannon 1995).

Conservation Strategy

An integrated science-based, old-growth forest habitat conservation strategy was developed and adopted for the 1997 Forest Plan and carried forward in the 2008 Forest Plan Amendment. This old-growth strategy has two components 1) Old-growth Reserves and 2) a "matrix".

Old-Growth Reserve System

The 1997 Forest Plan Interagency Viable Population Committee (VPOP) systematically screened all wildlife species and identified those old-growth associated species considered to be most sensitive to habitat loss and fragmentation of the old-growth ecosystem. These species were then used to determine the size and spacing requirements of Old-Growth Reserves (OGRs). The approach was reviewed and carried forward in the 2008 Forest Plan (USDA 2008d, Appendix D, pgs. D-8 and D-9).

Old-Growth Reserve Criteria

Primary habitat criteria for OGRs are described in the Forest Plan (USDA 2008b, pp. 3-57 through 3-62; and Appendix K) and the Forest Plan FEIS (USDA 2008c, Appendix D, pp. D-5 thru D-9). See also 1997 Forest Plan FEIS (USDA 1997b, Appendix N). OGR calculations are based on the acres of NFS lands within the VCU. A medium OGR is located along Carroll Inlet at the northern extent of the project. No modifications are proposed to the medium OGR. A small OGR is located within VCU 7470.

VCU 7470 OGR History

The rationale for the small OGR in VCU 7470 is to provide connectivity between the Naha LUD II and low-elevation beach fringe POG in the George Inlet Salt Chuck. When the Tongass amended the Forest Plan in 2008, the small OGR was mapped incorrectly. An errata was created Feb. 6, 2012 to correct the mapping error and adopt the biologically preferred interagency OGR.

Matrix Management

The second component of the old-growth forest habitat conservation strategy (USDA 2008d, Appendix D, p. D-10) is management of the area outside reserves that is subject to timber harvest (the “matrix”). Pacific Northwest Research Station scientists noted the need to provide enhanced landscape connectivity and to manage human disturbance of the land similar to natural disturbance regimes (Kiester and Eckhardt 1994). Matrix management can serve at least three important roles: 1) providing habitat at smaller spatial scales, 2) increasing the effectiveness of the reserves, and 3) improving landscape connectivity (USDA 2008d, Appendix D, p. D-3). Standards and Guidelines applicable to wildlife within the “matrix” are discussed below under individual MIS sections.

Connectivity

Connectivity is an element of biological diversity that describes the natural condition of old-growth in terms of patch size and distribution. An intact, undeveloped landscape is assumed to be fully functional, maintaining species, communities, and their supporting ecological processes within their natural ranges of variability (Poiani et al. 2000). On the Tongass National Forest, landscape connectivity between old-growth blocks or between high and low elevation habitats is important to maintaining well-distributed, viable wildlife populations (USDA 2008c, p. 2-54). The percentage of the original POG forest no longer in an old-growth condition can serve as an indicator of the potential effect on several biodiversity aspects, including structural diversity (within-stand), connectivity (unfragmented, continuous old-growth blocks), and overstory and understory species composition (USDA 2008c, p. 3-151).

Fragmentation resulting from human actions such as timber harvest, and natural causes such as windthrow, reduces landscape connectivity by breaking larger contiguous blocks of habitat into smaller patches that are at increasing distances from each other. Timber harvest creates a highly fragmented landscape pattern that includes increased forest-opening edge and decreased patch size (Thomas et al. 1988).

Patch Size

Large, contiguous blocks of old-growth forest are more important to old-growth associated species than individual stands. Large old-growth blocks provide expansive foraging and hunting territories, as well as protection from predators, and promote genetic mixing among populations that would be less likely to interbreed if they were spatially separated by forest fragmentation.

As habitat becomes scarce, patches become smaller and more isolated and individuals are required to traverse larger gaps in search of suitable habitat. Past a certain threshold in gap size, the dispersing animal may perish before finding suitable habitat, particularly in heavily fragmented landscapes

(With and King 1999). The distribution of a species within a landscape may change from being a single "continuous" population, to that of a patchily distributed population with a number of independent subpopulations (Haufler 2007). Populations may become isolated, and therefore at greater risk of local extirpation, if fragmentation hinders movement of individuals between subpopulations (Mladenoff 1997). The degree to which this occurs depends on species-specific dispersal capabilities, the distance between habitat patches, and conditions within the matrix between habitat patches.

Patches at the stand levels (or the smallest size classes) represent scales of influence important to organisms such as lichens, fungi, plants, invertebrates, and small bodied mammals which may be locally endemic, occur in very specific forest structure or soil conditions, or have limited dispersal capabilities (USDA 1997a, p. 3-24, USDA 2008c, p. 3-168). Larger patches represent scales of influence important to wider-ranging species such as deer, marten, and forest-dwelling birds. Existing patch conditions are displayed in Table 18.

Table 18. Existing POG patch size for WAAs 406/407 combined, all land ownerships

Patch Size	Historic All Ownerships			Existing All Ownerships		
	Number of patches	Acres	Average patch size (acres)	Number of patches	Acres	Average patch size
0-39 acres	158	2,245	14	274	3,158	12
40-249 acres	40	3,401	85	61	5,521	91
250-499 acres	4	1,175	294	13	4,295	330
500-999 acres	3	1,963	654	9	7,125	792
1000+ ac	10	85,993	8,599	10	56,687	5,669
Total	215	94,776	N/A	367	76,786	N/A

Source: pog_Patch_1954_071113.xlsx, pog_patches_by_alt_082313.xlsx. Note: N/A = Not Applicable.

Interior Habitat

Interior forest habitat describes forest that is far enough away from an opening to not be affected by the opening's light, temperature, moisture, and wind conditions (Harper et al. 2005). When fragmentation occurs there is an increase in the amount of forest edge habitat, and a decrease in the amount of interior forest habitat. Edge effects may include changes in vegetation structure, species composition (both plants and animals), predation rates, and disturbance (Murcia 1995, As 1999). The extent or "depth" of edge effects varies with the contrast in the structure and composition of adjacent vegetative communities, the width of the habitat fragment, and the stability of the remaining vegetation, and may be species-dependent (Harper et al. 2005).

Concannon (1995) found that different types of edge on the Tongass had differing degrees of influence on the adjacent forest. Concannon noted that the edge effect distance varied by such factors as forest type, tree density, site aspect, slope, solar exposure, latitude, season, and edge type. Consistent with that research, the following distances were used to define edge: 656 feet from hard edges (e.g., roads, past harvest) and 394 feet from soft edges (e.g., muskegs, meadows).

Although the number of species may be higher along edges, the number of habitat specialists (i.e., those associated with interior forest conditions or structural components of old-growth forest) decreases (As 1999, Kissling and Garton 2007). Species such as the brown creeper are negatively affected by edge and therefore benefit from larger blocks containing interior habitat. Therefore, the brown creeper was selected as the indicator for interior habitat in the Saddle Lakes project area. Existing interior habitat is shown in Table 19.

Table 19. Interior habitat, all land ownerships

Area	Historic	Existing	Percent reduction
VCU 7460	10,983	3,050	(-72.2%)
VCU 7470	6,363	3,070	(-51.8%)
VCU 7530	8,248	2,623	(-68.2%)
WAA 406	30,321	14,193	(-53.2%)
WAA 407	13,949	7,440	(-46.7%)

Interior habitat based upon vegetative & climatic edge effect distances for Southeast Alaska (Concannon 1995)

If a stand is circular and surrounded by roads and previous harvest, 31 acres would be needed to provide any interior habitat in the very center (660 feet radius circle). However, a more likely scenario is a generally rectangular isolated patch between clearcuts, a road, and a muskeg, which would require a minimum of 45 acres to have one acre of interior habitat in the middle (Figure 6). The gray square in the middle represents POG. The total POG required in this configuration for one acre of interior habitat is 45 acres.

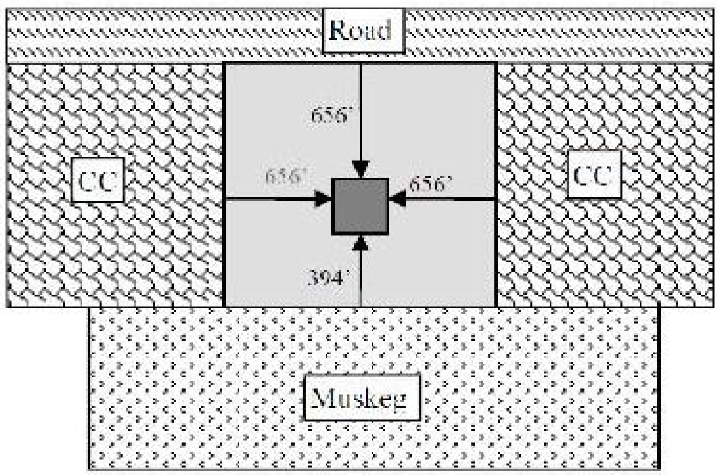


Figure 6. Interior productive old-growth (POG) diagram

Corridors

The connectivity between old-growth habitat in a landscape may be as important to maintaining diversity as the size of the old-growth patches (Noss 1983). Populations of most species exist in discrete subpopulations that live in distinct habitat patches surrounded by other habitats that they do not inhabit. However, if individuals can frequently move between subpopulations, immigrants may prevent subpopulations from becoming locally extinct (Orians et al. 2013). Maintenance of habitat connectivity is important to minimize isolation and potential local extirpation of wildlife species associated with interior old-growth (Hunter 1990).

Morrison et al. (1998) listed four types of movement in relation to corridors or connectivity:

- Dispersal, including movement of young from natal areas;
- Migration between seasonal habitats;
- Home range movement over the space of days to locate resources; and
- Eruption or irregular movements into new areas in response to habitat change.

Corridors may be functional (i.e., non-contiguous patches of old-growth forest and other vegetation with structural characteristics that facilitate movement across the landscape) or structural (i.e., physically connected patches of old-growth forest).

To be effective, corridors should contain enough interior forest to give animals a sense of security and the ability to avoid predation from edge species. Linear corridors with little or no interior habitat are not as effective as wider ones. However, linear corridors that network larger habitat patches facilitate re-establishment of species and may provide habitat for species that could not otherwise survive in small isolated patches (Forman and Godron 1981, Hunter 1990, Rosenberg et al. 1995, Rosenberg et al. 1997). For example, the small OGR contributes to functioning of habitat in George and Carroll Inlets by connecting the habitat with source populations in the Naha LUD II. Within WAAs 406 and 407, corridors along the beach, streams, and between old-growth habitats at different elevations have been reduced by past harvest.

The Forest Plan indicates that projects are to be designed to maintain landscape connectivity (USDA 2008b, WILD1.VI, p. 4-91). The objective is to maintain corridors of old-growth forest among large and medium Old-growth Habitat reserves and other Non-development LUDs at the landscape scale. Connectivity currently exists between the Carroll medium OGR partially within the north end of the project area (VCUs 7460 and 7440) and Naha LUD II through the North Revilla Inventoried Roadless Area (#526). Limited connectivity currently exists between the medium OGR and the Semi-Remote Recreation LUD south of the project area near California Head (VCUs 7580 and 7590) and between Naha LUD II and the Semi-Remote Recreation LUD. However, the Forest Service does not have jurisdiction over the non-NFS lands located between the Saddle Lakes project area and the Semi-Remote Recreation LUD.

Projects are to consider opportunities to allow for the elevational migration of wildlife within the Modified Landscape LUD (USDA 2008b, WILD1.B.2 p. 3-115). Elevational connectivity corridors were identified within the Modified Landscape LUD to ensure that wildlife migration patterns and habitat connectivity are protected over the long term within the Saddle Lakes project area (Table 20).

Table 20. Corridors in the Saddle Lakes project area

Corridor Number	Approximate Location	Connectivity Description/Importance	Potential Units Within Corridor
1	Medium OGR in VCUs 7460 and 7440 and Naha LUD II	Connectivity currently exists between the medium OGR partially within the north end of the project area and Naha LUD II through the North Revilla Inventoried Roadless Area (#526) in accordance with Forest Plan landscape connectivity direction (USDA 2008b, WILD1.VI, p. 4-91).	None
2	Small OGR in VCU 7470 at the head of George Inlet Saltchuck	The objective for the location of this OGR is to maintain connectivity between Naha LUDII and the George Inlet salt chuck thereby facilitating dispersal and re-colonization of vacant territories.	Alternative 5 would move the OGR and harvest Units 300 through 312.
3	North of Island Point	This is an important elevational corridor because it is the only windfirm POG corridor of sufficient width for roughly four (4) miles either direction that extends from the high elevation ridge near Buckhorn Lake east to saltwater.	Units 203, 204, 207, and 224
4	North of Gunsight Creek	Remaining corridor from high elevation to the beach between Gunsight Creek and Shelter Cove.	None

Corridor Number	Approximate Location	Connectivity Description/Importance	Potential Units Within Corridor
5	North of Lemon Lake	This corridor joins the medium OGR to North Revilla Roadless Area and the small OGR linking the beach buffer to the higher ridges and is the beginning of connectivity south through the project area.	Units 8 and 9
6	North Saddle Lakes to Buckhorn Lake	This is the main connectivity corridor between the north and south halves of the project area. It begins on the south side of the North Revilla Roadless Area in #5 above, goes between the two North Saddle Lakes, crosses the stream above South Saddle Lake, and continues south connecting to the large ridge in the Carroll Roadless Area that extends north of Buckhorn Lake and south to non-NFS land at the southern project boundary (see #1 above).	Units 48, 49, 53, 122, and 154 and Road 8300330 (that could be left open) would bisect this corridor.
7	North Saddle Lakes to George Inlet	This important travel corridor starts north of North Saddle Lakes and follows the ridge west to George Inlet. Extensive deer use was observed along this corridor.	Units 28, 30, 31, 40, 71, 113, and 114
8	West end of North Saddle Lakes	This is a short, but high use travel corridor around the west end of North Saddle Lakes. It links corridors 6 and 7 to provide connectivity from Naha into the southern portions of the project area.	Units 46, 115, and 116

Based on knowledge of the Saddle Lakes project area, areas were identified as wildlife corridors where additional harvest could reduce natural connectivity and limit the ability of land-based species to disperse or migrate (Figure 7).

Figure 7. Saddle Lakes project area wildlife connectivity corridors

Management Indicator Species

Management Indicator Species (MIS) are species whose response to land management activities can be used to predict the likely response of other species with similar habitat requirements (Forest Service Manual [FSM] 2631.3). The Forest Plan FEIS identifies 13 wildlife MIS (USDA 2008c, pgs. 3-230 to 3-241). Twelve MIS have been selected for detailed analysis. Brown bear (Ursus arctos) do not occur on Revillagigedo Island and are not considered in this analysis. The rationale for MIS selection is displayed in Table 21. Impacts to their preferred habitat(s) would occur during project implementation since harvest activities in POG alter stand structure and diversity.

Table 21. Wildlife species selected as management indicator species (MIS) for the Saddle Lakes Timber Sale Project

Species	Species Class	Basis for MIS Selection, habitat preference	Associated POG Habitat Project Level Indicator/Measurement1
Sitka Black-tailed deer (*Odocoileus hemionus sitkensis*)	MIS	Important subsistence and game species; represents variety of habitat at all elevations	Deep snow winter habitat - acres of high-POG ≤800’; average snow winter habitat - acres of POG ≤1,500’; summer habitat - all habitats except stem exclusion
Alexander Archipelago wolf (*Canis lupus ligoni*)	MIS	Population concerns, major predator of deer	Deer/wolf Interactions, fragmentation
Black bear (*Ursus americanus*)	MIS	Species of local interest; important game species; early (<26 year old) habitat and all types of old growth	Denning habitat - acres of POG. Foraging - POG within 500’ of anadromous fish streams and all habitats except stem exclusion
American marten (*Martes americana*)	MIS	Important furbearer. Represents POG and fragmentation	Winter - acres of high-POG ≤1,500’; year-round - POG; fragmentation
Bald eagle (*Haliaeetus leucocephalus*)	MIS	Represents coastal habitats with large trees	POG within beach/estuary buffer; disturbance
Brown creeper (*Certhia americana*)	MIS	Snag-dependent species affected by edge.	Acres of interior POG
Hairy woodpecker (*Picoides villosus*)	MIS	Snag-dependent species representing high-volume POG	Acres of high-POG at all elevations, patch size
Red-breasted sapsucker (*Sphyrapicus ruber*)	MIS	Snag-dependent species representing low-medium POG	Acres of low- and medium-POG at all elevations, patch size
Red squirrel (*Tamiasciurus hudsonicus*)	MIS	Small mammal & key goshawk prey; POG; mature, cone-bearing trees provide limited foraging habitat	Acres of POG and young growth greater than 40 years old
River Otter (*Lontra canadensis*)	MIS	Important furbearer; riparian and coastal habitat	POG within 500’ of fish streams and within beach buffers
Vancouver Canada goose (*Branta canadensis fulva*)	MIS	Represents hydric and unproductive old growth; nests in trees	Acres of muskeg, NPOG, and hydric POG (SD4H, SD5H)
Mountain goat (*Oreamnos americanus*)	MIS	Important game species;	POG near cliffs

Sitka Black-tailed Deer

The Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) is a subspecies of mule deer that is endemic to the coastal areas of Southeast Alaska and northern British Columbia. Sitka black-tailed deer will be here after referred to as "deer." Deer/wolf interactions are discussed under the Wolf section, below.

Deer populations in Southeast Alaska vary with geography and climate. Within GMU 1A, deer populations tend to fluctuate seasonally in response to winter weather and wolf and bear predation (Porter 2011a). Annual variability in weather patterns and snowfall can have noticeable impacts on deer distribution, population density, and hunter accessibility (McCoy et al. 2009). Abundant deer forage is available within old-growth stands in the project area, but lightly to moderately browsed indicating that deer numbers are below carrying capacity. Deer numbers are thought to be at very low levels throughout most of GMU 1A (Porter 2011a).

Deer Habitat

Specific habitat for deer varies by season and whether they are resident or migratory deer. Deer distributions within Saddle Lakes area WAAs 406/407 are not known, but roughly two-thirds of the deer studied on Admiralty Island near Juneau made distinct migrations between winter and summer ranges while the other one third were year-round residents of their winter range (Schoen and Kirchhoff 1985). Given the amount of alpine habitat available, migration patterns may be similar within WAAs 406 and 407. Schoen and Kirchhoff (1990) recommended that where possible, old-growth habitat should be retained in large blocks extending from sea level to the subalpine zone so that deer can make elevational movements in response to changing snow conditions.

Winter habitat is the limiting factor for deer in Southeast Alaska (USDA 2008c, p. 3-230). Hanley (1984) concluded that the overall effect of snow depth restricts the range of suitable habitats and lowers the quality of all habitats. Because snow increases the energy cost of foraging, grazing time required to meet minimum energy needs also increases with snow depth (Hanley et al. 1989).

Most of WAAs 406/407 is classified as an intermediate snow area during average winters based upon long-term yearly averages (see Climate section above), but portions of the WAAs in the Saddle Lakes area are classified as high snow; and a small area in WAA 406 near Carroll Point is classified as low snow. Since the project area occasionally experiences severe winters with higher than normal snow conditions, deer deep snow winter habitat, average winter habitat (average snow), and non-winter habitat were analyzed. Table 22 shows the historic and current acreages of deer habitat on NFS lands.

Table 22. Deer winter habitat acreages on NFS lands in WAAs 406 and 407

WAA	Habitat	Historic (1954) Acres	2013 Acres	% Change
406	Deep Snow	3,866	2,463	-36%
	Average Snow	52,202	40,421	-23%
	Non-Winter	122,505	116,178	-5%
407	Deep Snow	1,168	940	-20%
	Average Snow	17,772	15,930	-10%
	Non-Winter	41,202	40,657	-1%

Deep Snow Winter Habitat

Extensive research conducted in Southeast Alaska indicates that low-elevation (less than 800 feet) high-POG habitat containing large trees with large branches to intercept snow and containing relatively high amounts of quality forage are important to deer during severe winters with above average snowfall (Person and Brinkman 2013, Schoen and Kirchhoff 2007, Hanley 1984). Further, during severe winters, deer densities in POG are substantially higher than in second-growth (i.e., young-growth) stands (Brinkman et al. 2011, Schoen and Kirchhoff 2007, Doerr et al. 2005). The lowest quality habitat for deer that Brinkman encountered was young, shrub-sapling stage clearcuts. In those stands, the canopy was still sufficiently open enough to allow snow build up, but thick enough to retard snow melt. Therefore, winter severity and the amount of young growth are key factors in determining the capability of winter range to support deer populations.

Under intermediate and deep snow conditions, deer will select those habitats that provide for snow interception and food availability (Suring et al. 1992, Schoen and Kirchhoff 2007).Within the project area, availability of large cedars also facilitates use by deer. Deer beds were noted at the base of large cedars and were often situated on small knobs or benches where deer could see wolves or other predators approaching.

Hanley (1984), Doerr et al. (2005), Brinkman (Person 2007, email), and Person (2009) all found that southerly aspects below 800 feet elevation were important to deer during deep snow winters in Southeast Alaska.

Average Winter Deer Habitat

During average winters, when habitat selection by deer is not appreciably influenced by snow, deer will select those habitats that provide the best foraging opportunities (Suring et al. 1992). Migratory deer move as high in elevation as snow conditions allow; resident deer also move up and down slope within their home ranges depending on changing snow levels (McNay and Vollner 1995, B.C. Ministry of Forests 1996, Schoen and Kirchhoff 2007, Colson et al. 2012). Elevations up to 1,968 feet may be used during relatively snow free periods (Hanley 1984, Schoen and Kirchhoff 1985) although 1,500 feet has generally been cited as the upper elevation (Kirchhoff and Hanley 1992, White et al. 2009). Hanley (1984) summarized that during snow-free periods, the relative importance of habitats may shift. Herb-layer, evergreen plants (bunchberry and five-leaved bramble) continue to be the forage of highest quality, but may be more available in more open-canopied, lower-volume forests. When supplemental forage is available from open stands during mild winters, deer populations may increase to levels above normal carrying capacity. As a result, heavy mortality may occur during the next deep snow winter (McCoy 2008).

Non-Winter (Spring/Summer/Fall) Deer Habitat

Spring, summer, and fall habitat conditions are important for maintaining the nutritional condition of deer throughout the year (Hanley et al. 1989, Klein 1965). Body reserves accumulated during summer are critical for winter survival and reproduction. Does foraging in extensively clearcut habitats may have difficulty meeting protein requirements for lactation because of high tannin concentrations in sun-grown leaves (Hanley et al. 1989). Subalpine, alpine, and scrub [NPOG] forest stands were used by migratory deer at elevations greater than 1,969 feet (Schoen and Kirchhoff 1990). Resident deer remain within their home ranges, but also use open habitats such as young clearcuts, muskegs, and NPOG.

Deer Model Habitat Capability

The deer model, takes into account snow depth, elevation, aspect, and vegetation to provide a habitat suitability index (HSI) of average winter deer habitat capability (DHC). Habitat capability values were designed to estimate changes in deer carrying capacity that result from timber harvest. The model was not designed to calculate actual deer populations since it does not include complex predator/prey relationships or recruitment/mortality interactions which can substantially alter actual deer populations (USDA 1997b, Appendix N, p. N-32). The deer model estimates long-term DHC, and assumes that winter range is the limiting factor to deer populations in Southeast Alaska (USDA 1997b, Appendix N, p. N-33).

The condition of previously harvested stands (e.g., stand initiation or stem exclusion) and stands proposed for harvest are compared to the habitat capability that existed prior to large-scale timber harvest. In general, higher value deer habitat is reduced in value when harvested and drops further at the stem exclusion stage; some lower value deer habitat initially increases in value when harvested due to increased forage, but drops below pre-harvest levels once stem exclusion occurs. Low-elevation, high-POG stands with southern aspects and low average snowfall are assumed to provide the best quality deer winter habitat. Areas above 1,500 feet in elevation are assumed to have no value as winter habitat.

Additional information on the deer model is provided in the Forest Plan FEIS (USDA 2008c, pgs. 3-231, 3-323, 3-265 to 3-267, and USDA 2008d, Appendix B, pgs. B-31 to B-32). Table 23 shows historic and existing DHC in WAAs 406 and 407 on NFS lands.

Table 23. Existing deer habitat capability (DHC) in WAAs 406 and 407 on NFS lands

WAA	Historic DHC	Existing DHC	Percent Reduction
406	3,276	2,521	-23%
407	1,158	1,042	-10%

Source: USFS Tongass National Forest GIS.
Deer habitat capability (DHC) does not equal actual deer; it is used as a tool to compare alternatives.

Alexander Archipelago Wolf

The Alexander Archipelago wolf (*Canis lupus ligoni*) is endemic to Southeast Alaska, but occurs throughout the southeast mainland and islands in the Alexander Archipelago except Admiralty, Baranof, and Chichagof (MacDonald and Cook 2007, Person et al. 1996). The decision not to list *C. l. ligoni* in 1994 as threatened under the Endangered Species Act was based in large part on the Forest Service's commitment to enhance habitat protection. The USFWS was again petitioned to list *C. l. ligoni* as threatened in 2011. The 90-day finding was published on March 31, 2014 (Federal Register 2014). The USFWS found that the petition presents substantial information indicating that listing the Alexander Archipelago wolf may be warranted. Therefore, when funding becomes available, the USFWS will conduct a status review to determine if listing the Alexander Archipelago wolf is warranted. This 90-day finding does not change the current status of wolves.

Wolves are social animals that actively defend territories from encroachment from other packs or individuals (Mech 1970 as cited in Porter 2009a). Smith et al. (1987) identified one wolf pack, which he called East Chuck pack, between George and Carroll Inlets. Portions of three other packs identified by Smith et al. (1987) occur within WAAs 406/407: the Carroll Inlet Pack on the east side of Carroll Inlet, the Town Pack near Ketchikan, and a suspected Naha River Pack.

No statistically reliable population estimates for wolves are available for GMU 1A, including WAAs 406 and 407, but the wolf population appears to be stable based upon mandatory harvest reporting (Porter 2009a). Under either state or federal subsistence regulations, hunters may legally harvest 5 wolves between August 1 and April 30 and an unlimited number of wolves may be trapped from November 10 to April 30. The most common methods of hunter/trapper access are by boat (81%) and off-road vehicles (14%). Between 90 to 100 percent of the wolves harvested are taken by local residents (Porter 2009a).

Wolves spend most of their time below 1,200 feet elevation regardless of season (Person et al. 1996, Person 2001). Wolves are a habitat generalist; but data from radio-collared wolves on Prince of Wales and Kosciusko Islands indicated that wolves avoided clearcuts, young-growth forests, and roads (Person 2001). However, Person and Russell (2008) state that wolves are easily observed in open habitats such as grassy meadows, young clearcuts, and muskegs. No wolf dens were found during Saddle Lakes project area field review, but suitable habitat is present adjacent to the numerous lakes and streams.

The following three issues related to wolf conservation were identified in Person et al. (1996): 1) decline in deer carrying capacity (deer density); 2) effect of roads on mortality and displacement; and 3) continued exploitation or overharvest of wolves. Three similar global protection needs were identified in NatureServe (2012): 1) Minimize habitat fragmentation and protect integrity of high-use corridors to ensure maintenance of gene flow between neighboring populations; 2) Close logging roads following timber harvest in areas important to the wolves and their prey; and 3) Closely regulate wolf hunting and trapping to ensure long-term viability of the wolves. Changes in deer habitat and roads are under the jurisdiction of the Forest Service. Wolf hunting and trapping regulations fall under the jurisdiction of the Federal Subsistence Board (FSB) and ADF&G. ADF&G is currently analyzing the feasibility of intensive management (predator control) within portions of GMU 1A in an attempt to increase deer populations (Alaska Statutes AS 16.05.255(e)), but WAAs 406 and 407 are not currently included in that effort.

Deer Density

Due to lack of population data, the deer model has been used as an indicator to assess the ability of an area to support deer populations capable of maintaining sustainable wolf populations and meeting human harvest demands. Model-defined deer densities (deer per square mile) do not represent actual populations and are not related to wolf viability, but represent the functioning of the predator-prey system dynamic (USDA 2008c, p. 3-282). Person et al. (1997) clarified that habitat capability of at least 18 deer per square mile is needed to support wolves and deer hunter demand on a sustainable basis. Deer densities above five deer per square mile, in conjunction with old growth reserves, were predicted to maintain viable wolf populations on the Tongass (Suring et al. 1993 VPOP Strategy). Because WAAs 406 and 407 contain extensive areas of NFS land above 1,500 feet in elevation, historic deer densities predicted by the model were slightly below 18 deer per square mile in WAA 406, and at 18 deer per square mile in 407 (Table 24).

Wolf populations are closely tied to prey abundance (Person et al. 1996, MacDonald and Cook 2009). Sitka black-tailed deer are the principal prey of wolves in southeast Alaska representing up to 77 percent of their diet, but wolves also feed heavily on spawning salmon, beaver, moose, mountain goat, and voles (Person et al. 1996, Smith et al. 1987, Szepanski et al. 1999. Lowell 2009a).

Wolf/Deer Interactions in Fragmented Habitat

Wolf predation can be a primary factor in controlling deer populations in Southeastern Alaska (Farmer et al. 2006). McNay and Voller (1995) found predation by wolves to be highly efficient in fragmented, heavily logged landscapes on Vancouver Island, British Columbia.

Suitable deer habitat plays an important role in maintaining the deer/wolf equilibrium. The stability of such an equillibrium is contingent on the availability of suitable habitat for deer, such that the deer population can maintain a rate of growth sufficient to offset losses to predation (Person et al. 1996). Interruption of deer/wolf equilibriums through events such as severe winters or reduction in the quality and quantity of suitable habitat may result in widely fluctuating wolf and deer populations (Person et al. 1996). Hanley et al. (2005) found a strong, inverse relation between home range size of wolves and the proportion of deep-snow winter habitat for deer. Similarly, there was a strong relation between wolf pack size and proportion of deer winter habitat within a home range, resulting in higher wolf densities where deer densities are high (Person 2001). Population reductions resulting from increased wolf harvest and habitat fragmentation may enhance isolation of island wolf packs and reduce their ability to survive and reproduce.

Wolf Populations and Road Density

In order to maintain viable, well-distributed wolf populations, the Viable Population (VPOP) committee (Suring et al. 1993, p. 157) recommended that road densities should be held below 1 mile per square mile in any three contiguous WAAs. Forest Plan Standards and Guidelines (USDA 2008c, WILD1.XIV, p. 4-95) state that total road densities of 0.7 to one mile per square mile or less may be necessary to address wolf mortality concerns where they have been determined to exist.

Wolf mortality has not been an issue in WAAs 406 and 407 in the past due in part to the lack of road access. However, since the Ketchikan to Shelter Cove Road would connect the project area to the communities of Ketchikan and Saxman in the near future (see cumulative effects section), road densities below 1,200 feet in elevation were analyzed to determine the effect on potential wolf harvest (Table 24).

Table 24. Original and existing deer densities and road densities on NFS Lands in the Saddle Lakes project area

WAA	Habitat	Original (1954) Density	Current Density	% Change
406	Deer Density[1/]	17	13	-23%
	Open Road Density[2/]	0	0.68	N/A
	Total Road Density[2/]	0	1.40	N/A
407	Deer Density[1/]	18	16	-11%
	Open Road Density[2/]	0	0.63	N/A
	Total Road Density[2/]	0	0.93	N/A

Note: N/A = Not Applicable.

1/ Theoretical deer densities calculated from the deer model DHC. Actual deer population information not available.

2/ Road densities include only NFS roads and lands below 1,200 feet in elevation; freshwater lakes not included. Total road densities include open, maintenance level 1(closed), and decommissioned roads.

Black Bear

Black bears (*Ursus americanus*) are the most abundant bear in Alaska (Schoen and Peacock 2007), but no population information is available for GMU1A (including WAAs 406/407). Black bears, bear scat, and/or rooted-out skunk cabbage were observed during field review of the Saddle Lakes project area. Three bear dens were located and confirmed by an ADF&G wildlife biologist within the Saddle Lakes project area. A fourth suspected den was found by the timber crew, but needs to be confirmed. A young bear was observed in the vicinity of a historic den, but the den was not relocated.

Using data from studies in western Washington, where black bear habitat is similar to that in GMU 1A, black bear density in forested habitats across Southeast Alaska was estimated at 1.4 bears per square mile in 1990 (Bethune 2011). The estimate for Revillagigedo Island in 1990 was 1,764 bears. Black bears have been hunted in GMU 1A for many years and mandatory harvest reporting has been in place since 1973 (Bethune 2011). Since 2009, black bear hunters are required to obtain a harvest ticket/report form prior to hunting. Annual black bear harvest in GMU 1A increased from 25 bears in the 1970s to a current range of 77 to 102 bears, with fluctuations believed to be more linked to weather than changes in bear numbers (Bethune 2011). Some of the highest bear harvest continues to come from WAAs 406 and 407 because of its close proximity to Ketchikan (Bethune 2011). Due to mortality concerns the Alaska Board of Game at the November 2010 meeting, established a drawing permit for non-resident black bear hunters hunting without a guide in GMUs 1 through 3.

Bear Habitat

Black bears prefer mixed deciduous-coniferous forests with a dense understory, but occur in various habitats with estuaries, riparian areas, and old-growth forests providing the highest quality habitat (Schoen and Peacock 2007). Information on the denning habits in Southeast Alaska is limited, but bears on Mitkof Island made exclusive use of large-diameter trees, snags, or hollow logs for their winter dens, presumably because heavy precipitation and the poorly drained soils rendered ground dens less suitable (Erickson et al. 1982). Similar results were found by Davis et al. (2012) on northern Vancouver Island, British Columbia in that dens occurred in or beneath large diameter trees that provided thermal and security benefits. Davis et al. (2012) also found that bears often reused the same dens over multiple years, particularly in areas where thermally efficient den sites were limited. Re-use was partially dependent upon security from predators including other bears and wolves.

Young clearcuts, muskegs, small openings, and subalpine meadows provide high levels of forage (Schoen and Peacock 2007, USDA 2008c p. 2-233). Bears frequent beaches during the spring to forage on grasses and sedges. In late spring, bears can be efficient predators of deer fawns. During mid-summer, bears begin foraging on berries and make use of habitats (such as riparian forest, avalanche slopes, young clearcuts, and subalpine and alpine areas) that produce abundant berry crops (Schoen and Peacock 2007).

The use of salmon-spawning streams by bears in late-summer and fall in Southeast Alaska is well documented. For example, bears were observed near Gunsight Creek and Salt Creek in the OGR above the George Inlet salt chuck. The late-summer season has been identified as the most critical or limiting period for bears when they must build up energy reserves adequate to survive the winter and successfully reproduce (Schoen and Peacock 2007, Peacock 2004). Not all bears utilize salmon, some remain at higher elevations and forage on vegetation, deer, and small mammals. Impacts to POG within 500 feet of anadromous fish streams were analyzed to address the importance of riparian habitat to black bear. Table 25 shows existing bear habitat within WAAs 406 and 407.

Table 25. Existing bear habitat on NFS Lands in WAAs 406 and 407

WAA	Habitat	Historic (1954) Acres	Existing (2013) Acres	% Change
406	Denning Habitat[1/]	61,321	48,982	-20%
	Foraging Habitat[2/]	122,385	110,046	-10%
	POG within 500 feet of Class I streams	7,615	6,433	-16%
407	Denning Habitat[1/]	19,789	17,946	-9%
	Foraging Habitat[2/]	41,146	39,303	-4%
	POG within 500 feet of Class I streams	2,517	2,320	-8%

1/ Denning = POG – all SD categories SD4H through SD67 at all elevations.
2/ Foraging = All habitats except stem exclusion.

Mountain Goat

Mountain goats (*Oreamnos americanus*) inhabit rugged, mountainous habitats in western North America. In Alaska, mountain goats occur in coastal regions in Southeastern and Southcentral Alaska. They have also been introduced into non-native range including Revillagigedo Island where they are now firmly established (ADF&G 2013a). Revillagigedo Island transplants include Swan Lake (WAA 406) in 1983 and Upper Mahoney Lake (WAA 407) in 1991.

Mountain goat populations are often small and geographically isolated. As a result, mountain goat population trends throughout Alaska vary considerably from place to place and from year to year. GMU 1A has an estimated 3,000 to 4,000 goats and the populations, except for Cleveland Peninsula, appear to be stable with healthy goat populations (Porter 2010a). Current regulations are one goat by registration permit only on the east side of Carroll Inlet, or one goat by drawing permit only on the west side of Carroll Inlet. Most hunter access to goats is by float plane into high elevation lakes. A lone mountain goat was observed on the Lemon Lake road (NFSR 8337000) in October 2012. Goats are more frequently sighted at higher elevations adjacent to the project area, or at higher elevations on the east side of Carroll Inlet above Swan Lake.

Habitat

The quantity and quality of winter habitat is the most limiting factor for mountain goats in Southeast Alaska (USDA 2008c, p. 3-232). High snowfall can result in substantially reduced survival of adult mountain goats (ADF&G 2013a). In Southeast Alaska, mountain goats commonly use POG when wet snow pack in the alpine zone forces goats down into more protected forests (ADF&G 2013a, Fox et al. 1989, Fox and Smith 1988). Fox et al. (1989) recommended that mountain goat travel corridors between important forested wintering sites be identified and maintained. Within Southeast Alaska, steep slopes that provide escape terrain generally accumulate the least amount of snow (Fox et al. 1989).

When predators are detected and an attack is possible, mountain goats move to very steep or rocky escape terrain where predators are unable to follow or attack without substantial risk or injury (Festa-Bianchet and Coté 2008, Fox and Streveler 1986). Therefore, the presence of steep, rough terrain is an important habitat feature (Hengeveld et al. 2004). Hamel and Coté (2007) found that female goats in Canada also spent more time foraging near escape terrain than away from it. They found that females with kids foraged the closest to escape cover even though habitat quality may be less. Quality escape terrain for mountain goats has been defined as slopes between 45 to 75 degrees (summarized in Suring et al. 1988). Taylor and Brunt (2007) found similar selection (41 to 60 degrees) in British Columbia.

Smith (1986) found that over 95 percent of all radio-collared goat relocations in Southeast Alaska were within 1,300 of a cliff (defined as slopes greater than 50 degrees). Based upon discussion with USFS Wildlife Biologists B. Logan and T. Schenck in 2013 (pers. comm.), POG habitat within 1,300 feet of slopes 50 degrees or greater was used as the definition of important goat habitat in the effects analysis, rather than 50 percent slope as listed in Forest Plan Standards and Guidelines (USDA 2008b, WILD1.XV.A.3, p. 4-96). Existing habitat is displayed in Table 26.

Table 26. Existing mountain goat habitat on NFS Lands in WAAs 406 and 407

WAA	Historic Habitat (acres)	Existing Habitat (acres)	Percent Change
406	46,296	37,896	-18%
407	15,280	13,939	-9%

Source: USFS, Tongass National Forest GIS.
POG habitat within 1,300 feet of slopes 50 degrees or greater.

American Marten

American marten (*Martes americana*) were specifically considered in the design of medium-sized old-growth reserves (10,000 to 40,000 acres) under the Forest Plan Conservation Strategy (Suring et al. 1993; Flynn et al. 2004; USDA 2008a). The Viable Population (VPOP) committee for the 1997 Tongass Forest Plan strongly recommended that conservation areas (i.e., OGRs) be connected by travel corridors so marten could move between protected habitat areas (Suring et al. 1993). Natural populations of marten are found on Revillagigedo Island (MacDonald and Cook 2007). Marten on Revillagigedo Island belong to the subspecies *M. a. americana* (Small et al. 2003b). Since there is no indication that Pacific marten (*M. caurina*) occur on Revillagigedo Island, *M. caurina* is not discussed further in this analysis.

ADF&G does not have population data for marten in GMU 1A. Marten abundance, as measured by densities and home range sizes, is known to vary spatially and temporally throughout Southeast Alaska, in association with habitat suitability, prey densities, and trapping pressure (Schoen et al. 2007, Flynn and Schumacher 2009, Flynn et al. 2012). Outside Alaska, density indices in Thompson (1994) also varied by habitat with densities in uncut areas much higher than densities in logged forests. Pauli et al. 2012 found that most (72%) of the marten in their Southeast Alaska/Queen Charlotte Island study were residents, whereas the remaining 28 percent dispersed distances of 9 to 25 miles. The latter were generally young of the year or yearlings.

Trappers in Southeast Alaska are more interested in marten than other furbearer species since marten are easy to trap, pelts are easy to process, and pelt prices are generally higher (Porter 2010b). Trapping pressure generally fluctuates with pelt price. Under the current state and federal subsistence regulations, there is no trapping limit for marten in GMU 1A.

Marten are generalist predators and will vary their diet seasonally based on available prey. Marten feed on small mammals year-round, and voles are the most common prey for marten range-wide (Flynn et al. 2004; Poole et al. 2004; Potvin et al. 2000). Long-tailed voles, red-backed voles, salmon, and other small rodents are the most common species eaten by marten in Southeast Alaska (Flynn et al. 2004, Ben-David et al. 1997). However, squirrels, birds, deer carcasses, and intertidal organisms are utilized in years when preferred foods were not readily available (Flynn and Schumacher 2009).

Habitat

Marten in western temperate North America occur in coniferous forests and select moist stands with complex physical structure near the ground. Thompson and Harestad (1994) summarized 10 studies from across marten ranges documenting selection for overmature timber, and against pole sized or smaller stands. The association of marten with structurally complex forests is related to their need for avoiding predators, accessing prey beneath the snow, and finding protected microenvironments for resting in winter and for giving birth and sheltering newborn.

Due to their body shape, they are energy constrained in the winter and select habitat structure that helps them to conserve energy (Buskirk and Powell 1994). In Southeast Alaska, habitat requirements reflect a strong interaction between food, cover, and climate, with forest cover being particularly important for travel, denning and resting sites, hunting, avoiding avian predators, and thermoregulation (Flynn et al. 2004). Consequently, the quantity and quality of winter habitat is a limiting factor for marten in Southeast Alaska (USDA 2008c, p. 3-234).

Within Southeast Alaska, marten prefer POG and tend to avoid NPOG and both younger and older clearcuts (Flynn 2006, Flynn & Schumacher 2001). Research on nearby Chichagof Island showed 82 percent of marten use was in forest habitat. Marten selected large multi-storied and medium multi-storied habitats during the winter with 63 percent of winter locations occurring at less than 820 feet elevation (Flynn and Schumacher 2001, Flynn 2004 Appendix B). However, Flynn and Schumacher recommended using 1,500 feet elevation for winter analysis due to the number of locations (32%) between 800 and 1,500 feet elevation. Additional marten research is currently underway on Kuiu Island (Flynn et al. 2012 and 2013 progress reports), but habitat selection analysis is not yet available.

Marten will travel through other habitat types and include a wide range of habitat types in their home ranges (Flynn 2006, Buskirk 2002). Habitat use and movements are strongly related to the distribution and abundance of food. Snyder and Bissonette 1987 and Steventon and Major 1982 found that marten travel through clearcuts to adjacent residual stands generally in a straight line as opposed to longer zigzag patterns throughout uncut forest. Lack of small mammal prey and overhead cover were the rationale. Thompson and Colgan 1994 found that the biomass of prey killed by marten in unlogged areas was greater than twice the amount taken in clearcut areas in abundant prey years. Although diets were not significantly different, biomass was 30 percent greater in scarce years. Andruskiw et al. (2008) found that marten in Ontario hunted with less success in regenerating forest stands than in uncut boreal forest even though small mammals were equally abundant. Structural habitat complexity enhanced, rather than diminished, the efficiency of predatory search by marten.

Marten Populations and Road Density

An increase in road access can increase trapping pressure on marten as they are easily trapped along roads accessible to vehicles (Flynn et al. 2004). Open roads receive the highest and most consistent use, and therefore are likely to have the greatest effect on marten. Closed roads facilitate walk-in access. Existing marten habitat and road densities on NFS Lands by VCU is shown in Table 27.

Table 27. Existing marten habitat and road densities[1/] on NFS Lands by VCU

VCU	Habitat	Historic (1954) Acres or mi/mi^2	Existing (2013) Acres or mi/mi^2	Percent Change
7460	Winter[2/]	12,541	7,317	-42%
	Year-round[3/]	19,869	14,493	-27%
	Open Road Density	0	1.0	N/A
	Total Road Density	0	2.2	N/A
7470	Winter[2/]	5,548	4,064	-27%
	Year-round[3/]	9,388	7,903	-16%
	Open Road Density	0	0.7	N/A
	Total Road Density	0	1.2	N/A
7530	Winter[2/]	10,250	5,637	-45%
	Year-round[3/]	17,073	12,433	-27%
	Open Road Density	0	0.7	N/A
	Total Road Density	0	1.5	N/A

Source: USFS Tongass National Forest GIS. N/A = Not Applicable

1/ Includes only NFS total road density and lands below 1,500 feet in elevation; lakes not included in the area calculation. Total road densities include open, maintenance level 1(closed), and decommissioned roads.

2/ Winter habitat equals high-POG less than or equal to 1500 ft. elevation.

3/ Year-round habitat equals POG, all elevations.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is protected under the Bald and Golden Eagle Protection Act which provides for special management of bald eagles, their young, and their nests. The Tongass supports the largest breeding population of bald eagles in the world (Hodges 2011). About 87 nests occur in George or Carroll Inlets. Eagles were frequently observed while boating to the Saddle Lakes project area.

Habitat

Nearly all bald eagles nests in Southeast Alaska are in old-growth forest within the beach fringe (Stenhouse 2007, Jacobson and Hodges 1999, Gende et al. 1997, King et al. 1972). Of almost 3,000 bald eagle nests observed by Robards and Hodges (1976) in Southeast Alaska, 84 percent were in old-growth stands, in trees greater than 36 inches in diameter with stout branches capable of supporting the large heavy nests. No eagle nests were recorded in second-growth trees in this study. The Forest Plan designates a 1,000-foot forested beach buffer along shorelines and estuaries (USDA 2008b, BEACH1, p. 4-4). Current bald eagle habitat is shown in Table 28.

Table 28. Existing bald eagle habitat on NFS lands in the Saddle Lakes project area

VCU	Historic Acres	Existing Acres	Percent Reduction
VCU 7460	2,711	1,875	-31%
VCU 7470	32	22	-31%
VCU 7530	2,581	1,794	-30%

Source: USFS Tongass National Forest GIS.
Habitat is POG within the beach/estuary buffer.

Brown Creeper

The brown creeper (*Certhia americana*) is an uncommon year-round resident that is widely distributed throughout Southeast Alaska and the Tongass National Forest (Heinl and Piston 2009). Although widespread, this species can be difficult to detect and monitor due to its small size and cryptic coloration, as well as its low volume, high-pitched call. Quantitative data on the abundance of brown creepers in the Tongass National Forest is lacking. Long-term (1966 to 2011) breeding bird survey (BBS) data show a slightly positive trend for Alaska, but data should be used with caution due to small detection rates and limited samples (Sauer et al. 2012).

Habitat

Brown creepers depend on cavities in the large-diameter snags characteristic of old-growth stands in Southeast Alaska (Cotter 2007b, ADF&G 2005, Andres et al. 2004, Stotts et al. 1999, DellaSala et al. 1996) and elsewhere (Poulin et al. 2013). Brown creepers forage primarily on trunks of live, large with abundance correlated with trees greater than 39 inches diameter at breast height (dbh) suggesting this species is an old-growth obligate (Kissling, et al., Forest Bird Presentation, Conservation Strategy Meeting, 2006). The preference for old-growth forests appears to be correlated with the abundance of snags and large diameter live trees with sloughing or thick bark for nest sites, and with structural components and microclimate (Poulin et al. 2013, Poulin et al. 2008, Wiggins 2005).

Studies across the US and Canada have found that brown creepers are negatively affected by edge, and that densities are consistently lower in edge habitat (Poulin et al. 2013, Wiggins 2005, Hejl et al. 2002). Studies by Poulin et al. (2008) in New Brunswick, Canada, found that 62 percent of brown creeper nests were located greater than 328 feet from edges, with the average distance 470 feet. Kissling and Garton (2008) found similar edge effects on brown creepers within Southeast Alaska based on a limited number of detections.

Prior to timber harvest much of the historic interior POG was low elevation habitat associated with coastal shorelines or major stream drainages. Existing interior habitat is shown for NFS lands in Table 29.

Table 29. Existing brown creeper interior POG on NFS lands, Saddle Lakes project area

VCU	Historic Acres	Existing Acres	Percent Reduction
VCU 7460	10,885	3,050	-72%
VCU 7470	4,469	2,417	-46%
VCU 7530	7,832	2,493	-68%

Source: USFS Tongass National Forest GIS.
Interior habitat based upon edge effect distances in Concannon (1995).

Hairy Woodpecker

Hairy woodpeckers (*Picoides villosus*) are a widely distributed permanent resident throughout Southeast Alaska (Heinl and Piston 2009). Hairy woodpeckers were recorded on 83 percent (10 of 12) of BBS routes on the Tongass, and occurred at an estimated density of 0.1 birds per acre (Cotter 2007b). But this data should be used with caution due to small detection rates and limited sample size. Hairy woodpeckers were observed in Unit 47, and occasionally seen or heard elsewhere in the project area.

Habitat

Hairy woodpeckers rely on dead and decaying trees, both standing and fallen, for nesting, foraging, and roosting. Consequently, they are sensitive to timber-harvest activities that decrease the abundance of these large trees (Cahall and Hayes 2009). They are primary cavity excavators for other cavity-dependent wildlife species (Walters et al. 2002). Their abundance seems to be correlated with increasing snag density, proportion of large snags, and heartwood decay (Ripper et al. 2007, Saab et al. 2009).

High-volume, western hemlock or Sitka spruce old-growth forests receive more use in the Tongass National Forest than medium or low volume stands or cedar (Hughes 1985, USDA 2008c pp. 3-231 & 3-240). Habitat patches greater than 500 acres are thought to provide optimal habitat (USDA 2008c p. 3-240). Kissling and Garton (2008) only detected hairy woodpeckers in buffers greater than 820 feet and in control areas in Southeast Alaska. Kissling and Garton speculated that absence of hairy woodpeckers from narrow buffers may indicate these species avoid edge habitats, or that the forested area was small relative to their territory size. Existing habitat is displayed in Table 30.

Table 30. Existing hairy woodpecker habitat on NFS lands by VCU

VCU	Historic Acres	Existing Acres	Percent Reduction
VCU 7460	14,358	8,982	-37%
VCU 7470	5,946	4,461	-25%
VCU 7530	10,909	6,268	-43%

Source: USFS Tongass National Forest GIS.
Habitat is high-POG at all elevations.

Red-breasted Sapsucker

The red-breasted sapsucker (*Sphyrapicus ruber*) is a common, primary cavity excavator that depends on soft, decaying wood in snags and partially dead trees for nesting and foraging. The species is widely distributed throughout Southeast Alaska forests during the spring, summer, and fall seasons and is a documented breeder on Revillagigedo Island (Heinl and Piston 2009).

Approximately 32 percent of the global population of red-breasted sapsuckers breed in Southeast Alaska (Kissling et al., Forest Bird Presentation, Conservation Strategy Meeting, 2006). Relatively little quantitative data are available on the abundance of red-breasted sapsuckers on Revillagigedo Island. Long-term BBS data (Sauer et al. 2012) shows a slightly positive trend for Alaska (7% increase), but data is based on small detection rates and limited sample size. Red-breasted sapsuckers were frequently observed or heard during Saddle Lakes field surveys. Red-breasted sapsucker nests were found near Units 51, 201, and 240.

Habitat

Red-breasted sapsuckers prefer late-successional forests (greater than 200 years old) with high densities of large snags (Joy 2000, Kissling and Garton 2008, DellaSala et al. 1996). Joy (2000) found that snags containing red-breasted sapsucker nests on northern Vancouver Island, British Columbia, were taller (107 feet) and larger diameter (mean 37 inches dbh) than snags without nests. He concluded that choice of large diameter snags may reflect an attempt to maximize nest space for large clutch size, thermal insulation, and/or protection from predators. Wagner (2011) found that tree size and presence of fungal infection (visible conks) were good indicators of nest tree selection by red-breasted sapsuckers in Southeast Alaska.

In Southeast Alaska, red-breasted sapsuckers are associated with low to moderate volume old-growth forest (Hughes 1985) that should be in patches greater than 250 acres (USDA 1997b, p. 3-357) or in buffers at least 1,312 feet wide (Kissling 2003). Red-breasted sapsuckers were commonly found in forested areas with 30 to 60 percent crown closure and along clearcut edges (Cotter and Andres 2000). Existing habitat is displayed in Table 31.

Table 31. Existing red-breasted sapsucker habitat on NFS lands by VCU

VCU	Historic Acres	Existing Acres	Percent Reduction
VCU 7460	5,512	5,512	0%
VCU 7470	3,442	3,442	0%
VCU 7530	6,165	6,165	0%

Source: USFS Tongass National Forest GIS.
Habitat is medium-POG (SD4N,SD4S, SD5H) and low-POG (SD4H).

Red Squirrel

Red squirrels (*Tamiasciurus hudsonicus*) are common in Alaska and are endemic in the coastal mainland of Southeast Alaska, and islands in the Alexander Archipelago south of Fredrick Sound and east of Clarence Strait (MacDonald and Cook 2007). No population densities are available on Revillagigedo Island, but Smith (2012) found average densities of 0.8 and 1.5 squirrels per acre during spring and autumn, respectively on nearby Mitkof Island. Under the current state and federal subsistence regulations, there is no harvest limit for squirrels in the GMU 1A and no closed season.

Habitat

Red squirrel population density is strongly correlated with the density of large trees and snags, which may limit breeding females. Old-growth forests, particularly spruce trees, provide the highest value habitat since they contain higher densities of cavities and interlocking branches for homesites, and produce important cone seeds for squirrels (Cook, et al. 2006). Red squirrels can live in young-growth stands that have reached seed-producing age (i.e., 30 to 40 years, Burns and Honkala 1990), but seed crops may be unreliable at this age and stands do not provide the snags and downed logs necessary for food caching and reproduction until at least 100 years of age (Suring 1988).

Koprowski (2005) summarized information showing that squirrel population dynamics appear to be closely associated with cone abundance. Existing red squirrel habitat is displayed in Table 32.

Table 32. Existing red squirrel habitat on NFS lands by VCU

VCU	Historic Acres	Existing Acres	Percent Reduction
VCU 7460	19,869	14,493	-27%
VCU 7470	9,388	7,903	-16%
VCU 7530	17,073	12,433	-27%

Source: USFS Tongass National Forest GIS.
Habitat is all classifications of POG at all elevations.

River Otter

River otters (*Lontra canadensis mira*) occur on the islands and mainland throughout southeast Alaska and coastal British Columbia and are distinctly different morphologically from interior subspecies (MacDonald and Cook 2007, Suring et al. 1993). No population data exist for GMU 1A, but populations appear to be healthy and thriving based upon trappers surveys and mandatory sealing of pelts (Porter 2010b). There is currently no limit on the number of otter that can be harvested in GMU 1A (Porter 2010b, federal subsistence regulations).

Otters are highly mobile and often move in response to shifting availability of food. Consequently, home range size and location are dynamic (Boyle 2006). River otters feed almost exclusively on fish, but may occasionally forage on crustaceans, amphibians, insects, birds, and mammals (Larsen 1984; Melquist et al. 2003, Guertin et al. 2010).

Habitat

In Southeast Alaska, river otters are associated with coastal and fresh water aquatic environments and the adjacent (within 100 to 500 feet) old-growth forest (Larsen 1984, Woolington 1984). Old-growth forests with canopy cover and large-diameter trees and snags provide habitat for burrows and den sites. Natal dens are on well drained sites near streams in old-growth habitat and riparian zones are used as travel corridors between den sites and coastal foraging areas. Larsen (1983) and Woolington (1984) ascertained that river otters in coastal Alaska avoided clearcut areas 5 to 23 years old, but some use occurred in young-growth at least 60 years old. Avoidance was likely due to dense shrub growth, extensive slash, and lack of overstory cover.

Quality habitat was noted in the small OGR above George Inlet salt chuck, along Gunsight Creek, and along multiple unnamed fish streams in the project area. Existing river otter habitat is displayed in Table 33.

Table 33. Existing river otter habitat on NFS lands by VCU

VCU	Historic Acres	Existing Acres	Percent Reduction
VCU 7460	8,177	5,777	-29%
VCU 7470	3,102	2,679	-14%
VCU 7530	10,929	7,965	-27%

Source: USFS Tongass National Forest GIS.
Habitat is POG within 500 feet of Class I and Class II fish bearing streams.

Vancouver Canada Goose

The Vancouver Canada goose (*Branta canadensis fulva*) subspecies is found almost exclusively in Southeast Alaska and British Columbia. Vancouver Canada geese are relatively non-migratory moving less than 19 miles between nesting, brood rearing, and winter concentration areas (Hupp et al. 2010, Hupp et al. 2006).

No quantitative data regarding the abundance of Vancouver Canada geese on the Tongass is available. Population estimates for Southeast Alaska range from 10,000 breeding residents (USDA 2008c p. 3-241) to 25,000 individuals observed along marine shorelines during winter (Hodges et al. 2008).

Habitat

In contrast to other subspecies of Canada geese, Vancouver Canada geese use forested habitats for nesting, brood rearing, and molting. Rose (1979) discovered a high proportion of nests on Annette Island in muskeg with scattered shore pine. All nests located by Hupp et al. (2006) were in vegetation classified by the Tongass National Forest as “forested”, however 58 percent were in “low productivity” forest or muskeg beneath or near groups of shore pine. The remaining nests were generally in poorly drained, small or intermediate sized western hemlock or mixed hemlock and spruce or cedar, with 9 to 30 MMBF per acre. Nests in forested sites were close to muskegs or sedge meadows and were usually near the forest edge at the base of trees or snags that formed almost complete overhead cover. Lebeda and Ratti (1983) found nests built in trees in their study on Admiralty Island.

Lebeda and Ratti (1983) reported that habitat use shifted to forest edge and intertidal zones with increased age of goslings. Use of open water by geese with broods was uncommon and geese used the forest as escape cover rather than open water. During the summer molting period when geese are flightless, they are found on lakes and inlets (Hupp et al. 2010). In winter, geese concentrate in estuaries and marine waters adjacent to shorelines (Hodges et al. 2008). Upper George Inlet and salt chuck, and upper Carroll Inlet near the estuary are important wintering areas. All historic goose habitat remains within VCUs 7460, 7470, and 7530 (Table 34).

Table 34. Existing Vancouver Canada goose habitat, NFS Lands

VCU	Historic Acres	Existing Acres	Percent Reduction
VCU 7460	12,125	12,125	0%
VCU 7470	6,243	6,243	0%
VCU 7530	14,833	14,833	0%

Source: USFS Tongass National Forest GIS.
Habitat is muskeg, NPOG, SD4H, and SD5H.

Other Wildlife Species of Interest

Other wildlife species of interest (OSI) selected for detailed project analysis and the rationale for their selection are displayed in Table 35. Impacts to their preferred habitat(s) would occur during project implementation since harvest activities in POG alter stand structure and diversity. Effects for many species continue and/or intensify long-term as harvested stands enter into the stem exclusion phase.

Endemic small mammals and neotropical migratory birds are discussed below. Herons, raptors, and murrelets are analyzed in detail in the Wildlife Resource Report, available in the Saddle Lakes project record.

Table 35. Selected other species of interest (OSI) in the Saddle Lakes project area

Species	Species Class	Basis for OSI Selection, habitat preference	Associated POG Habitat Project Level Indicator/Measurement1
Southern red-backed Vole (*Myodes gapperi solus*)	OSI	Endemic small mammal most likely to be affected by timber harvest; important prey species.	Acres of POG
Great Blue Heron (*Ardea herodias*)	OSI	FP requirements	Acres of POG within beach/estuary or lake buffers
Forest Raptors	OSI	FP requirements	POG
Marbled murrelet (Brachyramphus marmoratus)	OSI	FP requirement; sensitive to forest management activities	Acres of large tree SD67 POG
Neotropical Migratory Birds	OSI	MBTA requirements	Various habitats, including POG

Endemic Small Mammals

Endemic species are distinct, unique species with a restricted area or range (Schoen et al. 2007b). Southeast Alaska has been found to be a region with an especially high degree of endemism in its small mammal fauna. This is apparently due to its archipelago geography and its highly dynamic glacial history. Mammal surveys on the Tongass have resulted in the documentation of new distributions, new species, and distinct populations. However, there continue to be gaps in knowledge about the natural history and ecology of wildlife subspecies indigenous to Southeast Alaska (Hanley et al. 2005). The proportion of endemics decreases from the outer islands in the archipelago eastward toward the inner islands nearer the mainland with the pattern more pronounced in the southern part of the archipelago (MacDonald and Cook 2007). Consistent with this pattern, Revillagigedo Island was mapped fairly low on the biodiversity hotspot scale (Cook et al. 2006, ISLES website). There are currently 24 mammal species or subspecies considered endemic to Southeast Alaska (Cook et al. 2001).

No small mammal surveys were conducted specifically for the Saddle Lakes project. However, endemic small mammal surveys were completed on Revillagigedo Island, including the Saddle Lakes area, by MacDonald and Cook as part of the ongoing ISLES project (Cook and MacDonald 2013a). Five small mammal species were collected at the Shelter Cove site: dusky shrew, cinereus shrew, northwest deermouse, meadow jumping mouse, and southern red-backed vole. An additional species, long-tailed vole, was collected at the head of Carroll Inlet.

Revillagigedo Island Southern Red-backed Vole

The southern red-backed vole (*Myodes gapperi solus*) is the only endemic small mammal restricted to Revillagigedo Island; (MacDonald and Cook 2011, MacDonald and Cook 2007; Smith 2005). No population is available for this red-backed vole.

Habitat

No habitat studies have occurred related to the Revillagigedo Island red-backed vole. The best information on red-backed voles in Southeast Alaska comes from nearby Wrangell Island (Smith and Nichols 2004, Smith et al. 2005) where studies were conducted on the Wrangell Island red-backed vole (*Myodes gapperi wrangeli*) association with old growth. Unlike studies elsewhere, vole densities were not consistently higher in old growth but varied between years and were likely influenced by overall population density (Smith et al. 2005). Habitat features that were correlated with vole density included the amount of down, decayed wood and the cover of surface water during spring (Smith et al. 2005, Hanley et al. 2005).

Young-growth supported a higher proportion of the population during a high density year than the following years when overall densities were much lower. Vole densities in young-growth showed substantially greater variation among years and average body mass and reproductive rates were lower with minimal evidence of juvenile recruitment into the population (Smith and Nichols 2004, Smith et al. 2005). As a result, Smith and Nichols (2004) questioned whether young growth could sustain breeding populations in intensively managed landscapes. Smith et al. (2005) found that vole densities in old-growth declined the least between years indicating that it was the highest quality habitat and that regenerating young growth was a dispersal sink.

Sullivan and Sullivan 2011 found substantially more red-back voles in partially cut stands than in 3 to 20 year old clearcut stands in British Columbia, but their sites were drier than sites in Southeast Alaska. Because densities and reproductive rates were highest in POG forest, and questions remain on young-growth, POG was selected as the measurement criteria for red-backed voles.

Neotropical Migratory Birds

The Migratory Bird Treaty Act of 1918 (MBTA) as amended (16 U.S.C. § 703) prohibits the taking of migratory birds, unless authorized by the Secretary of Interior. Executive Order 13186 provides for the conservation of resident and migratory birds and their habitats and requires the evaluation of the effects of federal actions on migratory birds, with an emphasis on species of concern. Federal agencies are required to support the intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory birds when conducting agency actions (USDA 2008c p. 3-244, MOU 08-MU-1113-2400-264).

An authoritative list of avian species occurring in the Ketchikan area (Revillagigedo Island) has been prepared (Heinl and Piston 2009). Forty-nine bird species are identified as species of concern in southeast Alaska by the Boreal Partners in Flight program and the USFWS (BPIF 1999, USDA 2008c Table 3.10-3, pp. 3-247 & 3-248, USFWS 2008). Sixteen of the bird species occur in Hemlock-Spruce forest.

Neotropical Migratory Birds are discussed in detail in the Wildlife and Subsistence Resource Report. Refer to the Forest Plan FEIS for additional information on migratory bird species (USDA 2008c pp. 3-244 through 3-248).

Threatened, Endangered, Candidate, and Sensitive Species

A review of all federally listed threatened, endangered, and candidate fish and wildlife species within Alaska and Alaska Region (USFS R10) sensitive species was completed. Existing survey data, GIS layers and databases, research, literature reviews, and information in the 2008 Forest Plan FEIS (USDA 2008d, Appendix F, pgs. F-1 to F-16) was used for analysis.

Species not occurring within Southeast Alaska inside waters and/or the southern portion of the Tongass National Forest were dropped from further analysis. Species potentially occurring within the Saddle Lakes area (Table 36) were analyzed in detail in the Biological Evaluation (Reeck 2013) located in the project record and summarized below. There is no critical habitat designated within or adjacent to the Ketchikan-Misty Fiords Ranger District (KMRD).

Table 36. Threatened, endangered, candidate, and sensitive species occurring in the Saddle Lakes project area or nearby vicinity

Common Name	Scientific Name	Status
Humpback whale	*Megaptera novaeangliae*	Endangered
Steller sea lion (Eastern DPS)	*Eumetopias jubatus*	Delisted / R10 Sensitive[1/]
Yellow-billed loon	*Gavia adamsii*	Candidate Species / Alaska Region 10 Sensitive Species
Queen Charlotte goshawk	*Accipiter gentilis laingi*	Alaska Region 10 Sensitive Species

1/ The Steller sea lion eastern Distinct Population Segment (DPS) was delisted under the Endangered Species Act effective December 4, 2013 (Federal Register Vol. 78, No. 213). Members of the endangered Western DPS have been documented in northern Southeast Alaska but rarely occur south of Fredrick Sound and would be unlikely to occur in the Saddle Lakes project area (NMFS 2013).

Humpback whales and Steller sea lions inhabit the marine waters adjacent to the Saddle Lakes project area. Yellow-billed loons nest exclusively in arctic tundra (USFWS 2006). Winter range includes the coastal waters of southern Alaska. A detailed discussion of the Queen Charlotte goshawk is provided below because this species is associated with the old-growth forest ecosystem and affected by timber management.

Queen Charlotte Goshawk

The Queen Charlotte goshawk (*Accipiter gentilis laingi*), a subspecies of the northern goshawk, is identified as a species of concern throughout its range and is identified as a sensitive species by the Forest Service, Alaska Region (USDA 2009). The Queen Charlotte subspecies (herein goshawk) occurs on the Queen Charlotte Islands and Vancouver Island in British Columbia and from the Alexander Archipelago in Alaska north to Prince William Sound. Recent goshawk population analysis by Sonsthagen et al. (2012) has identified Revillagigedo Island (REV cluster) as a short-term, long-term, and historic population sink with high immigration from Admiralty Island and coastal British Columbia.

Habitat

In Southeast Alaska, goshawks preferentially use high volume old-growth forest, followed by medium volume old-growth forest and avoid non-forested, clearcut, and regenerating areas (Smith 2013, Federal Register 2007). Within the 20 to 30 acres immediately surrounding nests, 89 percent of nests were located in high-POG (SD5N, SD5S, SD67) stands with relatively dense, multi-storied canopies (Lewis et al 2003, McClaren 2004, and Doyle 2006 as cited in USDA 2008c, p. 3-227). Nest trees tend to be located in the least fragmented area of individual home ranges (USFWS 2007). Nests generally do not occur above 1,000 feet elevation (Titus et al. 1994). Nesting areas in Southeast Alaska can be 2,500 acres in size (Flatten et al. 2001).

Predominant prey items during the breeding season (red squirrel, Steller's jay, grouse, varied thrush, and woodpeckers) are species most abundant or occur exclusively, in old-growth forest. As a result, goshawks rely almost entirely on POG as foraging habitat (Smith 2013).

No nests have been found in the Saddle Lakes project area despite repeated surveys over multiple years. Goshawk nests can be difficult to locate (Flatten et al. 2001). Nesting activity varies yearly in response to prey and weather with territory occupancy lower in fragmented forest than in contiguous forest (USFWS 2007).

Environmental Consequences

Impacts to old-growth habitat occur immediately during project implementation since harvest activities alter stand structure and diversity. Additional short-term changes occur as harvested stands begin to regenerate (stand initiation phase, 0 to 25 years). Effects continue and intensify long-term as harvested stands enter into the stem exclusion phase (26 to 150 years) where dense regeneration tends to shade out all understory habitat. Young-growth thinning can delay the onset of stem exclusion or temporarily improve low light conditions, but thinning benefits typically last 15 to 20 years (Alaback 2010, Cole 2010, McClellan et al. 2014).

Reductions in productive old growth (POG) habitat and resultant effects on many Tongass wildlife species persist for roughly 300 years. The gradual decline in old-growth habitat from timber harvest and road construction is considered an irreversible commitment (USDA 2008b p. 3-2) or a non-renewable resource (Cotter 2007). The current management practice of re-harvesting managed stands within 100 years of the first harvest "has the potential to permanently change the disturbance regime of these forests from long-term gap dynamics (with dominant trees persisting an average of 300 to 500 years or more) to more frequent stand replacing disturbance. A key ecological consequence of these short-duration disturbance cycles is the elimination of late-successional habitats" (Alaback et al. 2013). A forest with greatly increased frequency of major disturbance may at a certain point experience local extirpation of species that depend on the structural and functional components of old-growth (Orians et al. 2013).

Actions Common to All Alternatives

State of Alaska Right-of-Way on NFS Land

The State of Alaska right-of-way (ROW; see Chapter 2) encompasses roughly 40 acres of NFS land. Assuming a 66-foot wide road clearing width, about 9 acres of ground disturbance would occur within the ROW. About 0.3 miles of road could be constructed within the small OGR in VCU 7470. New road construction is generally inconsistent with Old-growth Habitat LUD objectives, but new roads may be constructed if no feasible alternative is available (USDA 2008b, TRAN A, p. 3-61).

The ROW, and construction within the ROW, would have minimal effect on wildlife habitat due to the limited acres involved. Disturbance from construction activities would be temporary in nature. Effects of the additional road construction on road density are discussed in the Wolf and Marten MIS sections. Effects of the Ketchikan to Shelter Cove Road on wildlife from increased public access are discussed by species under cumulative effects in the MIS and Other Species of Interest analyses later in this section.

Fish Passage Barrier Modification

All action alternatives include a partial barrier modification to improve upstream access to coho salmon and steelhead runs in lower Salt Creek. Blasting would be used to produce steps and resting pools. Disturbance would be temporary (i.e. limited to the blasts) and limited to the immediate blasting area. Bald eagle timing restrictions are not required since the proposed blasting is over ½ mile from the closest nest. Barrier modification is not expected to have measurable effects on wildlife species or habitat.

Old-Growth Reserves

In response to comments received during the Saddle Lakes scoping process, the Responsible Official requested a project-level review of the VCU 7470 small OGR. The Forest Plan states that under limited circumstances, a line officer may decide to modify the size and location of an OGR. Modifications of OGRs, other than minor as described [in Appendix K], require the completion of a project-level review (USDA 2008b, Appendix K, p. K-1). The Forest Plan Appendix K also provides for "other projects not considered in the Forest Plan" to be considered under these limited circumstances. While the dismissal of the Tongass exemption from the 2001 Roadless Rule is not a project, it affects 48 percent of the Saddle Lakes project area.

Project Level OGR Review 2013

The project level review was conducted on March 12, 2013, by an Interagency Review Team (IRT) comprised of USFWS, ADF&G, and Forest Service biologists. The IRT reviewed the existing OGR and developed one Roadless, and two Hybrid OGRs (see Saddle Lakes OGR Report (USDA 2013) for detailed analysis). The IRT determined that the existing OGR was in the biologically preferred location since it met the OGR goals and objectives, and maintained connectivity between the Naha LUD II and George and Carroll Inlets.

The Responsible Official decided on April 8, 2013, to select the Roadless OGR option to carry forward for analysis in Alternative 5. Details of the Roadless OGR are summarized below. Impacts of moving the OGR are discussed under individual MIS species accounts of Alternative 5 effects.

Roadless OGR Option

The IRT developed an OGR entirely within the North Revilla Inventoried Roadless Area (IRA 526). This OGR retains the portion of the existing OGR currently within the IRA, and includes additional Roadless acres to the northeast. This OGR eliminates the early seral habitat and roads, but protects fewer acres of habitat by reducing overall size and by moving additional acres into the IRA. The Roadless OGR fails to meet several biological criteria:

- It removes the important connection between the Naha LUD II and George Inlet;
- It contains a smaller percentage of the large block POG within the VCU;
- It reduces the amount of low-elevation large tree and high-POG winter/nesting habitat, particularly on more gentle slopes;
- It reduces the amount of low-elevation Class I riparian habitat; and
- It excludes rare features such as known Alaska Region sensitive and rare plant populations.

Adoption of the Roadless OGR would require a Forest Plan amendment; however, the IRT concurred that the Roadless OGR would not provide comparable achievement of Old-Growth Habitat LUD goals and objectives.

Table 37. Old-growth reserve (OGR) criteria for the small OGR in the Saddle Lakes project area

Forest Plan Appendix K Criterion	VCU 7470		
Minimum Required OGR acres[1/]	2,534		
Minimum Required POG acres[2/]	1,267		
IOGR purpose/rationale for VCU	**Connectivity between Naha LUD II and low elevation beach fringe POG in George Inlet Salt Chuck State Marine Park.**		
	Existing OGR (Alts. 2, 3, 4, 6)	**Roadless OGR (Alt. 5)**	**% Change**
OGR acres	3,225	2,852	-12%
POG acres	2,182	1,941	-11%
Acreage requirements met?	Yes	Yes	N/A
Appendix D General Design Criteria			
Circular rather than linear to maximize interior habitat/minimize fragmentation	Yes	Yes	N/A
Minimizes roads (total miles)[3/]	2.6	0	+100%
Minimizes early seral habitat (acres)	80	0	+100%
Riparian/beach/estuary habitats (Class I stream miles)	5.6 mi	4.9 mi	-13%
Includes largest remaining block of POG in VCU?	Yes	Yes, but reduced acres	N/A
Rare/Underrepresented features (number of rare or sensitive plant locations)	4	0	-100%
Important deer winter habitat (acres)[4/]	864	657	-24%
Important marten habitat (acres)[5/]	1,248	1,086	-13%
Goshawk nesting habitat (acres)[5/]	989	794	-20%
Murrelet nesting habitat SD67 (acres)	174	149	-14%
Other Considerations			
Connectivity	Yes	No	N/A
Low elevation POG <800' (acres)	1,360	1,059	-22%
Comparable achievement of Old-growth LUD Goals & Objectives?	**N/A**	**No**	**N/A**

N/A = Not Applicable.
1/ Small OGRs are a contiguous landscape of at least 16 percent of the National Forest System land area of each VCU.
2/ At least 50 percent of the small OGR should be productive old growth.
3/ 1.8 miles of current mainline and planned State ADOT Ketchikan Shelter Cove Road system within or adjacent to OGR.
4/ High-Volume Productive Old Growth (High-POG) less than 800 feet in elevation.
5/ High-POG less than 1,500 feet in elevation.

Connectivity/Fragmentation

An intact landscape is "a VCU having less than 5 percent of its original POG harvested" (USDA 2008c, p. 3-168). None of the project area VCUs (7460, 7470, 7530) are intact. Relatively high concentrations of past harvest have occurred in a number of areas including George Inlet, Carroll Inlet, and near Ketchikan on Revillagigedo Island. In many of these areas, biodiversity has been affected due to the intensity of past harvest and the higher reductions in larger tree POG types (USDA 2008c, p.163). All action alternatives would further reduce POG habitat. Because clearcut harvest has the greatest impact on POG forest, it would have the greatest impact on connectivity. Uneven-age management would remove up to 33 percent of the basal area. This would maintain plant understories comparable to plant communities typically found in old-growth, but stand structure, snow interception capability, and tree size could be affected for 50 years or more (Deal 2009).

See MIS section below for how changes in POG and changes in connectivity and fragmentation affect Tongass wildlife.

Patch Size

All action alternatives would reduce existing habitat patches. Patch size is analyzed under Marten, Hairy Woodpecker, and Red-breasted Sapsucker MIS sections.

Interior Habitat

Interior habitat would be reduced under all action alternatives. Changes in interior habitat are analyzed under the Brown Creeper MIS section.

Corridors

Treatment of identified corridors under the action alternatives are described and summarized in Table 38. In addition to the specific corridors, all action alternatives would remove leave strips left by the previous timber sales making it harder for deer to move up and down the slopes in the winter. This affects connectivity for species such as marten and red-backed voles, and affects habitat for small, less mobile species such as salamanders, gastropods, and arthropods. Effects related to corridors are discussed under Deer, Marten, Red Squirrel MIS sections, and under the Endemic Small Mammal section.

Table 38. Treatment of corridors under action alternatives in the Saddle Lakes project area

Corridor	Treatment(s)	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
1	None	Maintains	Maintains	Maintains	Maintains	Maintains
2	Alternative 5 would move the OGR and clearcut Units 300 through 308 and 310 through 312.	Maintains	Maintains	Maintains	Eliminates	Maintains
3	Alternatives 4, 5, and 6 would clearcut Units 204 (east of the road), and 207 and partial cut Units 203 and 204 (west of the road). Alternative 5 would also partial cut Unit 224.	Maintains	Maintains	Eliminates	Eliminates	Eliminates
4	None	Maintains	Maintains	Maintains	Maintains	Maintains
5	Alternatives 2, 4, 5, and 6 would clearcut Units 8 and 9.	Eliminates	Maintains	Eliminates	Eliminates	Eliminates
6	Alternative 2 would partial cut Units 154 and 48. Alternative 4 would clearcut Units 48, 53 and 154 and partial cut Unit 49. Alternative 5 would clearcut Units 48, 49, 53, 122, and 154. Alternative 6 would clearcut Units 48 and 154 and partial cut Unit 49.	Reduces	Maintains	Eliminates	Eliminates	Eliminates

Corridor	Treatment(s)	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
7	Alternative 2 would partial cut Unit 28. Alternatives 4 and 5 would clearcut Units 28, 31, 40, 71, 113, and 114 and partial cut Units 30 and 71. Alternative 6 would clearcut Units 31, 40, 113, and 114 and partial cut Unit 30.	Reduces	Maintains	Eliminates	Eliminates	Eliminates
8	Alternative 2 would partial cut Units 46 and 116. Alternative 4 would clearcut Units 46 and 116. Alternative 5 would clearcut Units 46, 115, and 116. Alternative 6 would clearcut a portion Unit 46 and partial cut Unit 116.	Reduces	Maintains	Eliminates	Eliminates	Reduces

Management Indicator Species

Sitka Black-tailed Deer

Direct/Indirect Effects

Measurement criteria for analyzing direct and indirect effects to the Sitka black-tailed deer are disclosed below. NFS lands within WAAs 406 and 407 were used for direct effect analysis for deer.

Effects Common to All Action Alternatives

All of the action alternatives would reduce deer habitat (deep snow winter, average winter and habitat discussion below). Even aged prescriptions (i.e., clearcut logging) would directly reduce the amount of deer habitat and reduce habitat capability for deer (Person et al. 1996). Clearcutting causes both short-term and long-term effects. “Although during summer and mild winter conditions, deer may benefit from young clearcuts, the long-term prognosis is permanent loss of suitable foraging habitat” (Person and Brinkman 2013).

Many young-growth stands have been precommercially thinned (PCT) which delays the onset of the stem exclusion phase (Hanley et al. 2013). However, analysis of past PCT treatments by Alaback (2010) on Prince of Wales Island showed that while thinning can be effective in improving wildlife habitat, one of the key limitations is its relatively short longevity. Alaback found that soon after thinning (generally not more than 15 years), crop trees expand their branches and create a dense overstory canopy shading out understory forage. McClellan et al. (2014) noted similar canopy closure in stands 21 years post thin on the False Island area of Chichagof Island.

Closed-canopy, young-growth stands (roughly 26 to 150 years old) provide minimal forage due to the lack of light penetration to the forest floor (stem exclusion phase). Loss of old-growth habitat to stem exclusion represents an irreversible commitment of resources (USDA 2008c, p. 3-2) representing a permanent loss of old-growth deer habitat under current 100 year rotations. See Biodiversity section above and Alaback et al. (2013) for further discussion of changes to old-growth ecological function and condition resulting from clearcut harvest.

Review of historic uneven-aged (partial-cut) treatments on the Tongass showed that uneven-aged harvest maintained understory forage better than clearcut harvest (Deal et al. 2009, Deal 2001). Stand structural diversity and plant composition and abundance were greater in partial-cut stands than in young-growth stands developing after clearcutting (Deal, 2001, Deal and Tappeiner 2002). Fifty years after partial-cutting, tree diameters, large tree numbers, species composition, stand complexity, and understory diversity were similar to original stand conditions (Deal et al. 2009). However, in the short-term, partial cutting opens the overstory canopy and provides less snow interception. Therefore, the uneven-aged management prescriptions would result in shorter-term (roughly 50 year) reductions in deer winter habitat. Actual change in canopy depends upon individual stand prescription removal pattern. Different removal patterns, all with 30 percent basal area removed, are simulated in Figure 8 (excerpted from Vanderwel et al. 2011).

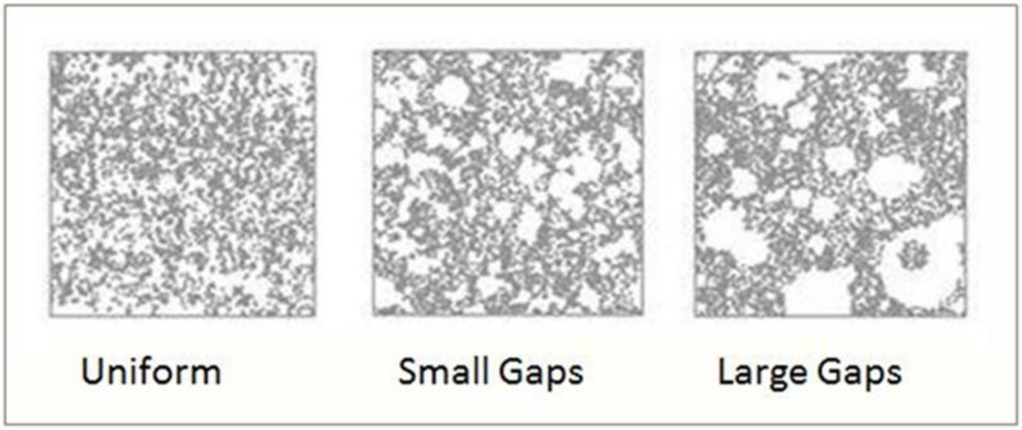


Figure 8. Variation in partial cutting removal patterns

Deep Snow Winter Habitat

Measurement criteria: acres of high-POG (SD5N, SD5S, SD67) less than or equal to 800 feet in elevation on south aspects.

The greatest adverse effect to deer results from clearcutting in higher volume stands at low elevations which are critical to deer during winters with heavy snow fall (Porter 2011a). Early harvests (clearcuts) took place in easy, accessible lower elevation areas that are the most desirable for deer winter habitat. Over time, harvests occurred farther uphill progressively leaving large patches of diminished (reduced forage, increased snow accumulation) lower quality deer winter habitat which severely limits deer options for finding quality habitat (Hanley 1984). In fragmented landscapes where small, remnant patches of old growth exist, deep snow may isolate deer by precluding movement between patches (McNay and Vollner 1995, Schoen and Kirchhoff 1985).

Hunters and predators, (e.g., wolves and bears) also contribute to declines during or following deep snow winters and may inhibit subsequent recovery (Hanley 1984; also see Wolf Section below). Farmer et al. (2006) found that predation by wolves was the primary source of mortality for adult and yearling females and malnutrition was the major cause of death in juveniles.

Deer confined to isolated stands of POG consume available food resources and suffer higher rates of mortality from malnutrition than deer in unfragmented old-growth forest (Kirchhoff 1994). The negative energy balance (energy debt) of deer during winter is a direct consequence of decreased availability of high quality food, and is aggravated by additional energy costs associated with snow and cold temperatures (Parker et al. 1999). Farmer et al. (2006) found that clearcuts and stands in stem exclusion generally increased risk of death for all sex and age groups of deer, and at all spatial scales, regardless of mortality source.

Partial cutting would affect deep snow winter habitat until sufficient canopy closure occurs to provide snow interception. The timeframe would likely be influenced by removal patterns.

Average Winter Habitat

Measurement criteria: acres of POG less than 1500 feet in elevation, Deer model (DHC).

Except for portions of six units (16, 17, 28, 71, 72, & 140), all proposed timber harvest is less than 1,500 feet elevation. Therefore, the proposed timber harvest would reduce average winter deer habitat. Young clearcuts would provide forage during relatively snow-free periods and can be a refuge from wolves. However, increased slash levels in young-growth stands could hinder movement and increase energy debt accessing forage (McClellan et al. 2014, Hanley 1984). Once stem exclusion occurs, young-growth stands may provide cover, but contain minimal forage and contribute to mortality from malnutrition and predation (Farmer et al. 2006). Consequently, timber harvest that reduces forage availability and snow interception lowers the long-term carrying capacity for deer. See deer model results for changes in habitat capacity during average winters.

Partial cutting would have short-term effects until sufficient canopy closure occurs to provide snow interception or could provide habitat during relatively snow-free periods.

Non-Winter (Spring/Summer/Fall)

Measurement criteria: all habitats except older (26 to 150 year old) young-growth.

Forage would increase temporarily in young clearcuts, but decrease long-term along all elevational gradients once stem exclusion occurs. Stem exclusion reduces the amount of high quality forage available during non-winter periods and can cause deer to enter the winter in poorer condition. Stem exclusion contributes to malnutrition in lactating females and poor survival of fawns. High quality, abundant forage in summer, fall, and spring habitats is important to restore body condition and accumulate body reserves (Parker et al. 1999).

Timber harvest can make deer more susceptible to hunting mortality in the fall. Farmer et al. (2006) found that buck use of young clearcuts in landscapes accessible by roads increased risk of death from hunting. Initial hunting access within most of WAAs 406/407 is by boat, but logging roads are used for additional access to hunting areas.

Partial cutting would have less effect on deer habitat as stands would not develop into stem exclusion. Logging slash could affect access to available forage for several years.

Changes in deer habitat for WAAs 406 and 407 during all seasons are shown in Table 39. Alternatives 2, 4, and 6 are similar in the overall amount of habitat affected, but vary in harvest prescriptions.

Table 39. Change in deer habitat on NFS Lands in WAAs 406 and 407

Habitat	Remaining Habitat Acres (% reduction from existing acres)						
	Historic (ac)	Existing \ Alt. 1 (ac)	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
WAA 406							
Deep snow winter	3,866	2,463	2,411 (-2.1%)	2,457 (-0.2%)	2,418 (-1.8%)	2,411 (-2.1%)	2,429 (-1.4%)
Average winter	52,202	40,421	39,322 (-2.7%)	40,065 (-2.7%)	39,196 (-2.7%)	38,890 (-2.7%)	39,373 (-2.7%)
Non-winter	122,505	116,178	114,832 (-1.1%)	115,711 (-0.4%)	114,675 (-1.3%)	114,259 (-1.7%)	114,881 (-1.7%)

Habitat	Remaining Habitat Acres (% reduction from existing acres)						
	Historic (ac)	Existing \ Alt. 1 (ac)	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Non-winter at stem exclusion	122,505	116,178	108,699 (-6.4%)	109,579 (-5.7%)	108,543 (-6.6%)	108,127 (-6.9%)	108,750 (-6.4%)
WAA 407							
Deep snow winter	1,168	940	911 (-3.0%)	925 (-1.6%)	881 (-6.3%)	844 (-10.2%)	881 (-6.3%)
Average winter	17,772	15,930	15,161 (-4.8%)	15,465 (-2.9%)	15,082 (-5.3%)	14,843 (-6.8%)	15,163 (-4.8%)
Non-winter	41,202	40,657	39,797 (-2.1%)	40,112 (-1.3%)	39,718 (-2.3%)	39,461 (-2.9%)	39,811 (-2.0%)
Non-winter at stem exclusion	41,202	40,657	38,443 (-5.4%)	38,758 (-4.7%)	38,364 (-5.6%)	38,107 (-6.3%)	38,457 (-5.4%)

Source: USFS, Tongass National Forest GIS.
Deep snow winter habitat = high-POG ≤800 ft. elevation on south aspect
Average winter habitat = POG≤1,500 ft. elevation
Non-winter habitat = all habitats except stem exclusion young growth.

All action alternatives would reduce deer model habitat capability. The effects would occur immediately after project completion, and intensify in 25 to 30 years as the harvested stands transition into the stem exclusion stage. Reductions in habitat capability could lead to a decline in the deer population, particularly following severe winters. Deer model results are shown by alternative in Table 40.

With deer numbers likely below carrying capacity, it is not known what effect the proposed harvest would have upon existing deer numbers, but less habitat would be available which could lead to increased mortality during deep snow winters. Reduced habitat capability could hinder the state's intensive management objective to increase deer in GMU 1A and result in fewer deer being available to hunters.

Table 40. Deer model habitat capability on NFS Lands[1/] in WAAs 406 and 407

Stand Age	Deer Habitat Capability (% reduction from existing)						
	Historic	Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
WAA 406							
0 to 25 years[2/]	3,276	2,521	2,482 (-1.5%)	2,505 (-0.6%)	2,479 (-1.7%)	2,472 (-1.9%)	2,485 (-1.4%)
26 to 200 years[3/]			2,396 (-5.0%)	2,433 (-3.5%)	2,391 (-5.2%)	2,378 (-5.7%)	2,400 (-4.8%)
WAA 407							
0 to 25 years[2/]	1,158	1,042	1,014 (-2.7%)	1,027 (-1.4%)	1,010 (-3.1%)	997 (-4.3%)	1,011 (-3.0%)
26 to 200 years[3/]			978 (-6.1%)	995 (-4.5%)	971 (-6.8%)	954 (-8.4%)	974 (-6.5%)

Source: USFS, Tongass National Forest GIS. 1/ NFS lands only. Partial harvest was modeled as clearcut. Habitat capability does not equal actual deer; it is used as a tool to compare Alternatives. 2/ 0 – 25 years represents the initial effect of project implementation. 3/ 26 – 200 years represents the effect of stem exclusion.

Alternative 1

Alternative 1 would have no effect on deer from this project. All existing deep snow habitat would remain to support current deer populations during winters with above average snowfall. With most of the project area below 1,500 feet elevation, Alternative 1 would maintain the highest level of average winter habitat. All non-winter (spring/summer/fall) habitat would be maintained, which would help deer enter the winter in better nutritional condition with higher fat reserves. Deer habitat capability would decline slightly as previously harvested stands enter stem exclusion.

Alternative 1 would not fragment deer habitat. Deer would not be more susceptible to hunting or predation. Alternative 1 would maintain the existing OGR between the Naha LUD II and George and Carroll Inlets, which would allow continued movement between source and sink habitat. It would also maintain current elevational corridors linking summer and winter habitat, allowing deer to move up and down slopes during the winter as snow levels allowed.

Alternative 2

Alternative 2 would harvest 80 acres of deep snow winter habitat, 1,868 acres of average winter habitat, and 2,207 acres of non-winter habitat. Therefore, it would contribute to all of the effects mentioned above. This alternative maintains the second highest level of biodiversity of the action alternatives since it contains a higher percentage of partial-cutting.

The 53 acres of clearcutting represent a long-term loss of deer habitat during deep snow winters, whereas the 27 acres of partial-cutting represents a shorter-term loss. Within average winter habitat, clearcutting would occur on 916 acres and partial cutting would occur on 952 acres. About 48 percent of the non-winter habitat (1,055 acres) would be clearcut resulting in long-term effects, and 52 percent (1,152 acres) would be partial-cut resulting in short-term effects from slash. This reduction in available habitat increases the risk of malnutrition. Effects would be more pronounced in resident deer that do not migrate to high quality alpine areas during the summer.

Deer model habitat capability would be maintained at 98 and 97 percent of current levels, respectively within WAAs 406 and 407 initially (Table 40), then drop to 95 and 94 percent as the harvest units transition into stem exclusion. Actual impacts would likely be less, as all harvest units are modeled as even-aged (clearcut) in accordance with current deer model direction.

Alternative 2 would maintain elevational and connectivity corridors 2, 3, and 4 (see Figure 7). Alternative 2 would reduce the effectiveness of corridors 6, 7, and 8 short-term by partial cutting Units 28, 46, 48, 116, and 154. Alternative 2 would eliminate corridor 5 by clearcutting Units 8 and 9. Clearcut units would hinder movement up and down slopes and contribute to increased risk of winter malnutrition, predation and/or hunting mortality.

Alternative 2 would maintain the existing OGR maintaining connectivity between the Naha LUD II and George and Carroll Inlets to replenish sink habitat.

Alternative 3

Alternative 3 would have the least effect of the action alternatives on deer habitat since it would harvest the least amount of habitat (Table 39). It would harvest 21 acres of deep snow winter habitat, 821 acres of average winter habitat, and 1,012 acres of non-winter habitat. Many low elevation, south-facing slopes were excluded from harvest in this alternative, and no units were proposed within the identified elevational corridors (see Figure 7). All 21 acres of harvest in deep snow winter habitat would be clearcut. Average winter habitat would be maintained at 97 to 99 percent of existing levels. Alternative 3 would clearcut 663 acres and partial cut 158 acres of average winter habitat. Deer would still be able to move up and down many slopes, as snow levels allow, to access additional foraging areas. Roughly 82 percent (816 acres) of the non-winter habitat would be clearcut and 19 percent (196 acres) would be partial-cut. The risk of malnutrition would be slightly higher than existing levels as would predation risk, but less than in the other action alternatives.

Deer model habitat capability is maintained at 99 percent of current levels initially (Table 40), then drops to 96 and 95 percent of existing habitat capability within WAAs 406 and 407 as harvested units move into stem exclusion. Actual impacts would likely be less, as all harvest units are modeled as even-aged management (clearcut) in accordance with current deer model direction.

Alternative 3 was specifically designed to maintain the identified elevational and connectivity corridors. Alternative 3 would maintain the existing OGR in VCU 7470 so connectivity between the Naha LUD II and George and Carroll Inlets would be maintained to replenish sink habitat.

Alternative 4

Alternative 4 would harvest 105 acres of deep snow winter habitat, 2,073 acres of average winter habitat, and 2,424 acres of non-winter habitat. It would harvest the second highest amount of timber, and 87 percent of total harvest would have even-age clearcut prescriptions. As a result, it would have the second highest impact on deer habitat (Table 39) and second highest risk to deer nutrition, reproduction, and predation.

Under Alternative 4, 101 of the 105 acres of deep snow winter habitat harvested would be clearcut. Alternative 4 would clearcut 1,794 acres of average winter habitat and 279 acres would be partial-cut. Alternative 4 would clearcut stands along the elevational gradient limiting a deer’s ability to move up and down slopes in search of forage. Non-winter habitat would initially drop to 99 percent of existing levels in WAA 406 then drop to 93 percent at stem exclusion. Alternative 4 would clearcut 2,112 acres of non-winter habitat and partial cut 312 acres.

Deer model habitat capability is maintained at 98 and 97 percent of current levels initially (Table 40), then drops to 95 and 93 percent long-term within WAAs 406 and 407 as harvested units transition into stem exclusion.

Alternative 4 does not implement elevational corridors within the Modified Landscape LUD (USDA 2008b WILD1.B.2. p 3-115). This would further reduce deer mobility since elevational connectivity is already very limited on the landscape. Alternative 4 would eliminate corridors 3, 5, 6, 7, and 8 which would affect connectivity long-term. Specific units in conflict include: even-aged management (clearcutting) in Units 8, 9, 28, 31, 40, 46, 48, 53 71-1, 71-3, 113, 114, 116, and 154 and uneven-aged management in Units 30, 49, 71-2, 203, and 204. Alternative 4 would maintain the existing OGR in VCU 7470, maintaining connectivity between the Naha LUD II and George and Carroll Inlets to replenish sink habitat.

Alternative 5

Alternative 5 would have the greatest impact on deer by harvesting the greatest amount of timber, hence deer habitat, throughout all seasons (Table 39. Alternative 5 harvests 148 acres of deep snow winter habitat (95 percent of which is clearcut), 2,619 acres of average winter habitat, and 3,116 acres of non-winter habitat.

Deep snow habitat would be the most fragmented under this alternative increasing the risk of mortality from malnutrition or predation. Most stands harvested within average winter habitat would be clearcut (2,410 acres), but 208 acres would be partial-cut. Clearcutting would limit habitat for migratory deer long-term by reducing forage along the elevational gradient and create competition with resident deer by concentrating deer within remaining old-growth patches, thus increasing the risk of predation and die-off from malnutrition and/or affecting reproduction. Resident deer with home ranges within the Saddle Lakes project area would be impacted more than migratory deer. Ninety percent (2,594 acres) of the non-winter harvest would be clearcut whereas 10 percent (291 acres) would be partial-cut.

Deer model habitat capability is maintained at 98 and 96 percent of current levels initially (Table 40), then drops to 94 and 92 percent long-term within WAAs 406 and 407 at stem exclusion.

Alternative 5 does not implement elevational corridors within the Modified Landscape LUD (USDA 2008b WILD1.B.2. p. 3-115). It would eliminate corridors 2, 3, 5, 6, 7, and 8. Even-aged management (clearcut) units include 8, 9, 28, 31, 40, 46, 48, 49, 53, 71-1, 71-3, 113, 114, 115, 116, 122, and 154. Uneven-aged management units include 30, 71-2, 203, 204, and 224.

Alternative 5 would also move the existing OGR in VCU 7470 into the North Revilla IRA requiring a Forest Plan Amendment to implement. Relocation of the OGR would reduce the overall acres of protected deer habitat, and eliminate the connectivity between the Naha LUD II and George and Carroll Inlets by clearcutting Units 300 through 308 and 310 through 312. Loss of connectivity would limit the ability to replenish sink habitat given the movement patterns found by Colson et al. (2012) on nearby Prince of Wales Island, and McNay and Vollner (1995) in British Columbia. Likewise, the Interagency Review Team determined that the Roadless OGR does not provide comparable achievement of the Old Growth Habitat LUD goals and objectives nor provide comparable achievement of biological design criteria including deer winter habitat.

Alternative 6

Alternative 6 would harvests 93 acres of deep snow winter habitat, 1,814 acres of average winter habitat, and 2,143 acres of non-winter habitat. Alternative 6 ranks third of the action alternative for impacts on deer habitat and risk to deer populations (Table 39).

Alternative 6 would clearcut 87 of 93 acres of deep snow winter habitat. Alternative 6 would clearcut 1,423 acres of average winter habitat, and 391 acres would be partial-cut. Alternative 6 would also clearcut stands along elevational gradients limiting a deer’s ability to move up and down slope in search of forage. Roughly 77 percent (1,654 acres) of the non-winter habitat would be clearcut and 23 percent (484 acres) would be partial-cut.

Deer model habitat capability is maintained at 99 and 97 percent of current levels initially (Table 40), then drops to 95 and 93 percent as habitat capabilities within WAAs 406 and 407 move into stem exclusion.

Alternative 6 does not implement elevational corridors within the Modified Landscape LUD. Alternative 6 eliminates elevation corridors 3, 5, 6, and 7, and reduces the width and effectiveness of corridor 8. Specific units in conflict include: uneven-aged management in Units 30, 49, 203, 204, 224, and even-aged management (clearcut) in Units 8, 9, 31, 40, 48, 113, 114, 116, 154, and 207. Alternative 6 would maintain the existing OGR in VCU 7470 maintaining connectivity between the Naha LUD II and George and Carroll Inlets to replenish sink habitat.

Cumulative Effects

Cumulative effects analysis for deer includes all land ownerships within WAAs 406 and 407 and uses the same habitat measurement criteria used in the direct and indirect effects analysis. The deer model was used for analyzing cumulative change to average winter carrying capacity and deer habitat capability (DHC).

Effects Common to All Action Alternatives

Most past and recent timber harvest has been by even-aged management (clearcutting). Early harvest was generally at lower elevations in higher volume stands which affected both winter and non-winter habitat. The greatest impact has been to deep snow winter habitat. With one-third to almost one-half of this most limiting deer habitat impacted (Table 41), deer populations may have a difficult time in rebounding after deep snow winter die-offs and be more susceptible to predation and malnutrition. These latter two factors could affect recruitment rates and predator/prey relationships.

Impacts to deep-snow habitat may partially explain the low deer numbers within this portion of GMU 1A. Impacts to average winter habitat have been less intensive, but more widespread. Past timber harvest has limited the number of interspersed POG "leave strips" making it more difficult for deer to move between forage patches in the winter, and/or caused deer to expend more energy to move. Much of the older harvest is currently in stem exclusion. Some older harvest stands on Cape Fox lands in George Inlet have recently been clearcut a second time.

In addition to effects displayed in Table 41 below, approximately 500 acres of habitat flooded on the east side of Carroll Inlet (WAA 406) from the construction of the Swan Lake hydroelectric facility. An additional 61 acres of POG could be affected by the proposed dam expansion. The AMHTA recently completed extensive (3,276 ac) low-elevation harvest along Leask Creek in George Inlet. If the proposed AMHTA land exchange is approved, substantial impacts could occur from logging within the 8,170 acre Shelter Cove parcel.

The Ketchikan to Shelter Cove Road, when completed, would connect the communities of Ketchikan and Saxman to the Saddle Lakes project area. This would make the Saddle Lakes project area more accessible to hunters and would likely increase hunting pressure in WAA 406 west of Carroll Inlet and WAA 407. Similar to findings by Farmer et al. (2006) on nearby Prince of Wales Island, bucks in young clearcuts may be more susceptible to hunting mortality. Declines in the deer population resulting from reduced habitat capability may decrease the number of deer available to wolves and hunters (Person 2001, Farmer et al. 2006, Brinkman et al. 2009).

Table 41. Cumulative change to deer habitat on all land ownerships in WAAs 406 and 407

Habitat	Remaining Habitat Acres (% reduction from historic acres)						
	Historic (ac)	Existing \ Alt. 1 (ac)	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
WAA 406							
Deep snow winter	4,194	2,775 (-33.8%)	2,723 (-35.1%)	2,769 (-34.0%)	2,729 (-34.9%)	2,723 (-35.1%)	2,741 (-34.6%)
Average winter	54,385	42,506 (-21.8%)	41,408 (-23.9%)	42,150 (-22.5%)	41,281 (-24.1%)	40,975 (-24.7%)	41,459 (-23.8%)
Non-winter initial	126,769	120,343 (-5.1%)	118,997 (-6.1%)	119,876 (-5.4%)	118,840 (-6.3%)	118,425 (-6.6%)	119,047 (-6.1%)
Non-winter at stem exclusion	125,078	112,641 (-9.9%)	111,295 (-11.0%)	112,174 (-10.3%)	111,139 (-11.1%)	110,723 (-11.5%)	111,345 (-11.0%)

Habitat	Remaining Habitat Acres (% reduction from historic acres)						
	Historic (ac)	Existing \ Alt. 1 (ac)	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
WAA 407							
Deep snow winter	1,937	1,193 (-38.4%)	1,165 (-39.9%)	1,178 (-39.2%)	1,134 (-41.5%)	1,098 (-43.3%)	1,134 (-41.5%)
Average winter	28,932	23,379 (-19.2%)	22,609 (-21.9%)	22,914 (-20.8%)	22,531 (-22.1%)	22,291 (-23.0%)	22,612 (-21.8%)
Non-winter initial	65,777	62,893 (-4.4%)	62,032 (-5.7%)	62,347 (-5.2%)	61,954 (-5.8%)	61,696 (-6.2%)	62,046 (-5.7%)
Non-winter at stem exclusion	61,000	55,446 (-9.1%)	54,585 (-10.5%)	54,900 (-10.0%)	54,507 (-10.6%)	54,250 (-11.1%)	54,599 (-10.5%)

Source: USFS Tongass National Forest GIS. Does not include Leask Lakes harvest or future projects.

Deer Model Results

See the Methodology section above for a description of parameters used in the deer model for cumulative effects.

Historic and more recent clearcut timber harvest on all land ownerships, combined with the Saddle Lakes Timber Sale, would further impact deer habitat carrying capacity (Table 42) and therefore have long-term adverse effects.

Table 42. Cumulative change in deer habitat capability (DHC) on all land ownerships in WAAs 406 and 407[1/]

	Historic	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
		Deer Habitat Capability (DHC; % reduction from historic)					
WAA 406							
0 to 25 years[2/]	3,568	2,521 (-29.3%)	2,482 (-30.4%)	2,505 (-29.8%)	2,479 (-30.5%)	2,472 (-30.7%)	2,485 (-30.4%)
26 to 200 years[3/]		2,446 (-31.4%)	2,396 (-32.8%)	2,433 (-31.8%)	2,391 (-33.0%)	2,378 (-33.4%)	2,400 (-32.7%)
WAA 407							
0 to 25 years[2/]	2,465	1,042 (-57.7%)	1,014 (-58.9%)	1,027 (-58.3%)	1,010 (-59.0%)	997 (-59.6%)	1,011 (-59.0%)
26 to 200 years[3/]		1,019 (-58.7%)	978 (-60.3%)	995 (-59.6%)	971 (-60.6%)	954 (-61.3%)	974 (-60.5%)

Source: USFS Tongass National Forest GIS.

1/ Historic capability was reconstructed for all ownerships using the best information available. Non-NFS lands were given zero current habitat capability per current model direction. Partial harvest was modeled as clearcut. Habitat capability does not equal actual deer; it is used as a tool to compare alternatives. Does not include Leask Lakes harvest or identified future projects.

2/ 0 – 25 years represents the initial effect of project implementation

3/ 26 – 200 years represents the effect of stem exclusion.

Alternative 1

Alternative 1 would not harvest POG or result in any additional roads, and would not contribute to cumulative effects on deer habitat and deer. However, the combination of past harvest and foreseeable projects would affect deer habitat and deer. Of the alternatives being considered, Alternative 1 would have the least cumulative impacts on deer habitat (Table 41). Deep snow habitat has been affected the most of any habitat by past projects, and has the highest potential to limit deer populations. Past harvest in the stand initiation phase (0 to 25yrs) would continue to move toward stem exclusion. These stands would provide some forage during relatively snow free winters and during the non-winter season. Once stem exclusion occurs, deer habitat would be permanently lost under the current 100-year rotation. Past harvest within beach and riparian buffers, and OGRs would be reduced long-term (150 plus years) but would eventually recover.

The Ketchikan to Shelter Cove Road, when completed will make the Saddle Lakes project area more accessible to hunters and would likely increase hunting pressure. The 8,170 acre proposed AMHTA land exchange, if approved, could further reduce habitat since AMHTA plans to harvest the area (AMHTA 2014). The land exchange would reduce deer model habitat capability since non-NFS lands are assigned a zero value.

Alternatives 2, 3, 4, 5, and 6

Cumulative effects on deer habitat are similar between alternatives because most past and more recent harvest (i.e., Leask Lakes Timber Sale) has been by clearcutting. Deep snow winter habitat would be reduced to roughly 65 percent of historic levels in WAA 406, and to 58 percent of historic levels in WAA 407. With the above reductions in habitat, deer populations may have a difficult time in rebounding after severe winter die-offs and be more susceptible to predation and malnutrition. These latter two factors could affect recruitment rates and predator/prey relationships.

Impacts to average winter habitat has been less intensive, but more widespread than impacts to deep snow winter habitat. About 76 percent of the average winter habitat would remain in WAA 406 and about 78 percent in WAA 407 (Table 41). About one-quarter of the historic average winter habitat has been reduced. Timber harvest within these WAAs started at low elevation and has moved upward on the slope. Timber harvest has removed interspersed POG “leave strips”. Both scenarios have made it more difficult or caused deer to expend more energy moving between forage patches in the winter.

Impacts to non-winter habitat have been substantially less than impacts to winter habitat due to the inclusion of NPOG and non-forested habitats. Non-winter habitat at stem exclusion would be maintained at roughly 89 percent of historic levels in both WAAs 406 and at 407.

Habitat capability, as predicted by the deer model for WAA 406, would be reduced long term to roughly 67 percent of historic levels at stem exclusion (Table 42). Habitat capability in WAA 407 would be reduced to roughly 40 percent of historic levels at stem exclusion.

Summary of Deer Effects

Deer populations in Alaska are dynamic and fluctuate considerably with the severity of the winters. When winters are mild, deer numbers are likely to increase. Periodic severe winters may cause a major decline. In addition to population declines, excessive amounts of snow can hinder deer movements that can lead to:

- changed feeding patterns;
- increased energy expenditure;
- increased risk of malnutrition;

- increased predation rate; and
- lowered survival rate of newborn fawns the following summer.

Deer productivity depends on the nutritional status of deer, which relates to the productive capacity of the habitat (Hanley et al. 1989). Predation may speed up population declines, as well as slow recovery. Forest management affects the balance between deer and wolves by changing the quantity and quality of food resources for deer (Hanley et al. 1989).

The most recent ADF&G deer management report indicates that clearcut logging continues to reduce old-growth habitat in portions of the Unit [1A], previously logged stands no longer support deer, and local deer populations are expected to decline (Porter 2011a). Deer harvest has remained well below the long-term average. At the time of the report, with deer numbers remaining low in most of Unit 1A, hunters are selecting other more productive areas and consequently there is less effort and fewer deer harvested in Unit 1A (Porter 2011a). Although the Forest Plan conservation strategy maintains population viability of deer, further declines in the deer population in WAAs 406 and 407 would likely result from:

- the cumulative reduction of elevational connectivity [from timber harvest activities];
- a cumulative reduction in deer habitat and habitat capability as a result of past, proposed and future [timber] harvest activities; and
- die-offs during severe winters.

These reductions would further impact subsistence and sport deer hunter success, making it harder for hunters to obtain deer and could alter deer/wolf predator-prey equilibriums for 150 years or longer.

Alternative 1 ranks the highest overall in terms of least effects to deer since it would maintain all current old-growth deer habitat. This alternative would contribute to maintaining current deer populations and hunter success. Of the action alternatives, Alternative 3 ranks highest in terms of least effects to deer habitat and populations followed by Alternatives 2, 6, and 4. Alternative 5 would have the greatest impact on deer habitat, and therefore the greatest potential impact on deer populations and hunter success. Differences between the alternatives are largely due to differences in silvicultural prescriptions. Alternatives 4, 5, and 6 impact deer further by eliminating elevational connectivity corridors within the project area. Alternative 5 moves the small OGR in 7470, resulting in a loss of connectivity and a further reduction in the quality and quantity of the habitat.

Alexander Archipelago Wolf

Direct/Indirect Effects

The measurement criteria for analyzing direct and indirect effects on the Alexander Archipelago Wolf include deer density (from deer model), fragmentation, and road density less than or equal to 1,200 feet elevation. For direct and indirect effects, NFS lands within WAAs 406 and 407 were used.

Effects Common to All Action Alternatives

All action alternatives would reduce current deer densities, increase fragmentation thereby affecting deer/wolf interactions, and increase road densities below 1,200 feet in elevation.

Deer Density

The reduction of deer habitat and deer densities from clearcutting, as well as habitat fragmentation can affect wolf populations. Because wolves in Southeast Alaska use other resources when deer are unavailable, switching to alternative prey such as salmon could help to reduce long-term numerical declines in wolf populations (Szepanski et al. 1999). All action alternatives would reduce deer densities in WAA 406 and 407 by less than one deer per square mile initially, and roughly one deer per square mile at stem exclusion. Alternative 5 would have the highest likelihood of causing deer population declines, and the highest risk of impacting wolf populations.

None of the action alternatives would meet Forest Plan Standards and Guidelines for maintaining 18 deer per square mile (USDA 2008b, WILD1.XIV.2, p.4-95). This density of deer provides a high probability of functioning and persisting predator-prey dynamics between wolves and deer (Person 2014).Therefore, the Saddle Lakes Timber Sale would decrease the number of deer to sustain both wolves and hunter demand.

Wolf/Deer Interactions in Fragmented Habitat

All action alternatives would increase forest fragmentation. Timber harvest, road building, and subsequent spatial isolation of winter habitats may intensify predation on resident deer populations and indirectly impede recruitment of migratory deer. Deer concentrate in residual patches of old-growth forest during winter and may suffer higher mortality from wolf predation (Person and Kirchhoff 2009, Person et al. 1996, Kirchhoff 1994). While wolves may benefit short-term from concentrations of deer, overall declines in deer populations could lead to widely fluctuating wolf populations and result in less wolves over time.

Farmer et al. (2006) determined predation by wolves was the primary source of mortality for does and yearling females; topographic features such as the proportion of flat terrain exerted the strongest influence on predation. Flat and/or open habitats with greater snow accumulation increased the risk whereas hillsides and steeper terrain enabled deer to detect predators more easily and made pursuit more difficult for wolves.

Wolf Populations and Road Density

Logging roads in the Saddle Lakes Project Area, like typical Southeast Alaska roads, were constructed along the coastline or valley bottoms, with clearcuts spaced out along the roads on the lower hillsides. Roads facilitate movements by wolves and may enhance wolf efficiency into areas where deer are concentrated (Person et al. 1996). Person (2006) updated the relationship between road density for lands below 1,200 feet elevation and wolf mortality related to hunting and trapping. Results indicated that the probability of excessive wolf harvest was 40 percent for WAAs with road densities greater than 0.7 miles per square mile if the WAA is connected to a community road system. Probability of overkill was only 13 percent if the WAA was not road accessible from a community. Roads themselves do not decrease habitat capability for wolves, but increased density of roads may lead to higher hunting and trapping mortality (USDA 2008d Appendix D, p. D-26). Wolf mortality, has not been identified as a concern for the Saddle Lakes area since it is not connected to a community. Increased total road density from project roads could facilitate walk-in access to additional hunting and trapping areas, but would not increase the probability of overkill.

Under all action alternatives, open road densities within WAAs 406 and 407 would increase above 0.7 miles per square mile, but remain at or below 1.0 mile per square mile (Table 43). After project roads are closed at the end of the sale, open road densities would return to existing levels. Total road densities would increase to roughly 1.5 miles per square mile in WAA 406, and increase to roughly 1.2 miles per square mile in WAA 407.

Table 43 summarizes effects to wolf conservation on NFS lands in WAAs 406 and 407.

Table 43. Effects to wolf conservation on NFS lands[1/] in WAAs 406 and 407

Parameter	Deer and Road Densities						
	Historic	Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
WAA 406							
Deer Density	17	13.1	12.9	13.0	12.9	12.9	12.9
Deer Density stem exclusion			12.5	12.7	12.5	12.4	12.5
Open Road (mi)[2/]	N/A	73.8	82.2	76.9	87.9	88.9	86.1
Max Open road density (mi/mi^2)		0.7	0.8	0.7	0.8	0.8	0.8
Total road (mi)		151.4	159.8	154.5	165.5	166.5	163.7
Total road density (mi/mi^2)		1.4	1.5	1.4	1.5	1.5	1.5
WAA 407							
Deer Density	18	16.0	15.6	15.8	15.5	15.3	15.6
Deer Density stem exclusion			15.0	15.3	14.9	14.7	15.0
Open Road (mi)[2/]	N/A	23.9	31.3	31.0	35.0	36.3	34.3
Max Open road density (mi/mi^2)		0.6	0.8	0.8	0.9	1.0	0.9
Total road (mi)		35.3	42.7	42.5	46.4	47.7	45.7
Total road density (mi/mi^2)		0.9	1.1	1.1	1.2	1.3	1.2

Source: USFS, Tongass National Forest GIS. N/A = Not Available.

1/ Includes only NFS roads and lands below 1,200 feet elevation; freshwater lakes not included.

2/ Open road densities would increase during life of the sale then would revert to existing level of open road.

Alternative 1

Alternative 1 would have the lowest impact on wolves since it would maintain the highest deer density to support wolves and the lowest road density to help prevent overharvest.

Deer Density

Alternative 1 would have no direct effect on deer density and therefore, no effect on deer/wolf interactions. Deer densities would drop by roughly 0.1 deer per square mile as remaining past harvest enters stem exclusion. This alternative does not currently meet Forest Plan Standards and Guidelines for maintaining 18 deer per square mile (USDA 2008b, WILD1.XIV.2, p.4-95).

Wolf/Deer Interactions in Fragmented Habitat

Existing connectivity would be maintained allowing deer to utilize slopes to escape wolves. Secondary prey sources such as salmon would also be unaffected under this alternative. Wolf populations would continue to fluctuate based upon natural processes such as prey availability after average and severe winters and from hunting and trapping mortality.

Wolf Populations and Road Density

Total road densities are currently above one mile per square mile in WAA 406, but are below one mile per square mile in WAA 407 (Table 43). Road density would not change under Alternative 1. Total road densities in WAA 407 would remain above the Forest Plan Standards and Guidelines (USDA 2008b, WILD1.XIV.1 p. 4-95), but road density has not been an issue for the Saddle Lakes area since it is not currently connected to any community. Regulatory processes are currently in place to deal with human-caused mortality.

Alternatives 2, 3, 4, 5, and 6

See Effects Common to All Action Alternatives section above. Of the action alternatives, Alternative 3 has the lowest potential impact on wolves followed by Alternatives 2, 6, 4, then 5.

State of Alaska Right-of Way on NFS Land

Road construction by the State of Alaska within the ROW would increase the open and total road miles in WAA 407 (see Table 43) by 0.7 mile under Alternatives 2 and 3 and by 0.1 mile under Alternatives 4, 5, and 6. Open and closed road densities would increase less than 0.1 mile per square mile. Once new timber sale roads are closed (except for road 8300280), open road densities in WAA 407 would equal 0.7 mile per square mile under all action alternatives. Total road density would equal 1 mile per square mile.

Cumulative Effects

The measurement criteria for analyzing cumulative effects to wolves are the same as those used for direct and indirect effects. All land ownerships in WAAs 406 and 407 were used as the scale for analysis. Impacts on wolves are also considered at the Revilla Island/Cleveland Peninsula biogeographic province level. The Forest Plan FEIS states, “Most of the WAAs that currently meet the Wolf guideline, but may not meet it in the future after 100 plus years of implementation, are located in the North Central Prince of Wales and Revilla Island/Cleveland Peninsula biogeographic provinces “(USDA 2008c, pp.3- 283 to 3-284)”.

Effects Common to All Action Alternatives

Historic timber harvest and road construction on all land ownerships has reduced deer habitat capability and therefore deer densities as calculated by the deer model (Table 44). Habitat capability was reduced on the east side of Carroll Inlet (WAA 406) with the construction of the Swan Lake hydro-facility and lake. The proposed expansion of the dam would impact another 95 acres, reducing habitat capability. The proposed Trust land exchange would affect deer and road densities, if approved. The Leask Lake sale harvested 72 percent of the Leask drainage (3,726 acres of 5,240 total acres).

Public motorized access would increase with the completion of the Ketchikan to Shelter Cove Road. This public road will not only increase open road densities, and but will likely increase hunting and/or trapping pressure for deer and wolves, and could cause a shift from current boat-based access to vehicle access. While wolf mortality has not been identified as a concern in the past, completion of the Ketchikan to Shelter Cove Road could lead to wolf mortality concerns in the future. Using the information from Person (2006) above, the probability of an overkill (i.e., unsustainable harvest) of wolves would increase from 13 percent to 40 percent with completion of the Ketchikan to Shelter Cove Road.

Table 44. Cumulative effects on wolves on all land ownerships in WAAs 406 and 407

	Historic	Existing / Alt 1	Alternatives				
			Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
WAA 406[1/]							
Number of Deer/square mile							
Deer Density	18	12.7	12.5	12.7	12.5	12.5	12.6
Deer Density stem exclusion		12.3	12.1	12.3	12.1	12.0	12.1
Road Density (mi)							
Open Road (mi)[2/]	N/A	91.7	100.1	94.8	105.8	106.8	104.0
Max Open road density (mi/mi^2)		0.8	0.9	0.8	0.9	0.9	0.9
Total road (mi)		170.0	178.4	173.1	184.1	185.1	182.3
Total road density (mi/mi^2)		1.5	1.6	1.5	1.6	1.6	1.6
WAA 407[1/]							
Number of Deer/square mile							
Deer Density	24	10.0	9.8	9.9	9.7	9.6	9.7
Deer Density stem exclusion		9.7	9.4	9.6	9.3	9.2	9.4
Road Density (mi)							
Open Road (mi)[2/]	N/A	136.2	143.6	143.3	147.2	148.6	146.6
Max Open road density (mi/mi^2)		1.8	1.9	1.9	2.0	2.0	2.0
Total road (mi)		149.1	156.5	156.2	160.1	161.5	159.5
Total road density (mi/mi^2)		2.0	2.1	2.1	2.1	2.2	2.1

Source: USFS, Tongass National Forest GIS. N/A = Not Available.

1/ Includes both NFS and non-NFS roads and lands below 1,200 feet elevation; freshwater lakes not included. Recent harvest on state lands near Leask Lakes and the remaining Ketchikan-Shelter Cove road construction on state lands is not included. Data was not available.

2/ Open road densities would increase during life of the sale then would revert to existing level of open road.

Alternative 1

Alternative 1 would not contribute to cumulative effects. However, previously harvested stands have, and will continue to decrease deer density as additional stands move into stem exclusion. From deer model results, deer densities across all land ownerships were historically at or above the 18 deer per square mile. Based upon land selection and past harvest, deer densities within WAAs 406 and 407 are now at 12.7 and 10.0 deer per square mile, respectively (Table 44). They would decrease further (32 percent and 40 percent reduction from historic levels, respectively) as previously harvested stands continue to move into stem exclusion.

The likelihood of unsustainable wolf harvest would increase with the completion of the Ketchikan to Shelter Cove Road. Total road densities are substantially above 1 mile per square mile. The Ketchikan to Shelter Cove Road would increase these densities.

Alternatives 2 , 3, 4, 5, and 6

None of the action alternatives would provide 18 deer per square mile to support wolves at the cumulative level across all land ownerships. Alternatives 2 through 6 when added to past projects would reduce deer densities in WAA 406 by roughly 6 deer per square mile from historic conditions at stem exclusion (Table 44). Deer densities in WAA 407 would drop from to roughly 15 deer per square mile from historic conditions once stem exclusion occurs.

Forest fragmentation may focus wolf predation on specific sites where deer are concentrated and relatively vulnerable. It can intensify predation and contribute to declines in deer populations and an overall loss of population resiliency. Person (2001) found a strong relation between wolf pack size and proportion of deer winter habitat within home range. This reflects greater habitat capability for wolves where deer densities are high. As a result of past and proposed management activities, wolf home range sizes may be forced to expand to contain sufficient deer, wolves may have to shift to other less advantageous prey sources, and/or pack size could be reduced due to insufficient deer numbers.

Alternative 5 would move the current small OGR in VCU 7470 into the North Revilla Roadless Area. This would result in the loss of the important connectivity corridor between the Naha LUD II and George and Carroll Inlets. This could affect the movement of Revillagigedo Island wolf packs.

Total road density would increase further above the guideline of 0.7 to 1.0 mile per square mile in both WAAs (Table 44). While wolf mortality has not been a concern in the past, dynamics could shift with the completion of the Ketchikan to Shelter Cove Road and become a concern (see analysis based upon Person and Logan (2012) below). It is uncertain what, if any, regulatory changes on wolf harvest may occur given the State of Alaska’s intensive management goals for GMU 1A, and the ESA listing proposal currently being evaluated by the USFWS.

Since deer density is below 18 deer per square mile and road densities are above 1 mile per square mile, methodology in Person and Logan (2012) was used to determine if wolves in WAAs 406 and 407 are at risk of chronic unsustainable mortality or pack depletion. Person and Logan (2012) assumed that an annual reported harvest rate of greater than or equal to 3 wolves per home range (30 percent of pack) indicated unsustainable harvest mortality within a WAA. Unsustainable harvest for greater than 5 years indicated risk that chronic unsustainable harvest was occurring. Kill of greater than 7 wolves per pack were considered “pack depletion.”

Using ADF&G wolf harvest data for WAAs 406 and 407 (Porter 2013a),WAA 406 averaged 3.0 kills per pack and WAA 407 averaged 1.6 kills per pack.

Looking at the individual years between 2000 and 2013, WAA 406 had annual harvests of greater than or equal to 3 wolves, 8 times during the 14-year reporting period. These data indicate a risk of chronic unsustainable mortality. WAA 406 also experienced pack depletion (i.e., annual harvest rate of greater than 7 wolves) twice during the reporting period.

Three times during the 14-year reporting period, WAA 407 had annual harvests of greater than or equal to 3 wolves, indicating unsustainable mortality but not chronic unsustainable mortality. No pack depletion occurred in WAA 407 during the 14-year reporting period.

Evaluating effects of harvest mortality on wolf populations using WAAs as spatial units is not ideal. However, they are the smallest reportable unit by which harvest data are reliably tabulated. Therefore, Person and Logan (2012) urge caution about inferring the sustainability of harvest for any particular WAA, without considering neighboring areas. See the Wildlife Resource Report for analysis of mortality risk on Revillagigedo Island.

Revillagigedo Island/Cleveland Peninsula Biogeographic Province

Wolves were also analyzed by considering deer model deer density outputs for all WAAs within the Revilla Island/Cleveland Peninsula biogeographic province level (Province 15). According to deer model outputs, 5 out of the 19 WAAs in Province 15 historically had deer densities of 18 deer per square mile or greater. Currently, only four WAAs have least 18 deer per square mile or greater (Table 45).

Table 45. Deer model densities in the Revilla Island/Cleveland Peninsula Biogeographic Province (Province 15)

WAA	Deer Density Historic	Deer Density Current	1997 FP historic1/	2008 FP NFS historic	2008 FP current
101	15	14	12	22	21
202	0	0	0	0	0
303	18	18	19	19	18
404	12	12	15	12	12
405	25	21	25	22	18
406	17	13	16	16	12
407	11	10	11	17	15
408	6	6	5	13	13
509	14	13	14	15	14
510	15	10	14	14	10
511	5	5	6	5	5
612	18	18	18	18	18
613	21	20	21	20	*19*
614	15	13	13	20	*20*
715	9	9	8	8	8
1815	9	9	8	9	9
1816	11	10	13	11	10
1817	17	17	16	16	16
1902	21	17	22	21	16

Source: USFS, Tongass National Forest GIS.

1/ All non-NFS lands were assigned zero habitat capability (historic and present) due to lack of non-NFS data at the biogeographic province scale and to be consistent with Forest Plan methods.

The deer model results are similar to those predicted in the 1997 Forest Plan. They are similar to the 2008 Forest Plan results with two noted exceptions; WAA 101 Gravina and WAA 303 Duke Island. The 2008 Forest Plan calculations for WAA 101 show deer density being above 18 deer per square mile, both historically and currently. However, calculations run for the Saddle Lakes Timber Sale show these WAAs below 18 deer per square mile (Table 45). This may be due to the extensive, non-NFS lands on Gravina that were not included in Forest Plan density calculations. Calculations for WAA 303 show slight differences and may be due to updated GIS layers since Duke Island is in a non-development LUD. The Forest Plan calculations for WAA 303 are slightly above 18 deer per square mile, whereas the Saddle Lakes area historic and current calculations are slightly below 18 deer per square mile.

The above outputs suggest that, based on modeled deer densities, Saddle Lakes project area WAAs and the Revilla Island/Cleveland Peninsula Biogeographic Province may not be capable of sustaining wolf populations and meeting hunter demand.

Summary of Wolf Effects

Alternative 1 has the least effect on wolves followed by Alternatives 3, 2, 6, 4, then 5, in increasing order of effects. Clearcut timber harvest would decrease habitat capability for deer, the primary prey for wolves, for up to 150 years or longer. Partial cutting would have shorter-term effects. Current deer densities in WAAs 406 and 407 are below the Forest Plan guideline of 18 deer per square mile (USDA 2008b, p. 4-95). Therefore, the action alternatives would increase the risk that there will be an insufficient number of deer to sustain both wolves and hunter demand. The Saddle Lakes Timber Sale would have minor impacts on deer density (approximately 1 deer per square mile reduction). However, at stem exclusion, cumulative activities (see Appendix B) in WAAs 406 and 407 would reduce historic deer densities by 33 and 63 percent respectively, which could likely affect predator/prey equilibriums. Decline in deer numbers can cause wolf home ranges to expand or lead to reductions in pack size or condition.

Roads allow movements by wolves, and may enhance wolf efficiency in areas where deer are concentrated. The Saddle Lakes Timber Sale would have a minor impact on road density (less than 1 percent). However, the completion of the Ketchikan to Shelter Cove Road would connect the Saddle Lakes area to the communities of Saxman and Ketchikan, and could shift access from boats to vehicles or snowmobiles. The Ketchikan to Shelter Cove Road could cause an increase in trapping pressure potentially making road density and wolf mortality a concern. Roads constructed under the Saddle Lakes Timber Sale would add to this concern, as they would provide easier walk-in access into new areas. Wolf populations are currently thought to be stable within GMU 1A, with unlimited trapping allowed. Intensive management for deer by ADF&G could further decrease wolf populations if expanded to the Saddle Lakes area (WAAs).

Black Bear

Direct/Indirect Effects

The measurement criteria for analyzing direct and indirect effects on the black bear include: acres of POG for denning habitat; all habitats except older second-growth for foraging habitat; and POG within 500 feet of anadromous fish streams to address the importance of riparian habitat. NFS lands within WAAs 406 and 407 were used as the scale for direct and indirect effects analysis.

Effects Common to All Action Alternatives

The greatest impact to black bear habitat is the clearcutting of POG, which removes the large trees used for denning. This in turn leads to lower bear reproductive success and population density, and higher dispersal and mortality (Schoen and Peacock 2007). Davis et al. (2012) found that conversion of late-successional forests to younger even-aged stands may lead to decreased black bear populations from increased cannibalism, predation by other bears or wolves, or increased energetic costs from using less thermally advantageous dens. Young clearcuts provide bears with an abundance of forage due to increases in shrub and berry productivity, but forage disappears with the onset of stem exclusion (Schoen and Peacock 2007, Brodeur et al. 2008). In addition, young-growth stands often lack the root masses and large hollow trees used as denning sites (Bethune 2011).

Partial cutting could affect suitable denning habitat if large diameter trees are removed or if large trees with rot are felled for safety reasons. However, stands would develop large trees more quickly than clearcut units (Deal et al. 2009). Partial-cut units would continue to provide forage (Deal 2007); actual change in available forage would depend upon individual stand removal pattern.

Insufficient quantitative data is available on the seasonal habitat relationships of black bears in Southeast Alaska. However, the availability of spawning salmon in the summer and fall affects body size, reproductive success, and population density (Schoen and Peacock 2007). Riparian buffers (RMAs) protect the first 100 feet adjacent to the stream, but not the adjacent habitat heavily utilized by foraging bears. See Table 46 for changes to denning and foraging habitat.

Table 46. Change in bear habitat on NFS Lands in WAAs 406 and 407

Habitat	Acres (% change from existing)						
	Historic	Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
WAA 406							
Denning Habitat[1/]	61,321	48,982	47,873 (-2.3%)	48,626 (-0.7%)	47,756 (-2.5%)	47,441 (-3.1%)	47,934 (-2.1%)
Foraging Habitat[2/]	122,385	110,046	108,699 (-1.2%)	109,579 (-0.4%)	108,543 (-1.4%)	108,127 (-1.8%)	108,750 (-1.2%)
POG within 500 feet of Class I streams	7,615	6,433	6,288 (-2.3%)	6,350 (-1.3%)	6,285 (-2.3%)	6,252 (-2.8%)	6,279 (-2.4%)
WAA 407							
Denning Habitat[1/]	19,789	17,946	17,169 (-4.3%)	17,478 (-2.6%)	17,093 (-4.8%)	16,852 (-6.1%)	17,179 (-4.3%)
Foraging Habitat[2/]	41,146	39,303	38,443 (-2.2%)	38,758 (-1.4%)	38,364 (-2.4%)	38,107 (-3.0%)	38,457 (-2.2%)
POG within 500 feet of Class I streams	2,517	2,320	2,272 (-2.1%)	2,318 (<0.1%)	2,275 (-1.9%)	2,233 (-3.8%)	2,275 (-1.9%)

Source: USFS, Tongass National Forest GIS.

1/ Denning = POG – all SD categories SD4H through SD67 at all elevations.

2/ Foraging = All habitats except stem exclusion - shown for stem exclusion phase roughly 26 years after project implementation. See Table deer non-winter for similar initial effects.

Alternative 1

Alternative 1 would have no effect on black bear denning habitat, foraging habitat or foraging habitat/cover within 500 feet of Class I streams (Table 46). No roads would be constructed so hunting access would continue to be predominantly by boat with no change in access. Existing stands would continue to move toward stem exclusion and individual den sites could be affected by natural processes such as windthrow.

Alternative 2

Alternative 2 would harvest a total of 1,886 acres of bear denning habitat (Table 46). Impacts to bear denning would be long term until young-growth reaches sufficient size to provide the trees and snags necessary to accommodate bear use. Alternative 2 would clearcut around one confirmed den and partial-cut around a second confirmed den. The remaining dens fall outside of unit boundaries. Uneven-aged management prescriptions could maintain denning structures, particularly in large unmerchantable trees, but the extent will not be known until individual stand prescriptions are written, and OSHA safety regulations are implemented during logging.

Alternative 2 would clearcut 1,055 acres of foraging habitat and partial cut 1,152 acres. Partial-cut units would continue to provide forage long-term, but abundance could vary based upon removal pattern. Alternative 2 would decrease foraging and security habitat within 500 feet of Class I streams by harvesting 193 acres.

Alternative 2 would maintain the existing OGR connectivity in VCU 7470 preserving the important link with the Naha LUD II source populations and the important habitat Salt Creek. Alternative 2 would have the second least impact on bear habitat of the action alternatives

Alternative 3

Alternative 3 would harvest 824 acres of bear denning habitat (Table 46). Alternative 3 would partial cut around one confirmed bear den. The remaining bear dens fall outside of unit boundaries. Alternative 3 would clearcut 816 acres of foraging habitat and partial-cut 196 acres, and would clearcut 85 acres of cover and forage habitat within 500 feet of Class I streams.

Alternative 3 maintains the existing OGR connectivity in VCU 7470 preserving the important link with the Naha LUD II source populations and important habitat along Salt Creek. Alternative 3 would have the least impact on bear habitat of the action alternatives.

Alternative 4

Alternative 4 would harvest 2,079 acres of bear denning habitat (Table 46). Denning habitat would be reduced long term from the 1,798 acres of clearcutting, but less so from the 281 acres of partial cutting. Alternative 4 would clearcut around one confirmed bear den and partial cut around a second confirmed den. The remaining known bear dens are outside of the boundaries of harvest units. Alternative 4 would clearcut 2,112 acres of bear foraging habitat and partial cut 312 acres. Alternative 4 would clearcut 193 acres of habitat within 500 feet of Class I streams, thereby affecting security cover and forage long-term.

Alternative 4 maintains the existing OGR connection with the Naha LUD II. It has the second greatest impact on bear habitat of the action alternatives.

Alternative 5

Alternative 5 would harvest 2,635 acres of bear denning habitat (Table 46). Alternative 5 would clearcut both units that contain bear dens, resulting in a direct loss of den sites and forcing bears to find alternative sites. Alternative 5 would have the greatest long-term impact on foraging habitat (Table 46) by harvesting 2,875 acres of POG, predominantly through clearcutting. Alternative 5 would have the greatest impact to habitat within 500 feet of Class I streams since 268 acres of existing habitat would be clearcut, leaving only the 100 foot riparian buffer (RMA).

Alternative 5 would move the small OGR in VCU 7470, severing the connection between the Naha LUD II and George and Carroll Inlets. After moving the OGR, proposed clearcutting would reduce foraging and security habitat along Salt Creek from over 500 feet wide to the 100 foot RMA. Alternative 5 has the greatest impact on bear habitat of the action alternatives.

Alternative 6

Alternative 6 would clearcut 1,423 acres of bear denning habitat and partial-cut 391 acres (Table 46). Alternative 6 would clearcut around one confirmed den and partial-cut around a second confirmed den. The remaining dens fall outside of unit boundaries. Alternative 6 would harvest 2,138 acres of foraging habitat. Impacts to foraging habitat would be similar, but slightly less than described in Alternative 4, due to a higher proportion of uneven-aged management. Alternative 6 would harvest 200 acres of foraging and security habitat within 500 feet of Class I streams.

Alternative 6 maintains the existing OGR, preserving the connection with the Naha LUD II source populations and the foraging habitat along Salt Creek within the OGR. Alternative 6 has the third greatest impact on bear habitat of the action alternatives.

Cumulative Effects

The measurement criteria for analyzing cumulative effects on the black bear are the same as those used for direct and indirect effects. All land ownerships within WAAs 406 and 407 were used as the scale for the cumulative effects analysis.

Effects Common to All Action Alternatives

All past and current activities within WAAs 406 and 407 have affected bears or bear habitat in some manner. Changes in denning and foraging habitat have contributed to reductions in black bear populations in GMU 1A (Bethune 2011). Due to conservation concerns over reduced bear populations and increased harvest of black bears by non-resident hunter, ADF&G recently enacted draw permits and harvest tickets to limit bear hunting in GMUs 1 to 3. Even-aged timber harvest (clearcut) has had the greatest impact on bear habitat, as stands are currently in stem exclusion or will be in stem exclusion within 30 years. Recent clearcut harvest on Trust lands at Leask Lakes removed 3,726 acres of denning habitat, but currently provides short-term forage. This foraging habitat will be reduced long-term with the onset of stem exclusion. If the Trust land exchange is approved, 8,170 acres would be taken out of NFS ownership and Forest Plan Standards and Guidelines, including beach buffers and RMAs, would no longer apply.

The Ketchikan to Shelter Cove Road connection is likely to increase hunting pressure within the portions of WAAs 406 and 407 that can be accessed from the road system. Table 47 shows cumulative reduction in bear habitat. Cumulative effects are similar to, but more substantial than those discussed under direct effects since most units were clearcut.

Alternative 1

Alternative 1 would not contribute to cumulative effects within the Saddle Lakes area. However, past timber harvest and other management activities on all ownerships have reduced black bear denning habitat in WAAs 406 and 407 to 80 and 82 percent, respectively of what was available historically (Table 47). The Leask Lakes harvest, the proposed Ketchikan to Shelter Cove Road, and Swan Lake expansion would affect an additional 4 percent of denning habitat within the combined WAAs. Loss of habitat may lead to reduced black bear populations due to increased cannibalism, predation by wolves, and/or increased energetic costs from using less thermally advantageous dens (Davis et al 2012). Foraging areas along Class I streams have been impacted the greatest with less than 60 percent of the historic habitat remaining in WAA 407and less than 80 percent remaining within WAA 406. Reductions in foraging habitat may mean that bears enter the winter in poorer condition which can affect overwinter survival and reproductive success. The Ketchikan to Shelter Cove Road will change hunter access and could further reduce bear populations within WAAs 407 and 406 west of Carroll Inlet.

Table 47. Cumulative effects to black bear habitat in all land ownerships for WAAs 406 and 407, Saddle Lakes project area

Habitat	Acres (% reduction from existing)						
	Historic	Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
WAA 406							
Denning Habitat[1/]	63,536	51,099 (-19.6%)	49,990 (-21.3%)	50,743 (-20.1%)	49,873 (-21.5%)	49,558 (-22.0%)	50,051 (-21.2%)
Foraging Habitat[2/]	125,078	112,641 (-9.9%)	111,295 (-11.0%)	112,174 (-10.3%)	111,139 (-11.1%)	110,723 (-11.5%)	111,345 (-11.0%)
POG within 500 feet of Class I streams	8,944	7,143 (-20.1%)	6,998 (-21.8%)	7,060 (-21.1%)	6,995 (-21.8%)	6,961 (-22.2%)	6,988 (-21.9%)
WAA 407							
Denning Habitat[1/]	31,257	25,704 (-17.8%)	24,927 (-20.3%)	25,235 (-19.3%)	24,850 (-20.5%)	24,609 (-21.3%)	24,937 (-20.2%)
Foraging Habitat[2/]	61,000	55,446 (-9.1%)	54,585 (-10.5%)	54,900 (-10.0%)	54,507 (-10.6%)	54,250 (-11.1%)	54,599 (-10.5%)
POG within 500 feet of Class I streams	6,244	3,734 (-40.2%)	3,686 (-41.0%)	3,732 (-40.2%)	3,689 (-40.9%)	3,647 (-41.6%)	3,689 (-40.9%)

Source: USFS, Tongass National Forest GIS.

1/ Denning = POG all elevations. Table does not include the 3,726 acres of harvest at Leask Lakes or future projects.

2/ Foraging = All habitats except stem exclusion shown for stem exclusion phase. See deer non-winter for initial effects on similar habitat.

Alternatives 2, 3, 4, 5, and 6

Cumulative impacts are similar between the action alternatives and include incremental impacts from past and future harvest discussed under Alternative 1. Denning and foraging habitat would be reduced long-term (Table 47). Long-term effects on habitat within 500 feet of Class I streams would be the greatest under Alternative 5 where habitat in WAA 407 is reduced down to 58 percent of what was available historically and the small OGR is moved away from Salt Creek. Alternative 5 would also have the greatest impact on habitat within 500 feet of Class I streams in WAA 406. The proposed Ketchikan to Shelter Cove Road will change hunter access and likely increase hunting pressure within the Saddle Lakes Area. Project-related roads would provide easier walk-in access to areas not previously hunted due to their distance from boat access and/or existing roads (see wolf and marten sections for discussions on road densities at WAA and VCU scales).

Summary of Bear Effects

Past, present, and future management actions would reduce bear denning habitat by up to 22 percent and foraging habitat along streams by up to 42 percent, and have reduced bear populations as a result. ADF&G expects bear numbers to decline as clearcut areas reach the stem exclusion stage. Alternative 1 would have no direct impact on current bear habitat or populations. Alternative 3 would have the next lowest impact, followed by Alternatives 2, 6, and 4, in increasing levels of effects. Alternative 5 would have the greatest impact to black bears. The long-term effects of clearcut logging, even with precommercial thinning (PCT), are detrimental to black bear populations in GMU 1A (Bethune 2011).

Mountain Goat

Direct/Indirect Effects

Measurement criteria for analyzing direct and indirect effects to mountain goats include acres of POG within 1,300 feet of slopes greater than or equal to 50 degrees (cliffs). NFS lands within WAAs 406 and 407 were used as the scale for direct and indirect effects analysis.

Effects Common to All Action Alternatives

Timber harvest can effect mountain goat populations by reducing the amount of habitat available for mountain goats during the critical winter season (ADF&G 2013a). The amount and distribution of escape terrain within suitable winter habitat is a primary determinant of goat winter range (Fox et al. 1989). Due to the importance of conifers and arboreal lichens in the winter diet, timber harvest may also produce a serious decline in forage availability for goats in southeast Alaska (Fox and Smith 1988). Winter snowfall increases energy expenditures by forcing goats to paw through snowpack to obtain forage and by making travel between areas more difficult (Fox et al. 1989). Clearcuts would result in long-term to permanent habitat loss under current 100-year timber rotations. Snow interception could be reduced short-term in partial-cuts, but forage availability would recover over time based upon canopy and stand structure information presented in Deal et al. 2009. Forest development also has the potential to reduce or eliminate access to mineral licks, disturb goats on their winter range, influence predator-prey dynamics, and create access for hunters to previously un-hunted and vulnerable goat populations (see Hengeveld et al. 2004). All action alternatives would construct varying miles of new roads. New roads, except for road 8300280, would be closed at the end of the sale, but would provide additional walk-in access for hunters. Some new roads would provide easier access to high-elevation habitat.

Table 48 summarizes change in mountain goat habitat by alternative.

Table 48. Change in mountain goat habitat[1/] on NFS Lands in WAAs 406 and 407

Area	Historic	Acres (% reduction from existing acres)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
WAA 406	46,296	37,896	37,407 (-1.3%)	37,775 (-0.3%)	37,328 (-1.5%)	37,191 (-1.9%)	37,482 (-1.1%)
WAA 407	15,280	13,939	13,433 (-3.6%)	13,667 (-2.0%)	13,383 (-4.0%)	13,241 (-5.0%)	13,470 (-3.4%)

Source: USFS, Tongass National Forest GIS.
1/ POG within 1,300 feet of a cliff (slope 50 degrees or greater).

Alternative 1

There would be no effect on mountain goats or goat habitat under Alternative 1. All current habitat would remain and continue to provide escape cover from predators and forage. No roads would be constructed, and therefore current hunting access would not change.

Alternative 2

Alternative 2 would harvest 996 acres of mountain goat habitat of which 651 acres are partial-cut and 344 acres are clearcut (Table 48). Impacts would be long-term in clearcut units, but shorter-term in partial-cut units. There could be a slight change in hunter access, but proposed roads do not access higher elevation areas where the goats are more frequently observed. Compared to other action alternatives, Alternative 2 would have the second lowest risk of affecting goat habitat and predator/prey equilibrium of the action alternatives due to the amount of uneven-aged harvest.

Alternative 3

Alternative 3 would harvest 393 acres of goat habitat, of which 124 acres are partial-cut and 269 acres are clearcut (Table 48). Similar to Alternative 2, partial-cut units would continue to provide habitat, but quality would be reduced in more severe winters. Clearcut areas represent long-term to permanent habitat loss. New roads in Alternative 3 are mainly shorter segments into areas with existing harvest, and do not access higher elevation areas where the goats are more frequently observed. Alternative 3 could impact individual goats, particularly nannies with kids which remain close to escape cover. Alternative 3 would have the least impact of the action alternatives on goat habitat, and has a low risk of altering predator/prey equilibrium.

Alternative 4

Alternative 4 would harvest 1,125 acres of goat habitat in project area WAAs, of which 239 acres are partial-cut and 885 acres are clearcut (Table 48). Since most units would be clearcut, impacts to goat habitat would be more severe than Alternatives 2 or 3. Alternative 4 roads would access additional ridges making it easier for hunters to walk in to areas frequented by goats. Alternative 4 would have the second greatest effect on mountain goat habitat and predator/prey equilibrium of the action alternatives.

Alternative 5

Alternative 5 would harvest 1,404 acres of goat habitat, with 201 acres partial-cut and 1,203 acres clearcut (Table 48). Alternative 5 proposes the greatest amount of clearcutting representing the greatest long-term to permanent habitat loss. Alternative 5 roads would access additional ridges making it easier for hunters to walk in to areas frequented by goats. Of the action alternatives, Alternative 5 would have the greatest impact on goat habitat and represents the greatest risk of altering predator/prey equilibrium.

Alternative 6

Alternative 6 would harvest 884 acres of goat habitat, of which 311 acres are partial-cut and 573 acres are clearcut (Table 48). Alternative 6 roads would not access higher elevation ridges. Alternative 6 would have the third lowest risk of affecting goats and predator/prey equilibrium of the action alternatives. Alternative 6 harvests less mountain goat habitat overall than Alternative 2, but proposes more clearcutting.

Cumulative Effects

Measurement criteria for analyzing cumulative effects to mountain goats are the same as was used for analyzing direct and indirect effects. All land ownerships within WAAs 406 and 407 were used as the scale for the cumulative effects analysis.

Effects Common to All Action Alternatives

Cumulative impacts to mountain goat habitat are incremental to direct effects, and have been more substantial across time and all land ownerships. Past timber harvest has directly removed both winter foraging areas and escape terrain. Additional impacts could occur from the proposed Swan Lake and Mahoney Lake hydropower projects. However, actual impacts to goat populations are unknown since they are a relatively new introduction in the area, but appear to be stable to increasing (Porter 2010a). The planned Ketchikan to Shelter Cove Road would increase access into the Saddle Lakes area (WAAs 406/407), and allow hunter access. This could shift some hunting from float plane based access to road access, but higher ridges would most likely still be accessed by float plane.

Table 49 summarizes cumulative change in mountain goat habitat by alternative.

Table 49. Cumulative change in mountain goat habitat[1/] on all land ownerships in WAAs 406 and 407

Area	Historic	Acres (% reduction from historic acres)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
WAA 406	47,600	38,865 (-18.4%)	38,376 (-19.4%)	38,744 (-18.6%)	38,297 (-19.5%)	38,159 (-19.8%)	38,451 (-19.2%)
WAA 407	24,279	17,760 (-26.9%)	17,253 (-28.9%)	17,487 (-28.0%)	17,203 (-29.1%)	17,061 (-29.7%)	17,290 (-28.8%)

Source: USFS, Tongass National Forest, GIS.
1/ POG within 1,300 feet of a cliff (50 degree slope or greater).

Alternative 1

Alternative 1would not contribute to cumulative effects since there are no direct or indirect effects. However, past management activities in WAA 406 have reduced historic goat habitat (Table 49). The Leask Lakes timber sale likely affected habitat in WAA 407, but specific change could not be calculated. Additional habitat could be affected in both WAAs 406 and 407 by the proposed AMHTA land exchange since the proposal includes forest habitat adjacent to higher elevation ridges.

Alternatives 2 , 3, 4, 5, and 6

Cumulative impacts to mountain goats would be similar to direct effects but more substantial in scope and intensity (Table 49). Present and future management actions may affect the established population as habitat is reduced below existing amounts. Nannies with kids would be the most impacted as they have the most restricted area within escape cover to avoid predators. Reduced winter habitat would affect available foraging areas and/or the amount of forage available. This could either push goats into areas further from escape cover making them more susceptible to predation, cause then to expend more energy obtaining forage, and/or affect body condition and subsequent reproductive success.

Summary of Mountain Goat Effects

Impacts from the Saddle Lakes project would be limited (up to 5 percent reduction from the existing condition) whereas cumulative effects have been more substantial (up to 30 percent reduction). However, since these mountain goat populations are a relatively recent introduction (1983 and 1991), it is uncertain how much past management activities have actually impacted goat populations. Both populations are stable to expanding (Porter 2010b) and have limited hunting seasons. Alternative 1 would maintain the most goat habitat followed by Alternatives 3, 2, 6, 4, and 5, in increasing order of effects.

American Marten

Direct/Indirect Effects

The measurement criteria used to analyze direct and indirect effects to marten include: Acres of high-POG less than or equal to 1,500 feet elevation as the winter measurement, POG for year-round effects, fragmentation, and road densities less than 1,500 feet elevation. NFS lands within VCUs 7460, 7470, and 7530 were used as the scale for analysis.

The marten model has not been used in recent analyses, and it was not used it for analysis in the Saddle Lakes project area for the following reasons: 1) selected winter high-POG habitat corresponds to the highest HSI values from the model; 2) habitat loss was considered, based upon the available research, to be a more direct approach than including a “multiplier” to predict a “theoretical” number of marten.

Well distributed marten populations were defined as occurring in every third-order watershed or generally a 10,000 acre landscape approximately the size of an average VCU (USDA 1997a, p. 3-398). Marten effects were calculated at the VCU level but also considered the broader WAA scale for cumulative effects. The Saddle Lakes project area is located within the Revillagigedo Island/Cleveland Peninsula Biogeographic Province, which is considered a high-risk province for marten in the 1997 Forest Plan (USDA 1997b). However, under the 2008 Forest Plan, Legacy Standards and Guidelines do not apply to Saddle Lakes VCUs (USDA 2008b, WILD1.IV.D., pp. 4-90 & 4-91).

Effects Common to All Action Alternatives

Clearcutting directly affects marten habitat and can reduce the connectivity of remaining patches. Clearcut harvest reduces canopy cover, the amount of coarse woody debris, the availability of denning and resting sites, habitat for prey species, and marten hunting efficiency. Clearcutting creates a, highly fragmented landscape pattern that includes increases in forest-opening edge and decreases patch size (Thomas et al. 1988). Elimination of connectivity due to clearcutting would have long-term impacts on marten dispersal throughout the project area.

Clearcutting differs from natural disturbances in that it represents a large-scale change rather than small dispersed patches where trees remain standing or partially standing (Hansen et al. 1991). Clearcuts reduce forest cover exposing martens to much higher snow accumulations and predation risks (Schoen et al. 2007a). Avoidance of both young and older clearcuts in the winter is well documented both in Alaska (Flynn 2006, Flynn & Schumacher 2001, Flynn & Schumacher 1999) and other areas. Therefore, clearcutting creates long-term habitat loss.

Marten densities are notably higher in intact forests with less fragmentation (USDA 2008c, p. 3-234). Research across marten distribution has shown a negative linear relationship between clearcut logging and marten density, and the more fragmented the area, the lower the carrying capacity (Soutiere 1979, Thompson 1994, Thompson and Harestad 1994, Chapin et al. 1998, Hargis et al. 1999). Based on three widespread studies (Utah, Maine, Québec), Potvin et al. (2000) conclude that martens can tolerate a maximum of 30 percent clearcut harvest within in their home range (also referred to as 30 percent clearcut tolerance). Poole et al. (2004), Wasserman et al. (2012), and Cushman et al. (2011) observed similar results in British Columbia, Idaho, and Wyoming, respectively. Fragmentation constrained foraging paths to the extent that marten were unable to select cover types that offered the highest densities of prey species, affecting foraging efficiency. Feldhammer et al. (2003) summarized multiple studies suggesting that martens fail to colonize or abandon home range size landscapes with less than 60 percent mature forest. Below this threshold, marten inhabit suboptimal habitat, spend excessive energy on hunting, and have less time available for social interaction and breeding. Cheveau et al. 2013 and Johnson et al. 2009 found that clearcutting affected female body index (reproduction) and juvenile survival respectively.

Flynn found similar trends in Southeast Alaska: indices of fragmentation correlated with marten density with marten numbers higher in less fragmented habitats (Flynn 2006). Flynn et al. 2004 interpreted the fragmentation variables to collectively indicate that areas with larger and more evenly distributed patches of forest supported higher densities of martens than areas with more fragmented forest. Findings by Flynn suggest that trends may be consistent across marten range, and that research findings from other areas may be applicable in Alaska.

The Marten Scientific Panel (USDA 1997b, Appendix N) concluded that clearcut silviculture on a 100-year rotation would result in further fragmentation of marten habitat and there could be substantial gaps in marten distribution which could be permanent and result in limited interaction between populations. The consequence of a gap would be some measure of reduced gene flow within the population and the greater the size and number of gaps, the higher the risk of reducing gene flow. Populations that have become isolated or reduced in size face increased risks of extirpation from inbreeding, genetic drift, and random environmental events (Flynn and Schumacher 1997).

Partial-cutting may have less effect on marten populations. Thompson and Harestad (1994) theorized that selective logging which removed less than 30 percent of the basal area every 100 years in temperate rain forests would not reduce habitat carrying capacity. Godbout and Ouellet (2008) found that marten neither selected for or against units that had been partial-cut as long as canopy cover and structure was maintained.

Roads can indirectly affect marten by facilitating trapper access. Habitat suitability for marten begins to decline when road density reaches 0.2 miles per square mile. Interior areas away from roads can act as a refugium from trapping (Flynn et al. 2007). Marten within these source areas are able to disperse into heavily trapped sink areas after the trapping season ends. Extensive roading results in most marten home ranges being intercepted by roads which can result in the entire population being vulnerable to overharvest (Suring et al. 1993).

Table 50 summarizes change in marten habitat by VCU.

Table 50. Change in marten habitat on NFS Lands by VCU

Habitat	Historic	Acres (% reduction from existing) and Road Density[1/]					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460							
Winter[2/]	12,541	7,317	6,941 (-5.1%)	7,246 (-1.0%)	6,871 (-6.1%)	6,820 (-6.8%)	6,947 (-5.1%)
Year-round[3/]	19,869	14,493	13,641 (-5.9%)	14,277 (-1.5%)	13,524 (-6.9%)	13,321 (-8.1%)	13,713 (-5.4%)
Open Road Density (mi/mi^2)	N/A	1.0	1.1	1.0	1.3	1.3	1.2
Total Road Density (mi/mi^2)		2.2	2.3	2.2	2.5	2.5	2.4
VCU 7470							
Winter[2/]	5,548	4,064	3,649 (-10.2%)	3,856 (-5.1%)	3,598 (-11.5%)	3,438 (-15.4%)	3,642 (-10.4%)
Year-round[3/]	9,388	7,903	7,126 (-9.9%)	7,435 (-5.9%)	7,050 (-10.8%)	6,809 (-13.8%)	7,136 (-9.7%)
Open Road Density (mi/mi^2)	N/A	0.7	1.1	1.1	1.4	1.4	1.3
Total Road Density (mi/mi^2)		1.2	1.6	1.6	1.9	2.0	1.8

Habitat	Historic	Acres (% reduction from existing) and Road Density[1/]					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7530							
Winter[2/]	10,250	5,637	5,584 (-0.9%)	5,610 (-0.5%)	5,583 (-1.0%)	5,518 (-2.1%)	5,583 (-1.0%)
Year-round[3/]	17,073	12,433	12,176 (-2.1%)	12,293 (-1.1%)	12,177 (-2.1%)	12,064 (-3.0%)	12,166 (-2.1%)
Open Road Density (mi/mi^2)	N/A	0.7	0.8	0.7	0.8	0.8	0.8
Total Road Density (mi/mi^2)		1.5	1.6	1.6	1.6	1.6	1.6

Source: USFS, Tongass National Forest, GIS. N/A = Not Available.
1/ NFS total road density below 1,500 feet elevation.
2/ Winter habitat equals high-POG less than 1500 ft. elevation
3/ Year-round habitat equals POG, all elevations.

State of Alaska Right-of Way on NFS Lands

The State of Alaska ROW on NFS lands would increase the open and total road miles in VCU 7470 by 0.7 mile under Alternatives 2 and 3 and by 0.1 mile under Alternatives 4, 5, and 6 (Table 50). Open and closed road densities would increase less than 0.1 mile per square mile. Once new timber sale roads are closed (except for proposed NFS Road 8300280), open road densities in VCU 7470 would equal 0.7 mile per square mile under all action alternatives. Total road density would equal 1.3 mile per square mile.

Alternative 1

Alternative 1 would have no direct or indirect effect on marten populations or marten habitat. Existing winter and year-round habitat would be maintained with no change in habitat connectivity or carrying capacity. Population dynamics would continue to function. Prey abundance (see red squirrel and endemic mammal sections) would continue to fluctuate from natural causes. Therefore, current hunting efficiency and social interactions would continue. The small OGR would be maintained in its current location, providing connectivity between source and sink habitat and facilitating marten movement across the landscape.

Existing open and total road densities are above 0.6 mile per square mile but have not created mortality concerns. Trappers are currently allowed to trap an unlimited number of marten. Pelt price and weather currently influence trapping pressure more than road density. Under this alternative, changes in marten populations are expected to be directly attributable to natural causes (e.g., fluctuations in prey populations), changes in pelt price, or both.

Alternative 2

Alternative 2 would harvest a total of 844 acres of high-POG winter habitat and 1,885 acres of year-round POG habitat. Alternative 2 would have the second lowest impact on marten populations and marten habitat of the action alternatives (Table 50). Denning, foraging sites, and subnivean access would be directly affected within the 370 acres of clearcut harvest, and the remaining marten habitat would be more fragmented. The 474 acres partial-cut may have minimal effect on marten. The 916 acres of clearcutting within year-round POG would directly affect denning and resting sites and prey abundance. Home ranges of affected individuals would likely increase in size.

Alternative 2 would maintain connectivity corridors 1, 2, 3, and 4 (Table 38) and eliminate corridor 5 due to clearcutting. Based upon limited research, partial cutting in corridors 6, 7, and 8 may have a minimal effect on marten, but would maintain overall dispersal throughout the project area. The small OGR would be maintained in its current location, providing connectivity between source and sink habitat.

Alternative 2 would increase open and total road densities by 0.1 mile per square mile in VCU 7460, by 0.4 mile per square mile in VCU 7470, and by 0.1 mile per square mile in VCU 7530.

Alternative 3

Alternative 3 would harvest 306 acres of high-POG winter habitat and 824 acres of year-round POG habitat. Alternative 3 would have the least impact on marten populations and marten habitat of the action alternatives (Table 50). Roughly 201 acres of winter habitat would be clearcut. Similar levels of impact would occur to year-round habitat (Table 50). Based on identified linear relationships, timber harvest in Alternative 3 could result in a one-to-six percent reduction in marten populations. However, the 105 acres of partial cutting in winter habitat and 161 acres of partial cutting in year-round habitat may have minimal effect on marten.

Alternative 3 would cause the least amount of habitat fragmentation by maintaining all corridors by not harvesting many low elevation stands, and by maintaining all identified elevational connectivity corridors (Table 38). The small OGR would be maintained in its current location, providing connectivity between source and sink habitat and facilitating marten movement across the landscape.

Alternative 3 would not increase open road densities in VCUs 7460 or 7530, but would increase current road densities in VCU 7470 to 1.1 miles per square mile. Total road densities would increase less than 0.1 miles per square mile in VCU 7460, increase by an additional 0.4 miles per square mile in VCU 7470, and increase by an additional 0.1 miles per square mile in VCU 7530.

Alternative 4

Alternative 4 would harvest 967 acres of high-POG winter habitat and 2,079 acres of year-round POG habitat. Alternative 4 would have the second highest impact on marten populations and marten habitat (Table 50). About 774 acres of winter habitat would be clearcut directly affecting marten and 195 acres would be partial cut. Based on identified linear relationships, timber harvest in Alternative 4 could result in up to a 12 percent reduction in marten populations. Denning and foraging sites and subnivean access would be affected long term within clearcut harvest units. Remaining habitat would be fragmented into smaller blocks. Home ranges of affected individuals would likely increase in size.

Connectivity corridors 1, 2 and 4 would be maintained under Alternative 4, but corridors 3, 5, 6, 7, and 8 would be eliminated due to clearcutting within the corridors (Table 38). This could have long-term impacts on marten dispersal throughout the project area. The small OGR would be maintained in its current location, providing connectivity between source and sink habitat.

Alternative 4 would increase open and total road densities by 0.3 miles per square mile in VCU 7460, by 0.7 miles per square mile in VCU 7470, and by 0.1 miles per square mile in VCU 7530.

Alternative 5

Alternative 5 would harvest 1,242 acres of high-POG winter habitat and 2,635 acres of year-round POG habitat. Alternative 5 would have the greatest impact on marten habitat and populations (Table 50). Roughly 1,132 acres of winter habitat would be clearcut and 109 acres partial cut. Most year-round habitat would be clearcut. Based on identified linear relationships, timber harvest in Alternative 5 could result in up to a 14 percent reduction in marten populations. Harvest within POG would directly affect denning and resting sites. Depending upon species, prey abundance would be affected long-term or permanently under current 100-year timber rotations. Home ranges of affected individuals would likely increase in size. Habitat for important prey species would be reduced to the greatest extent under Alternative 5. This reduction in prey could also reduce the number of marten within the Saddle Lakes area.

Alternative 5 would maintain corridor 1 and 4, but corridors 2, 3, 5, 6, 7, and 8 would be eliminated due to clearcutting within the corridors (Table 38). Alternative 5 would move the small OGR in VCU 7470 into the North Revilla Roadless Area severing the connection with the Naha LUD II and reducing the overall amount of protected high-POG and POG habitat. The OGR relocation would restrict movement of source populations in the Naha LUD II to recolonize vacant territories within the project area. Harvest of Units 300 to 312 within the current OGR would affect marten movement patterns and make marten more susceptible to predation.

Alternative 5 would increase open and total road densities by 0.3 miles per square mile in VCU 7460 during the life of the sale, open road density by 0.7 miles per square mile and total road density by 0.8 miles per square mile in VCU 7470, and open and total road densities by 0.1 miles per square mile in VCU 7530.

Alternative 6

Alternative 6 would harvest 846 acres of high-POG winter habitat and 1,814 acres of year-round POG habitat. Alternative 6 would fall in the middle of the action alternatives for impacts on marten populations and marten habitat. Roughly 599 acres of winter habitat would be clearcut with the remaining 247 acres being partial-cut. About 1,423 acres of year-round habitat would be clearcut with the remaining 391 acres being partial-cut. Timber harvest in Alternative 6 could result in up to a 10 percent reduction in marten populations.

Alternative 6 would maintain corridors 1, 2 and 4, but corridors 3, 5, 6, and 7 would be eliminated due to clearcutting within the corridors (Table 38). The width of corridor 8 would be reduced due to clearcutting in Unit 46. Elimination of connectivity would have long-term impacts on marten dispersal. The small OGR would be maintained in its current location, providing connectivity between source and sink habitat and facilitating marten movement across the landscape.

Alternative 6 would increase open and total road densities by 0.2 miles per square mile in VCU 7460 during the life of the sale, by 0.6 miles per square mile in VCU 7470, and open and total road densities by 0.1 miles per square mile in VCU 7530.

Cumulative Effects

Measurement criteria for analyzing cumulative effects to marten are the same as those used for analyzing direct and indirect effects. All land ownerships within WAAs 406 and 407 and VCUs 7460, 7470 and 7530 were used as the scale for the cumulative effects analysis.

Effects Common to All Action Alternatives

Cumulative effects on marten come from clearcut timber harvest and road construction. Long-term effects were considered to be 150 years or longer to provide the full suite of marten habitat requirements. An additional 3,726 acres of timber harvest recently occurred on the Trust Leask Lake parcel that is not reflected in the Forest Service GIS data for WAA 407. The proposed AMHT land exchange, if approved, could affect over 4,000 acres marten habitat in VCUs 7460 and 7470. Therefore, impacts to marten would be higher than shown in Table 51. The additional six miles of road to be constructed under the Ketchikan to Shelter Cove Road would not have a substantial impact on road density. It could however, affect trapper access as it would connect Ketchikan and Saxman to the project area VCUs and WAAs, and add an additional means of access that is less weather dependent than boat access. With this road connection, roads built under the proposed Saddle Lakes timber sale would contribute to open and closed road densities, and increase the amount of trapper access to the project area. Project roads would open new areas to trapping during the life of the timber sale, and provide easier walk-in access post-sale.

Table 51 summarizes cumulative change in marten habitat in all land ownerships. Table does not include 3,726 acres of recent AMHTA harvest or associated roads.

Table 51. Cumulative change in marten habitat on all land ownerships by VCU and WAA

Habitat	Historic	Acres and Road Density[1/] (% reduction from historic)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460							
Winter[2/]	12,639	7,317 (-42.1%)	6,941 (-45.1%)	7,246 (-42.7%)	6,871 (-45.6%)	6,821 (-46.0%)	6,947 (-45.0%)
Year-round[2/]	19,967	14,494 (-27.4%)	13,641 (-31.7%)	14,277 (-28.5%)	13,524 (-32.3%)	13,321 (-33.3%)	13,713 (-31.3%)
Over 30% clearcut?[3/]	N/A	No	Yes	No	Yes	Yes	Yes
Open Road Density (mi/mi^2)	0	1.0	1.1	1.0	1.3	1.3	1.2
Total Road Density (mi/mi^2)	0	2.2	2.3	2.2	2.5	2.5	2.4
VCU 7470							
Winter[2/]	7,353	4,634 (-37.0%)	4,219 (-42.6%)	4,425 (-39.8%)	4,168 (-43.3%)	4,008 (-45.5%)	4,212 (-42.7%)
Year-round[2/]	12,278	9,434 (-23.2%)	8,657 (-29.5%)	8,965 (-27.0%)	8,580 (-30.1%)	8,339 (-32.1%)	8,667 (-29.4%)
Over 30% clearcut?[3/]	N/A	No	Yes	No	Yes	Yes	No
Open Road Density (mi/mi^2)	0	1.1	1.4	1.4	1.6	1.7	1.6
Total Road Density (mi/mi^2)	0	1.5	1.8	1.8	2.0	2.1	1.9
VCU 7530							
Winter[2/]	10,830	6,216 (-42.6%)	6,164 (-43.1%)	6,190 (-42.8%)	6,162 (-43.1%)	6,097 (-43.7%)	6,162 (-43.1%)
Year-round[2/]	18,401	13,761 (-25.2%)	13,504 (-26.6%)	13,621 (-26.0%)	13,505 (-26.6%)	13,392 (-27.2%)	13,494 (-26.7%)
Over 30% clearcut?[3/]	N/A	No	No	No	No	No	No
Open Road Density (mi/mi^2)	0	1.0	1.1	1.1	1.1	1.1	1.1

Habitat	Historic	Acres and Road Density[1/] (% reduction from historic)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Total Road Density (mi/mi^2)	0	1.8	1.9	1.8	1.9	1.9	1.9
WAA 406							
Winter[2/]	36,435	24,555 (-32.6%)	24,127 (-33.8%)	24,458 (-32.9%)	24,055 (-34.0%)	23,940 (-34.3%)	24,132 (-33.8%)
Year-round[2/]	63,536	51,099 (-19.6%)	49,990 (-21.3%)	50,743 (-20.1%)	49,873 (-21.5%)	49,558 (-22.0%)	50,051 (-21.2%)
Over 30% clearcut?[3/]	N/A	No	No	No	No	No	No
Open Road Density (mi/mi^2)	0	0.7	0.8	0.7	0.8	0.8	0.8
Total Road Density (mi/mi^2)	0	1.3	1.4	1.4	1.4	1.4	1.4
WAA 407							
Winter[2/]	15,865	10,443 (-34.2%)	10,028 (-36.8%)	10,235 (-35.5%)	9,977 (-37.1%)	9,817 (-38.1%)	10,022 (-36.8%)
Year-round[2/]	31,257	25,704 (-17.8%)	24,927 (-20.3%)	25,235 (-19.3%)	24,850 (-20.5%)	24,609 (-21.3%)	24,937 (-20.2%)
Over 30% clearcut?[3/]	N/A	No	No	No	No	No	No
Open Road Density (mi/mi^2)	0	1.6	1.7	1.7	1.8	1.8	1.8
Total Road Density (mi/mi^2)	0	1.8	1.9	1.9	1.9	1.9	1.9

Source: USFS, Tongass National Forest, GIS.
1/ Total road density below 1,500 feet elevation.
2/ Winter habitat equals high-POG ≤1500’ elevation; year-round equals POG all elevations; Year-round includes Leask harvest.
3/ Consistent research threshold is 30 percent clearcut harvest within marten home range.

The amount, location, and type of modification to POG can directly affect connectivity within the project area. Thompson (1994) found that residual stands of less than 40 acres were used less than expected. Bissonette et al. (1989) and Chapin et al. (1998) found similar results on patch size. Hargis et al. (1999) noted that marten captures were zero to low in areas with less than 100 meters [328 feet] between openings. They concluded that landscapes lacking interior habitat may not sustain reproducing marten populations. These findings appear to also be valid in Southeast Alaska.

Since land ownership and WAA boundaries are administrative rather than physical in limitations on patch size, patch size was calculated across the combined 406/407 WAA and across all land ownerships. Table 52 summarizes change in marten habitat patch size on all land ownerships in combined WAAs.

Table 52. Change in marten habitat patch size on all land ownerships in WAAs 406 and407 combined

Patch Size	Historic	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt 5	Alt 6
Number of patches ≥40 acres	57	93	92	93	93	92	93
Total acres in patches ≥40 acres	92,532	73,651	71,622	72,807	71,527	71,135	71,826
Percent Reduction in acres	N/A	-20.4%	-22.6%	-21.3%	-22.7%	-23.1%	-22.4%
Average size patches ≥40 acres	1,623	792	779	783	769	773	772
Percent Reduction average patch size	N/A	-51.2%	-52.0%	-51.8%	-52.6%	-52.4%	-52.4%

Source: USFS Tongass National Forest GIS: pogpatch082313.xlsx. Note: N/A = Not Applicable.

Alternative 1

Alternative 1 would not contribute to cumulative effects. However, due to past activities that have long-term effects, marten winter habitat within project area VCUs is currently at 57 to 63 percent of what was available historically. Year-round habitat (POG) is at 73 to 77 percent of historic levels. Both younger and older clearcuts are avoided during the winter (Flynn & Schumacher 1999, Flynn & Schumacher 2001). As a result, past and recent clearcutting represent long-term to permanent loss of marten winter habitat. More recent clearcutting (3,726 acres) on AMHTA lands is mostly below 1,500 feet elevation, and at least a portion may have been high-POG winter habitat. The remaining areas would have been POG and provided year-round habitat in VCU 7470 and WAA 407. Additional habitat could be affected within project area VCUs if the proposed AMHTA land exchange is approved.

As discussed under direct effects, marten are most energy constrained during the winter and require suitable habitat where prey are not only abundant, but also available beneath the snow. Stem exclusion stands are unlikely to support abundant prey. Use of these or similar stands would cause marten to expend excess energy searching for prey, increasing the chance of mortality (Buskirk and Powell 1994, Harlow 1994). Cumulative impacts are slightly less at the broader WAA scale, (Table 51).

From identified linear relationships between clearcut harvest and marten density, marten populations could be reduced 27 percent from historic levels in VCU 7460, 23 percent in VCU 7470, and 25 percent in VCU 7530. POG would continue to dominate project area VCUs as the amount of clearcut would remain below the 30 percent threshold identified by research. Marten populations would be more influenced by fluctuations in prey. If linear relationships also apply to winter habitat (i.e., the limiting factor for marten) marten populations could be reduced by 43 percent during winters making it harder for populations to rebound during high prey, low snow years.

Most trappers in GMU 1A access trapping areas using boats (Porter 2010b). This trend would likely continue for trapping near the beach or areas east of Carroll Inlet. However, the Ketchikan to Shelter Cove Road would connect the project area to Ketchikan and Saxman, and enable vehicle and/or snowmobile access to nearby trapping areas.

Alternatives 2 , 3, 4, 5, and 6

Alternatives 2, 4, and 6 would reduce marten winter habitat within project area VCUs (Table 51) maintaining slightly over half of the winter habitat that was available historically. Impacts would be slightly less under Alternative 3, and slightly more under Alternative 5.

With inclusion of Leask Lakes harvest, habitat loss under Alternatives 2, 4, 5, and 6 would exceed the research threshold of 30 percent (i.e., greater than or equal to 30 percent of the landscape clearcut). This would put VCUs 7460 and 7470 at increased risk of not maintaining marten populations and permanent gaps in marten distribution would likely occur. VCU 7530 is approaching this threshold, but would not exceed it as a result of the Saddle Lakes Timber Sale. Impacts are slightly less at the broader WAA scale (Table 51). Unlike the above direct effects, cumulative effects would be higher during winter, further affecting marten populations.

The action alternatives, combined with past and foreseeable future management actions, could reduce marten populations by at least 33 percent. If linear relationships also apply to winter habitat (i.e., the limiting factor for marten), populations could be reduced by 43 to 45 percent and could take longer to recover during high prey years. Marten could inhabit suboptimal habitat where they spend excessive energy on hunting prey, and have lower reproductive success, or territories could be abandoned causing gaps in project area distribution.

Research in Southeast Alaska by Flynn et al. (2004) supports the conclusion that all action alternatives would further reduce the effective patch size and connectivity of marten habitat since they marten do not use younger or older second-growth. Other research (see Affected Environment) has shown that clearcuts affect marten movement. Under the action alternatives, POG habitat in patches greater than or equal to 40 acres will have decreased roughly 20 percent from historic levels, and the number of patches almost doubled (Table 52). The average size of the available patches has decreased by over 50 percent. Reduction in available habitat and connectivity could cause marked change in marten foraging behavior and foraging efficiency, change movement path selection, cause marten to inhabit suboptimal habitat, and spend excessive energy on hunting prey. Also a reduction in habitat could cause marten to have less time available for social interaction and breeding, affect female body index reducing reproductive success, and cause juveniles to disperse farther distances where they experienced poorer body condition, and suffered twice the mortality risk.

OGRs and IRAs would act as refugia from trapping and continue to provide habitat for marten, but Flynn et al. (2004) found that OGRs do not support the densities of marten predicted by Forest Plan analysis. The current small OGR in VCU 7470 would be maintained under Alternatives 2, 3, 4, and 6, which would maintain the important connectivity link with source habitat in the Naha LUD II to repopulate vacant territories within Saddle Lakes VCUs. Alternative 5 would move the existing small OGR into habitat that the Interagency Review Team determined does not provide comparable achievement of old-growth goals and objectives, and sever this important link by clearcutting the current connection. As a result, vacant territories within Saddle Lakes VCUs and WAAs may not be repopulated, causing gaps in marten distribution on a broader scale.

With the completion of the Ketchikan to Shelter Cove Road, some trapper access could shift from boats to vehicles and/or snowmobiles. Therefore, open road densities ranging could affect habitat suitability and lead to overharvest of marten (Table 51). Trapping pressure would continue to fluctuate with pelt price. Of the action alternatives, Alternative 3 would have the least cumulative effects on marten populations and marten habitat. The cumulative effects of Alternatives 2 and 6 are similar, and would rank second of the action alternatives in terms of having the least cumulative effects. Impacts under Alternative 2 may be slightly less than Alternative 6 because of the amount of uneven-age management harvest proposed. Alternative 4 would have the second greatest cumulative effects on marten, with Alternative 5 having the greatest cumulative effects on marten habitat, connectivity, dispersal capability, and populations.

Summary of Marten Effects

Habitat loss under Alternatives 2, 4, 5, and 6 would exceed the research threshold of 30 percent clearcut tolerance in VCUs 7460 and 7470, putting these VCUs at increased risk of not maintaining marten populations. Habitat loss in VCU 7530 would not exceed thresholds under any alternative. The consequence of additional harvest would leave localized gaps in distribution and reduced gene flow within the population, lower densities of marten, lower body condition and reproductive success, altered foraging patterns and efficiency, and lower winter survival due to loss of subnivean denning sites. The greater the size and number of gaps, the higher the risk of reducing gene flow. Alternative 5 would move the small OGR in VCU 7470, severing the important connection between the Naha LUD II source and sink habitat within the George and Carroll Inlet areas.

Bald Eagle

Direct/Indirect Effects

The measurement criteria for analyzing direct and indirect effects for bald eagles includes: POG within beach/estuary buffers; potential disturbance near nests. NFS lands within VCUs 7460, 7470, and 7530 were used as the scale for the effects analysis.

Effects Common to All Alternatives

Forest Plan beach/estuary Standards and Guidelines maintain the 1,000-foot wide beach fringe which protects bald eagle nesting, perching and roosting habitat (USDA 2008b, pp. 4-4 to 4-5).

In conjunction with the National Bald Eagle Guidelines, the USFWS Alaska Region (USFWS 2009a) has identified step-by-step guidelines to assist in determining if activity near an eagle nest is likely to “take” or disturb bald eagles (a potential violation of the Bald and Golden Eagle Protection Act). There are no activities proposed within disturbance avoidance zones listed in the USFWS conservation measures for avoiding take. The proposed rock quarry at MP 4.280 of Road 8340000 is at the edge of the one-half mile blasting restriction and may require timing restrictions to prevent disturbance of nesting bald eagles.

Therefore, there would be no direct or indirect effects on bald eagle habitat or bald eagles under any alternative with required timing restrictions. Natural processes such as windthrow and weather would continue to affect eagle productivity.

Cumulative Effects

Effects Common to All Alternatives

The Saddle Lakes project would not contribute to bald eagle cumulative effects under any alternative. Cumulative effects come from ongoing effects from past timber harvest and associated activities within in the beach buffer on NFS and non-NFS lands. Past harvest has reduced eagle habitat by 30 to 48 percent. Previously harvested stands along the coastline would remain unsuitable until existing trees become large enough and contain the branch structure capable of supporting eagle nests.

Summary of Bald Eagle Effects

The Saddle Lakes project would have no impact on bald eagles or their habitat. Impacts to non-NFS beach nesting habitat would depend upon final project designs and future management plans.

Brown Creeper

Direct/Indirect Effects

Measurement criteria include acres of interior POG. NFS lands within VCUs 7460, 7470, and 7530 were used as the scale for analysis.

Interior POG habitat was calculated from GIS layers using the edge effect distances identified in Concannon (1995). All clearcuts were buffered (656 feet);

- Edge effects from roads running through forested areas were calculated using the same effective distance as clearcuts (656 feet) due to a similar abrupt edge;
- Muskeg/non-forested areas were buffered (394 feet) since the edge was naturally feathered by the muskeg/forest interface; and
- Roads clearing through non-forested areas were calculated using the same distance as muskegs (394 feet).

Effects Common to All Action Alternatives

Hejl et al. (2002), Wiggins (2005), and Poulin et al. (2013) summarized multiple studies across the United States where brown creepers were substantially more abundant in unlogged versus logged conditions including clearcuts, partial cuts, and regenerated pole-sapling stands. Immature and mature second-growth forests (even 100-yr old stands) often did not contain essential structural characteristics such as of large, mature and old-growth trees that provide both foraging and nesting sites. Partial cutting, (even with less than 30 percent removal) affected brown creeper abundance (Mahon et al. 2008, Vanderwel et al. 2007 and 2011, Young and Hutto 2002).

Logging and the resulting fragmentation of forest reduces the overall availability of suitable nesting and foraging habitat, increases the distance between suitable nesting/foraging habitat patches, and decreases reproductive success by lowering prey availability (Wiggins 2005). Nest failures can be caused by alteration of the nest site by wind or rain, predation, human disturbance (Kissling, 2006). However, the primary effect of forest fragmentation is that brown creepers may simply avoid breeding in small forest fragments (Hejl et al. 2002a, Hejl et al. 2002b, Hobson and Bayne 2000). Several Southeast Alaska studies (DellaSala et al. 1996, Kissling and Garton 2008) found substantially fewer or an absence of creepers in logged habitat or narrow buffers.

Few studies quantified actual relationship between habitat loss and population decline. Instead terms such as "relative abundance" and "avoidance" were often used. As a result, it is uncertain how far brown creeper populations have declined, but it is likely that some brown creepers may inhabit less suitable edge habitat affecting survival, reproductive success, and dispersal of juveniles. Others have likely abandoned territories or died leaving substantial gaps in distribution. Changes to brown creeper habitat are shown in Table 53.

Table 53. Effect on brown creeper and interior habitat[1/] on NFS Lands by VCU

VCU	Historic (ac)	Existing / Alt. 1 (ac)	Acres (% reduction from existing acres)				
			Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460	10,885	3,050	2,704 (-11.3%)	2,940 (-3.6%)	2,661 (-12.8%)	2,651 (-13.1%)	2,691 (-11.8%)
VCU 7470	4,469	2,417	2,174 (-10.1%)	2,248 (-7.0%)	2,153 (-10.9%)	2,060 (-14.8%)	2,165 (-10.4%)
VCU 7530	7,832	2,493	2,471 (-0.9%)	2,474 (-0.8%)	2,473 (-0.8%)	2,471 (-0.9%)	2,471 (-0.9%)

Source: USFS Tongass National Forest GIS

1/ Interior habitat based upon vegetative & climatic edge effect distances for Southeast AK (Concannon 1995).

Alternative 1

Alternative 1 would have no effect on brown creeper habitat or populations. Hejl, et al. (2002a) summarized that retaining continuous, unfragmented areas of unlogged mature and old-growth forests would provide optimum brown creeper habitat. Although the project area is currently fragmented, all existing patches of interior habitat would be maintained to support brown creeper populations.

Alternative 2

Alternative 2 would affect 610 acres of brown creeper habitat (Table 53). Partial cutting in Units 47, 48, 50, 75, 80, and 123 would impact the large patch of interior habitat on the south shore of North Saddle Lakes. Partial-cutting in Units 28, 29, and 147 would affect the patch on the north side of the lake. According to work by Deal et al. 2009, partial-cut stands may regain large tree structural diversity and function within 50 years, but brown creepers require large decadent trees with sloughing bark which could take longer to develop. Clearcutting Unit 67 would affect the interior habitat patch near Granite Island/George Inlet and preclude brown creeper use long term or permanently under a 100-year rotation. Edge effect from Units 43 and 44 would reduce interior POG within the VCU 7470 small OGR. Other smaller patches would be affected throughout the project area with roughly 99 percent of the habitat being maintained in VCU 7530. The number of brown creepers is expected to decline with habitat loss and/or reproductive success would be reduced from current levels as birds occupy sub-optimal habitat. Large interior patches within OGRs and Roadless areas would be unaffected by Alternative 2. Alternative 2 would have the third lowest risk to brown creeper populations of the action alternatives since it harvests the third lowest number of acres.

Alternative 3

Alternative 3 would affect 298 acres of interior brown creeper habitat. Impacts would be greatest in VCU 7470 (Table 53) Units impacting VCU 7470 include Units 43, 44 (affecting interior POG within the OGR), and Unit 67. VCU 7460 has the second highest effect. Partial-cutting in Unit 123 would reduce the size of the large interior patch on the south side of North Saddle Lakes. Smaller patches of interior brown creeper habitat would be affected throughout the project area. Fewer individuals would be impacted as most large patches would remain. Alternative 3 causes the least fragmentation of the action alternatives, and has the least risk to reproductive success and/or population decline.

Alternative 4

Alternative 4 would affect 672 acres of interior brown creeper habitat reducing available habitat throughout project area VCUs (Table 53). In addition to the effects described under Alternative 2, the entire large patch by North Saddle Lakes would be removed and additional impacts would occur near the George Inlet Salt Chuck from the clearcut harvest proposed in Units 64, 65, 66, and 155. Harvest within the wildlife corridor through Units 203, 204, 207, and 224 would remove the interior patch north of Island Point. Increased fragmentation would likely reduce nesting success and juvenile dispersal. Alternative 4 has the second highest effect on brown creeper habitat, breeding success, dispersal, and overall populations.

Alternative 5

Alternative 5 would impact 806 acres of brown creeper habitat predominantly through clearcutting (Table 53). Clearcutting in Units 46, 47, 48, 49, 50, 74, 75, 80, 115, 118 and 123 would eliminate the large patch of interior habitat on the south shore of North Saddle Lakes. Units 28, 29, 30 and 147 would eliminate the patch on the north side of the lake. Additional impacts would occur near the George Inlet Salt Chuck from clearcutting Units 64, 65, 66, and 155. By not implementing the wildlife corridor through Units 203, 204, 207, and 224, the interior patch north of Island Point would be removed. The large block of interior POG in the current VCU 7470 OGR would be reduced because the OGR would be moved into the North Revilla Roadless Area and Units 300 to 312 harvested. Under Alternative 5, interior habitat would be highly restricted outside OGRs and Roadless areas. Since most units would be clearcut, harvest would result in a long-term loss of brown creeper habitat. Alternative 5 would have the greatest effect on brown creepers of all alternatives.

Alternative 6

Alternative 6 would affect 633 acres of interior brown creeper habitat reducing available habitat (Table 53). Harvest of Units 48, 49 50, 118, and 123 will remove most of the block located south of North Saddle Lakes. Additional impacts would occur near the George Inlet Salt Chuck from Units 64, 65, 66, and 155, and to the VCU 7470 OGR from Units 44 and 106. Alternative 6 has the second lowest risk of the action alternatives since it proposed the second lowest number of acres, or the third risk overall.

Cumulative Effects

Cumulative effects to brown creeper come from ongoing effects from past and more recent timber harvest activities on all land ownerships, with smaller impacts from hydroelectric projects. Some of the greatest historic interior POG losses were along the eastern shore of Carroll Inlet, with smaller losses along the western shore within the Saddle Lakes project area. Larger blocks of current habitat are primarily restricted to OGRs and Inventoried Roadless Areas.

Since brown creepers appear to be impacted by all types of harvest or large tree removal, all activities would reduce brown creeper habitat. Additional fragmentation would occur with the completion of the Ketchikan to Saddle Lakes Road. Data is lacking for the Leask Lakes area, but the 3,726 acres of recent harvest activity would have had wide spread impacts to brown creeper habitat. Impacts from the proposed 8,170 acre land exchange would depend upon approval, but could affect multiple patches of interior habitat within the Saddles Lakes project area, including patches within the small OGR in VCU 7470.

Alternative 1

The Saddle Lakes project would not contribute to cumulative effects. Impacts to brown creeper interior habitat have been substantial (up to 72 percent) representing long-term to permanent habitat loss under 100-year rotations (Table 54). Since beach buffers are currently protected, some historic coastal habitat could be restored after 150 years, but suitability would be influenced by the adjacent upland condition. A limited amount of interior POG (28, 48, and 32 percent of the historic acreages) would remain within VCUs 7460, 7470, and 7530 respectively. Alternative 1 would have the least impact on brown creepers and their habitat.

Alternatives 2, 3, 4, 5, and 6

Alternatives 2, 3, 4, 5, and 6 would reduce brown creeper habitat and populations (Table 54). Roughly one-quarter to one-third of historic interior habitat would remain. About on-half of the historic habitat would remain at the larger WAA 406/407 scale. The AMHTA land exchange, if approved, would further reduce interior habitat. The small OGR in VCU 7470 and the adjacent North Revilla Roadless Area contains the largest block of interior habitat that remains within the Saddle Lakes project area. This contributes to a slightly lower impact within VCU 7470 and WAA 407. Alternative 2 would have the third lowest impact on brown creepers.

Table 54. Cumulative change in brown creeper/interior habitat[1/] on all land ownerships by VCU and WAA

Area	Historic (ac)	Acres (% reduction from historic acres)					
		Existing / Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCUs							
VCU 7460	10,983	3,050 (-72.2%)	2,704 (-75.4%)	2,940 (-73.2%)	2,661 (-75.8%)	2,651 (-75.9%)	2,691 (-75.5%)
VCU 7470	6,363	3,070 (-51.8%)	2,820 (-55.7%)	2,897 (-54.5%)	2,799 (-56.0%)	2,656 (-58.3%)	2,811 (-55.8%)
VCU 7530	8,248	2,623 (-68.2%)	2,601 (-68.5%)	2,605 (-68.4%)	2,604 (-68.4%)	2,601 (-68.5%)	2,602 (-68.5%)
WAAs							
WAA 406	30,321	14,193 (-53.2%)	13,824 (-54.4%)	14,063 (-53.6%)	13,783 (-54.5%)	13,771 (-54.6%)	13,811 (-54.5%)
WAA 407	13,949	7,440 (-46.7%)	7,190 (-48.5%)	7,267 (-47.9%)	7,168 -48.6%)	7,025 (-49.6%)	7,180 (-48.5%)

Source: USFS Tongass National Forest GIS; SaddleWildlfieSummariesByAlt0618.xlsx. Note: VCU = Value Comparison Unit; WAA = Wildlife Analysis Area.

1/ Interior habitat based upon vegetative & climatic edge effect distances for Southeast AK (Concannon 1995).

Summary of Brown Creeper Effects

Impacts to brown creeper interior habitat from past management activities have been substantial (over 72 percent loss) and would be further reduced with implementation of the Saddle Lakes timber sale, and identified future management activities (up to76 percent loss). Clearcutting represents long-term to permanent habitat loss under 100-year rotations. Partial-cutting would reduce local populations, but impacts could be of shorter duration. Actual time of recovery within partial-cut units would depend upon the structure maintained during harvest. Since beach buffers are currently protected, some historic coastal habitat could be restored after 150 years, but suitability would be influenced by adjacent upland condition. From the available scientific literature past, present, and future management actions have reduced the amount of suitable nesting and foraging habitat, and increased the distance between suitable nesting and foraging habitat. These actions have likely lowered reproductive success, decreased juvenile dispersal success, and caused substantial reductions in brown creeper populations resulting in widespread gaps in distribution. The remaining habitat is predominantly within OGRs and other non-development LUDs, or IRAs. Alternative rankings from greatest to lowest risk are 5, 4, 6, 2, 3 then 1. Alternative 1 does not contribute to direct or cumulative effects.

Hairy Woodpecker

Direct/Indirect Effects

Measurement criteria include acres of high-POG [SD5N, SD5S, SD67] all elevations. The VCU scale was used to analyze direct and indirect effects on the hairy woodpecker.

Effects Common to All Action Alternatives

Hairy woodpeckers depend on cavities in large-diameter trees and hard snags characteristic of high-POG stands. Clearcutting has an immediate effect on hairy woodpecker habitat by altering the complex ecological structure afforded by old-growth forest stands (Cotter 2007). Replacing mature stands with young stands eliminates decaying trees and reduces insect infestations, which are detrimental to habitat capability and likely results in population declines (Jackson et al. 2002, Kissling and Garton 2008, Anderson 2003, Penhollow and Stauffer 2000, Cahall and Hayes 2009). Information on the specific quantitative correlation between habitat loss and reduction in hairy woodpecker populations was not found, but information in Zarnowitz and Manuwal (1985) suggests that it may not be a linear relationship. Under current 100-year rotations, clearcutting represents permanent habitat loss since stands would be re-harvested before producing large trees with sufficient decay to create cavities for nesting and support sufficient insect populations for foraging.

Vanderwel et al. (2007) found no clear trends on the effects of partial harvest on hairy woodpeckers in Ontario as long as key structural components were maintained. However, without individual stand prescriptions, it is not possible to know how much of the large tree component and structure preferred by hairy woodpeckers would remain. Also, partial-cutting would affect stand volume and likely decrease preferred high-POG habitat to less preferred medium- or low-POG. Habitat would recover within a shorter timeframe than clearcut units.

Legacy Standards and Guidelines do not apply to VCUs within the Saddle Lakes area (USDA 2008b p. 4-90). Jackson et al. (2002) state that the importance of snags in clearcuts is questionable for hairy woodpeckers since the microclimate surrounding the snag is changed. Regardless past clearcuts within the Saddle Lakes area contain few to no reserve trees.

Changes in high-POG are shown in Table 55. Direct effects would be the greatest within VCU 7470 under all action alternatives, increasing the importance of the large block of high-POG within the existing small OGR.

Table 55. Effect on hairy woodpecker high-POG habitat[1/] on NFS lands by VCU

VCU	Historic (ac)	Existing / Alt. 1(ac)	Acres (% reduction from existing acres)				
			Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460	14,358	8,982	8,596 (-4.3%)	8,911 (-0.8%)	8,535 (-5.0%)	8,476 (-5.6%)	8,612 (-4.1%)
VCU 7470	5,946	4,461	4,044 (-9.3%)	4,252 (-4.7%)	3,994 (-10.5%)	3,833 (-14.1%)	4,039 (-9.5%)
VCU 7530	10,909	6,268	6,216 (-0.8%)	6,241 (-0.4%)	6,214 (-0.9%)	6,149 (-1.9%)	6,214 (-0.9%)

Source: USFS, Tongass National Forest GIS; SaddleWildlifeSummariesByAlt0618.xlsx. Note: VCU = Value Comparison Unit.
1/ Habitat is high-POG at all elevations.

Alternative 1

Alternative 1 would have no effect on hairy woodpecker habitat or populations. All existing high-POG habitat would be maintained and current nest sites would remain unaffected by forest management (Table 55). Fragmentation would be limited to natural intervals of vegetation types and historic harvest. Hairy woodpecker populations would remain at current levels unless affected by natural causes such as windthrow or predation.

Alternative 2

Alternative 2 would clearcut 370 acres of preferred high-POG hairy woodpecker habitat, and partial-cut 485 acres. Based upon scientific research, this would reduce hairy woodpecker habitat by reducing nest trees and insects associated with stand decay. The 1 to 9 percent habitat reductions (Table 55) could cause reductions in individuals or shifts in territories. Fewer high-POG stands and large diameter trees would be available as nesting and foraging habitat. Effects would be greater than

Alternatives 1 and 3, but less than Alternatives 4, 5, or 6. Alternative 2 maintains the current small OGR which contains some of the largest blocks of high-POG habitat currently present in the area.

Alternative 3

Alternative 3 would have the least impact of the action alternatives on hairy woodpeckers since it would retain the greatest amount of nesting and foraging habitat (Table 60). Alternative 3 would clearcut 201 acres of preferred high-POG habitat and partial-cut 106 acres. Alternative 3 maintains the large block of habitat within the existing small OGR in VCU 7470.

Alternative 4

Alternative 4 would have the second highest impact on hairy woodpecker nesting and foraging habitat and individuals by clearcutting 772 acres and partial cutting 195 acres of high-POG habitat (Table 55).

Alternative 5

Alternative 5 would have the greatest impact on both hairy woodpecker habitat (Table 55) and populations since the impacts of logging increase as more large trees and snags are removed (Anderson 2003). Habitat would be reduced long term by 1,133 acres of clearcutting, but impacts may be shorter termed in the 120 acres of partial cutting. Alternative 5 would move the small OGR in VCU 7470 into the North Revilla Roadless Area. Clearcutting of Units 300 through 308 and 310 through 312 would remove a large block of high-POG currently present within the OGR, and would result in a permanent habitat loss under the current 100 year rotation.

Alternative 6

Alternative 6 ranks third of the action alternatives for impacts and would remove 599 acres of habitat by clearcutting, and 246 acres of habitat by partial cutting (Table 55).

Cumulative Effects

All land ownerships within project area VCUs and WAAs were used to evaluate cumulative effects on hairy woodpeckers. The combined WAAs were used to evaluate cumulative effects on patch size greater than or equal to 500 acres since VCU and ownership boundaries are administrative, not physical, breaks. All POG categories were used for analyzing patch size since hairy woodpeckers do use other POG classes (Hughes 1985). Therefore, it was assumed that low- and medium-POG, while less preferred, would not fragment habitat.

Cumulative effects to hairy woodpeckers come primarily from past and recent timber harvest and road construction activities. The 3,726 acres of Leask Lake clearcut harvest are not included in Table 56as it is unknown what percentage of the harvest may have been high-POG. Therefore, the table likely underestimates the overall effect to hairy woodpecker habitat within WAA 407. The Ketchikan to Shelter Cove road clearing could affect up to 16 acres of POG (calculated using 2 miles of road times a 66 foot clearing width). The Swan Lake dam expansion would affect 47 acres of high-POG habitat. The proposed AMHTA land exchange, if approved, would have substantial impacts on hairy woodpecker habitat.

In addition to directly removing nesting and foraging habitat, timber harvest would affect the amount of POG habitat in block 500 acres or larger. The total amount of habitat within patches 500 acres or larger have been reduced to 72 percent of historic levels (Table 56).

Table 56. Effect on hairy woodpecker high-POG habitat on all land ownerships by VCU and WAA

Area	Historic (ac)	Acres (% reduction from historic acres)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU							
VCU 7460	14,455	8,982 (-37.9%)	8,596 (-40.5%)	8,911 (-38.4%)	8,535 (-41.0%)	8,476 (-41.2%)	8,612 (-40.4%)
VCU 7470	7,750	5,031 (-35.1%)	4,614 (-40.5%)	4,822 (-37.8%)	3,994 (-48.5%)	3,833 (-50.5%)	4,609 (-40.5%)
VCU 7530	11,523	6,883 (-40.3%)	6,830 (-40.7%)	6,856 (-40.5%)	6,214 (-46.1%)	6,149 (-46.6%)	6,829 (-40.7%)
WAA							
WAA 406	41,994	29,557 (-29.6%)	29,119 (-30.7%)	29,459 (-29.8%)	29,057 (-30.8%)	28,932 (-31.1%)	29,133 (-30.6%)
WAA 407	16,951	11,528 (-32.0%)	11,111 (-34.5%)	11,319 (-33.2%)	11,061 (-34.7%)	10,900 (-35.7%)	11,107 (-34.5%)

Source: USFS Tongass National Forest GIS; SaddleWildlifeSummariesByAlt0618.xlsx.

Alternative 1

Alternative 1 would not contribute to cumulative effects. However, effects from past management will continue into the foreseeable future. Proposed future projects will cause further decline. Approximately 60 to 65 percent of the historic habitat currently remains within project area VCUs (Table 56). Impacts are slightly less at the broader WAA scale, with 68 to 70 percent of the historic habitat remaining. Widespread habitat loss has likely affected hairy woodpecker populations, but the actual extent is unknown.

Alternatives 2, 3, 4, 5, and 6

All action alternatives would have similar effects on all three project area VCUs. Hairy woodpecker habitat would decline to roughly 50 to 60 percent of historic habitat levels. Large patch habitat (greater than or equal to 500 acres) would be reduced by about 30 percent. Loss of habitat has had an impact on hairy woodpecker populations by reducing nesting success and/or affecting distribution on a localized scale. Timber harvest and associated activities has the potential to destroy active nests, disturb nesting adults and young, and/or cause nest abandonment. Alternative 3 would maintain the highest level of hairy woodpecker habitat followed by Alternatives 2, 6, 4, and 5.

Under the action alternatives, the number of patches would increase slightly, but amount of habitat within these patches would decrease to 70 to 72 percent of historic levels (Table 57). Average patch size would also decrease. The remaining large patches of POG are predominantly located within OGRs, other non-development LUDs, and the 2001 Roadless Areas.

Table 57. Change in hairy woodpecker habitat patch size on all land ownerships in WAAs 406 and 407

Comparison	Historic	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt 5	Alt 6
Number of patches ≥500 acres	13	19	19	19	19	19	19
Total acres in patches ≥500 acres	87,956	63,812	62,006	63,028	61,812	61,432	62,074
Percent Reduction (ac)	N/A	(-27.5%)	(-29.5%)	(-28.3%)	(-29.7%)	(-30.2%)	(-29.4%)
Average size of patches ≥500 acres	6,766	3.359	3,263	3,317	3,253	3,233	3,267
Percent Reduction average patch size	N/A	(-50.4%)	(-51.8%)	(-51.0%)	(-51.9%)	(-52.2%)	(-51.7%)

Source: USFS Tongass National Forest GIS; Note: N/A = Not Applicable.

Summary of Hairy Woodpecker Effects

Direct effects to preferred hairy woodpecker habitat varies from less than 1 percent up to 14 percent depending upon the Alternative and the VCU. However, cumulative effects are more substantial. Thirty-eight to 51 percent of the historic VCU habitat would be lost long-term from harvesting large diameter, high-POG habitat. Large patches (greater than or equal to 500 acres) would decrease 26 to 28 percent from historic levels. Alternative rankings from least effect to greatest effect are Alternative 1, 3, 2, 6, 4, and 5 respectively.

Red-Breasted Sapsucker

Direct/Indirect Effects

Measurement criteria includes: acres of medium- and low-POG [SD5H, SD4S, SD4N, SD4H] at all elevations and patch size. The scale used to analyze direct and indirect effects includes VCU 7460, 7470, and 7530.

Effects Common to All Action Alternatives

Effects to red-breasted sapsuckers are very similar to those described under hairy woodpecker. The main difference is in the type of POG affected (medium- and low-POG vs. high-POG). Legacy Standards and Guidelines do not apply, therefore all harvest is expected to impact current habitat and reduce red-breasted sapsucker populations. Matsuoka et al. 2012 and DellaSala et al. 1996 found that sapsuckers were associated with old growth on nearby Prince of Wales Island and occurred in greater densities than in any young growth type. Likewise, Kissling and Garton (2008) mention a fragmentation threshold, but did not state what percentage of young-growth was required to cause populations to decline. The choice of large diameter snags may reflect an attempt to maximize nest space for large clutch size, thermal insulation, and/or protection from predators (Joy 2000).

Effects of partial harvest on red-breasted sapsuckers are varied. Beese and Bryant (1999) found higher densities in un-harvested stands than green tree retention stands in British Columbia. Conversely, Mahon et al. (2008) found higher densities of red-breasted sapsuckers in northwestern British Columbia partial-cut stands with up to 60 percent of the stand volume removed. However, the latter harvest simulated high-frequency, small scale disturbance and retained structural diversity and forage sites. Differences may be a function of harvest prescription and stand condition remaining after harvest, differences in areas, or both. OSHA safety regulations will likely require many existing snags to be felled during logging operations further reducing suitable habitat. Changes in red-breasted sapsucker preferred habitat are shown in Table 58.

Table 58. Effect on red-breasted sapsucker habitat on NFS lands by VCU

VCU	Historic (ac)	Acres (% reduction from existing)					
		Existing \ Alt. 1(ac)	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
7460	5,512	5,512	5,045 (-8.5%)	5,366 (-2.6%)	4,988 (-9.5%)	4,845 (-12.1%)	5,101 (-7.5%)
7470	3,442	3,442	3,083 (-10.4%)	3,182 (-7.6%)	3,056 (-11.2%)	2,976 (-13.5%)	3,097 (-10.0%)
7530	6,165	6,165	5,961 (-3.3%)	6,052 (-1.8%)	5,962 (-3.3%)	5,915 (-4.1%)	5,952 (-3.5%)

Source: GIS, SaddleWildlfieSummariesByAlt0618.xlsx
Medium- and Low-POG all elevations.

Alternative 1

There are no direct or indirect effects on red-breasted sapsuckers from Alternative1. Except for natural events, all existing medium- and low-POG habitat within the project area would remain. Populations of red-breasted sapsuckers are expected to remain at current levels unless altered by natural events.

Alternative 2

Alternative 2 would reduce red-breasted sapsucker habitat within project area VCUs by 1,030 acres or by 7 percent across all project area VCUs combined (Table 58). Approximately 546 acres would be clearcut and 484 acres partial cut. Nesting and foraging habitat would be eliminated within clearcuts. Alternative 2 ranks second of the action alternatives behind Alternative 3 because of the higher amount of partial cutting in Alternative 2 versus Alternative 6.

Alternative 3

Alternative 3 would reduce red-breasted sapsucker habitat within project area VCUs by 518 acres (Table 58). Approximately 462 acres would be clearcut and 56 acres partial cut. Alternative 3 ranks first among the action alternatives for maintaining red-breasted sapsucker cavity nesting habitat.

Alternative 4

Alternative 4 would reduce red-breasted sapsucker habitat within project area VCUs by 1,112 acres (Table 58). Approximately 1,026 acres would be clearcut and 86 acres partial cut. Alternative 4 ranks fourth of the action alternatives for maintaining habitat since it harvests the second highest amount of existing habitat.

Alternative 5

Alternative 5 would have the greatest impact on red-breasted sapsucker habitat and number of individuals (Table 58). Approximately 1,281 acres would be clearcut and 102 acres partial cut. Loss of suitable large diameter nesting trees and snags and foraging sites would be more widespread across the project area with the relocation of the Small OGR in VCU 7470. Alternative 5 ranks last of the action alternatives for maintaining red-breasted sapsucker habitat.

Alternative 6

Alternative 6 would reduce red-breasted sapsucker habitat within project area VCUs by 969 acres (Table 58). Approximately 824 acres would be clearcut and 145 acres partial cut. Alternative 6 ranks second of the action alternatives for maintaining more open old-growth habitat preferred by red-breasted sapsuckers.

Cumulative Effects

All ownerships within project area VCUs and WAAs were used for cumulative effects analysis. Effects would be very similar to those listed under direct effects, but broader in context. Cumulative effects come mainly from recent and proposed timber harvest and road construction activities as most historic harvest targeted higher volume stands. Approximate 16 acres of POG habitat would be affected by the Ketchikan to Shelter Cove road clearing. The Swan Lake dam expansion would affect an additional 41 acres of med- and low-POG habitat. If approved, the AMHTA land exchange would further impact red-breasted sapsucker habitat. Cumulative change in red-breasted sapsucker habitat for all ownerships is shown in Table 59.

Table 59. Effect on red-breasted sapsucker habitat on all land ownerships by VCU and WAA

Area	Historic (ac)	Acres (% reduction from historic)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460	5,512	5,512 (0%)	5,045 (-8.5%)	5,366 (-2.6%)	4,988 (-9.5%)	4,845 (-12.1%)	5,101 (-7.5%)
VCU 7470	4,527	4,403 (-2.7%)	4,043 (-10.7%)	4,143 (-8.5%)	4,016 (-11.3%)	3,936 (-13.1%)	4,058 (-10.4%)
VCU 7530	6,878	6,878 (0%)	6,674 (-3.0%)	6,765 (-1.6%)	6,676 (-2.9%)	6,628 (-3.6%)	6,665 (-3.1%)
WAA 406	21,542	21,542 (0%)	20,871 (-3.1%)	21,284 (-1.4%)	20,817 (-3.4%)	20,626 (-4.3%)	20,918 (-2.9%)
WAA 407	14,306	14,175 (-0.9%)	13,816 (-3.4%)	13,916 (-2.7%)	13,789 (-3.6%)	13,709 (-4.2%)	13,830 (-3.3%)

Source: GIS, SaddleWildlfieSummariesByAlt0618.xlsx.
Medium- and Low-POG all elevations.

Kissling & Garton (2008) chose to use buffer width, because patch boundaries were difficult to define when forested landscape features were interconnected. Remaining large patches of POG are predominantly located within OGRs and 2001 Roadless Areas. Changes in patch size are shown in Table 60.

Table 60. Change in red-breasted sapsucker habitat patch size, all land ownerships WAAs 406/407

Comparison	Historic	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt 5	Alt 6
Number of patches >250 acres	17	32	32	32	32	32	32
Total acres in patches ≥250 acres	89,131	68,107	66,724	67,323	66,107	65,726	66,369
Percent Reduction in acres		(-23.6%)	(-25.1%)	(-24.5%)	(-25.8%)	(-26.3%)	(-25.5%)
Average size patches ≥250 acres	5,243	2,128	2,022	2,104	2,066	2,054	2,074

Comparison	Historic	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt 5	Alt 6
Percent Reduction average patch size		(-59.4%)	(-61.4%)	(-59.9%)	(-60.6%)	(-60.8%)	(-60.4%)

Source: USFS Tongass National Forest GIS, pogpatch082313.xlsx

Alternative 1

Alternative 1 would not contribute to cumulative effects, but past clearcut harvest would continue to reduce available habitat. Impacts are greater at the patch scale. The 17 historic patches of POG greater than or equal to 250 acres have been split into 32 smaller blocks. Less than 77 percent of the original POG in blocks greater than or equal to 250 acres is currently present. Additional patches could be removed under Alternative 1 if the proposed land exchange is approved.

Alternatives 2, 3, 4, 5, and 6

Alternatives 2, 3, 4, 5, and 6 would contribute to cumulative effects on red-breasted sapsucker habitat (Table 59). The loss of habitat would reduce the number of large diameter trees capable of supporting cavities large enough to handle large clutch size, provide thermal insulation, and/or protection from predators. All 32 current patches greater than or equal to 250 acres would be maintained, but habitat within the patches would be reduced to 75 percent of what was historically available (Table 60). Densities in Southeast Alaska are substantially higher in old-growth than young-growth (DellaSala et al. 1996). Therefore, the loss of POG habitat combined with habitat reduction within large patches has reduced red-breasted sapsucker populations within Saddle Lakes area VCUs and WAAs. The reduction in sapsuckers has likely caused localized gaps in distribution potentially affecting predators such as goshawks.

Summary of Red-breasted Sapsucker Effects

The loss of medium-POG and low-POG habitat from management activities would reduce the number of large diameter trees capable of supporting cavities large enough to handle large clutch size, provide thermal insulation, and/or protection from predators. The loss of POG habitat combined with habitat reduction within large patches would further reduce red-breasted sapsucker populations within Saddle Lakes area VCUs and WAAs. This reduction in sapsuckers has likely caused localized gaps in distribution potentially affecting predators such as goshawks. Alternatives ranked from least effect to greatest effect are as follows: 1, 3, 6, 2, 4, and 5.

Red Squirrel

Direct/Indirect Effects

Measurement criteria includes: acres of POG at all elevations as breeding habitat. The VCU scale was used to analyze direct and indirect effects.

Effects Common to All Action Alternatives

Red squirrel densities and numbers of midden are substantially higher in mature to old forests than clearcuts (King et al. 1998, Coté and Ferron 2001). Red squirrels typically rely upon mature forests that produce large quantities of tree seed, shaded microclimates for fungal growth and long-term cone storage, and cavities for nesting. Clearcutting and management schemes that do not promote the return of forests to these conditions will not favor re-establishment and long-term persistence of red squirrels (Koprowski 2005). The lack of overstory cover in clearcuts makes red squirrels more subject to predation, especially by marten. Red squirrels in Southeast Alaska will cross short gaps caused by clearcutting if down logs and nearby trees provide for rapid, inconspicuous travel (Bakker and Van Vuren 2004, Bakker 2006). However, clearcuts limit the availability of down logs and interconnected vegetation over time and create barriers to red squirrel dispersal (Bakker 2006).

Stand age appears to influence red squirrel abundance and use of young-growth. Haughland and Larsen (2004) found that mature forest (120-140 years old) provided the best habitat followed by mature edge, thinned edge, and lastly thinned forest (81-100 years old) in young-growth stands in British Columbia. Squirrel density, overwinter success, and female reproductive success were highest in the mature forest.

Herbers and Klenner (2007) studied the effects of partial harvest on red squirrels in central British Columbia. They found an approximate 1:1 relationship between logging intensity and declining red squirrel density two to four years after logging. If findings by Herbers and Klenner (2007) are applicable in Southeast Alaska, partial harvest would reduce red squirrel densities by about 30 percent.

Alternative 1

There are no direct or indirect effects to red squirrels under Alternative 1. Large trees and snags would continue to provide quality cavity nesting habitat, thermoregulation during winter denning, and foraging habitat with abundant cone production. Overstory canopy would continue to provide interlocking canopies for efficient foraging and as escape routes from predators. Alternative 1 provides the highest level of red-squirrel density and dispersal.

Alternative 2

Alternative 2 would harvest 1,885 acres of POG habitat with roughly half (916 acres) clearcut (Table 61). Clearcutting would either reduce the total number of individual red squirrels or cause a shift into old-growth territories vacant from overwinter mortality. Red squirrel densities could be reduced by about 30 percent in partial-cut units. Alternative 2 maintains the connectivity through the small OGR in VCU 7470. Alternative 2 would maintain connectivity corridors 2, 3, and 4. The partial cutting in corridors 6, 7, and 8 would provide sufficient overhead cover to facilitate dispersal. Corridor 5 would be eliminated which would affect red squirrel dispersal and use. Because of the amount of partial cutting, Alternative 2 would have the second lowest impact of the action alternatives on red-squirrel densities and dispersal.

Table 61. Change in red squirrel habitat[1/] on NFS lands by VCU

VCU	Historic (ac)	Acres (% reduction from existing acres)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460	19,869	14,493	13,641 (-5.9%)	14,277 (-1.5%)	13,524 (-6.7%)	13,321 (-8.1%)	13,713 (-5.4%)
VCU 7470	9,388	7,903	7,126 (-9.8%)	7,435 (-5.9%)	7,050 (-10.8%)	6,809 (-13.8%)	7,136 (-9.7%)
VCU 7530	17,073	12,433	12,176 (-2.1%)	12,293 (-1.1%)	12,177 (-2.1%)	12,064 (-3.0%)	12,166 (-2.1%)

Source: USFS Tongass National Forest GIS
1/ POG all elevations.

Alternative 3

Alternative 3 would harvest 824 acres of POG habitat with 161 acres partial-cut, or about half the amount of harvest as any other action alternative (Table 61). Alternative 3 maintains important wildlife corridors facilitating dispersal into vacant territories. It also maintains the important connectivity through the small OGR between source habitat in the Naha LUD II and the remainder of the project area. Alternative 3 would have the lowest impact of the action alternatives on red-squirrel densities and dispersal.

Alternative 4

Alternative 4 would harvest 2,079 acres of POG habitat with 281 acres partial-cut (Table 61). Red squirrel densities could be reduced by 30 percent in partial-cuts, and would be eliminated from clearcuts. The amount of clearcutting would eliminate many of the leave strips that currently facilitate dispersal. In addition, Alternative 4 eliminates corridors 3, 5, 6, 7, and 8 further limiting the availability of escape routes and creating barriers to red squirrel dispersal. As a result, it may be harder for red squirrels to recolonize vacant territories that develop from winter mortality.

Alternative 5

Alternative 5 would harvest 2,635 acres of POG breeding habitat with 222 acres partial-cut (Table 61). Alternative 5 would have the greatest impact on red squirrel habitat and populations since clearcutting represents long-term to permanent reductions in breeding habitat, and shorter-term reductions in foraging habitat (until trees produce consistent cone crops). With the higher amount of clearcut harvest increased competition for remaining suitable habitat could also occur. Red squirrels would be more susceptible to predation by having fewer escape routes and fewer old-growth dispersal routes. Alternative 5 eliminates corridors 2, 3, 5, 6, 7, and 8 further impacting the availability of escape routes and creating barriers to red squirrel dispersal. Alternative 5 would move the small OGR in VCU 7470 eliminating the connectivity with source populations in the Naha LUD II. This would affect success in recolonizing the George/Carroll Inlet area in the event of serious winter mortality.

Alternative 6

Alternative 6 would harvest 1,814 acres of POG breeding habitat with 391 acres partial-cut (Table 61). Connectivity corridors 2 and 4 would be maintained, but corridors 1, 3, 5, 6, and 7 would be eliminated due to clearcutting within the corridors. The width of corridor 8 would be reduced due to clearcutting in Unit 46. Alternative 6 would have impacts on connectivity hence limiting the availability of escape routes and creating barriers to red squirrel dispersal.

Cumulative Effects

Cumulative effects for red squirrels are similar to those described above under direct effects. Suitable habitat has been reduced by timber harvest and hydropower facility construction. Recent clearcut harvest has the greatest effect followed by partial cutting and lastly historic harvest since some of these older stands may provide foraging habitat. Alaska Mental Health Trust Authority recently harvested 3,726 acres (71 percent of the land base) at Leask Lakes. It is assumed that all harvested acres were POG and therefore reduced red squirrel habitat. The proposed land exchange could affect additional acres. Additional timber harvest from the Saddle Lakes project would directly remove habitat for red squirrels. Road construction through POG has generally minor impacts in the form of reducing canopy escape routes making red squirrels more susceptible to predation (Gucinski et al. 2001). The Ketchikan to Shelter Cove Road would reduce habitat in two ways: 1) it would remove roughly 16 acres of POG during right-of-way clearing, and 2) create additional gaps in the canopy.

The Swan Lake hydropower facility flooded 500 acres during construction, although it is uncertain how much of this was POG. The proposed expansion would remove an additional 61 acres of POG habitat. The Mahoney Lake hydropower construction would not expand the current lake, but would remove (clear) an undisclosed amount of habitat on non-NFS lands for support facilities in the near future.

Alternative 1

Alternative 1 would have no effects on red squirrel habitat and would not contribute to cumulative effects. Impacts to red squirrels from past timber harvest and associated road construction have reduced habitat to roughly 75 percent of historic levels in Saddle Lakes VCUs (Table 62). Impacts have been slightly less at the broader WAA scale with roughly 81 percent of the habitat maintained, excluding the estimated 3,726 acre reduction at Leask Lakes in WAA 407 and the 605 acres at Swan Lake hydropower facility in WAA 406.

Table 62. Cumulative change in red squirrel habitat[1/] on all land ownerships by VCU and WAA

Area	Historic (ac)	Acres (% reduction from historic acres)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460	19,967	14,494 (-27.4%)	13,641 (-31.7%)	14,277 (-28.5%)	13,524 (-32.3%)	13,321 (-33.3%)	13,713 (-31.3%)
VCU 7470	12,278	9,434 (-23.2%)	8,657 (-29.5%)	8,965 (-27.0%)	8,580 (-30.1%)	8,339 (-32.1%)	8,667 (-29.4%)
VCU 7530	18,401	13,761 (-25.2%)	13,504 (-26.6%)	13,621 (-26.0%)	13,505 (-26.6%)	13,392 (-27.2%)	13,494 (-26.7%)
WAA 406	63,536	51,099 (-19.6%)	49,990 (-21.3%)	50,743 (-20.1%)	49,873 (-21.5%)	49,558 (-22.0%)	50,051 (-21.2%)
WAA 407	31,257	25,704 (-17.8%)	24,927 (-20.3%)	25,235 (-19.3%)	44,850 (-20.5%)	24,609 (-21.3%)	24,937 (-20.2%)

Source: USFS Tongass National Forest GIS, SaddleWildlfieSummariesByAlt0618.xlsx
1/ POG, all elevations.

Alternatives 2, 3, 4, 5, and 6

All action alternatives would maintain 67 to 71 percent of the red squirrel habitat in VCU 7460, 69 to 73 percent in VCU 7470, and 73 to 74 percent in VCU 7530 (Table 62). All harvest would affect canopy closure increasing the risk of predation and eliminating or reducing escape routes. Harvest would directly reduce the number or large trees suitable for denning and affect cone crop production. Young-growth stands over 40 years of age may again produce cones, but are less reliable than older trees and do not have sufficient size or decay to support dens. Long timeframes would be required for stands to develop suitable denning trees with cavities.

Summary of Red Squirrel Effects

All action alternatives would reduce historic red squirrel habitat by 26 to 33 percent and likely cause gaps in distribution. Increased fragmentation affects squirrel dispersal and increases the risk of predation and reduces overwinter survival. Reductions in red squirrel numbers could affect populations of predators such as marten and goshawk. Alternative ranking in terms of greatest to least risk is as follows: Alternative 5, 4, 6, 2, 3, and 1.

River Otter

Direct/Indirect Effects

Measurement criteria include: acres of POG within 500 feet of Class I and II streams, and POG within beach buffers. The VCU scale was used to analyze direct and indirect effects.

Effects Common to All Action Alternatives

Threats to river otter include degradation or development of coastal and riverine/riparian habitat adjacent to fish streams. Habitat alterations that result in reductions in prey populations, inadequate shelter, or increases in exposure to contaminants are particularly detrimental to river otters (Melquist et al. 2003). Since Larsen (1983) found that river otters avoided clearcuts, clearcutting represents a direct habitat loss. Structural components such as suitable large diameter trees and down logs for denning would be affected long term (150 to 300 years). Beach buffers provide the highest quality habitat and are protected by forest-wide Standards and Guidelines. All habitat within 100 feet of fish streams would be protected by riparian management area (RMA) Standards and Guidelines. Security and denning habitat and travel corridors 100 to 500 feet from the stream would be reduced (Table 63). Information on impacts of partial cutting is lacking, but single-tree selection prescriptions would likely maintain at least some habitat.

Effects to water quality would be minimal and temporary in nature (see Aquatics section). Likely sources would be LTF reconstruction, road construction, and bridge or culvert installation. These activities are not expected to have a measurable impact on otters or prey species.

Table 63. Effect on river otter habitat[1/] NFS lands, by VCU

VCU	Historic (ac)	Acres (% reduction from existing acres)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460	8,177	5,777	5,419 (-6.2%)	5,643 (-2.3%)	5,406 (-6.4%)	5,352 (-7.4%)	5,477 (-5.2%)
VCU 7470	3,102	2,679	2,462 (-8.1%)	2,563 (-4.3%)	2,435 (-9.1%)	2,351 (-12.2%)	2,435 (-9.1%)
VCU 7530	10,929	7,965	7,820 (-1.8%)	7,892 (-0.9%)	7,824 (-1.8%)	7,767 (-2.5%)	7,815 (-1.9%)

Source: USFS Tongass National Forest GIS, river_otter_beach_stream.xlsx
1/ Acres of POG within beach buffers and within 500 feet of Class I or II fish streams.

Alternative 1

Alternative 1 would maintain all existing river otter habitat. All denning and burrowing structures would remain as would security cover. Populations would continue to fluctuate from natural causes; pelt price would continue to dictate trapping pressure. Alternative 1 does the best job of maintaining river otters and all components of their habitat.

Alternative 2

Alternative 2 would reduce existing river otter habitat in VCUs 7460, 7470, and 7530 (Table 63). All river otter habitat would be protected within beach and RMA buffers, but 720 acres of denning and burrowing habitat would be affected outside these buffers. Older young growth may provide security cover, but would continue to lack the structural diversity and complexity of POG. Alternative 2 would maintain the existing small OGR in VCU 7470. As a result, it would continue to maintain quality river otter habitat above the George Inlet salt chuck outside the RMA. Alternatives 2 and 6 rank in the middle of the Alternatives – Alternative 6 harvests slightly less habitat overall, but Alternative 2 harvests less within 2 of the 3 project VCUs and prescribes less clearcutting.

Alternative 3

Alternative 3 would harvest 325 acres of river otter habitat within VCUs 7460, 7470, and 7530 (Table 63). Alternative 3 would have the least impact of the action alternatives on river otters and their habitat, but would remove den structures, security cover, and foraging habitat and reduce travel corridor width along some streams. Alternative 3 would maintain the small OGR in its current location protecting the area outside the RMA above George Inlet salt chuck.

Alternative 4

Alternative 4 would harvest 757 acres of stream associated habitat (Table 63). Harvest would reduce denning habitat, security cover, and travel corridors. It could affect individual otters and/or cause shifts in distribution or home range size. Alternative 4 would maintain the current small OGR protecting important habitat above George Inlet salt chuck. Alternative 4 ranks second highest for overall impact.

Alternative 5

Alternative 5 would have the greatest effect on river otter habitat (Table 63). Habitat outside RMAs would be reduced by 951 acres. With the relocation of the small OGR in Alternative 5, habitat above the George Inlet salt chuck would be limited to the RMA. The loss of this habitat contributes to the decline of habitat in VCU 7470 and could affect travel from the salt chuck into the large Class I system above this area. Alternative 5 would have the greatest effect on river otter habitat.

Alternative 6

Alternative 6 would harvest 694 acres of river otter habitat (Table 63). Alternative 6 would maintain the current small OGR protecting important habitat above George Inlet salt chuck. Among the action alternatives, Alternative 6 ranks third in terms of effects. Alternative 6 harvests slightly less habitat than Alternative 2 overall, but contains more clearcutting.

Cumulative Effects

Habitat on NFS lands is currently protected by the 1,000-foot beach buffer and riparian stream buffers. However, timber harvest was allowed prior to the 1997 Forest Plan and has reduced river otter habitat. Coastal habitat on non-NFS lands is not protected by Forest Plan Standards and Guidelines and many areas have been altered by development. Stream buffers on non-NFS lands appear to vary by ownership and age. The Leask Lakes timber harvest likely impacted otter habitat, but from photos of the area, some habitat was left along Leask Creek and the coastline. Swan Lake hydropower expansion would impact additional habitat above the lake. The Ketchikan to Shelter Cove Road would make additional streams accessible to trappers. Impacts to POG denning and burrowing habitat along coastlines and riverine systems are shown in Table 64.

Alternative 1

The Saddle Lakes Timber Sale would have no effect on river otters under Alternative 1 and therefore not contribute to cumulative effects. Effects to river otter come from past logging along the beach in George and Carroll Inlets and along major drainages. Older young-growth stands (greater than 26 years) within the project area are not as structurally diverse as POG since they lack understory vegetation. Young growth contains cover in the form of stumps and down logs, but most regeneration is small diameter (generally 2 to 12 inches dbh) so would not provide denning habitat. In addition, some older young growth on Cape Fox Corporation land was recently clearcut.

Table 64. Cumulative effects on river otter habitat[1/] on all land ownerships by VCU and WAA

Area	Historic (ac)	Acres (% reduction from historic acres)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460	8,218	5,777 (-29.7%)	5,419 (-34.1%)	5,643 (-31.3%)	5,406 (-34.2%)	5,352 (-34.9%)	5,477 (-33.3%)
VCU 7470	6,378	4,296 (-32.6%)	4,079 (-36.0%)	4,180 (-34.5%)	4,052 (-36.5%)	3,968 (-37.8%)	4,052 (-36.5%)
VCU 7530	13,288	9,097 (-31.5%)	8,952 (-32.6%)	9,024 (-32.1%)	8,956 (-32.5%)	8,899 (-33.0%)	8,947 (-32.6%)
WAA 406	31,006	23,432 (-24.4%)	22,928 (-26.1%)	23,225 (-25.1%)	22,919 (-26.1%)	22,809 (-26.4%)	22,981 (-25.9%)
WAA 407	17,197	10,413 (-39.4%)	10,195 (-40.7%)	10,297 (-40.1%)	10,169 (-40.9%)	10,085 (-41.4%)	10,169 (-40.9%)

Source: USFS Tongass National Forest GIS, river_otter_beach_stream.xlsx

1/ Acres of POG within beach buffers and 500 feet of Class I or II fish streams.

Alternatives 2, 3, 4, 5, and 6

Impacts to river otter habitat would be more substantial when past, present, and future management actions and activities are included. Habitat has been reduced to approximately 65 percent of historic levels within VCUs 7460, 7470, and 7530 (Table 64). Habitat has been reduced to roughly 75 percent of historic levels in WAA 406, and to less than 60 percent in WAA 407 due to past harvest along George Inlet.

Summary of River Otter Effects

Coastal beach habitat and riparian habitat on NFS lands is currently protected by Forest Plan Standards and Guidelines. Habitat outside RMAs would be affected by the Saddle Lakes action alternatives. Timber harvest has reduced river otter habitat by 30 to 40 percent, but otter populations are currently healthy and there is no limit on the number of otter that can be trapped (Porter 2010b, ADF&G 2013b). Trapping pressure is currently low due to lower pelt prices. Alternative ranking in terms of highest risk to lowest: Alternative 5, 4, 6, 2, 3, and 1.

Vancouver Canada Goose

Direct/Indirect Effects

Measurement criteria include: acres of hydric-POG [SD5H, SD4H], unproductive forest [NPOG], and forested muskeg. The VCU scale was used to analyze direct and indirect effects.

Effects Common to All Action Alternatives

Although breeding Vancouver Canada geese in Southeast Alaska often occur in forested muskeg or low-productivity forests, there is some use of POG. As a result, clearcut timber harvest would have a direct effect on goose habitat by reducing nesting, brood rearing, and escape habitat. Overstory canopy is an important component of nesting and brood rearing habitat in terms of nest location, roosting, and loafing sites (Hupp et al. 2006, Lebeda and Ratti 1983). Young clearcuts (less than 25 years old) may provide food and ground cover, but do not have a suitable tree canopy. Older young-growth stands may provide tree cover, but lack the well-developed understory needed for food and hiding cover.

Information on the effects of partial harvest on Vancouver Canada geese was not found, but the relatively low basal area removal proposed would likely maintain some level of habitat.

Table 65 shows the impacts the various alternatives would have on goose habitat. The amount of proposed timber harvest is not expected to reduce goose hunting opportunities.

Table 65. Effect on Vancouver Canada goose habitat[1/] on NFS lands by VCU

VCU	Historic (ac)	Acres (% reduction from existing acres)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460	12,125	12,125	11,657 (-3.9%)	11,934 (-1.6%)	11,582 (-4.5%)	11,406 (-5.9%)	11,622 (-4.1%)
VCU 7470	6,243	6,243	6,017 (-3.6%)	6,056 (-3.0%)	5,995 (-4.0%)	5,946 (-4.8%)	6,003 (-3.8%)
VCU 7530	14,833	14,833	14,657 (-1.2%)	14,736 (-0.7%)	14,659 (-1.2%)	14,601 (-1.6%)	14,646 (-1.2%)

Source: USFS Tongass National Forest GIS,
1/ Acres of Muskeg, NPOG, and hydric POG (SD4H, SD5H).

Alternative 1

Alternative 1 would not harvest timber or construct roads so would not affect nesting, brood rearing, or foraging habitat, nor affect escape cover. Alternative 1 ranks the highest for maintaining Vancouver Canada goose habitat and individuals.

Alternative 2

Timber harvest would decrease suitable habitat by 872 acres of which 361 acres would be partial-cut (Table 65). Timber harvest activities would directly impact nesting, brood rearing, foraging, and escape cover and could displace individual geese. Alternative 2 ranks second among the action alternatives for maintaining habitat and goose populations.

Alternative 3

Alternative 3 would harvest 476 acres of which 35 acres would be partial-cut (Table 65). Alternative 3 ranks the highest of the action alternatives for maintaining nesting, brood rearing, foraging, and escape habitat.

Alternative 4

Alternative 4 would harvest up to 966 acres of goose habitat with partial cutting occurring on 65 acres (Table 65). Alternative 4 has the second highest impact on geese and nesting and rearing habitat and could cause displacement of individual geese. It ranks fifth among the alternatives for maintaining habitat and supporting geese.

Alternative 5

Alternative 5 proposes the highest amount of harvest which would impact 1,250 acres of goose habitat (Table 65). Roughly 80 acres would be partial-cut. The movement of the small OGR in VCU 7470 into 2001 Roadless Areas would eliminate habitat within close proximity to George Inlet, an important wintering area. Among the action alternatives, this alternative ranks last in protecting habitat. It has the highest probability of displacing geese.

Alternative 6

Alternative 6 would harvest up to 931 acres of habitat and includes 137 acres of partial-cutting (Table 65). This alternative ranks fourth overall.

Cumulative Effects

Relevant cumulative effects on Vancouver Canada goose habitat come from road construction, past timber harvest, and transmission line construction (Table 66). Additional habitat loss may have resulted from Swan Lake hydropower construction, but the extent of suitable habitat is not known. Likewise, there is not information on how much of the 3,726 acres AMHTA harvest at Leask Lakes was on hydric soils. Future projects such as the Ketchikan to Shelter Cove Road and Swan Lake expansion may affect 40 acres of goose habitat. The proposed AMHTA land exchange would transfer suitable goose nesting and brood rearing habitat, including the portion of the small OGR above George Inlet, to non-NFS ownership.

Table 66. Cumulative effects on Vancouver Canada goose habitat[1/] on all land ownerships

Area	Historic (ac)	Acres (% reduction from historic acres)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460	12,126	12,126 (0%)	11,657 (-3.9%)	11,934 (-1.6%)	11,582 (-4.5%)	11,406 (-5.9%)	11,622 (-4.2%)
VCU 7470	7,674	7,674 (0%)	7,447 (-3.0%)	7,484 (-2.5%)	7,426 (-3.2%)	7,376 (-3.9%)	7,434 (-3.1%)
VCU 7530	15,557	15,557 (0%)	15,380 (-1.1%)	15,460 (-0.6%)	15,382 (-1.1%)	15,324 (-1.5%)	15,369 (-1.2%)
WAA 406	56,938	56,938 (0%)	56,292 (-1.1%)	56,649 (-0.5%)	56,219 (-1.3%)	55,985 (-1.7%)	56,247 (-1.2%)
WAA 407	31,471	31,471 (0%)	31,244 (-0.7%)	31,281 (-0.6%)	31,223 (-0.8%)	31,173 (-0.9%)	31,231 (-0.8%)

Source: USFS Tongass National Forest GIS,
1/ Acres of Muskeg, NPOG, and hydric POG (SD4H, SD5H).

Alternative 1

Known past harvest was on non-hydric soils and had minimal impact on goose habitat or populations. Some units on hydric soils (SD4H SD5H) may have been harvested on non-NFS lands, including recent harvest within the Leask Lakes area, but habitat data is not available for these areas. Likewise, proposed projects such as the Ketchikan to Shelter Cove road and hydropower construction/expansion could affect up to 83 acres. Populations would continue to fluctuate from natural causes such as predation, disease, hunting, and other factors. The completion of the Ketchikan to Shelter Cove road could have the greatest impact on area geese as it would provide road access during hunting seasons.

Alternatives 2, 3, 4, 5, and 6

Past and proposed timber harvest plus other foreseeable projects would reduce suitable nesting, brood rearing and foraging habitat in project area VCUs (Table 66). The disturbance from timber harvest, hydropower expansion and construction, and road construction would directly impact nesting, brood rearing, foraging, and escape cover. Some individuals could be displaced, fail to nest, or abandon broods due to habitat loss and/or disturbance, but huntable populations would still exist. The

Ketchikan to Saddle Lakes Road would provide increased access for hunters making George and Carroll Inlets and area lakes accessible from Ketchikan and Saxman.

Summary of Canada Goose Effects

None of the alternatives would have a substantial impact on overall goose habitat and therefore populations although some individuals could fail to nest, could abandon broods, be less successful foraging, or be more susceptible to predation as primary habitat is lost. Over 94 percent of the historic habitat would be maintained into the future. No restrictions in hunting are anticipated from implementing the Saddle Lakes Timber Sale.

Other Species of Interest

Endemic Small Mammals – Revillagigedo Island Southern Red-backed Vole

Direct/Indirect Effects

Measurement criteria include: acres of POG at all elevations. The VCU scale was used to analyze direct and indirect effects.

Alternative 1

Alternative 1 would not impact small endemic mammals or more specifically the Revilla Island red-backed Vole. All existing habitats would be maintained. Populations would continue to fluctuate from natural causes such as weather and predation.

Alternatives 2, 3, 4, 5, and 6

Endemic species within island geography are especially vulnerable to extinction. Habitat destruction, direct hunting, competition for food, and other factors also put intense pressure on island endemics (Cook and MacDonald (2013a).

The effects of clearcutting and fragmentation on endemic populations of small mammals are largely un-documented, but have potential for substantial impacts (Cook and MacDonald 2001). Clearcut harvesting creates a highly fragmented landscape that increases the amount of forest-opening edge and decreases the size of old-growth forest patches. These patches may be too small or isolated from other similar stands to function habitat for less mobile species associated with old-growth (Harris 1984, Thomas et al. 1988). The isolation of small mammal populations and the lack of connectivity of suitable habitat increase the risk and decrease the likelihood of long-term persistence of local populations after extensive clearcut harvest (Swanston et al. 1996).

No studies have been completed on red-back Vole response to partial cutting in Alaska. In general, red-backed Voles seem to persist in some partially harvested forests if mature forest components such as large overstory coniferous trees, downed logs, and understory are maintained (Sullivan and Sullivan 2011, Fauteux et al. 2012)..In a 14 year study in British Columbia, Ransome et al. (2009) found that red-backed vole numbers were highest in uncut forest, intermediate in 2.5 acre group selection cuts with 33 percent removal, and lower in large clearcuts.

Effects to red-backed Vole habitat would be similar to those described under Red Squirrel (see Table 61). Partial-cutting would maintain habitat for red-backed Voles although Vole densities would likely be reduced based upon the above research. Clearcutting would remove habitat long-term, affect size and connectivity of remaining habitat patches, and put small mammal populations at higher risk of local extirpation. Alternatives 4, 5, and 6 would further impact small endemics eliminating corridors 3, 5, 6, 7, and 8. Since the predominant prescription in Alternative 5 is even aged clearcutting, it would have the most substantial effect overall.

Alternative 5 would move the existing small OGR in VCU 7470 into 2001 Roadless and remove the connectivity between source habitat in the Naha LUD II and George and Carroll Inlets making it harder for vacant territories to be recolonized.

Cumulative Effects

Cumulative changes to POG habitat for red-backed voles (25 to 32 percent reduction from historic levels) are the same as for red squirrels (Table 62). The extent to which cumulative disturbance from forest management poses a threat to the persistence of endemic Revillagigedo red-backed Vole populations remains unclear and they may not be as sensitive to overstory removal as reported for Voles elsewhere (Smith and Nichols 2004, Smith et al. 2005). However, Smith et al. 2005 found that overall young-growth was a population sink.

Summary of Endemic Small Mammal Effects

All action alternatives, combined with past, present, and future activities, would reduce historic red-back Vole POG habitat by up to 32 percent. Young-growth may provide habitat when cyclic populations are high, but their long-term value has been questioned. Densities were lower long-term, and reproductive success and body condition were lower suggesting that young-growth is a sink habitat. Changes in red-back Vole numbers could affect predators such as goshawks and marten.

Neotropical Migratory Birds

Direct/Indirect Effects

Alternative 1

Alternative 1 would maintain all existing habitat for neotropical migratory birds.

Alternatives 2, 3, 4, 5, and 6

Direct habitat and disturbance related effects to migratory birds would occur under all action alternatives. As with other species, clearcut harvest would have the greatest impacts to habitat. The primary effect to birds would be nest destruction or abandonment if management activities occur in suitable nesting habitat during the breeding/nesting period, which generally begins April 15 and continues until July 15 when young birds have fledged (USFWS 2009b). The normal timber operating season is April 1 through November, but activities may occur outside this season if weather permits. Therefore, there is substantial overlap with the nesting period of migratory birds and impacts are likely.

Species most likely to be affected are those that nest in hemlock/Sitka spruce forests (e.g., chestnut-backed chickadee, Pacific-slope flycatcher) where timber harvest occurs, and thus the amount of harvest proposed under the alternatives is a measure of the extent of potential effects (USDA 2008c pp. 3-288 & 3-289). Changes in POG habitat can be used to assess changes in nesting habitat for migratory bird species that use hemlock/spruce/cedar forest as primary or secondary habitats (see MIS section above for discussion of various POG habitats). Nesting birds repeatedly disturbed by people in proximity to the nest could abandon the effort. See Wildlife Resource Report for additional information.

Species that utilize early successional or shrub habitats (e.g. McGillivray’s warbler, golden-crowned sparrow, and golden-crowned kinglet) may benefit short-term (1 to 25 years) from the proposed timber harvest due to the increase shrub production in early clearcuts. Habitat would be reduced long-term with the onset of stem exclusion.

Impacts to species using other habitats (e.g., cliffs, tide flats, rocky shorelines) would be negligible at the population level.

Cumulative Effects

Alternative 1

Under Alternative 1 there would be no cumulative effect on migratory birds as a result of implementing the Saddle Lakes timber sale. Previously harvested habitat would remain unsuitable for many species into the long term future.

Alternatives 2, 3, 4, 5, and 6

Alternatives 2 through 6 would contribute to cumulative effects. Past activities have removed habitat suitable for forest related migratory birds. Impacts to POG habitat would be similar to MIS discussions above.

Summary of Neotropical Migratory Bird Effects

All action alternatives harvest hemlock/spruce/cedar forest, used as primary habitat by 14 migratory bird species. Alternative are not anticipated to have a measurable effect on any migratory bird populations, although individuals and their nests may be impacted. Timber operating seasons overlap substantially with the migratory bird nesting season and can lead to nest destruction and/or abandonment.

Threatened, Endangered, Candidate, and Sensitive Species

A detailed analysis of effects on threatened, endangered, candidate, and sensitive species is provided in the Saddle Lakes Biological Evaluation and summarized in Table 67. Effects to the marine environment would be limited to temporary disturbance from LTF reconstruction and project related vessel traffic. Because timber harvest would reduce nesting and foraging habitat, detailed analysis of effects to the Queen Charlotte goshawk is provided below.

Table 67. Summary of threatened, endangered, candidate, and sensitive species determinations

Federally Listed Species	No Effect	Beneficial Effect	Not Likely to Adversely Affect	Likely to Adversely Affect
Humpback Whale	Alt 1		Alts 2, 3, 4, 5, 6	
R10 Sensitive Species	No Impact	Beneficial Impact	May Impact Individuals[1/]	Likely to Result in Loss or Trend[2/]
Steller's Sea Lion	Alt 1		Alts 2, 3, 4, 5, 6	
Yellow-billed loon	Alt 1		Alts 2, 3, 4, 5, 6	
Pacific herring	Alt 1		Alts 2, 3, 4, 5, 6	
Queen Charlotte Goshawk	Alt 1		Alts 2, 3, 4, 5, 6	

1/ Actual determination: "may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing".

2/ Actual determination: "likely to result in a loss of viability in the Planning Area, or a trend toward federal listing."

Queen Charlotte Goshawk

Direct/Indirect Effects

Measurement criteria include: medium- and high-POG (SD4N, SD4S, SD5H, SD5N, SD5S, SD67) less than 1,000 feet elevation for nesting habitat, and all POG less than 1,000 feet elevation for foraging habitat. The VCU scale was used to analyze direct and indirect effects.

Effects Common to All Action Alternatives

Timber harvest affects goshawks by reducing the amount of suitable nesting habitat, and impacting prey abundance, and/or prey availability (USFWS 2007). Nest habitat is affected in two ways: direct removal of higher volume, structurally diverse habitat and increased fragmentation. Nests tend to be located in the least fragmented areas of individual home ranges, and nest areas in large patches of old or mature forest are used more consistently than those in small patches (multiple studies summarized in USFWS 2007).

Clearcut logging "significantly degrades" habitat for the goshawk by creating large forest openings devoid of prey (USFWS 2007). Young growth may support some prey species. However, prey are generally unavailable because stand structure is too dense to allow goshawks to hunt effectively (USFWS 2007). Logging removes both foraging cover and perches. Goshawks hunt by alternating short flights with a period of watching from a perch, then attacking prey from the perch. This method of hunting relies on cover to conceal the predator's approach, perches from which to observe and attack, adequate visibility for spotting prey, and adequate space between trees to allow for flying between perches and attacking prey (USFWS 2007). Prey abundance has been shown to have a direct influence on whether goshawks nest in any given year. Low prey diversity increases goshawk sensitivity to habitat modification since habitat reduction may reduce prey abundance (see red squirrel, hairy woodpecker, and red-breasted sapsucker analysis in Wildlife Resource Report). Longer foraging distances increase energy demands on adults and increase risk of nest abandonment and decrease protection of chicks from adverse weather or predation. Thus, habitat quantity and quality is a function of the amount and distribution of POG through space and time (USFWS 2007). Clearcutting may also favor open habitat competitors or predators such as red-tailed hawks, barred owls, and great-horned owls (USFWS 2007).

Partial cutting has less effect on goshawks because it retains some older trees for nesting, maintains relatively high value foraging habitat, and maintains habitat for a diverse suite of prey (Iverson et al. 1996).

Timber harvest, and subsequent lack of habitat, could increase competition by other raptors, increase predation, reduce life expectancy, and reduce nesting success.

Alternative 1

Alternative 1 would have no direct or indirect impact on goshawks because no timber harvest activities would occur. All existing nesting and foraging habitat would remain intact to support current levels of goshawks and prey (Table 68). Natural processes such as weather and fluctuations in prey would continue to influence whether goshawks nest in any given year.

Alternative 2

Alternative 2 would clearcut 733 acres of goshawk nesting habitat and partial-cut 712 acres (Table 68). Partial-cutting would occur on a portion of the quality habitat on the south side of North Saddle Lakes and above the beach buffer near Island Point. Nesting habitat would become more fragmented throughout the project area.

Alternative 2 would impact 1,726 acres of foraging habitat of which 892 acres (52 percent) would be clearcut. With impacts to foraging habitat, goshawks may spend more time foraging and forage further distances which could impact chick survival and condition. All nesting and foraging habitat within the existing OGR would be maintained. Alternative 2 ranks second among the action alternatives for preserving goshawk habitat behind Alternative 3.

Table 68. Impacts to goshawk habitat on NFS lands by VCU

Habitat	Historic (ac)	Acres (% reduction from existing)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
VCU 7460							
Nesting[1/]	11,476	7,745	7,126 (-8.0%)	7,603 (-1.8%)	7,068 (-8.7%)	6,948 (-10.3%)	7,216 (-6.8%)
Foraging[2/]	13,196	8,846	8,052 (-9.0%)	8,637 (-2.4%)	7,978 (-9.8%)	7,820 (-11.6%)	8,129 (-8.1%)
VCU 7470							
Nesting[1/]	5,288	4,539	3,915 (-13.7%)	4,174 (-8.0%)	3,843 (-15.3%)	3,620 (-20.2%)	3,846 (-15.3%)
Foraging[2/]	6,523	5,150	4,474 (-13.1%)	4,737 (-8.0%)	4,403 (-14.5%)	4,169 (-19.0%)	4,406 (-14.4%)
VCU 7530							
Nesting[1/]	11,721	7,383	7,181 (-2.7%)	7,279 (-1.4%)	7,182 (-2.7%)	7,094 (-3.9%)	7,171 (-2.9%)
Foraging[2/]	13,353	8,783	8,527 (-2.9%)	8,644 (-1.6%)	8,527 (-2.9%)	8,437 (-3.9%)	8,516 (-3.0%)

1/ Nesting habitat = high-POG & medium-POG ≤1,000 feet elevation.
2/ Foraging habitat = POG ≤1,000 feet elevation.

Alternative 3

Alternative 3 would have the least impact on goshawk nesting and foraging habitat and consequently the least impact on goshawks of the action alternatives (Table 68). Alternative 3 would impact 611 acres of nesting habitat of which 500 acres (82 percent) would be clearcut. Alternative 3 would impact 762 acres of foraging habitat of which 647 acres (85 percent) would be clearcut. All nesting and foraging habitat within the existing OGR would be maintained. High quality nesting and foraging habitat on the south side of North Saddle Lakes and above the beach buffer near Island Point is maintained under this alternative. Alternative 3 maintains additional connectivity and reduces the amount of fragmentation.

Alternative 4

Alternative 4 ranks fifth among the action alternatives in terms of maintaining nesting and foraging habitat to support goshawk populations. Alternative 4 would impact 1,574 acres of nesting habitat of which 1,398 acres (89 percent) would be clearcut. Alternative 4 would impact 1,870 acres of foraging habitat of which 1,678 acres (90 percent) would be clearcut (Table 68). All habitat within the existing OGR would be maintained. Quality habitat on the south side of North Saddle Lakes would be either clearcut or partial cut and the habitat above the beach buffer near Island Point would be clearcut. Alternative 4 would create a more fragmented landscape and does not maintain connectivity corridors for important prey species.

Alternative 5

Alternative 5 would have the greatest impact on nesting and foraging habitat and on goshawks overall (Table 68). Of the 2,002 acres of nesting habitat being harvested, 1,864 acres (93%) would be clearcut. Alternative 5 would impact 2,352 acres of foraging habitat of which 2,196 acres (93%) would be clearcut. High quality habitat on the south side of North Saddle Lakes and above the beach buffer near Island Point would be clearcut under this Alternative. In addition, the small OGR in VCU 7470 would be relocated into the North Revilla Roadless area reducing the amount of high-POG habitat and further fragmenting the area. Under Alternative 5, the project area would be highly fragmented outside of OGRs and Roadless areas.

Alternative 6

Alternative 6 ranks third for maintaining nesting and foraging habitat and supporting goshawk populations. Alternative 6 would reduce goshawk nesting habitat by 1,435 acres of which 1,151 acres (80%) would be clearcut (Table 68). Alternative 6 would impact 1,728 acres of foraging habitat of which 1,449 acres (84%) would be clearcut. Quality habitat on the south side of North Saddle Lakes would be either clearcut or partial-cut. The habitat above the beach buffer near Island Point would be clearcut. The existing OGR in VCU 7470 would be maintained, but connectivity corridors would not be implemented increasing fragmentation overall.

Cumulative Effects

All ownerships within project area VCUs and WAAs were used for cumulative effects analysis.

Additional impacts to goshawks come from the past timber harvest on all ownerships. Current high levels of fragmentation and impacts on nesting habitat (up to 45 percent reduction from historic levels) could be affecting goshawk use of the area and limiting nesting. Research in British Columbia suggests that landscapes that should be managed for at least 40 to 50 percent mature and old-growth forest to provide adequate nesting and foraging habitat for Queen Charlotte goshawks (Doyle 2005, Northern Goshawk Recovery Team 2008). Up to 33 percent of the productive old-growth in a watershed or VCU in early seral stage (i.e. at least 67 percent in old-growth) was considered capable of sustaining goshawks on the Tongass (Iverson et al. 1996, 1997 FP Appendix N pages N-38 thru N-41). Harvesting at a rate exceeding this and creating an excess amount of early (0 to 100 year old) forest increases the risk of not sustaining goshawks (1997 FEIS, p. 3-393, Iverson et al. 1996).

Goshawks are at or would be at increased risk of sustainability as a result of Saddle Lakes and identified future projects. VCUs 7460 and 7530 are currently at increased risk with more than 33 percent of the suitable habitat harvested (Table 69). Impact would increase up to 43 percent as a result of the Saddle Lakes project. VCU 7470 currently contains less than 33 percent young-growth, but would be above and therefore at higher risk, after implementation of the Saddle Lakes and other foreseeable projects. Habitat alteration and fragmentation can affect goshawk survival and productivity at the population level if it decreases foraging habitat quality across the landscape (USFWS 2007). WAA 406 would remain below 33 percent, but WAA 407 is currently at higher risk of sustaining goshawks at the landscape scale by having more than 33 percent of the historic goshawk habitat in young-growth. This could affect breeding and nesting success, force goshawks to range further to forage and increase the risk of nest abandonment. Non-NFS harvest, such as the Leask Lakes timber sale, and hydropower construction/expansion would further increase risk..

Random events coupled with reduced suitable habitat patch sizes and connectivity may disrupt source–sink dynamics by modifying the balance between local extinction and recolonization (Sonsthagen et al. 2012). Since the Revillagigedo Island cluster is already a short-term, long-term, and historic population sink (Sonsthagen et al. 2012), this loss of goshawk habitat increases the risk of local extirpation.

Table 69. Cumulative impact goshawk habitat on all land ownerships by VCU and WAA

Habitat	Historic (ac)	Acres (% reduction from existing acres)					
		Existing \ Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt 5	Alt 6
VCU 7460							
Nesting	12,196	7,748 (-36.5%)	7,129 (-41.5%)	7,606 (-37.6%)	7,071 (-42.0%)	6,951 (-43.0%)	7,219 (-40.8%)
Foraging	13,297	8,849 (-33.5%)	8,055 (-39.4%)	8,640 (-35.0%)	7,981 (-40.0%)	7,823 (-41.2%)	8,132 (-38.8%)
Over 33% clearcut?		Y	Y	Y	Y	Y	Y
VCU 7470							
Nesting	8,864	5,962 (-32.7%)	5,338 (-39.8%)	5,596 (-36.9%)	5,266 (-40.6%)	5,042 (-43.1%)	5,268 (-40.6%)
Foraging	9,582	6,680 (-30.3%)	6,004 (-37.3%)	6,267 (-34.6%)	5,934 (-38.1%)	5,699 (-40.5%)	5,936 (-38.1%)
Over 33% clearcut?		N	Y	Y	Y	Y	Y
VCU 7530							
Nesting	14,696	8,442 (-42.6%)	8,241 (-43.9%)	8,339 (-43.3%)	8,241 (-43.9%)	8,157 (-44.5%)	8,230 (-44.0%)
Foraging	16,229	9,975 (-38.5%)	9,719 (-40.1%)	9,836 (-39.4%)	9,719 (-40.1%)	9,629 (-40.7%)	9,708 (-40.2%)
Over 33% clearcut?		Y	Y	Y	Y	Y	Y
WAA 406							
Nesting	40,172	27,934 (-30.5%)	27,114 (-32.5%)	27,689 (-31.1%)	27,056 (-32.6%)	26,851 (-33.2%)	27,193 (-32.3%)
Foraging	44,126	31,887 (-27.7%)	30,837 (-30.1%)	31,539 (-28.5%)	30,764 (-30.3%)	30,516 (-30.8%)	30,904 (-30.0%)
Over 33% clearcut?		N	N	N	N	N	N
WAA 407							
Nesting	25,153	14,535 (-42.2%)	13,911 (-44.7%)	14,169 (-43.7%)	13,839 (-45.0%)	13,615 (-45.9%)	13,841 (-45.0%)
Foraging	28,481	17,862 (-37.3%)	17,186 (-39.7%)	17,449 (-38.7%)	17,166 (-39.7%)	16,882 (-40.7%)	17,118 (-39.9%)
Over 33% clearcut?		Y	Y	Y	Y	Y	Y

Source: USFS Tongass National Forest GIS.

Issue 3B. Subsistence Use

Unit of Measure:

- Deer abundance and competition estimated by hunter demand as a percent of DHC.

Introduction

The Alaska National Interest Lands Conservation Act (ANILCA), passed by Congress in 1980, mandates that rural residents of Alaska, including both Natives and non-Natives, be given a priority for subsistence uses of fish and wildlife. The subsistence regulations contained in 50 C.F.R § 100.3(c)(25) apply on all public lands, excluding marine waters, but including all inland waters, both navigable and non-navigable, within and adjacent to the exterior boundaries of the Tongass National Forest, including Admiralty Island National Monument and Misty Fjords National Monument.

While there are a variety of cultural, popular, and sociological definitions and interpretations of subsistence, Congress addressed this subject in Section 803 of ANILCA.

Section 810 of ANILCA requires the Forest Service, in determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of National Forest System land in Alaska, to evaluate the potential effects on subsistence uses and needs. This analysis typically focuses on food-related resources most likely to be affected by habitat loss or alteration associated with land management activities.

The U.S. District Court Decision in Kunaknana v. Watt defines a significant restriction to subsistence use:

> “restriction for subsistence uses would be significant if there were large reductions in abundance or major redistribution of these resources, substantial interference with harvestable access to active subsistence-use sites, or major increases in non-rural resident hunting”.

Incomplete and Unavailable Information

Current subsistence use information is lacking. Surveys for Ketchikan (non-rural) were completed five years ago. Information for Saxman and Metlakatla is approximately 13 years old. Accurate data cannot be derived from ADF&G harvest records since some Saxman residents have a Ketchikan mailing address.

Existing data is sufficient to determine that deer are the main land mammal used and that use of deer is minor compared to marine resources.

Affected Environment

The Saddle Lakes project area and WAAs 406/407 fall within the community use areas of Metlakatla, Saxman, and Ketchikan. Metlakatla and a portion of Saxman are classified as rural and receive subsistence priorities under ANILCA. Ketchikan is classified as a non-rural community and residents do not have a subsistence priority under ANILCA.

Subsistence use areas vary by community, but the highest use generally occurs within a 15-mile radius of the community (USDA 2008c, p. 3-426). More extensive areas beyond the intensively used core are occasionally used. Intensive uses of core areas result from the economic need to be efficient. Wolfe (2004) contrasts the difference between subsistence objectives and sport hunting:

- Subsistence users typically hunt and fish in ways to efficiently optimize food output per investment of effort and money. Special trips to more distant parts of the community use area occur seasonally for special resources, or on certain years when local fish and game are scarce;
- Sport hunting commonly promotes principles of "fair chase," high-quality hunts, and greater opportunities for participation by other sportsmen. Less emphasis is placed on using the most efficient logging system or on distance traveled.

Salmon and other finfish, shellfish, marine plants and mammals, terrestrial wildlife including deer and other mammals, as well as berries, cedar bark, and timber are all subsistence resources harvested by rural communities in Southeast Alaska.

Community Profiles

Subsistence research conducted in Southeast Alaska over the past two decades has included detailed community studies, use area mapping, household surveys, and studies of specific subsistence harvests. The Tongass Resource Use Cooperative Survey (TRUCS) was completed in 1988. The 1997 Forest Plan provided a comprehensive analysis of subsistence resources and potential effects, both Tongass-wide and for each rural community of Southeast Alaska. Detailed community use information is available in the 1997 Forest Plan FEIS (USDA 1997a, pgs. 3-419 to 3-435, 3-575 to 3-714, and Appendix H). Additional information is presented in the 2008 Forest Plan FEIS (USDA 2008c, pp. 3-419 through 3-433).

Metlakatla

Metlakatla is located on Annette Island, 15 miles south of Ketchikan. It is a Federal Indian Reservation and a traditional Tsimshian community with a subsistence lifestyle. Metlakatla residents harvest an average of 70 pounds of wild resources per person per year. In 1987, Metlakatla residents harvested 55 pounds of fish and marine invertebrates per person, which comprised 78 percent of the total resource harvest (ADF&G 1999b). Deer and other mammals comprised 17 percent. Deer comprised almost 11 pounds per person or roughly 15 percent of harvested resources.

The majority (70 percent) of deer harvest by Metlakatla residents takes place in three WAAs (101, 202, and 405) located in the vicinity of the community (USDA 2008c, p. 3-649). Therefore, while some Metlakatla residents may hunt in the Saddle Lakes area, it is not a major use area for deer.

Saxman

Saxman is located two miles south of Ketchikan on the South Tongass Highway. Tlingits from the old villages of Tongass and Cape Fox resettled at the present site of Saxman in 1894. Today Saxman continues as a predominantly Tlingit community, with its own city and tribal governing bodies. Saxman is a recognized Native village with most residents maintaining a subsistence based lifestyle.

WAA 406 is one of the areas where Saxman residents obtain approximately 75 percent of their annual deer harvest. With the completion of the Ketchikan to Shelter Cove road, use within this area is expected to increase.

Saxman residents harvested 152 pounds of fish and marine invertebrates per person in 1999, which comprised 70 percent of per capita subsistence harvest in Saxman (ADF&G 2000). Deer accounted for 18 percent of the harvest. Harvest of all land mammals (including deer) dropped to only 13 percent (ADF&G 2000).

Ketchikan

Ketchikan does not have subsistence priority under ANILCA. However, many Ketchikan residents use the Tongass National Forest for hunting and fishing. The first Ketchikan residents were Tlingit members of the Tongass Tribe (Garza et al. 2006). Ketchikan became a European town in 1880 when the first fish cannery was built. WAAs 406 and 407 are two of the areas where Ketchikan residents obtain approximately 75 percent of their annual deer harvest. With the completion of the Ketchikan to Shelter Cove road, use within these WAAs is expected to increase.

No comprehensive household harvest survey has been conducted for Ketchikan. In 2006, the Ketchikan Indian Community (KIC) conducted their own survey using ADF&G standard household survey protocols adapting the household survey questions which had been used in Saxman (Garza et al. 2006). According to their survey results, Ketchikan residents harvest an average of 90 pounds of wild resources per person, per year. Ketchikan residents harvested 70 pounds of fish and marine invertebrates per person in 2006, which comprised 78 percent of total resource harvest (Garza et al. 2006). Total large land mammal harvest comprised roughly 15 percent. Deer comprised 10.5 pounds per person or roughly 12 percent of harvested resources.

Environmental Consequences

ANILCA requires the analysis of the potential effects on subsistence uses of all actions on federal lands in Alaska. This analysis most commonly focuses on those food-related resources most likely to be affected by habitat degradation associated with land management activities.

Marine resources account for more than half of the total per capita harvest in all Southeast Alaska communities. As a result, management activities that restrict access for subsistence harvest of land mammals have had a relatively small effect on overall subsistence harvest by weight (USDA 2008c, p. 3-424). The 2008 Forest Plan Record of Decision determined that, Forest-wide, under full implementation of the plan, the only subsistence resources likely to be significantly affected was Sitka black-tailed deer (USDA 2008a, p. 61).

Three factors related to subsistence uses are specifically identified by ANILCA: 1) resource distribution and abundance, 2) access to resources, and 3) competition for the use of resources.

Effects on Subsistence Use of Deer

Distribution and Abundance

Deer populations on Revillagigedo Island are thought to be at very low levels (Porter 2011a). Populations fluctuate seasonally in response to winter weather and predation, and long-term in response to clearcutting (Porter 2011a). Under all alternatives, including the No Action Alternative, deer habitat capability will decrease as a result of proposed harvest and existing young-growth stands entering the stem exclusion stage. Under the alternatives analyzed in this EIS, the possibility of a change in abundance or distribution would be roughly the same for Alternatives 2, 4, and 6, slightly less for Alternative 3, and slightly more for Alternative 5. The Saddle Lakes project would reduce deer habitat capability up to 8 percent from existing conditions, and up to 61 percent from historic habitat capabilities. The stem exclusion effect from past harvest would override the short-term increase of forage in the new clearcuts due to even-aged management. The reader is referred to the Sitka black-tailed deer MIS Section for more information.

Some localized shifts in deer distribution could occur in response to the disturbance caused by harvest activities, and the reduction in POG forest and habitat connectivity. However, this is not expect to change overall distribution within WAAs 406 or 407, or cause mass migration of deer to adjacent

WAAs (Colson et al. 2012, BC Ministry of Deer 1999, McNay and Vollner 1995). Under Alternative 5, and to a slightly lesser extent under Alternatives 4, 6, 2, and 3, the proposed timber harvest would remove existing “leave strips” of POG between past harvest units. The remaining POG would be further away from roads so deer could be less accessible to hunters or require more effort to obtain.

Access

ANILCA Section 811 states that rural residents engaged in subsistence uses shall have reasonable access to subsistence resources on the public lands. None of the alternatives would limit the use of public lands for the purposes of subsistence gathering activities. Beach access would not be affected by the Saddle Lakes project. Initial access to most deer hunting is currently by boat, but the road systems are used to access additional areas.

The 2008 KMRD Access Travel Management Plan (ATM) Decision Notice (DN) and Finding of No Significant Impact (FONSI) determined which roads on Revillagigedo Island would remain open to public use. Roads closed under the ATM decision are technically closed even though not all physical barriers have been installed to date. The Saddle Lakes project decision would update the ATM to include project constructed roads, but would not change access decisions made in the ATM. Closed roads would provide easier walk-in access for hunters until such time as brush and alder make the roads impassable. Total impassability from brush is not expected to occur within the foreseeable future.

The Ketchikan to Shelter Cove Road would connect additional areas in WAA 407 (including the Saddle Lakes area), and would connect WAA 406 west of Carroll Inlet to the communities of Saxman and Ketchikan. This additional road access is expected to increase hunting pressure within the Saddle Lakes project area and could lead to increased competition between user groups (see Competition section below). All communities having new road access to previously under-utilized subsistence areas have capitalized on the opportunity to expand their range. Subsistence use from Metlakatla may also expand given the daily ferry service between Metlakatla and Ketchikan. The Ketchikan to Shelter Cove Road will make access less weather dependent.

Competition for Deer

For analyzing competition, the following assumptions are made consistent with the Forest Plan FEIS (USDA 2008c, p. 3-432):

- Habitat reductions will result in increased competition if regulations allow sport use to remain constant, with the same number of users seeking fewer huntable resources.
- The demand for resources will remain constant or increase slightly as the habitat capability remains the same or declines over time.

Changes in deer abundance from timber harvest and increased road access to deer by both rural and non-rural hunters would affect competition for deer. Increased competition may result when less expensive access to the area or within the area is provided. Such is the case when road systems are established to local communities (USDA 2008c, p. 3-421).

Over 90 percent of GMU 1A hunters are local residents living within GMU 1A (Porter 2011a). From the 1999 data, Saxman residents harvested an estimated 198 deer whereas Ketchikan residents harvested 760 deer in GMU 1A (ADF&G 1999).

Because actual hunter demand is unknown, ADF&G deer harvest survey reports were used in this analysis to estimate the hunter demand. While these reports were extrapolated from random surveys for many years, the data provides the best available information. ADF&G has recently gone to mandatory reporting for all deer hunters which, over time, will provide better information.

ADF&G deer harvest survey results for WAA 406 (email from B. Porter, ADF&G, 08/19/2013) show an average of 56 deer per year being harvested from 2002 to 2011. WAA 407 received less use with an average of 21 deer harvested per year. Actual harvest averages 0.6 deer per hunter or 1.6 deer per successful hunter in WAA 406, and 0.3 deer per hunter or 1.1 deer per successful hunter in WAA 407.

Based on these results, the total number of hunters times two deer per hunter was used to estimate demand. This may be a slightly conservative approach since not all hunters are successful and actual harvests are less. Some hunters may also hunt in more than one WAA or GMU. After including predation in the deer model since wolves and bear are present in Saddle Lakes area WAAs, hunter demand for 190 deer equates to 8 percent of the historic habitat capability in WAA 406. Hunter demand for 142 deer in WAA 407 equals 9 percent of the historic habitat capability.

Table 70. Estimated deer harvest as a percent of deer habitat capability (DHC) by WAA.

WAA	Stand Age	Estimated Hunter Demand as a Percent of DHC						
		Historic	Existing / Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
WAA 406	0-25 years	2,284 (8%)	1,613 (12%)	1,588 (12%)	1,603 (12%)	1,587 (12%)	1,582 (12%)	1,590 (12%)
	26-200 years	2,284 (8%)	1,564 (12%)	1,533 (12%)	1,557 (12%)	1,530 (12%)	1,522 (12%)	1,536 (12%)
WAA 407	0-25 years	1,578 (9%)	669 (21%)	649 (22%)	657 (22%)	646 (22%)	638 (22%)	647 (22%)
	26-200 years	1,578 (9%)	652 (22%)	626 (23%)	637 (22%)	621 (23%)	611 (23%)	623 (23%)

Source: USFS Tongass National Forest GIS.

1/ Habitat capability reduced by 36% to account for predation. Non-NFS lands were given zero value per deer model direction.

It is assumed that a deer population at carrying capacity should be able to support a hunter harvest (demand) of approximately 10 percent of the habitat capability that is sustainable and provides a reasonably high-level of hunter success (USDA 2008c, pp. 3-428). Hunter success can be expected to decline when demand represents 10 to 20 percent of habitat capability. If demand exceeds 20 percent of habitat capability, harvest of deer by hunters may be restricted. This is done either directly through restrictions in seasons and bag limits, or indirectly through reduced hunter efficiency and increased difficulty in obtaining deer relative to historical rates.

Demand would remain at approximately 12 percent in WAA 406 (Table 70). Hunters in areas where demand is between 10 to 20 percent of habitat capability may experience reduced hunter efficiency, and moderate difficulty in obtaining deer. Demand would increase from 21 to 22 percent of habitat capability in WAA 407 (Table 70). Over the long-term, the proposed harvest would develop into stem exclusion and further reduce habitat capability. Current and projected deer demand in WAA 407 is at the level at which deer harvest may be restricted (greater than 20 percent), either directly through restrictions in seasons and bag limits, or indirectly through reduced hunter efficiency and increased difficulty in obtaining deer relative to historical rates. This fits with the harvest survey data in that WAA 407 has a lower success rate than WAA 406. Based upon the 2002 to 2011 harvest data averages

(Porter 2013b), 38 percent of all hunters were successful in WAA 406, whereas only 23 percent were successful in WAA 407.

Trends are not likely to change as a result of the Saddle Lakes project. Ketchikan residents would continue to harvest the greatest number of deer from the Saddle Lakes WAAs. Therefore, reductions in habitat capability to support deer could lead to increased competition between rural and non-rural hunters for available resources. Demand may also increase with the road connection to Ketchikan. Use from Metlakatla may increase causing additional completion between rural subsistence users. Additional non-rural and non-resident hunters may hunt the area given the easy access to and from Ketchikan. If future restrictions are necessary due to increased demand and less deer, then Ketchikan and other non-rural hunters would be restricted first. If further restrictions become necessary, then a “customary and traditional use” determination could be made for Saxman and potentially Metlakatla restricting other subsistence.

Effects on Subsistence Use of Fish

For Metlakatla, Saxman, and Ketchikan, fish is by far the major subsistence resource harvested, averaging 59 percent of the total subsistence harvest. During 2011, sockeye salmon made up 80 percent of the regional harvest for the Ketchikan subsistence and personal-use combined fisheries area, which includes Metlakatla and Saxman (ADF&G 2013). Currently there is no regulated sockeye subsistence or personal-use fishery within the Saddle Lakes project area. Other fisheries resources include eulachon, shrimp, sea cucumber, and Dungeness crab. The federal subsistence fishery for eulachon was closed in the Ketchikan area (Commercial Fishing District 1) in 2012, 2013, and 2014 following unexpectedly low returns of eulachon to the Carroll River in beginning in 2011. There are no known freshwater subsistence activities taking place in the project area.

The risk to fish and aquatic habitat from the Saddle Lakes project would be minimal. The Tongass Timber Reform Act (TTRA), Forest Plan Riparian Standards and Guidelines, and Best Management Practices (BMPs) would help protect aquatic resources.

Findings

Wildlife Resources

The Forest Plan indicated that forest-wide, deer habitat capabilities in some portions of the Tongass National Forest may not be adequate to sustain the current levels of deer harvest. Also, that full implementation of the Forest Plan could be accompanied by a significant possibility of a significant restriction on the abundance and/or distribution of deer, and on competition for this resource (USDA 2008a, p. 61).

Consistent with Section 810 of ANILCA, the Saddle Lakes project area was evaluated for potential effects on subsistence, as described above. Based on that evaluation, the Saddle Lakes project may have a significant possibility of a significant restriction of subsistence uses on deer due to changes in abundance and competition. The Ketchikan to Shelter Cove Road would increase access to deer affecting the demand and/or the amount of competition in the Saddle Lakes project area.

Based upon community use information and MIS analysis, the Saddle Lakes project shall not result in a significant restriction of other wildlife uses.

To be in compliance with ANILCA, and consistent with current Forest policy (FSH 2090.23), the following actions are required as a result of the finding of a significant possibility of a significant restriction:

- The proposed action be modified to remove the significant restriction finding; or
- The process be stopped for that action and the action prohibited; or
- After notifying the Regional Forester and requesting concurrence, proceed to Notice and Hearings.

Fisheries Resources

Effects from action alternatives are expected to be minor to subsistence fishery resources. Therefore, the Saddle Lakes Timber Sale is not expected to result in a significant restriction of fisheries subsistence uses.

Notice and Hearings

If the above evaluation results in the finding of a significant possibility of a significant restriction of subsistence uses and the responsible line officer decides to proceed, the official shall:

- Give notice to the Alaska Department of Fish and Game (for wildlife and fisheries subsistence uses);
- Give notice to the appropriate Subsistence Regional Advisory Councils and local fish and game advisory committees (for wildlife and fisheries subsistence uses); and
- Give notice and hold a public hearing in the vicinity of the area involved.

Notice shall not be less than 30 days and may be extended. Notices in a, b, and c, above may run concurrently.

Issue 4. Scenery and Recreational Opportunities

Issue Statement: Timber harvest and road construction could affect the scenery and recreational opportunities in the Saddle Lakes project area.

Internal concerns were expressed regarding the effects that timber harvest would have on areas visible from Visual Priority Routes and Use Areas (VPRs). The five VPRs in and adjacent to the project area include: Saddle Lakes Recreation Area, Harriet Hunt to Shelter Cove Connection Road (hereafter referred to as the Connection Road), Shelter Cove Boat Ramp, Carroll Inlet, and George Inlet. Changes to recreational opportunities may occur because of road construction and timber harvest.

The Scenery and Recreation Relationship

Managing the scenery of National Forest timber harvests is important to the recreation resource because visitors seeking recreation opportunities on a National Forest often have strong expectations of beautiful landscapes and a non-exploitive relationship with nature (Niemi and Whitelaw 1999; Durning 1999 as cited in Ribe 2009). Scenic beauty is an important issue affecting socially acceptable forestry and timber harvest decisions on the Tongass National Forest, and it also has a direct relationship with outdoor recreation opportunities. Most recreation activities take place in, and are dependent on, settings primarily undeveloped and widely dispersed (USDA 2008c, p. 3-370). These two resources are combined into one issue because of the strong connection between the two.

Issue 4A. Scenery

Units of Measure:

The following units of measure were used to evaluate effects of the proposed action to scenery and compare alternatives:

- Acres of timber harvest by silvicultural prescription within areas of High and Moderate Scenic Integrity Objective (SIO);
- Miles of road construction within project areas of High and Moderate SIO;
- Acres of timber harvest by silvicultural prescription within the planned Saddle Lakes Recreation Area viewshed; and
- Project Area acres that would change SIO if Visual Priority Routes (VPRs) are removed.

Methodology

Developing a system to quantify a resource that is hard to measure such as scenery has been a challenge to land management agencies. While the land and its characteristics are fairly constant, it is the perceptions of people and society that brings value to the scenery. Methodology used to evaluate scenery impacts for this project is called the Scenery Management System (SMS) and is described in *Landscape Aesthetics* (USDA Forest Service, 1995b). SMS provides the systematic framework used by the Forest Service for the inventory of scenic resources and provides measurable standards for its management. Please refer to the Scenery Resource Report for a more detailed explanation of the methodology of the scenery analysis. This section attempts to simplify the SMS process and terminology to provide clarity to the reader.

Scenery analysis:

- Evaluates whether the standards and guidelines for scenery established by the Forest Plan for each alternative are met.

- Quantifies the effects on scenery—not only the direct and indirect effects of this project, but also the cumulative effects—considering this project in the context of other projects happening, or recently implemented, in the area.
- Considers recommendations for any mitigation, enhancement, and monitoring deemed necessary.

Incomplete and Unavailable Information

The Existing Scenic Integrity (ESI) GIS layer used in analysis has not been updated in the past ten years. More recent information was considered in the project analysis but has not been synthesized into a new GIS dataset at this time. The ESI layer does not directly affect the units of measure and is not integral to the effects and conclusions of this analysis. More detail on this can be found in the Scenery Resource Report.

During the preparation of the DEIS, the VPR associated with the Harriet Hunt to Shelter Cove Connection Road was defined along the existing Forest Service road (road 8300000), since the exact route connecting the existing road to the Ketchikan road system was unknown at the time. This VPR was used to create GIS layers and data for the scenery analysis. The proposed action was later modified to include the State of Alaska right-of-way (ROW) on NFS lands (see Chapter 2, Items Common to All Action Alternatives). The exact alignment of the road within this ROW is unknown, but is anticipated to align with NFS Road 8300280, which is proposed for construction in varying lengths under the action alternatives (see Action Alternative descriptions). This short segment of the route was not used as a VPR in the analysis, as the effects are not expected to significantly change from the original.

Analysis Area

The analysis area for Scenery is the Project Area. In some factors, particularly the cumulative effects analysis, the Project Area is broken down into smaller areas, in which case VCUs are used. VCUs are used to represent a viewshed because they have similar spatial boundaries.

Affected Environment

Elements that comprise the existing condition of the scenery resource in the project area include: Landscape Character, Scenic Attractiveness, Land Use Designations (LUDs), Visual Priority Routes and Use Areas (VPRs), and Existing Scenic Integrity (ESI). The desired condition is represented by the Scenic Integrity Objectives (SIO), and developed using Visibility and Distance Zones (DZ). Visual Absorption Capacity (VAC) helps determine what activities can take place while meeting the SIOs. All together these comprise the affected environment.

The most critical elements are covered in this section of Chapter 3: Scenic Integrity, VPR, ESI, and SIO. Please refer to the Scenery Resource report for an in-depth discussion of all the affected environment elements.

Scenic Integrity

Scenic Integrity is a term used to describe the visual condition of the landscape while avoiding the use of the value judgments associated with scenery. Different people have different opinions of what is good, ugly, pretty, boring, or worthwhile when discussing scenery, but they should be able to agree on the level of integrity, or “intactness” of the landscape they are viewing. Scenic integrity is used to describe existing conditions, future conditions, or management goals, all referring to how “whole” the view looks or will look from the viewer’s perspective. The viewer is considered to be a “casual observer,” someone like a tourist, or a boat passenger, that is not studying the view but is observing it, possibly while doing something else. It is not someone with detailed knowledge of the harvest activities of an area or of the scenery analysis process.

Table 71. Scenic Integrity Definitions

Scenic Integrity Level	Definition
Very High	Landscapes that are intact, with only minute, if any, deviations.
High	Landscapes that appear intact. Deviations are not readily evident to the casual observer.
Moderate	Landscapes that appear slightly altered. Deviations are noticeable to the casual observer, but do not dominate the landscape.
Low	Landscapes that appear moderately altered. Deviations can begin to dominate a scene, but must blend with the surrounding landscape, as viewed by the casual observer.
Very Low	Landscapes that appear heavily altered. Deviations clearly dominate, but must blend to some degree.
Unacceptably Low	Landscapes that appear extremely altered. Deviations are extremely dominant and borrow little, if any, form, line, color, texture, pattern or scale from the landscape character.

Photographic examples of the levels of scenic integrity can be found in the Forest Plan (USDA 2008b, pages 4-61 to 4-63).

Scenery analysis uses scenic integrity in three ways. First, is to describe the existing condition of a landscape, before a project is implemented. Second is to describe the future condition of the landscape after a project has been implemented. Third, the SIOs, is a target condition with which a project should comply. The SIOs are the most important factor of scenery analysis on the Tongass National Forest. The Forest Plan defines SIOs for all of the Tongass, and projects are designed to meet or exceed the SIOs, in order to be in compliance with the Forest Plan.

Scenic Integrity Objectives (SIO)

Scenery Integrity Objective (SIO) is the term used to describe the desired visual condition of the landscape, and is applied to any activity that has the potential to affect the scenic character of the landscape. The SIO is also used to describe the degree of acceptable alteration of the characteristic landscape, and each LUD is assigned SIOs as seen from visual priority travel routes and use areas (VPRs).

For this project, as seen in Figure 10, the areas of Moderate SIO are found along the Connection Road, around Saddle Lakes, and along Carroll Inlet, and are areas within Modified Landscape LUD that are close to VPRs. The units of measure look more closely at areas of Moderate SIO as it is more difficult to have timber harvest in these areas while keeping the visible activity subordinate to the landscape. The majority of the project area is Very Low SIO (Table 72), and managed as landscapes that may appear heavily altered.

Existing Scenic Integrity (ESI)

Using the levels of scenic integrity previously discussed, the land is mapped according to the existing condition, and this mapping is called Existing Scenic Integrity (ESI). ESI is defined as the current state of the landscape, considering previous human alterations (USDA 1995, p. I-2).

ESI changes over time, as some alterations may revegetate and begin to blend in with the surrounding landscape, or as new projects that impact scenic integrity are implemented. It is important to compare the ESI of the project area to the adopted SIO of the LUD to determine if the existing condition conflicts with management goals (SIO), and how much additional disturbance is allowed.

Table 72. Existing Scenic Integrity (ESI) and Scenery Integrity Objective (SIO) types in the Saddle Lakes project area

Scenic Integrity Level	ESI [1/] (Percent of Project Area)	SIO [2/] (Percent of Project Area)
Very High	45%	0%
High	2%	9%
Moderate	2%	13%
Low	5%	16%
Very Low	37%	53%

1/ Source: USFS Tongass National Forest GIS, existing visual conditions layer (EVC, 2005).
2/ Source: USFS Tongass National Forest GIS.

When comparing ESI to SIO in the project area, it is evident that almost half of the project area is High or Very High ESI, which means almost half of the project area appears intact. With only 9% of the project area managed to High SIO, it is expected that activities will occur to reduce the scenic integrity of what is currently High or Very High ESI. Two-thirds of the project area are managed for Low or Very Low SIO, and able to accommodate more extensive visual changes such as clearcuts. Only 13% of the project area is managed for Moderate SIO. These areas are the focus of several of the units of measure for this issue, because of the difficulty in creating timber harvest activities that remain visually subordinate to the landscape.

Visual Priority Routes and Use Areas (VPR)

The Forest Plan identifies Visual Priority Routes and Use Areas (VPRs) to recognize routes and areas from which scenery will be emphasized. VPRs include towns, campsites, trails, roads, waterways, and dispersed recreation areas, and are listed in Appendix F of the Forest Plan. VPRs indicate areas from where people are likely to be viewing the landscape, and most often have a small footprint. A road may be identified as a VPR, but the trees alongside the road are not—but they are visible from the VPR. What can be seen from a VPR is extremely important, because that helps define the SIO. What is visible, and how far away it is from the viewer, as well as what LUD the landscape being looked at is in, determines the SIO for that area.

The VPRs in and adjacent to the project area are shown in Figure 9. The Forest Plan (page 4-57) lists the SIOs adopted for each LUD.

Table 73. Visual Priority Routes (VPRs) in and adjacent to the Saddle Lakes project area

VPR	VPR Type
George Inlet	Salt Water Use Areas
Carroll Inlet	Salt Water Use Areas
Harriet Hunt to Shelter Cove Connection Road	Routes not constructed or NEPA Cleared: Planned or Opportunities
Saddle Lakes Recreation Area	Routes not constructed or NEPA Cleared: Planned or Opportunities
Shelter Cove Boat Ramp	Routes not constructed or NEPA Cleared: Planned or Opportunities

Source: USFS Tongass National Forest GIS; USDA 2008b, Appendix F, pp. F-22 –F-24.

Three of the VPRs used in this analysis are considered “Routes not constructed or NEPA Cleared: Planned or Opportunities.” The Ketchikan-Misty Fiords Ranger District is the only district with VPRs that fall into this category, with five VPRs total classified as such. This project includes three of those five.

For purposes for this analysis, these “Planned” VPRs were treated as though they were existing and given equal weight as VPRs. As landscape features, they do already exist. It is assumed that the Harriet Hunt to Shelter Cove Connection Road, Saddle Lakes, and Shelter Cove Boat Ramp will see increased use if the Ketchikan to Shelter Cove Road is constructed, connecting these areas to the Ketchikan road system (see Recreation Cumulative Effects section). No additional construction would be necessary for them to accept increased use or to change from “Planned” VPRs to existing VPRs.

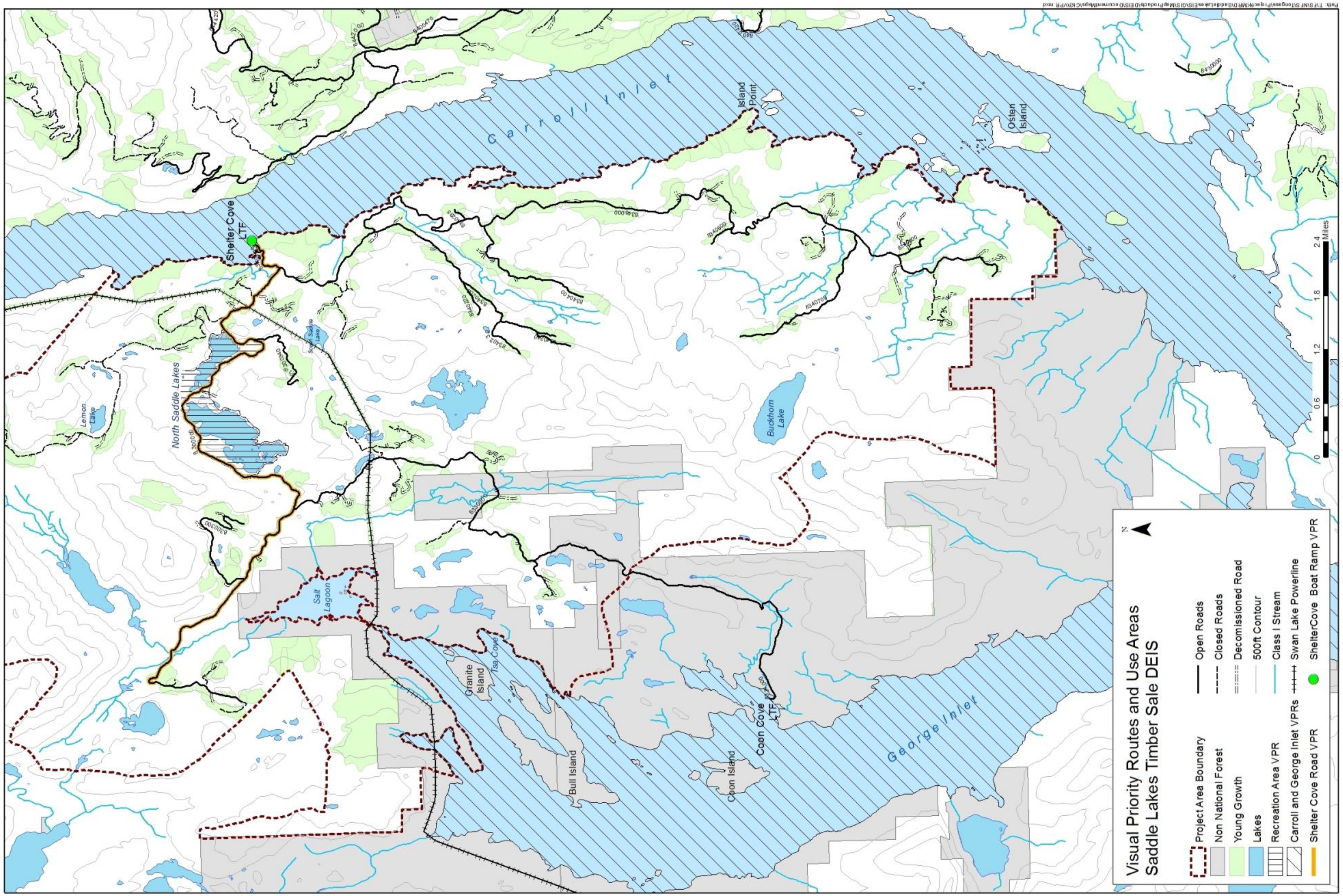


Figure 9. Saddle Lakes Project Area visual priority routes (VPRs)

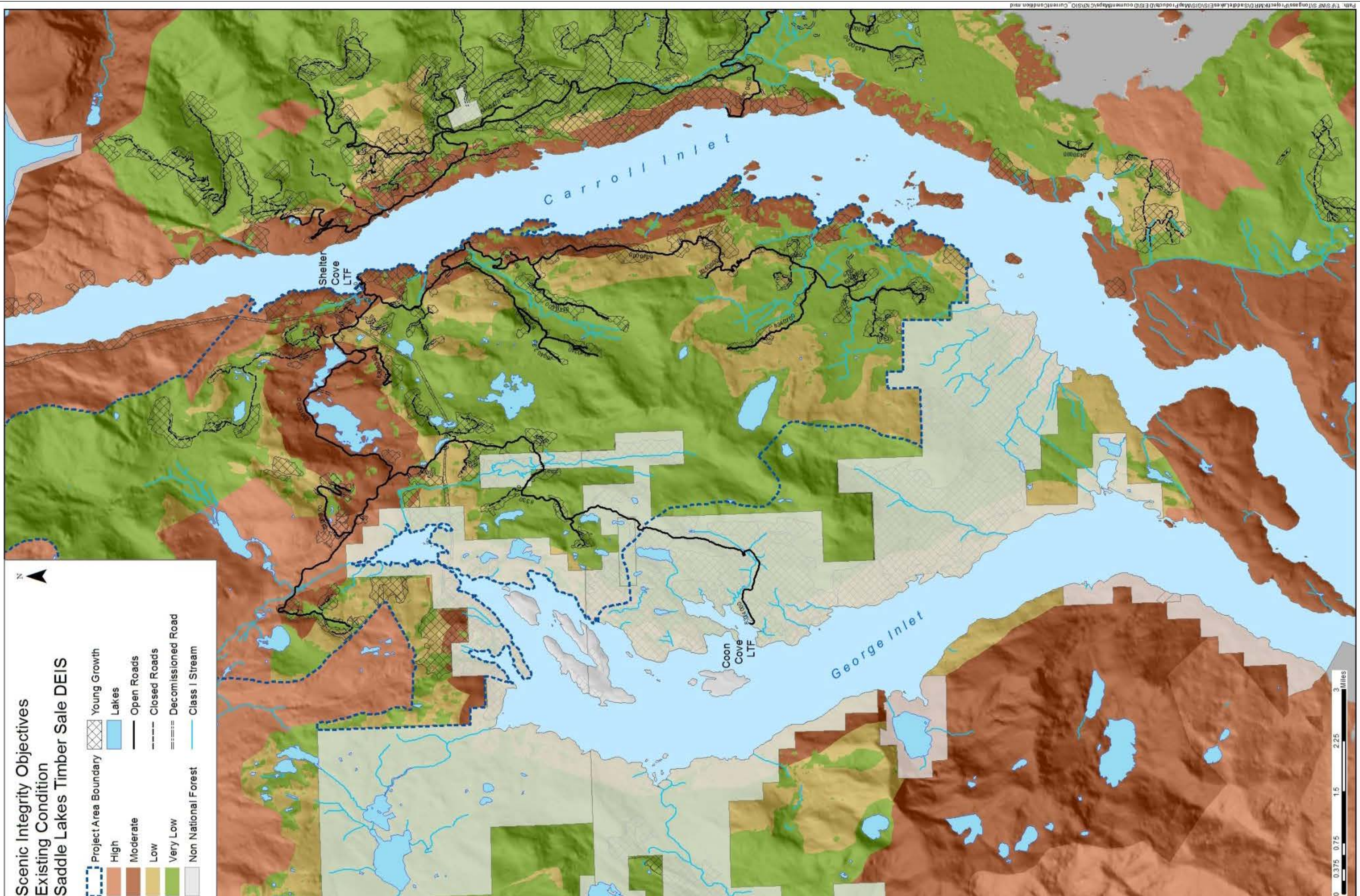


Figure 10. Scenic integrity objective (SIO) current condition for the Saddle Lakes project area

Environmental Consequences

Direct and Indirect Effects

The following table presents a summary of actions associated with the alternatives, including the number of VPR designations, proposed to be removed. A Forest Plan amendment would be needed for the removal of VPR designations.

Table 74. Saddle Lakes Timber Sale activities

	Saddle Lakes Timber Sale Activities				
Alt.	**Even-aged Silvicultural Methods[1/] (acres)**	**Uneven-aged Silvicultural Methods[2/] (acres)**	**Helicopter Harvest (% of total harvest)**	**NFS Road Construction (miles)**	**VPRs Removed (number of VPRs)**
1	0	0	0%	0	0
2	1,055	1,100	50%	10.2	0
3	816	196	19%	6.7	0
4	2,112	312	21%	19.6	4
5	2,594	281	25%	20.6	5
6	1,654	484	22%	16.3	3

Source: USFS Tongass National Forest GIS
1/ Includes clearcut method.
2/ Includes only uneven-aged silvicultural methods; 33% basal removal).

As stated previously, the analysis area for direct and indirect effects is the Saddle Lakes Project Area. The effects of VPR removal were also examined within the "Greater George and Carrol Inlet Area" which includes the viewsheds as seen from the length of those VPRs (see Scenery Resource Report for more detail). Existing harvest areas less than 30 years old are considered to still be visible (i.e., existing condition) and are used in analysis of direct effects. Harvest areas older than 30 years are considered to be visually recovered.

Clearcut Harvest vs. Partial Harvest (33 Percent Basal Area Removal, UA33)

The effects associated with the two silvicultural prescriptions in this project are quite different. In a very general sense, the clearcut prescription creates visible impacts while the UA33 prescription does not. Clearcuts can be designed to blend well with the landscape, and therefore may not be very noticeable, while impacts from the UA33 prescription may be visible at a close distance. For this analysis, we assume that units of UA33 would not be noticeable to the casual observer, and views of the project area exclusively consisting of units of UA33 would appear visually intact.

Effects Common to All Action Alternatives

State of Alaska Right-of-way on NFS Lands

The proposed State of Alaska Right-of-way is located within Old-Growth Habitat and Modified Landscape LUDs. The SIOs along the proposed alignment are High in Old-Growth Habitat LUD, and Moderate and Very Low in the Modified Landscape LUD. The Ketchikan to Shelter Cove Road ROW is at low elevation, and is not on a very steep slope, therefore would have minimal visual impact and meet the SIOs of the area.

Fish Passage Barrier Modification and Shelter Cove LTF Reconstruction

No effects are anticipated to the scenery resource as a result of implementing the fish passage barrier modification and the Shelter Cove LTF reconstruction.

Effects Comparison for the Action Alternatives (Alternatives 2 to 6)

The following tables are used to display effects for the action alternatives (Alternatives 2 to 6), and referred to in the alternative effects analyses that follow. Table 75 summarizes the silvicultural prescription acres in SIO by alternative. Table 76 summarizes road construction by SIO for each alternative. Table 77 quantifies the effects to SIO distribution of removing VPRs in Alternatives 4, 5 and 6. Table 78 summarizes the harvest within the Saddle Lakes Recreation Area viewshed by prescription for each alternative.

Table 75. Acres of harvest by existing scenic integrity objective (SIO) for the Saddle Lakes Timber Sale Project

Scenic Integrity Objective (SIO)	Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	CC	UA33	CC	UA33	CC	UA33	CC	UA33	CC	UA33
High	0	0	0	0	0	0	173	4	0	0
Moderate	129	589	171	27	774	148	921	61	530	185
Low	255	187	134	35	427	78	499	109	389	86
Very Low	671	375	512	134	912	85	1001	107	735	213
Totals	1055	1151	817	196	2113	311	2594	281	1654	484

Source: USFS Tongass National Forest GIS. Note: Numbers may not add due to rounding.

Table 76. Miles of proposed roads by alternative and scenic integrity objective (SIO) for the Saddle Lakes Timber Sale Project

Scenic Integrity Objective (SIO)	Alt. 2	Alt. 3	Alt. 4		Alt. 5		Alt. 6	
	Existing SIO	Existing SIO	Existing SIO	Revised SIO	Existing SIO	Revised SIO	Existing SIO	Revised SIO
High	0	0.1	0.2	0.2	0.8	0	0.2	0.2
Moderate	3.8	3.5	11.9	0	12.2	0	9.7	3.7
Low	4.2	2.0	6.8	6.6	6.8	6	5.1	2.9
Very Low	10.3	6.6	11.1	23.2	12.6	26.4	10.6	18.7
Total	18.2	12.1	30		32.4		25.5	

Source: USFS Tongass National Forest GIS. Note: Numbers may not add due to rounding. Revised SIO is after Forest Plan amendments are completed, removing VPRs for that Alternative.

Table 77. Effects of VPR removal (Alternatives 4, 5 and 6) for the Saddle Lakes Timber Sale Project

Alternative	Acres of Harvest in Areas that Decrease in SIO	Acres of Harvest in Areas with no change in SIO	Project Area Acres that decrease in SIO	Greater George/Carroll Inlet Area Acres that decrease in SIO
4	1,285	1,139	8,270	13,920
5	1,642	1,233	8,750	14,930
6	743	1,395	6,810	10,900

Source: USFS Tongass National Forest GIS.

Table 78. Acres of harvest within Saddle Lakes Recreation Area viewshed[1/] by prescription

Prescription	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
CC	6	0	462	526	215
UA33	400	32	109	62	132
Total	406	32	571	588	347

Source: USFS Tongass National Forest GIS.

1/ Viewshed includes the following units, including any variations of them (ie, -1, -2): 18, 19, 21, 27, 28, 29, 30, 31, 40, 46, 47, 48, 50, 51, 52, 75, 80, 114, 115, 116, 118, 122, 123, 125, 126, 134, 138, 147, 154, 156, 157, 158.

The following section describes the direct and indirect effects to scenery resources by Alternative.

Alternative 1

Alternative 1 would have no direct effects on the scenery resource because no timber harvest or road construction would occur. There would be a continued increase of the Existing Scenic Integrity (ESI) (e.g., from Very Low to Low, or Low to Moderate) because there would be no new harvest. Regrowth in previously harvested areas would lessen the visual disturbances of these older cuts and they would slowly become less noticeable.

Alternative 2

Alternative 2 is the proposed action, and was designed to allow the maximum timber harvest that would still meet the Forest Plan standards and guidelines for scenery, as well as all other resources. Originally, many, if not all, partial harvest units were a 50% basal removal, which would meet the Moderate SIO requirements. Later in the process, the partial harvest units were changed from 50% basal removal to 33% basal removal for silvicultural reasons. Currently, from a scenery perspective, Alternative 2 is the best example of an alternative that illustrates the amount of harvest and road construction that can be implemented while meeting Forest Plan standards and guidelines. It should be noted that units were removed from the alternative, or prescribed as partial harvest, for reasons other than scenery, including wildlife, soils, and economics.

Alternative 2 meets the Forest Plan standards and guidelines for scenery. This alternative would harvest 718 acres (33% of total project acres) within areas of Moderate SIO, of which 129 acres would be clearcut. Alternative 2 would require the construction of 3.8 miles of road within areas of Moderate SIO). No changes of SIO acreage inside or outside of the project area would occur, as no VPRs are proposed to be removed. Forest visitors in the VPR areas of the Modified Landscape LUD would see a landscape where harvest activities are allowed, but development would be subordinate to the existing landscape character. In other words, as the viewer looks at the scenery, it may not be immediately obvious that timber harvest has occurred within their view. Within the Saddle Lakes Recreation Area VPR viewshed, a total of 406 acres of timber would be harvested with almost all of that being partial harvest.

Alternative 2 ranks second highest among the action alternatives in terms of having the least effects to the scenery resource.

Alternative 3

Alternative 3 meets the Forest Plan standards and guidelines for scenery. This alternative would harvest 198 acres (20% of total project acres) within areas of Moderate SIO, of which 171 acres are clearcut. This alternative would construct 3.5 miles of road within areas of Moderate SIO. No changes of SIO acreage inside or outside of the project area occur, as no VPRs are proposed to be removed. Forest visitors in the VPR areas of Modified Landscape LUD would see the landscape where the harvest activities are allowed, but development would be subordinate to the existing landscape character. In other words, as the viewer looks at the scenery, it may not be immediately obvious that timber harvest has occurred within their view. Within the Saddle Lakes Recreation Area VPR viewshed, there would be less harvest occurring than in Alternative 2, with only 32 acres being harvested in that area, all of which is partial harvest.

Alternative 3 has the least effects to the scenery resource of all the action alternatives.

Common Issues for Alternatives 4, 5, and 6

Removal of VPR Designations

There are two main factors that make up SIO: LUD and VPR. Therefore, changing either factor can result in a change to SIO. A VPR can be modified, changing the aspect or distance from which the land is viewed for analysis purposes or the LUD can be changed. This project proposes to remove VPR designations in order to change the SIOs.

The harvest proposed in Alternatives 4, 5, and 6 does not meet Forest Plan Standards and Guidelines for Scenery without removing VPR designations. Each alternative proposes to remove a different number of VPR designations, but there is some commonality between all these removals.

Alternatives 4, 5, and 6 propose harvest that would result in more visual impact and change than the landscape could absorb, while still meeting the current management objectives (SIO). Under these alternatives, VPR designations would be removed resulting in changes in SIOs removing the areas of Moderate SIO and changing some areas from Low to Very Low. Changes are on all lands visible to the VPRs, are in place from now onward, and apply to all future projects in areas affected by the proposed SIO changes. Not all areas would change SIO, but those areas that do would allow more disruption to scenic integrity from now into the future. More detail on this action is found in the Scenery Resource Report.

In cases where the use of an area has declined over time (cabin removal or road closure), removing a VPR designation is a simple change. However, there is no data or anecdotal evidence to show the use of any of these VPRs has decreased since the 2008 Forest Plan. In this project, removing VPR designations is to increase the amount of timber harvest that can occur at this time. It is expected that if the Ketchikan to Shelter Cove Road is built, the Saddle Lakes Recreation Area, Shelter Cove Boat Ramp and other areas near the project area may see an increase in use.

Possible Effects caused by VPR designation removal

George and Carroll Inlets are VPRs that have a viewshed much larger than the Saddle Lakes project area. Removing them would affect a large area, but much of the land visible from the inlets has existing evidence of timber harvest. Some lands are Timber Production LUD, in which the SIOs enable a larger impact from projects, and some are private and State of Alaska lands, which do not fall under the Forest Plan Standards and Guidelines. Removing the VPR designations and having the Saddle Lakes project go forward with larger levels of harvest, may have a more visible impact than Alternative 2 and Alternative 3, but not drastically change the visual experience of either George or Carroll Inlet. They both show evidence of significant timber harvest, and would continue to do so into the future. This VPR designation is removed in Alternatives 4, 5, and 6.

The Ketchikan to Shelter Cove Road VPR is similar to the George and Carroll Inlet VPR, as the road passes areas where evidence of timber harvest is already noticeable. Removing the VPR would mean travelers along the road would see landscapes dominated by harvest activities, rather than seeing landscapes where timber harvest impacts are subordinate to the overall view, but not change it from an entirely untouched area to a heavily altered one. This VPR designation is removed in Alternatives 4, 5, and 6.

The Saddle Lakes Recreation Area VPR viewshed is currently all High and Very High ESI meaning that most of the land visible from the lakes has not been altered at this time. It is currently managed for Moderate SIO, where the landscape can appear slightly altered, but any evidence of activity (such as timber harvest) should not dominate the view. Removing this VPR designation would change this area to Very Low SIO, and after project completion, would result in a landscape that appears heavily altered. This VPR designation is removed in Alternatives 4 and 5.

The Shelter Cove Boat Ramp VPR designation is not removed in several alternatives because it was determined that no units are visible from this VPR, and removing this designation would not affect the potential harvest. This VPR designation is removed in Alternative 5.

Alternative 4

The harvest proposed in Alternative 4 does not meet Forest Plan scenery standards and guidelines without a Forest Plan amendment to remove four VPRs: George Inlet, Carroll Inlet, Saddle Lakes Recreation Area, and the Harriet Hunt to Shelter Cove Connection Road. Under this alternative, 922 acres of harvest (38 percent of total project acres) occurs in areas currently categorized as Moderate SIO, 774 of which are clearcut. This is 204 acres more than Alt. 2, with a much different balance of clearcut and partial harvest. Within the Saddle Lakes Recreation Area viewshed, 571 acres would be harvested, 81 percent of which are clearcut. This is 165 acres more than Alternative 2, though again this alternative has much more clearcut than partial cut. This alternative would construct 0.2 mile of road in existing areas of High SIO, and 11.9 miles of road in existing areas of Moderate SIO. The removal of the VPRs would change the SIOs of 1,285 acres of harvest in the project area, and 8,270 project area acres, all to a lower SIO. After the Forest Plan amendment is completed, there would no longer be any areas of Moderate SIO in the project area, and no harvest would occur in areas of Moderate SIO. There would still be 0.2 mile of road constructed in areas of High SIO, but none in areas of Moderate SIO. As an indirect effect of the VPR removal, 13,900 acres in the George and Carroll Inlet viewsheds will change SIO. The changes to the SIO would enable more activity that alter scenery to take place, and remain for future projects in the George and Carroll Inlet areas, including but not limited to timber harvest, utility corridor expansions, and recreation developments. Alternative 4 has very similar effects to scenery as Alternative 5 and more detail can be found in Alternative 5.

Alternative 4 ranks the second highest among the action alternatives in terms of having the most effects to the scenery resource.

Alternative 5

The harvest proposed in Alternative 5 does not meet Forest Plan scenery standards and guidelines without a Forest Plan amendment to remove five VPRs: George Inlet, Carroll Inlet, Saddle Lakes Recreation Area, the Harriet Hunt to Shelter Cove Connection Road, and the Shelter Cove Boat Ramp. Alternative 5 harvests 669 acres more than Alternative 2, or 30 percent more acres than Alternative 2. The difference in unit prescriptions, however, means that Alternative 5 harvests 1539 more acres of clearcut than Alternative 2 (145 percent more than Alternative 2).

Under this Alternative, 982 acres of harvest (34 percent of project area acres) occurs in areas currently categorized as Moderate SIO, 921 of which are clearcut. This is 264 acres more than Alt. 2, with a much different balance of clearcut and partial harvest. Alternative 5 is the only alternative that harvests from areas currently categorized as High SIO, with 173 acres of clearcut and 4 acres of UA33. Within the Saddle Lakes Recreation Area viewshed, 588 acres are harvested, 89% of which are clearcut. This is 182 acres more than Alternative 2, though again Alternative 5 has much more clearcut than partial cut. This Alternative would construct 0.8 miles of road in existing areas of High SIO, and 12.2 miles of road in areas currently categorized as Moderate SIO, compared to the 3.8

miles constructed in Moderate SIO in Alternative 2. To enable this Alternative to comply with the Forest Plan scenery objectives, it is proposed to remove 5 VPRs. The removal of VPRs would change the SIOs of 1,642 acres of harvest in the project area, and 8,750 project area acres, all to a lower SIO (Table 77). After the Forest Plan amendment is completed, there would no longer be any areas of Moderate SIO in the project area. After these changes, no harvest would occur in areas of Moderate SIO, nor would there be any road construction in areas of High or Moderate SIO. This Alternative also has a Forest Plan amendment to change the Old Growth Habitat LUD, with a net decrease in Old Growth Habitat LUD acreage of just over 400 acres. This reduces the High SIO acreage by the same amount. These changes are a part of the 14,900 acres of SIO change that would occur in the George and Carroll Inlet watersheds as an indirect effect of this project. The changes to SIO would enable more activity that alters the scenery to take place, and remain for any future projects in the George and Carroll Inlet areas, including but not limited to timber harvest, utility corridor expansions and recreation developments.

The main difference between Alternative 5 and Alternative 4 is the result of the Old Growth Habitat LUD change and the slightly increased harvest. They would have very similar visual effects. The largest impacts would be seen from Saddle Lakes (i.e., the “Saddle Lakes Recreation Area”), which are currently Very High and High ESI. Forest visitors in these areas would be seeing landscapes where the harvest activities are allowed to dominate the scenery. To help visualize the changes, the following figures were developed, and show both the existing view and the location of proposed units on the same view. The white overlay shows the unit locations but is not intended to be a photorealistic depiction of the future view. The map in Figure 11 indicates the location at which the photo was taken, the direction of the view, and the prescription of the units. Figure 12 shows the existing view at the eastern lake within the Saddle Lake Recreation Area, with Figure 13 showing the proposed units superimposed on the existing view. All units seen from this view are planned as clearcuts.

Impacts from the VPR removal will also be noticable along the Connection Road and Carroll Inlet, where Forest visitors may view landscapes where harvest activities are allowed to dominate the scenery. The visual impact would be less than at the Saddle Lakes Recreation Area because the Connection Road and Carroll Inlet already have existing clearcuts, many of which are already noticeable to the casual observer, while the Saddle Lakes Recreation Area viewshed is currently visually intact.

Alternative 5 has the most effects to the scenery resource of all the action alternatives.

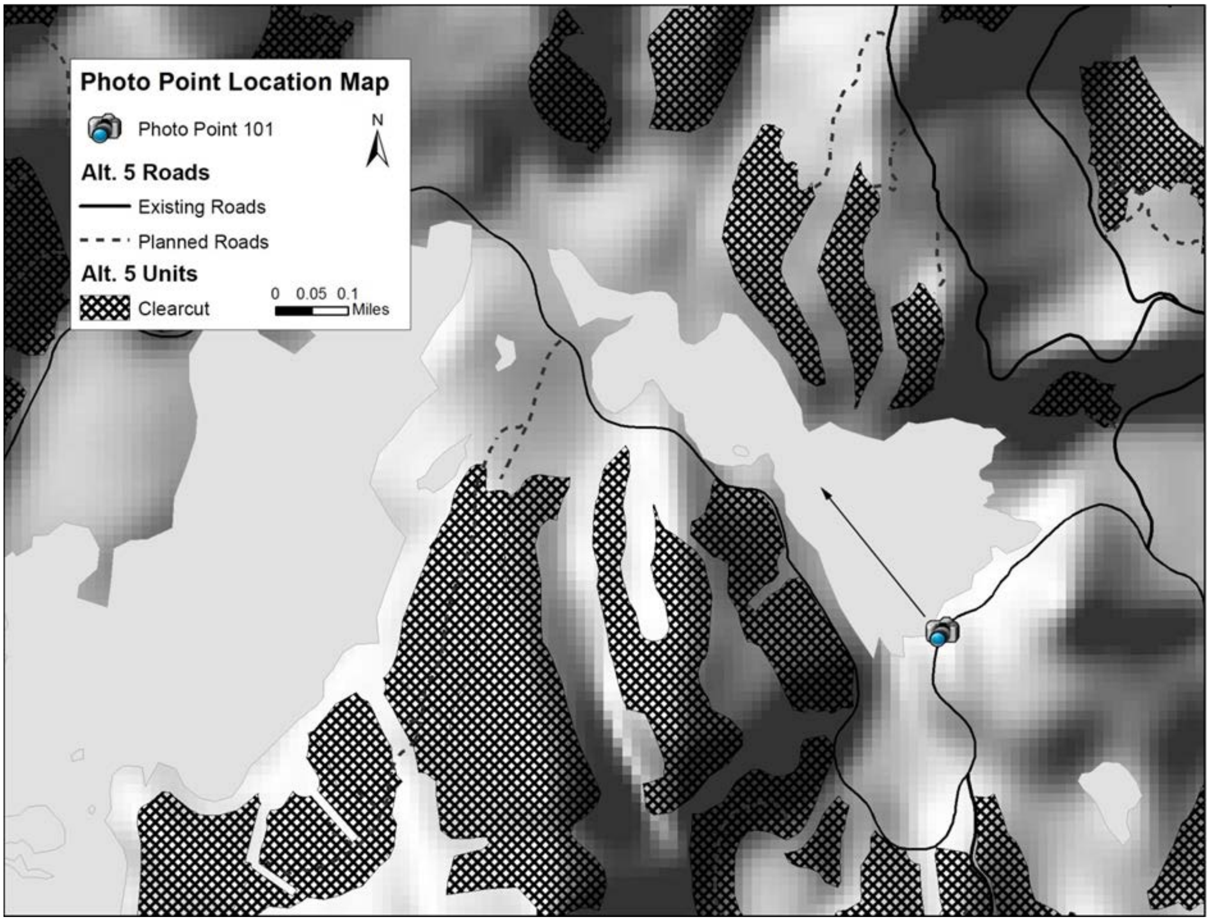


Figure 11. Photo point 101 location map, Saddle Lakes Recreation Area

Figure 12. (Photo point 101) existing view looking from North Saddle Lake (Saddle Lakes Recreation Area), southeast to northwest

Figure 13. (Photo point 101), with proposed alternative 5 units shown as an overlay over Figure 12 above

Alternative 6

The harvest proposed in Alternative 6 does not meet Forest Plan scenery standards and guidelines without a Forest Plan amendment to remove 3 VPRs: George Inlet, Carroll Inlet, and the Harriet Hunt to Shelter Cove Connection Road. Alternative 6 would harvest 715 acres within existing areas of Moderate SIO, of which 191 acres are clearcut. This is 3 acres total less than Alt. 2, but has 62 acres more of clearcut than Alt. 2. This alternative would also construct 0.2 miles of road within existing areas of High SIO, and 9.68 miles of road within existing areas of Moderate SIO. Within the Saddle Lakes Recreation Area viewshed, 347 acres of harvest would occur, with 62% of it clearcut. This is 59 acres less than Alt 2, but again has a larger number of acres of clearcut than that Alternative. After the Forest Plan amendment is completed, 350 acres of harvest would occur in areas of Moderate SIO. About 0.2 miles of road would still be constructed within areas of High SIO, while 3.7 miles of road would be constructed in areas of Moderate SIO. The removal of the 3 VPRs would change the SIOs of 743 acres of harvest in the project area, and 6810 project area acres, all to a lower SIO. These changes are a part of the 10,900 acres of SIO change that would occur in the George and Carroll Inlet viewsheds as an indirect effect of this project. The changes to SIO would enable more activity that alters the scenery to take place, and remain in effect for future projects in the George and Carroll Inlet areas, including but not limited to timber harvest, utility corridor expansions, and recreation developments.

The largest impacts of this project may be seen in Carroll Inlet and along the Ketchikan to Shelter Cove connection road. Forest visitors in these areas could landscape where the harvest activities are allowed to dominate the scenery. This Alternative does, however, keep the Saddle Lakes Recreation Area VPR and have significantly reduced harvest in that viewshed compared to Alternatives 4 and 5. Much of the Recreation Area viewshed would remain managed as Moderate SIO, appearing relatively unaltered, preserving the potential recreation value.

Alternative 6 ranks third highest among the action alternatives in terms of having the least effects to the scenery resource.

Cumulative Effects

Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the scenery cumulative effects analysis.

Cumulative effects for scenery resources in all affected viewsheds are estimated using quantifiable measures as indicators for actual effects. The cumulative effects scenery analysis area is best represented as a viewshed, and using VCUs to represent viewsheds, includes VCUs 7460, 7530 and 7470. All harvest areas 30 years-old or younger are included as past disturbance, and are assumed to have been harvested using even-aged silvicultural methods (i.e., clearcutting). The Swan Lake powerline corridor clearing is also included. Young-growth thinning (e.g., precommercial thinning) is not included because it would likely have a minimal effect on scenery.

Percent Allowable Visual Disturbance represents an index of cumulative effects and is an estimate of the possible level of disturbance as modeled by the Forest Plan FEIS (USDA 2008c, Appendix B, p. B-23). Visual disturbance outcomes vary by the scenic objectives for each of the LUDs available for timber harvest. Using this model it was assumed for viewsheds within the Timber Production LUD, that up to 50 percent of suitable lands within a viewshed may be under development (i.e., visually disturbed by harvest) at one time. For viewsheds within the Modified Landscape LUD, the Percent Allowable Visual Disturbance is 25 percent. Visual disturbance is calculated by adding the past, present, and reasonably foreseeable even-aged harvest acres and dividing by the acres of suitable land within a viewshed or VCU on NFS lands. It is calculated from a "birds-eye" view and not based on the view from specific viewpoints.

Table 79 represents a comparison of the expected cumulative visual disturbance by alternative. The table cell boxes highlighted in bold with a heavy border show areas that exceed the recommended limit of cumulative visual disturbance.

Cumulative Effects Common to all Action Alternatives

Cumulative effects to scenery consider the incremental impact of an action when added to past, present, and reasonably foreseeable future actions on NFS lands, as well as activities on adjacent non-National Forest System lands. Previous development in the project area has modified the scenic environment of many areas from a natural-appearing condition to a condition where some landscapes appear heavily altered. The effects of past timber harvest would continue to lessen over time, becoming more natural appearing during the reasonably foreseeable future, but consideration must be given to the potential incremental effects of other ongoing and future actions.

Alternative 1

No timber harvest or road construction is proposed under Alternative 1 that would result in direct effects. Therefore, no cumulative effects are anticipated. The scenery effects of past timber harvest would continue to lessen over time, particularly in VCU 7530, and the project area would become more natural appearing during the reasonably foreseeable future.

Alternative 2

Alternative 2 is above the 25 percent disturbance reference point in VCU 7530 at 26 percent, in the Modified Landscape LUD. Disturbance within all other VCUs are within the modeled allowances for all LUDs.

Alternative 3

The Total Disturbance in all VCUs, for all LUDs, are within the modeled allowances for this alternative.

Alternative 4

Alternative 4 would exceed the 25 percent modeled allowance for Total Disturbance in the Modified Landscape LUD in all VCUs, with 35 percent Total Disturbance in VCU 7460, 29 percent in VCU 7470, and 28 percent in VCU 7530. All VCUs are under the 50 percent mark for Timber Production LUD areas.

Alternative 5

Alternative 5 exceeds the 25 percent modeled allowance for Total Disturbance in the Modified Landscape LUD in VCUs 7460 and 7470 by 43 percent and 37 percent, respectively. The remaining VCU (7530) slightly exceeds the 25 percent mark, at 29 percent. All VCUs are under the 50 percent mark for Timber Production LUD areas.

Alternative 6

Alternative 6 exceeds the 25 percent modeled allowance for Total Disturbance in the Modified Landscape LUD in two VCUs, 26 percent in VCU 7470 and 29 percent in VCU 7530. All VCUs are under the 50 percent mark for Timber Production LUD areas.

Conclusion

Alternative 3 would rank highest as having the least effects to the scenery resource of the action alternatives, followed by Alternative 2 as the second highest, and then Alternative 6 in the middle. Alternative 5 ranks highest as having the most effects to the scenery resource of the action alternatives, and Alternative 4 ranks second highest as having the most effects.

Alternatives 2 and 3 meet the Forest Plan scenery standards and guidelines. Areas of the project likely to be viewed closely by the public may appear slightly altered, but the impacts of the project would be subordinate to the view blending with the surrounding landscape.

Alternatives 4, 5, and 6 do not meet the Forest Plan scenery standards and guidelines unless a Forest Plan amendment is done to remove the VPR designations. With the implementation of the proposed amendments, these alternatives would meet the Forest Plan. These three alternatives do not meet the goal of the Modified Landscape LUD to recognize scenic value in the project area, and all exceed the recommended allowances for Total Disturbance in Modified Landscape LUDs.

Design Features and Mitigation Measures

For the Saddle Lakes project, mitigation to reduce scenery effects has been incorporated into harvest unit design and harvest unit prescriptions. Units with Moderate SIOs were given priority for mitigation. Primary measures included: 1) deferring harvest of a setting or group of settings; 2) modifying unit size and/or shape; and 3) changing prescription to partial harvest with 33 percent basal removal. Some areas of Low and Very Low SIO were mitigated using the same measures in order to keep the area from falling below the required SIO.

Table 79. Expected cumulative visual disturbance by alternative in the Saddle Lakes project area

VCU	LUD	Total Acres in VCU w/in Project Area	Suitable Land (Acres)	Suitable Land (%)	Alternative 1 Total Disturbance (% of Suitable Land)	Alternative 2 Total Disturbance (% of Suitable Land)	Alternative 3 Total Disturbance (% of Suitable Land)	Alternative 4 Total Disturbance (% of Suitable Land)	Alternative 5 Total Disturbance (% of Suitable Land)	Alternative 6 Total Disturbance (% of Suitable Land)
7460	ML	6,108	2,424	40%	4%	11%	10%	**35%**	**43%**	23%
	TM	4,689	1,874	40%	0%	9%	5%	10%	12%	7%
7470	ML	5,158	2,627	51%	5%	17%	15%	**29%**	**37%**	**26%**
	TM	7,279	2,820	39%	4%	9%	9%	12%	13%	9%
7530	ML	4,327	1,418	33%	18%	**26%**	21%	**28%**	**29%**	**29%**
	TM	2,483	1,242	50%	25%	41%	37%	41%	41%	41%
Project Area	ML	16,028	6,738	42%	7%	16%	14%	**30%**	**36%**	**26%**
	TM	14,452	5,935	41%	7%	16%	14%	17%	18%	15%

Source: USFS Tongass National Forest GIS;

Note: ML = Modified Landscape LUD, TM = Timber Production LUD.

Issue 4B. Recreational Opportunities

Changes to recreational opportunities may occur because of road construction and timber harvest in the Saddle Lakes project area.

Units of Measure:

The following units of measure were used to evaluate effects of the Saddle Lakes Timber Sale to Recreation and compare alternatives:

- Changes to Recreation Opportunity Spectrum (ROS) system classification (acres).

In addition to these units of measure, a qualitative discussion of the project's effects on the recreational opportunities and experience in the project area is included.

Methodology

Acres of ROS and road miles used in this analysis were calculated using GIS digital data. However, due to the nature of recreation, this analysis relies heavily on a qualitative discussion of recreation activities and how they fit in the "big picture" for residents and visitors. Guided use numbers are reported annually and entered in the Tongass Outfitter / Guide Database which was queried for the numbers reported in this analysis.

Roads shown as mixed use or as open to vehicles less than 50 inches wide (OHV Trails) on the KMRD Motor Vehicle Use Map (MVUM) were considered "open" for this analysis. It is important to note that this definition may differ from other resource analyses in this DEIS. Closed roads may be used by recreationists on foot, bicycle, or other non-motorized means of travel. "Closed" roads for the recreation analysis are considered to be all roads not shown on the MVUM, regardless of whether they are NFS roads not open to the public (objective maintenance level 1- OBML 1) or temporary roads that are or are scheduled to be decommissioned.

The Scenery analysis is frequently referenced because of the close connection between the scenery of the areas used for recreation. Scenic beauty is an important issue affecting socially acceptable forestry and timber harvest decisions on the Tongass National Forest, and it also has a direct relationship with outdoor recreation opportunities. Most recreation activities take place in, and are dependent on, settings primarily undeveloped and widely dispersed (USDA 2008c, p. 3-370).

Incomplete and Unavailable Information

The Forest Service does not collect specific data with regard to the number of people or specific activities carried out while visiting the Saddle Lakes project area. Effects to recreation users are based on professional judgment, anecdotal information, and information on the types of activities generally done for recreation in similar areas.

The Saddle Lakes area was identified in the Forest Plan as important to hunters (subsistence) and Forest Service employees have seen the Shelter Cove dock full during deer hunting season. The amount of guided use is known from annual use reports which disclose the amount and type of use. Information is also available on the types of activities people do along the Ketchikan road system.

Recreation use types in the project area were anticipated based on use of similar areas as well as household surveys conducted for the State of Alaska Department of Transportation and Public Facilities (ADOT&PF). The amount of expected guide use in the future was based on the capacity of the area established in a previous NEPA analysis (USDA 2012). Cumulative effects were evaluated with the knowledge of a reasonably foreseeable road connection from Ketchikan and therefore the assumption that the project area would see similar uses as the rest of the Ketchikan road system.

The lack of exact numbers of recreation users in the project area does not affect the analysis

Analysis Area

The recreation analysis area for direct and indirect effects is the Saddle Lakes project area. In addition, the importance of tourism to the regional (Southeast Alaska) economy is discussed in the analysis, but is not analyzed in detail.

Cumulative effects for recreation are analyzed at a larger scale than the project area – not a set area with a "hard boundary," but an area that includes the proposed Ketchikan to Shelter Cove Road and therefore a qualitative discussion about the types of recreation and tourism opportunities available from the Ketchikan road system.

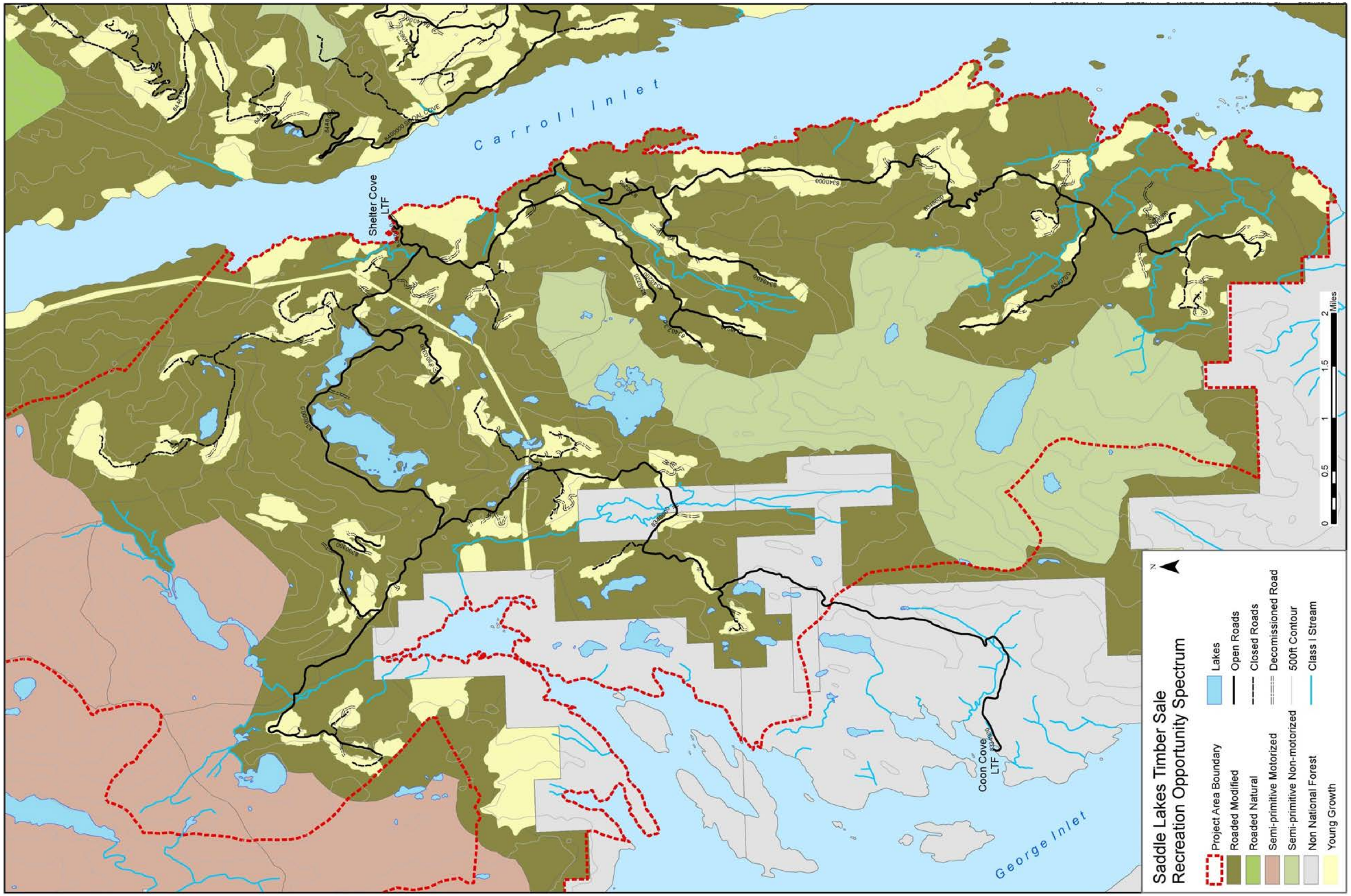


Figure 14. Existing Recreation Opportunity Spectrum classes in the Saddle Lakes Project Area

Affected Environment

The project area does not include Wilderness Area; Wild, Scenic, and Recreational Rivers; or any National Recreation Trails.

Past harvest and road building have set the current stage for recreational use of the Saddle Lakes project area. Roads allow visitors easier access to and throughout the project area. The project area is accessible from the Shelter Cove dock and Log Transfer Facility (LTF). In addition, a road from the Coon Cove LTF also accesses the project area across non-NFS lands. Although the Coon Cove LTF is outside the project area on non-NFS land, a few people may access the project area along the road from this LTF. Access to the project area along this road is not analyzed in detail in Issue 4B because it is expected to be minimal.

Recreation Opportunity Spectrum

Appendix I of the Forest Plan (USDA 2008b, pgs. I-1 to I-8) contains Recreation Opportunity Spectrum (ROS) Standards and Guidelines to help identify, quantify, and describe the types of recreation settings that the Tongass National Forest provides. The ROS inventory system is not a management system, so it does not dictate what type of activities are permitted in a given area. Rather, the ROS system portrays the combination of activities, settings, and experience expectations along a continuum that ranges from highly modified to primitive environments. There are seven ROS classifications along this continuum; Figure 14 shows the existing ROS classes for the Saddle Lakes project area.

The ROS inventory is used to assess the potential effects of the alternatives on recreation settings. Each ROS class includes setting indicators and applicable Standards and Guidelines. ROS is generally applied across a larger area of land to avoid isolated segments of one type being surrounded by another type. However, sometimes there are segments of land that seem to not fit the description of the surrounding assigned ROS class.

The current ROS classification indicates a Roaded Modified (RM) designation for the area surrounding the existing roads and previous harvest units. Although the entire Shelter Cove road system is classified as RM, the area immediately around North Saddle Lakes has a more natural-appearing landscape (High to Very High ESI) than other areas along the road system. This area may not completely fit the RM classification, but is not large enough to warrant a separate setting.

A portion of the southern part of the project area has a Semi-Primitive Non-Motorized (SPNM) setting, while the northern part of the project area, adjacent to the Naha LUD II, is designated as Semi-Primitive Motorized (SPM) (Figure 14). Although no roads exist in the SPM setting, there is float plane traffic to many of the lakes in the Naha watershed, which is contained in the same SPM setting, and the designation fits with the descriptions provided in Appendix I when all setting indicators are considered.

Visual Priority Routes and Use Areas

Appendix F of the Forest Plan (USDA 2008b, pgs. F-1 to F-24) contains a list of Visual Priority Routes and Use Areas (VPRs). The scenery section (Issue 4A) provides a discussion about VPRs, and includes a list of the VPRs used in the scenery analysis in Table 73. The recreation analysis also uses these VPRs.

Note that the Harriet Hunt to Shelter Cove Connection Road (VPR), is referred to as the Ketchikan to Shelter Cove Road in the recreation analysis to be consistent with the project title used by the State of Alaska Department of Transportation and Public Facilities (DOT&PF).

Planned Saddle Lakes Recreation Area

The area immediately around North Saddle Lakes is in a natural-appearing condition (High to Very High existing scenic integrity) and is designated as Modified Landscape LUD in the 2008 Forest Plan. Currently there are no developed recreation facilities in the Saddle Lakes project area. Recreation use in the project area is dispersed recreation. The planned Saddle Lakes Recreation Area would be the most likely destination in the project area for dispersed camping, and use of the lakes for kayaking and canoeing is probable.

Tourism and Visitor Use

The 2012 population estimate of the Ketchikan Gateway Borough was 13,779 individuals, a two percent increase from 2010 (US Census Bureau 2013). Because the Saddle Lakes area is remotely located (only boat and plane accessible) from Ketchikan, large numbers of people do not frequent the area at this time. The primary recreational use in the project area has been hunting, both sport and subsistence. For example, on opening day of the 2013 deer hunting season, private boats were taking up all available space at the Shelter Cove dock (Noah Lloyd, personal communication 2013). Subsistence use is addressed in Issue 3B.

Despite the rainy climate, the demand for outdoor recreational activities in the Ketchikan area is strong and varied (McDowell Group 1990). Fishing, hiking, boating / kayaking / canoeing, nature tours / sightseeing, and berry picking are popular outdoor activities undertaken by locals and visitors. Strong demand for road accessible camping and fishing opportunities exists in the community, with about 72 percent of households reporting fishing annually (McDowell Group 1990). There is an active snowmobile club in Ketchikan, although opportunities are limited by both the moderate winter weather and available places to go. Although current use of the Saddle Lakes project area is fairly low, there is high likelihood of increased use by both residents and visitors once the proposed Ketchikan to Shelter Cove Road is built. In 2009, household surveys conducted by a contractor for ADOT&PF as part of their analysis of the proposed road indicated the following top five activities to be pursued once the road is complete: sightseeing or simply driving around, camping, hiking, freshwater fishing, and hunting (ADOT&PF 2012).

Forest-wide Goals and Objectives describe the desired conditions sought to be attained on the Forest. One goal specified by the Forest Plan relates to local and regional economies: provide a diversity of opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska. One of the objectives to help achieve this goal is to support a wide range of natural resource employment opportunities within Southeast Alaska’s communities. This objective is also reflected in the purpose and need for the Saddle Lakes Timber Sale.

The visitor industry plays an important role in the Southeast Alaska economy, including Ketchikan. Most visitors arrive in Ketchikan during the months of May through September. According to a report prepared for the Alaska Department of Commerce, the visitor industry contributed 21 percent of the employment and 15 percent of the labor income for Southeast Alaska between May 2011 and April 2012. That equates to about 10,200 jobs (27 percent) of the state-wide visitor industry jobs (McDowell Group 2013).

Ketchikan is a principal destination for visitors to the Tongass National Forest; receiving almost a million cruise ship visitors annually as well as independent travelers that arrive via the ferry system, private boats, and flights. In October 2013, the Ketchikan Daily News reported that preliminary figures showed that just over 960,000 cruise ship passengers visited Ketchikan during 2013, an increase of almost 74,500 passengers from the previous year. This figure tops the record of nearly 931,000 visitors in 2008 (Ketchikan Daily News 2013). Ketchikan is the second most visited destination in Alaska, with 58 percent of all visitors stopping in Ketchikan (McDowell Group 2012). In 2006, the visitor industry created about 1,500 jobs (14 percent) of Ketchikan's payroll jobs (McDowell Group 2010). About 27 percent of those jobs were in tours and transportation, with another 37 percent in retail.

Recreation Places

A "Recreation Place" is defined by the Forest Plan as a geographical area having one or more physical characteristics particularly attractive to people engaging in recreation activities. They are usually easy to access and can be identified through patterns of use associated with protected boat anchorages and landings, aircraft landing sites, and roads. They may be beaches, streamside or roadside areas, trail corridors, hunting areas, or the immediate area surrounding a lake, cabin site, or campground (USDA 2008b, p. 7-32). A "Home Range Recreation Place" is a recreation place within about a 20-mile radius of a community (USDA 2008c, p. 2-59). The Shelter Cove road system / Saddle Lakes area is identified as a recreation place in the 1997 Forest Plan (see USDA 1997c, Recreation Place Inventory map; and USDA 2008c, p. 3-371) and falls within the home range of Ketchikan residents. The setting of a recreation place plays a key role in its attractiveness and use. Many recreation opportunities, such as viewing scenery or pursuing solitude are dependent on this relationship and require a natural type of setting, whereas others, such as hunting or fishing, are less dependent on the type of setting (USDA 2008c, p. 3-371).

Outfitter/Guide Use

In the past five years (2008 to 2012), one outfitter-guide has used the Saddle Lakes project area. Use has been minimal (17 service days total), and was for black bear hunting in the project area.

Commercial boat-based tours use both George and Carroll Inlets (VPRs), but do not have any shore stops and therefore do not require a special use permit from the Forest Service. In addition, private cabins (inholdings) do exist along the shores of George Inlet.

During the recent planning efforts associated with the 2012 Ketchikan-Misty Fiords Ranger District Outfitter and Guide Management Plan, guides requested more opportunities close to town as a potential means to grow their businesses. The Record of Decision (USDA 2012) allows for up to 1,420 service days per year to be issued to outfitter and guides in the South Revilla Natural Accessible Use Area, which includes the Shelter Cove road system. That use area also includes the Shoal Cove and Thorne Arm (Elf Point) road systems. This analysis assumes that those guided service days would be issued for the Shelter Cove road system. This is because the proposed Ketchikan to Shelter Cove Road makes access to the project area easier than it currently is, and would provide a location close to town as requested by the guides. In addition, this assumption provides a worst case scenario for effects from the Saddle Lakes project (in relation to outfitter and guides).

Recreation Access

The Ketchikan road system (all roads connected to Ketchikan) accesses numerous hiking trails and developed campgrounds, but provides a limited road system for recreationists to drive. Most of the road system connected to Ketchikan is on non-federal lands, and past timber harvest and urban/rural scenes dominate much of the land visible from the Ketchikan road system. No National Forest System (NFS) or State of Alaska roads connected to Ketchikan are open for off-highway vehicle (OHV) use. However, some OHV use does occur on private land. One road within the Saddle Lakes project area (NFS road 8337000, 4.6 miles) is currently assigned through the 2008 KMRD Access and Travel Management (ATM) Plan (USDA 2008g), and the associated Motor Vehicle Use Map (MVUM) as an OHV Trail (open only to vehicles 50 inches or less in width). According to the

KMRD ATM Plan, about 25.6 miles of road are open to mixed use (vehicles and OHVs) along the Shelter Cove road system (all within the Saddle Lakes project area).

The Ketchikan to Shelter Cove Road would connect the currently isolated Shelter Cove road system to the community of Ketchikan increasing access to the project area. The State of Alaska has requested a right-of-way on NFS lands within the Saddle Lakes project area for the construction, operation, and maintenance of about one mile of new road associated with the Ketchikan to Shelter Cove Road. Household surveys were conducted by a contractor for ADOT&PF as part of the analysis for this proposed road. The surveys identified an unmet need for access to lands through which the proposed road would travel, especially for access to recreational and subsistence-related activities (ADOT&PF 2012). Survey respondents indicated an interest in simply having additional roads to drive and access to additional land for recreation purposes; the number of trips along the route are projected to increase 60 to 70 percent.

Environmental Consequences

Direct and Indirect Effects

The following tables are used to display effects for the alternatives, and referred to in the alternative effects analyses that follow. The changes to ROS class expected under each alternative are shown in Table 80, while Table 81 provides a list of project area units important to the overall recreation experience in the Saddle Lakes project area by action alternative. Important units for the recreation resource include units within the Saddle Lakes viewshed and units along the road in the small Old-Growth Habitat LUD. Although Scenery analyzed all units in the Saddle Lakes viewshed, Recreation considered a subset of those with a focus on those units along the lake shores and adjacent to the main road (8300000) nearest the lakes.

Table 80. ROS class acres[1/] by alternative for the Saddle Lakes Timber Sale Project

ROS class[2/]	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
SPNM	5,133	5,133	5,133	5,063	5,063	5,133
SPM	6,644	6,644	6,644	6,644	6,603	6,644
RM	26,663	26,663	26,663	26,733	26,774	26,663
Total	**38,440**	**38,440**	**38,440**	**38,440**	**38,440**	**38,440**
Acres changed from SPM to RM	0	0	0	0	41	0
Acres[3/] changed from SPNM to RM	0	0	0	70	70	0

Source: USFS Tongass National Forest GIS.

1/ Acres may not total the same as other resource analyses due to rounding. In addition, about 20 acres of saltwater contained within the project boundary are not included in this table.

2/ ROS Classes: SPNM = Semi-Primitive Non-Motorized; SPM = Semi-Primitive Motorized; RM = Roaded Modified

3/ Harvest prescriptions calling for uneven-aged management with up to 33% removal were not considered to change ROS setting (for the scenery criteria) because they are not generally noticeable to the casual observer.

Table 81. Harvest units of high concern to recreation by alternative (acres[1/] and prescription[2/]) for the Saddle Lakes Timber Sale Project

Harvest Unit	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
27	14 ac UA33		14 ac CC	14 ac CC	
29	42 ac UA33		42 ac CC	42 ac CC	
30			15 ac UA33	15 ac UA33	15 ac UA33
46	48 ac UA33		48 ac CC	48 ac CC	36 ac CC, 7 ac UA33. 5 ac no cut
47	15 ac UA33		15 ac CC	15 ac CC	
48	19 ac UA33		19 ac CC	19 ac CC	19 ac CC
50	20 ac UA33		20 ac CC	20 ac CC	9 ac CC
51	24 ac UA33		24 ac CC	24 ac CC	9 ac CC
80	13 ac UA33		13 ac CC	13 ac CC	4 ac CC
114			16 ac CC	16 ac CC	16 ac CC
115				12 ac CC	
118			19 ac UA33	19 ac UA33	19 ac UA33
134	15 ac UA33		15 ac CC	15 ac CC	
138	15 ac UA33		15 ac CC	15 ac CC	
147	16 ac UA33		16 ac CC	16 ac CC	
300				23 ac CC	
301				14 ac CC	
302				15 ac CC	
303				12 ac CC	
305				20 ac CC	
306				11 ac CC	
307				36 ac CC	
308				9 ac CC	
311				4 ac CC	
Total Acres	**241**	**0**	**291**	**447**	**134**
Even-aged Clearcut	0	0	257	413	93
Uneven-aged 33% removal	241	0	34	34	41

Source: USFS Tongass National Forest GIS

1/ Acres are rounded to nearest whole number.

2/ UA33 = uneven-aged management (single-tree selection), CC = even-aged management (clearcut).

Effects Common to All Action Alternatives (Alternatives 2 through 6)

Recreationists using the project area during project implementation would experience an increased encounter rate and possible temporary adverse effects to their experience. The Shelter Cove dock could have less available space for use by recreationists because contractors may also tie up to the dock. Increased traffic levels may increase the safety risk posed to visitors along the open roads in the project area, and dust generated by more vehicles and truck/equipment traffic may affect some visitors. Noise levels due to active road construction and logging activities may affect the experience of some visitors. The first few years following timber harvest, people would likely use the recently harvested units for berry picking, hunting, and firewood gathering.

The State of Alaska right-of-way would result in an additional 1.1 miles of open road available for recreation users, creating a total of 26.7 miles of open road in the project area. Effects to the project area from linking Ketchikan and Shelter Cove via road are considered under Cumulative Effects.

NFS road 8337000 would be returned to OHV Trail status after completion of project activities and would be available for use by vehicles 50 inches or less in width.

New roads built as part of the Saddle Lakes Timber Sale would be open only for administrative purposes during project implementation, and would be closed to all motor vehicle use after the completion of silvicultural activities. The only exception to motorized closure after sale activities is for the above mentioned State of Alaska right-of-way which is expected to coincide with proposed NFS road 8300280. Non-motorized use of closed roads associated with the timber sale would be allowed after the project, which could make access to currently difficult to reach areas easier, especially for the first few years.

Due to safety concerns during active logging operations, roads shown on the MVUM as open may be temporarily closed to the public. These roads would be appropriately signed (marked) in accordance with provisions in the timber sale contract. At this time it is unknown which roads may be temporarily closed, how long the temporary closures would last, or what time of year the temporary closures may take place. Closures may affect access to portions of the project area during popular times of the year such as hunting season.

The proposed modification of a naturally occurring partial fish barrier on Salt Creek would improve access to upstream habitat for coho salmon and steelhead allowing more harvest by sport (recreational), subsistence, and commercial fisheries. This modification was considered to have a negligible effect on recreation as a whole and is not considered further in this analysis. Also, the proposed Shelter Cove LTF reconstruction would have a negligible effect on recreation.

It is assumed for analysis that most if not all recreation users would use the dock instead of the Shelter Cove LTF to access the project area. There may be some OHVs offloaded at or near the LTF site. However, this is anticipated to be a small percentage of total recreation use and therefore the proposed Shelter Cove LTF Reconstruction is expected to have minimal effect on recreation.

The following section describes the direct and indirect effects of timber harvest and road construction on recreation resources by alternative.

Alternative 1

The existing condition of the project area would continue. Limited outfitter-guide use of the area would likely continue, with service days remaining available (unused). Primary recreation in the area would continue to be hunting (sport and subsistence). No timber harvest or road construction is proposed under Alternative 1, resulting in no change to the ROS. No changes to the miles of open or closed roads would occur. Scenic integrity around North Saddle Lakes would remain intact because no harvest of adjacent units would take place.

Alternative 2

Alternative 2 proposes harvest in eleven of the units (241 acres) of high concern to recreation, but all units include uneven-aged silvicultural methods with 33 percent removal (Table 81). Harvest in these units would not be as noticeable to the casual observer (recreation visitors) when compared to a silvicultural prescription calling for a higher percentage of tree removal (e.g., even-aged clearcut method). This alternative would have fewer impacts to recreation than Alternatives 4 and 5, but more than Alternative 3.

Alternative 2 would construct 15.8 miles of road to facilitate the timber sale. After completion of the timber harvest these roads would be available for non-motorized activities such as hiking.

Alternative 3

Under Alternative 3, no harvest is proposed in units of high concern to recreation (Table 81) and there would be no changes to the ROS classes. Timber harvest occurring in this alternative would not be easily noticed by the average forest visitor recreating in the area.

Alternative 3 includes 11.7 miles of road construction to facilitate the timber sale. After completion of the timber harvest these roads would be available for non-motorized activities such as hiking.

Alternative 3 would have the least impacts to recreation resources over all other action alternatives (Alternatives 2, 4, 5, and 6).

Alternative 4

Alternative 4 proposes harvest in fourteen of the units (291 acres) of high concern to recreation (Table 81). All units are proposed for even-aged silvicultural prescriptions (clearcut), with the exception of two units which are proposed for uneven-aged silvicultural prescriptions with 33 percent removal (34 acres). Timber harvest would be easily noticed by the average forest visitor recreating in the area. Visitors would not experience much visual diversity along the road system. Opportunities for easy access to recreational activities within a mature old-growth forest would be more restricted than is currently available in the project area.

Minor changes in the ROS boundary would be needed due to the harvest of Unit 149 in this Alternative. This unit lies near the boundary between RM and SPNM ROS classes. Due to the topography of the proposed unit location, a new “buffer” around the unit would be needed. This would change 70 acres from SPNM (loss of 1.4 percent) to RM (gain of 0.4 percent).

Alternative 4 includes 29.4 miles of road construction to facilitate the timber sale. After completion of the Timber Sale these roads would be available for non-motorized activities such as hiking.

Alternative 4 would have more impacts to recreation than Alternatives 2, 3, and 6, but less impacts than Alternative 5.

Alternative 5

Alternative 5 would have the greatest impacts to recreation among the action alternatives, specifically on the diversity of recreational opportunities available within the project area. Alternative 5 proposes the greatest amount of harvest (2,875 acres) and road construction (32.3 miles) of all the action alternatives. This includes modifying the small OGR along the existing road 83000000, which would reduce opportunities for easy access to recreational activities within mature old-growth forest. Alternative 5 would also have the highest likelihood of impacting visitors’ experiences during active logging and road construction operations since there would be greater and longer time-periods of noise, traffic levels, and temporary road closures.

Alternative 5 proposes harvest in twenty-four units of high concern to recreation (447 acres) (Table 81). Similar to Alternative 4, all units are proposed for even-aged silvicultural prescriptions (clearcut), with the exception of two units proposed for uneven-aged management with 33 percent removal (34 acres). Timber harvest would be easily noticed by the average forest visitor recreating in the project area, particularly in the Saddle Lakes Recreation Area and the current Old-Growth Habitat LUD.

Alternative 5 includes 32.3 miles of road construction to facilitate the timber sale. After completion of the Timber Sale these roads would be available for non-motorized activities such as hiking.

Similar to Alternative 4, minor changes in the ROS boundary would be needed due to the harvest of Units 149 and 300 in this alternative. Unit 149 lies near the boundary between RM and SPNM ROS classes. Unit 300 is near the boundary between RM and Semi-Primitive Motorized (SPM) ROS classes. The new ROS boundaries result in a loss of 70 acres (1.4 percent) of SPNM and 41 acres (0.6 percent) of SPM, which would add 111 acres of RM within the project area.

Alternative 6

Alternative 6 proposes harvest in eight units of high concern to recreation (134 acres) (Table 81). Six units propose even-aged (clearcut) silvicultural prescriptions (93 acres), and three units propose uneven-aged silvicultural prescriptions with 33 percent removal (41 acres).

Although visitors would notice the harvest of these units while recreating in the project area, Alternative 6 would have less impacts to recreation opportunities than Alternatives 2, 4, and 5. This is because of the configuration and the location of the units, and the harvest prescriptions proposed for them. Alternatives 6 and 2 are approximately equal in terms of recreation impacts in the short term because although Alternative 2 proposes more acres of harvest in the units of concern, those acres would be uneven-aged management. However, that uneven-aged management means Alternative 2 uses more helicopter harvest (and less road building) around the lakes, and main roads may be closed more often to allow for public safety during helicopter operations.

Five of the six units proposed for even-aged management have been modified in this alternative to have less impact than Alternatives 4 and 5; these five units are proposed for uneven-aged management under Alternative 2 at the same acreage as Alternatives 4 and 5. Unit 46 at the south end of the largest lake would not harvest the 5 acre setting closest to the lake in Alternative 6, thereby effectively increasing the lake buffer. It also would have a 7 acre setting harvested with an uneven-aged treatment, lessening the visibility of the upper section of the unit to those recreating on the lake or driving the main road (8300000). Units 50 and 51 are also along the main road between the two North Saddle Lakes; both of these units in this Alternative would harvest fewer acres (leaving some settings for possible future harvest). Unit 80 is along the east shore of the larger lake and would harvest a 4 acre setting adjacent to Unit 48, resulting in less road building and harvest along the ridge east / above the lake than in Alternatives 4 and 5. In addition, although Unit 48 along the east side of the large lake would allow for an even-aged prescription, mitigation measures on unit configuration would reduce the visibility and therefore the impact to recreation visitors.

Alternative 6 includes 24.5 miles of road construction to facilitate the timber sale. After completion of the timber harvest, these roads would be available for non-motorized activities such as hiking.

Cumulative Effects

Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the recreation cumulative effects analysis.

Cumulative Effects Common to all Action Alternatives

Past harvest and road building have set the current stage for recreational use of the Saddle Lakes project area. Roads constructed for timber harvest allow visitors easier access to and throughout the project area.

The most relevant foreseeable future activity that would affect recreation is the planned Ketchikan-Shelter Cove Road that would link the existing Shelter Cove Road system (in the Saddle Lakes project area) to the Ketchikan road system. The State of Alaska DOT&PF would build a new single lane road to provide vehicle access to Shelter Cove and the public and private lands in between Lake Harriet Hunt and Shelter Cove. The State of Alaska is currently in the process of obtaining all the necessary land owner permissions (easements) from the various ownerships the route would cross and any potentially required permits, such as Corps of Engineers. The estimated start of construction for the new section is 2015.

The proposed Ketchikan to Shelter Cove Road would improve access to and throughout the project area by constructing about six miles of open road, of which about 1 mile is on NFS lands within the Saddle Lakes project area. This new road connection would allow people in Ketchikan to drive to the Saddle Lakes area instead of having to boat or fly to the area. As noted in the existing condition section, sightseeing / driving for pleasure is desired by locals, so this connection would lead to increased recreational use of the project area. The road would also allow for a wider range of visitors to access the project area and provide a more-economical means of getting there. At this time, the project area must be reached by boat or plane; once the road is connected to Ketchikan, older individuals, those with disabilities, and those people without a boat / plane could drive to the area (ADOT&PF 2012b).

Currently, the main road (NFS road 8300000) through the Saddle Lakes project area is open to mixed use, which allows for both OHV and passenger vehicle use. This road would become part of the Ketchikan to Shelter Cove Road. It is unknown at this time if there would be any change to this designation once the road is connected to Ketchikan, but there is a possibility that OHV use would be restricted because other State of Alaska roads do not allow OHV use.

Recreational use is projected to be primarily road-based dispersed recreation such as sightseeing, camping, berry-picking, hunting, and fishing. The Saddle Lakes Recreation Area would be the most likely destination in the project area for dispersed camping, and use of North Saddle Lakes for kayaking and canoeing is probable. Freshwater fishing in the lakes and streams of the Saddle Lakes area is also likely. An increase in outfitter-guide use is projected; up to 1,084 service days is available for summer use by outfitter guides in the South Revilla Natural Accessible Use Area (road based operations along the Shelter Cove, Shoal Cove, and Thorne Arm road systems) with additional service days available in the spring and fall seasons.

Use of the 4.6 miles of OHV Trail (8337000 road) is expected to increase once people can drive to the area via the Ketchikan to Shelter Cove Road. Continued use would result in increased maintenance costs from an already declining recreation budget. In order to maintain the OHV trail additional funding or maintenance agreements could explored with user groups or alternate funding sources. Without additional maintenance funding or agreements OHV trails may need to be closed because of unsafe conditions or to prevent resource damage (soils, water quality). In addition, there is an enforcement concern about user-created trails (off-road use) throughout the project area once access to the project area increases with completion of the Ketchikan to Shelter Cove Road.

In addition, firewood gathering and Christmas tree cutting would likely increase in the area since there are currently very few places along the Ketchikan road system for these activities.

Alaska Mental Health Trust Authority Land Exchange

The proposed Alaska Mental Health Trust Authority (AMHTA) land exchange with the Tongass National Forest is also likely to affect recreation opportunities within the Saddle Lakes Timber Sale project area. About 8,170 acres are currently proposed for exchange from the Forest Service to the AMHTA in the Saddle Lakes project area (AMHTA 2012). These lands would no longer be managed by the Forest Service and current and future uses would be affected.

Recreational use of AMHTA lands is allowed, but must be non-commercial, non-motorized, and day-use only (AMHTA 2008). For example, dispersed camping, OHVs, and guided use would not be allowed; road 8330000 is currently mixed use (vehicles and OHVs allowed) so if the exchange occurs and no motorized use is allowed by AMHTA, this opportunity would be lost. There is also a segment of the 8300000 road that could be affected by this proposed exchange. There is a possibility that the Forest Service could retain some rights associated with the roads during the exchange; however, since that would have to be analyzed and negotiated during the exchange, the recreation analysis assumes that an established public recreation policy for AMHTA lands would be in place.

In addition, the proposed location for the land exchange would reduce the amount of SPNM ROS class in the project area, which in turn would affect the range of available recreation opportunities. The Carroll Roadless Area, located in the project area would be reduced by about 3,300 acres (33 percent of the Roadless Area), which would affect the Semi-Primitive Non-Motorized and Semi-Primitive Motorized classes of dispersed Recreation opportunities (see Roadless section). A portion of the small Old-Growth Habitat LUD would also be affected by the proposed exchange.

Outside the project area, a developed campground is available at Settlers Cove State Park, in addition to the Forest Service campgrounds in the Ward Lake Recreation Area (Signal Creek, Last Chance, and 3 C's Group Use). Guided tours for a wide range of activities occur on federal, state and private lands around Ketchikan and along the Ketchikan road system. These include but are not limited to: sightseeing by vehicle, boat, or air; hiking; bicycle and motorcycle; interpretive and historical tours; fishing – both freshwater and saltwater; wildlife viewing; ziplines; canoeing / kayaking; and snorkeling.

The following section describes the cumulative effects to recreation resources by Alternative.

Alternative 1

No direct or indirect effects would occur under Alternative 1 and therefore, no cumulative effects would occur under this alternative. The project area would continue to see approximately the same use levels and types of recreation as it does currently with no changes to ROS or road miles.

Alternative 2

Alternative 2 retains all the VPR designations in the project area and proposes uneven-aged management for the units of concern to recreation (Saddle Lakes Recreation Area). These units would be less visible to the casual observer (most recreationists) and thus would have minimal effect on recreation.

Alternative 3

Similar to Alternative 2, Alternative 3 retains all the VPR designations in the project area, leading to higher scenic integrity in the project area, which is important to recreation. Alternative 3 proposes no harvest in areas of high concern to recreation and has the least impact to the recreation resource.

Alternative 4

Alternative 4 proposes to remove the George Inlet, Carroll Inlet, Ketchikan to Shelter Cove Road, and Saddle Lakes Recreation Area VPR designations decreasing scenic integrity throughout the project area now and into the future. The greatest impact to recreation would occur from removal of the Saddle Lakes Recreation Area VPR designation. Most recreation within the project area is anticipated to occur around the North Saddle Lakes, and scenic changes to this area could affect the experience of visitors to the lakes.

Alternative 5

The effects of Alternative 5 would be similar to Alternative 4, except all five VPRs would be removed and the Old-Growth Habitat LUD would be modified. The proposed Ketchikan to Shelter Cove Road passes through mostly non-NFS land until it reaches the western edge of the Saddle Lakes project area. Much of this land has had timber harvest. Under Alternative 5, the small OGR would be modified (moved away from the road) to allow for additional timber harvest along the existing 8300000 road (which would become part of the Ketchikan to Shelter Cove Road). This would lead to visitors viewing fairly constant young growth on their drive from Ketchikan through the project area to Shelter Cove at Carroll Inlet, regardless of land ownership. The SIO of the area would be Very Low. This may reduce the diversity of visitors to the project area, including guided clients who are typically interested in seeing more-natural landscapes during their visit.

Alternative 6

The effects of Alternative 6 would be similar to Alternative 4, except that there would be fewer impacts to recreation because the Saddle Lakes Recreation Area would be maintained as a VPR and several units near the Saddle Lakes Recreation Area would not be harvest or would be modified to lessen the visual impact, in turn reducing the impact to recreation. The Saddle Lakes Recreation Area viewshed would continue to be managed for Moderate SIO into the future. Most recreation within the project area is anticipated to occur around the North Saddle Lakes so although there would be scenic integrity objective reductions by removal of these VPRs, the impacts to recreation are less than in Alternatives 4 and 5. In the Saddle Lakes Recreation Area viewshed, Alternatives 2 and 6 are about equal: Alternative 2 has more total harvest but uses only uneven-aged management in the units of concern to recreation while Alternative 6 allows for some harvest in alternate configurations. However, because Alternative 6 removes three VPRs which reduces SIOs over vast acres in the greater George / Carroll viewsheds (see Scenery, Issue 4A), in the long term, recreation opportunities would be reduced for activities needing more natural environments more than in Alternatives 2 and 3, making Alternative 6 rank in the middle of the action alternatives.

Conclusion

Under all action alternatives, the State of Alaska would receive an easement from the Forest Service to construct, operate, and maintain about 1 mile of new road associated with the Ketchikan Shelter Cove Road. The Ketchikan to Shelter Cove Road would increase recreation use in the project area. Alternatives 2, 3, 4, and 6 would provide a better experience and High SIO to visitors because the OGR would provide a view of large trees along the road shortly after entering NFS land on the drive from Ketchikan to Shelter Cove (thus alternating between harvest-dominated landscapes and more natural landscapes).

The Saddle Lakes Recreation Area would be the most likely destination in the project area for dispersed camping, and use of the lakes for kayaking and canoeing is probable. Freshwater fishing in the lakes is also likely. As described under Affected Environment, OHV use is currently limited on the Ketchikan road system, and the Ketchikan to Shelter Cove Road project would increase the available opportunities for this activity because of the OHV Trail in the Saddle Lakes project area. Snowmobile use of the road in the winter is also a possibility.

Maintaining scenic integrity around the lakes (Saddle Lakes Recreation Area) would improve the experience for both local residents and visitors because it would provide a more natural appearing landscape in comparison to the surrounding harvested landscapes. Harvested landscapes may be observed all along the drive to Saddle Lakes as the connection road would cross through private and state lands, as well as the west part of the project area. Those action alternatives which do not modify or move the Old-Growth Habitat LUD (Alternatives 2, 3, 4, and 6) would continue to provide an area of High SIO along the road to the west of the lakes. This would maintain a diverse spectrum of road accessible visual conditions and recreational opportunities en route to the primary destination around the lakes.

Tourism is an important part of the Ketchikan and Southeast Alaska economy, with guided activities on NFS lands playing an important role in that industry. A natural appearing landscape could encourage more recreational use of the area and provide a desirable destination for guided activities. Guided activities often have an educational or interpretive component. Possible topics could be to contrast the harvested and unharvested areas, discuss the reasons for timber harvest, and provide an opportunity to showcase resource management and multiple use concepts. A portion of the fees paid by guides are returned to the district where they were generated. Up to 1,084 guided use service days for nature tours (sightseeing) and freshwater fishing are anticipated as a result of the road connection.

Alternatives 4 and 5 would have the most negative effect on recreation resources because they lower the scenic integrity objectives around the lakes by removing the Saddle Lakes Recreation Area VPR designation. This change not only affects how much timber harvest / road building can occur under the Saddle Lakes project, but also allows for higher harvest levels into the future. Alternative 6 would maintain the SIO around the lakes while still providing for about 42 MMBF of timber harvest. However, this alternative would remove the VPR designations for the Ketchikan to Shelter Cove Road, George Inlet, and Carroll Inlet. Alternatives 2 and 3 preserve all VPRs in the project area (Saddle Lakes Recreation Area, Ketchikan-Shelter Cove Road, George Inlet, Carroll Inlet, and Shelter Cove Boat Ramp). Alternatives 4 and 6 also preserve the Shelter Cove Boat Ramp VPR.

All alternatives would maintain the 8337000 road as an OHV Trail (4.6 miles). In the long-term, there is a concern for maintenance of this OHV Trail and alternate funding sources would need to be explored to keep the trail open. Newly constructed roads associated with the timber sale would be closed to motor vehicle use at the end of the project and would be available only for administrative use during the project. Temporary road closures could occur during active timber sale activities, particularly for OHV use. These closures may negatively affect recreation users for short periods of time, and would be the most disruptive if they occur during the fall hunting season.

Alternatives 1, 2, 3, and 6 do not result in any ROS changes within the project area. Alternatives 4 and 5 would require a small change to the ROS class boundaries. This is about a 1 percent (1.4%) decrease to the acres of SPNM class, with less than a 1 percent decrease to the acres of SPM additional under Alternative 5.

Design Features and Mitigation Measures

In Alternative 6, the lake buffer would be increased to 200 feet along the west boundary of Unit 48 to provide more of a visual screen for the proposed road in Unit 48, as well as the timber harvest itself. In addition, the boundary between Units 48 and 49 (east boundary of Unit 48 / west boundary of Unit 49) would be feathered (varied rather than straight) (see unit cards). This combination would reduce the impacts of a unit of high concern to recreation in the Saddle Lakes Recreation Area, when viewed from the lake and the road along the west side of the lake (8300000 road).

In all action alternatives, NFS road 8337000 would be returned to OHV Trail status, as currently shown on the MVUM, upon completion of timber sale activities. Any implemented road closure measures must be such that they are usable (passable / crossable) by OHVs (vehicles 50 inches or less in width).

Other Resources

Air Quality and Climate Change

This section describes the general air quality conditions expected in the Saddle Lakes project area and the information available about climate change in Southeast Alaska. Climate change and air pollution are closely linked, although in research and politics they have been largely separated. It is generally accepted that greenhouse gases (GHGs) are impacting the Earth's climate by warming the surface and the atmosphere, thus affecting rainfall, glacier and sea ice retreat, and sea level, among other factors (Ramananthan and Feng 2009). However, many of the traditional air pollutants (particulate matter or PM) and GHGs have common sources and may interact physically and chemically in the atmosphere causing a variety of environmental impacts on the local, regional and global scales (Bytnerowicz et al. 2007).

Affected Environment – Air Quality

Air quality on the Tongass National Forest and in Southeast Alaska is generally very good. The prevailing winds off the Pacific Ocean, the relatively small amount of industrial development and population centers, and the general lack of smoke from large-scale wildland fire all contribute to maintaining clean air in the region. However, localized air pollution from sources such as mining operations, marine vessels and cruise ships, wood-burning stoves, vehicle exhaust, diesel power and asphalt plants, incinerators, and unpaved roads can contribute to deterioration of air quality at various scales (temporal and spatial) that could impact sensitive receptors on the Tongass National Forest. Designated sensitive receptors of air quality impacts are lichens (Dillman et al. 2007; USDA 2008b). Lichens, especially canopy epiphytes, are particularly sensitive to pollution and climate because they obtain their water and nutrients from the atmosphere rather than soils, lack barriers to water or pollutants, and because their metabolism is moisture activated. This means lichens are very responsive to shifts in moisture and temperature (Geiser 2012).

Under the Tongass Land Management Plan, the goal of air resource management (ARM) is to maintain the current air resource condition to protect the Forest's ecosystems from on- and off-Forest air emissions sources. To help resource managers understand if on- and off-Forest air pollution is impacting sensitive receptors, we established a network of biomonitoring plots in 1989 that use lichens as indicators of air quality. Permanent plots are monitored every 8 to 10 years to determine if contaminant concentrations in lichens are above established thresholds developed for the Forest from pristine areas (Dillman et al. 2007). The consistent monitoring allows resource managers to gather trend data on contaminants (some of which are criteria pollutants or similar species such as nitrogen for nitrogen dioxide, sulfur for sulfur dioxide and lead). Concentrations above the established thresholds indicate that something in the vicinity of the plot is contributing additional levels of a particular contaminant over what is expected as background for the Forest.

The air quality condition has been derived from established air quality biomonitoring plots on other parts of Revillagigedo Island - Misty Fiords Wilderness (Manzanita Lake) and near Ketchikan (Ward Lake and Settlers Cove). Overall, lichens from plots on Revillagigedo Island were not above contaminant thresholds established for the Tongass National Forest (Dillman et al 2007). These plots are in direct influence from Ketchikan road system and human population activities (at Ward Lake and Settlers Cove) such as wood stoves, garbage burning, and other fossil fuel combustion activities.

Additionally, the air quality objective under the current Forest Plan is to attain national and state ambient air quality standards forest-wide. To determine if national and state ambient air quality standards are being met in the region, an annual review of EPA and Alaska Department of Environmental Quality reports is conducted at the forest level.

There is no non-attainment area in the vicinity of the project area.

Affected Environment – Climate Change

Climate fundamentally shapes our surroundings. Climate is extremely important to local ecosystems as well as human health and infrastructure since temperature, precipitation, winds, and meteorological events (for example, the timing of the first and last frost, the beginning and end of a rainy season, or a severe storm causing flooding) all influence the distribution of water, soils, plants, and wildlife across the globe. Significant, lasting change to existing weather patterns is commonly called “climate change.”

The term “greenhouse gases” (GHGs) refers to a variety of gases in the Earth’s atmosphere that react with sunlight in a way that influence global air temperature. GHGs are a function of air quality and include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (EO 13514). These GHGs are typically reported in units of carbon dioxide equivalent (CO_2e).

Long-term climate trends and decadal climate cycles have always occurred in Southeast Alaska, influencing air temperature and precipitation (Neal et al. 2002). There is a growing body of literature on the topic of climate change and likely effects on aquatic and terrestrial ecosystems of the Tongass National Forest (e.g., Bryant 2009, Hodgkins 2009, Hood and Berner 2009, Haufler et al 2010, Wolken et al. 2011, Hennon et al. 2012).

Changing Climate

The Tongass National Forest is a matrix of forests, wetlands, alpine meadows, ice, and rocks. Climate change impacts these landscapes in different and potentially unanticipated ways. The forest’s role in the global carbon cycle is thought to be significant, equal to about 8 percent of the carbon stored in all forests in the Lower 48 (USDA 2013d).

The U.S. Global Change Research Program (2009) reported that Alaska has experienced a 3.4 degree Fahrenheit rise in average annual temperatures over the past 50 years with an increase in winter temperatures of 6.4 degree Fahrenheit. Temperatures are expected to continue to rise. These increases in temperatures have led to other related changes to climate, such as an increase in snow-free days and shifts in precipitation. Snow-free days have increased across Alaska by an average of 10 days. According to Hennon et al. (2012), the forests of coastal Alaska are expected to experience the largest twenty-first century increase in frost-free days anywhere in North America (Meehl et al. 2004) as the winter climate moves across the snow–rain threshold (Hennon et al. 2012).

According to Haufler et al. (2010), anticipated climate change impacts to NFS lands and the lands of other ownerships on the Tongass National Forest include changing sea levels, increased ocean temperatures and changing circulation patterns, increased ocean acidification, increased storm intensities, changes to stream temperatures and flows, loss of glaciers, changes to wetlands, forest temperature and precipitation changes, and increases in invasive species. Climate change has been linked to increases in GHGs, with the primary factor being the rise in CO_2 levels (Haufler et al. 2010).

Yellow-cedar Decline

As discussed by Haufler et al. (2010), forest temperature and precipitation changes have an impact on NFS lands. In Southeast Alaska, these changes have been associated with a declining Alaska yellow-cedar (*Callitropsis nootkatensis*) distribution, henceforth referred to as yellow-cedar. Although distribution of yellow-cedar has been undergoing change over the last century, scientists are indicating that these distribution changes are increasing due to climate change (Hennon and Shaw 1997, Beier et al. 2008, Hennon et al. 2008).

For more detail on yellow-cedar decline, see the section entitled, Forest Health and Natural Disturbances in the Silviculture section in this chapter. There are about 1,797 acres of yellow-cedar decline mapped in the Saddle Lakes project area, with the majority occurring at elevations below 1,400 feet (USDA GIS Cedar Decline layer).

Carbon Sequestration

Forest ecosystems represent the largest terrestrial carbon sink on earth, such that the United Nations Framework Convention on Climate Change (see United Nations Framework Convention on Climate Change website) has recognized their management as an effective strategy for offsetting GHG emissions (Wilson et al. 2013). Although much of the attention on the forest carbon sequestration strategy in the United States has been on the role of private lands, public forests in the United States represent approximately 20 percent of the U.S. timberland area and also hold a significantly large share (30 percent) of the U.S. timber volume. With such a large standing timber inventory, these forested lands have considerable impact on the U.S. forest carbon balance (Depro et al. 2007).

Sequestration refers to the storage of carbon to reduce atmospheric carbon (CO_2) and mitigates the effects of climate change. For the purposes of federal land managers, biological sequestration occurs when atmospheric carbon is absorbed and stored by plants or soils. Biological sequestration is the net increase of carbon stored within a parcel of land over time, while the net decrease is considered an emission. In other words, a standing forest that exists today is not, in and of itself, considered sequestration, but any additional carbon that is stored within that forest as it grows over time would be considered sequestration (CEQ 2012).

Forests absorb carbon dioxide and reduce its presence in the atmosphere. Growing forests sequester and store more carbon over time until growth slows down considerably at maturity. Older trees sequester carbon through new growth at a declining rate, but retain pools of stored carbon until they burn or decay as they decline, die or are harvested. Actively growing forests turn water, sunlight and atmospheric carbon dioxide into solid carbon and oxygen and continue to store significant amounts of carbon when they are old. Carbon is continuously cycled among these storage pools and between forest ecosystems and the atmosphere as a result of biological processes in forests (e.g., photosynthesis, respiration, growth, mortality, decomposition, and disturbances such as fires or pest outbreaks) and anthropogenic activities (e.g., harvesting, thinning, clearing, and replanting). Because the carbon sequestration system consists of multiple pools, the fluxes between them, and numerous processes, it is important to consider forest carbon as a complete system, rather than just focusing on one pool or process. For example, if you were to just consider carbon fixed by growing trees through photosynthesis, you might assume that young forests are desirable because they sequester carbon faster than old forests. However, it is also important to consider the importance of carbon stored in older forests, both in live biomass and dead pools (Oregon Forest Resources Institute 2013).

The Tongass National Forest, like most forests, is considered a carbon sink (i.e., it stores more carbon in its systems than is released by natural processes). Cool conditions inhibit decomposition, slowing the rate of biomass breakdown and carbon release. Decaying plant matter is incorporated into the system's soil profile, where it accumulates and may reside indefinitely. As a result, mature forests generally store considerable amounts of carbon on the forest floor. As such, a critical ecosystem service sustained by the forest is carbon sequestration (i.e., the removal of carbon dioxide from the atmosphere and keeping that carbon inactive by storing it in live or dead biomass as well as organic soil matter).

In 2012, the Forest Inventory and Analysis (FIA) program made numerous carbon storage estimates available via online tools (see FIA Forest Carbon Estimation website) and prepared the first national assessment of the biomass and carbon attributes of down woody material (USDA 2012).

Table 82 shows the total carbon storage on the Tongass National Forest.

Table 82. Total carbon storage in the Tongass National Forest

State	Total Forest Carbon (million metric tons)					
	Live Aboveground	Live Belowground	Dead Wood	Floor Litter	Soils (organic)	TOTAL
Alaska (Southeast only)	386	86	142	207	385	1,206

Source: FIA Current data as of 15 Jul 2013 Standard Tables of Forest Carbon Stock Estimates by State (Forest Inventory and Analysis National Program website).

Notes: Alaska only includes the Southeast Alaska coast and does not include the 111 million acres of Interior Alaska because the FIA program does not yet collect plot data there.

Greenhouse Gasses

Climate change due to GHGs is a global phenomenon, so the spatial context for this discussion is the global climate.

The most important GHGs directly emitted by humans include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and several other fluorine-containing halogenated substances. Naturally occurring GHGs include water vapor, CO_2, CH_4, N_2O, and ozone (O_3). Although these GHGs occur naturally in the atmosphere, human activities have changed their atmospheric concentrations. Atmospheric CO_2 concentration has increased from a pre-industrial value of 280 ppm to nearly 390 ppm today, mostly due to carbon emissions from fossil-fuel burning and deforestation. GHGs trap heat and make the planet warmer.

The primary sources of GHG emissions in the Saddle Lakes project area are from transportation emissions (from seaplane flights, ferry/cruise ship activity, and vehicle travel) and emissions from fuel combustion associated with the city of Ketchikan. To provide context in understanding levels of GHGs, on a national level, GHG emissions totaled 6,822 million metric tons CO_2e in 2010 (Environmental Protection Agency 2012) and global GHG emissions totaled 31,781 million metric tons CO_2e in 2010 (U.S. Energy Information Administration 2013).

Environmental Consequences

Direct, Indirect and Cumulative Effects on Climate Change and Carbon Sequestration

Alternative 1 would likely result in a similar rate of climate change as current conditions, and would therefore have little or no effect on the rate of climate change in the Saddle Lakes project area or at least would not have an effect on the rate of climate change. Similarly, the rate of carbon sequestration would likely remain at its current rate for several years. Based on the literature review (see Climate Change Resource Report, Howle and Krosse 2014), it is uncertain whether the rate of carbon sequestration would be higher or lower under Alternative 1 compared with the action alternatives. It is possible that the rate of carbon sequestering would be slightly higher under the No

Action Alternative (at an unquantifiable level). As Depro et al. (2007) found, with longer periods of time (100 years) with no harvest, there would be an annual increase in carbon sequestration.

Alternative 1 is not expected to affect the current rate of climate change or carbon sequestration and thus would not add to the past, present, or reasonably foreseeable factors related to climate change.

Direct, Indirect and Cumulative Effects on Yellow cedar regeneration

Alternative 1 would likely result in the same rate of yellow cedar decline and current rates of regeneration, or at least would not have an effect on the rates of regeneration and/or decline. Since these factors are directly related to seasonal snow pack (loss of snow cover at lower elevations) and thawing cycles in late winter, a no-action alternative would have no direct, indirect, or cumulative effects on overall yellow-cedar decline and/or regeneration.

Direct, Indirect and Cumulative Effects on Greenhouse Gas Emissions

Alternative 1 results in no construction-related CO2e emissions because no Forest Service construction or harvest operations would take place. However, CO2e would continue to be produced in the Ketchikan area (near Saddle Lakes) annually as a result of existing vehicle, aviation, and ferry/cruise ship emissions. Therefore, GHGs emissions are likely to remain the same as current conditions under Alternative 1.

Alternatives 2, 3, 4, 5 and 6

Effects Common to All Action Alternatives

For all action alternatives, road construction activities, timber harvest operations, and administration of all operations by use of service vehicles throughout the life of the timber sale would result in emissions of greenhouse gases. These activities involve removing vegetation, grading and re-contouring the ground surface, hardening the road, potential extraction of materials such as gravel, soil, and rock from on-island material sources, and constructing bridges all of which require fuel-burning construction machinery, an increase in construction-related vehicle traffic a 3 to 10 year period. These construction actions would increase CO2e emissions due to fuel combustion from construction equipment and the vehicles of construction crews.

Although the nature of the effects would be the same for all action alternatives, the magnitude of effects would differ per alternative. This environmental impact statement only evaluates the change in CO2e emissions produced by the action alternatives as compared to the no action alternative when assessing project effects to climate. This qualitative approach also matches federal protocol (Council on Environmental Quality 2012) in using CO2e as the single assessed metric to encompass all greenhouse gas emissions.

The effects of project activities on regional changes in climate, in carbon sequestration and on the natural regeneration of yellow-cedar would be evaluated qualitatively for all action alternatives.

Direct, Indirect and Cumulative Effects on Climate Change and Carbon Sequestration

The following sub-sections qualitatively assess the potential impact of the action alternatives in general on carbon sequestering and climate change, but do not attempt to calculate quantifiable impact values.

Overall, under the action alternatives, the rate of climate change and carbon sequestration would likely continue at the current rate for several years. Based on the literature review presented in the Climate Change Resource Report, (Howle and Krosse 2014), it is uncertain whether the rate of carbon sequestration would be higher or lower under no action compared with the action alternatives; however, it is possible that the rate of carbon sequestering would be slightly higher under the no action alternative (at an unquantifiable level). As Depro et al. (2007) found, with longer periods of time (100 years) with no harvest, there would be an annual increase in carbon sequestration.

Direct, Indirect and Cumulative Effects on Yellow Cedar Regeneration

All action alternatives would likely result in the same rate of yellow-cedar decline and current rates of regeneration, or at least would not have an effect on the rates of regeneration and/or decline.

Direct, Indirect and Cumulative Effects on Greenhouse Gas Emissions

During timber sale operations, fuel combustion associated with harvesting timber would result in CO2e emissions. Additionally, the distance vehicles travel to and from the harvest units, regardless of the location, would increase, during the life of the sale. Both of these changes would increase CO2e emissions through additional fuel consumption.

For all action alternatives, construction activities—removing vegetation; grading and recontouring the ground surface; hardening the roads; potential extraction of materials such as gravel, soil, and rock from on-island material sources, constructing bridges and operation of timber harvest machinery (yarders, shovels, loaders, log trucks) would require fuel-burning construction machinery, an increase in construction-related vehicle traffic, and two to three seasons of construction in addition to a 3 to 10 year timber harvest operation over the life of the sale. These construction actions would increase CO2e emissions due to fuel combustion from construction equipment and the vehicles of construction crews.

The CO2e emissions from construction were assessed qualitatively for all alternatives based on the duration and type of construction activity that would occur. The relative amounts of GHGs for each action alternative is proportional to the amount of road construction and harvest operations. Therefore, Alternative 5 would have the highest anticipated GHGs, followed by Alternatives 4, 6, 2, and 3, which would have lower levels.

Overall, the effects of this project on climate change and air quality are negligible. The Air Quality and Climate Change resource reports in the project record contain a more-detailed discussion of the environmental effects of climate change and air quality from the activities identified for the Saddle Lakes project.

Although important on a global scale, it is estimated that the forests of the Tongass represent approximately only one quarter of 1 percent of the stored carbon in forests worldwide (USDA 2008c, p. 3-19). Therefore, it is reasonable to conclude that small, if even measurable, changes in carbon sequestration, greenhouse gasses, and yellow-cedar decline under any of the action alternatives would not be a relevant factor for choosing among alternatives. Additionally, as described above and in the Forest Plan, the task of understanding all the factors that influence climate change contains substantial uncertainty and for these reasons is not essential to a reasoned choice among alternatives.

None of the action alternatives are predicted to measurably contribute to the cumulative effects on climate change.

Aquatics

This section focuses on sedimentation, streamflow, and stream temperature as well as fish habitat and distribution. These are the principle areas of hydrology and fisheries that may be impacted by timber harvest and road construction activities.

Road construction and use, as well as stream crossings are primary sources of sediment into streams. Even-aged logging systems (e.g., clearcutting) on slopes may adversely affect peak streamflows and therefore, fish habitat. Water quality can be affected by timber harvest through sedimentation caused by increased traffic on the road system and harvest practices such as cable yarding and shovel loading. Increased water temperatures can be caused by removal of trees (which shade streams).

The following units of measure were used to evaluate current watershed condition, the effects of the proposal, and to compare alternatives:

Units of Measure:

- Changed streamflow: Cumulative harvest levels since 1984 in affected watersheds.
- Increased sediment: Percentage of basin comprised of roads (from acres of existing and proposed new road construction), and number of existing and proposed stream crossings.
- Changes in stream habitat: Miles of new roads, new stream crossings, timber harvest, and landslides.

Methodology

The analysis was based on field data collected by Forest Service personnel and GIS. Field surveys focused on verifying fish habitat and mapping new streams.

Incomplete and Unavailable Information

Stream flow and water quality data are unavailable for the affected watersheds. These data are not required for the effects analysis, which is based on known cause and effects relationships supported by peer reviewed literature.

There are some streams within the proposed action area that remain unclassified, however the majority of the unclassified streams are Class IV streams would be mapped during implementation during unit and road layout. Any new streams located during unit layout would be mapped and added to this analysis prior to the completion of the Final EIS.

The lack of stream gauge data and the incomplete cataloguing of classified streams within the Proposed Action area were not critical for the analysis of the potential impacts. Analysis of potential effects was based on the assumption that risk to aquatic habitats was possible with all existing and proposed new disturbances, and that implementation of Standards and Guidelines and Best Management Practices would eliminate or minimize these risks.

Analysis Area

The watersheds used for this analysis were delineated by the US Geological Survey (USGS) according to a national hierarchy of Hydrologic Unit Codes (HUC). The project area includes portions of four 6th-level HUC watersheds, further divided into twelve true watersheds. Twelve of these function as true watersheds. In coastal areas, the ocean is considered the common point, so some of these units drain unconnected streams into the ocean. These areas do not function as true watersheds. All of the watersheds located in the project area are listed in Table 83 and displayed on Figure 15 and Figure 16.

The analysis was conducted on all watersheds at both the 6th-level and 7th-level HUC affected by this project, including watershed areas that extend beyond the project boundary and/or beyond Forest boundaries. The analysis includes all available information for each watershed, including information from non-NFS lands.

Table 83. Affected watersheds in the project area used in the analysis of the Saddle Lakes Timber Sale

6th-level HUC Watershed	7th-level HUC Watershed (all in 1901010205)	Total Acres	National Forest (acres)	Non-National Forest (acres)	Percent National Forest Land in Watershed
Calamity Creek-Frontal Carroll Inlet	*0305 (N. Saddle Lake)*	5,879	5,458	419	92.8%
	0307 (Twin Peaks)	815	815	0	100%
	0308 (Gunsight Creek)	2,062	2,062	0	100%
	0310 (Shelter Cove-A)	163	163	0	100%
	0310 (Shelter Cove-B)	93	93	0	100%
	0310 (Shelter Cove-C)	194	194	0	100%
	0310 (Shelter Cove-D)	1,588	1,588	0	100%
George Inlet-Frontal Carroll Inlet	*0901 (Hidden Lakes)*	1,830	834	996	45.6%
	0903	1,612	433	1,179	26.9%
	0910 (George Inlet-B)	151	0	151	0%
	0910 (George Inlet-C)	677	0	677	0%
	0910 (Coon Cove-A)	968	1	967	0.1%
	0910 (Coon Cove-B)	182	0	182	0%
Marble Creek-Frontal Carroll Inlet	*0503 (Buckhorn Lake)*	3,441	3,299	142	95.9%
	0504 (Road End)	2,469	2,453	16	99.4%
	0510 (California Cove-C)	791	442	349	55.9%
	0510 (California Cove-D)	114	114	0	100%
	0510 (California Cove-E)	2,375	2,375	0	100%
Salt Lagoon	*0601 (Horseshoe Ridge)*	4,048	4,048	0	100%
	0602 (Lemon Lake)	1,560	1,560	0	100%
	0603 (Big Salt Creek)	4,654	4,337	317	93.2%
	0604 (Upchuck Creek)	938	806	132	85.9%
	0605 (Rainbow Creek)	4,078	3,091	988	75.8%
	0606 (Salt Lagoon-A)	344	208	136	60.5%
	0606 (Salt Lagoon-B)	25	0	25	0%
	0606 (Salt Lagoon-C)	412	148	264	35.9%
TOTAL		**41,463**	**34,522**	**6,940**	**83.3%**

Source: USDA Tongass National Forest GIS

Notes: Acres are rounded to nearest whole number. Percentages are rounded to nearest tenth.

Italicized text designates true watersheds.

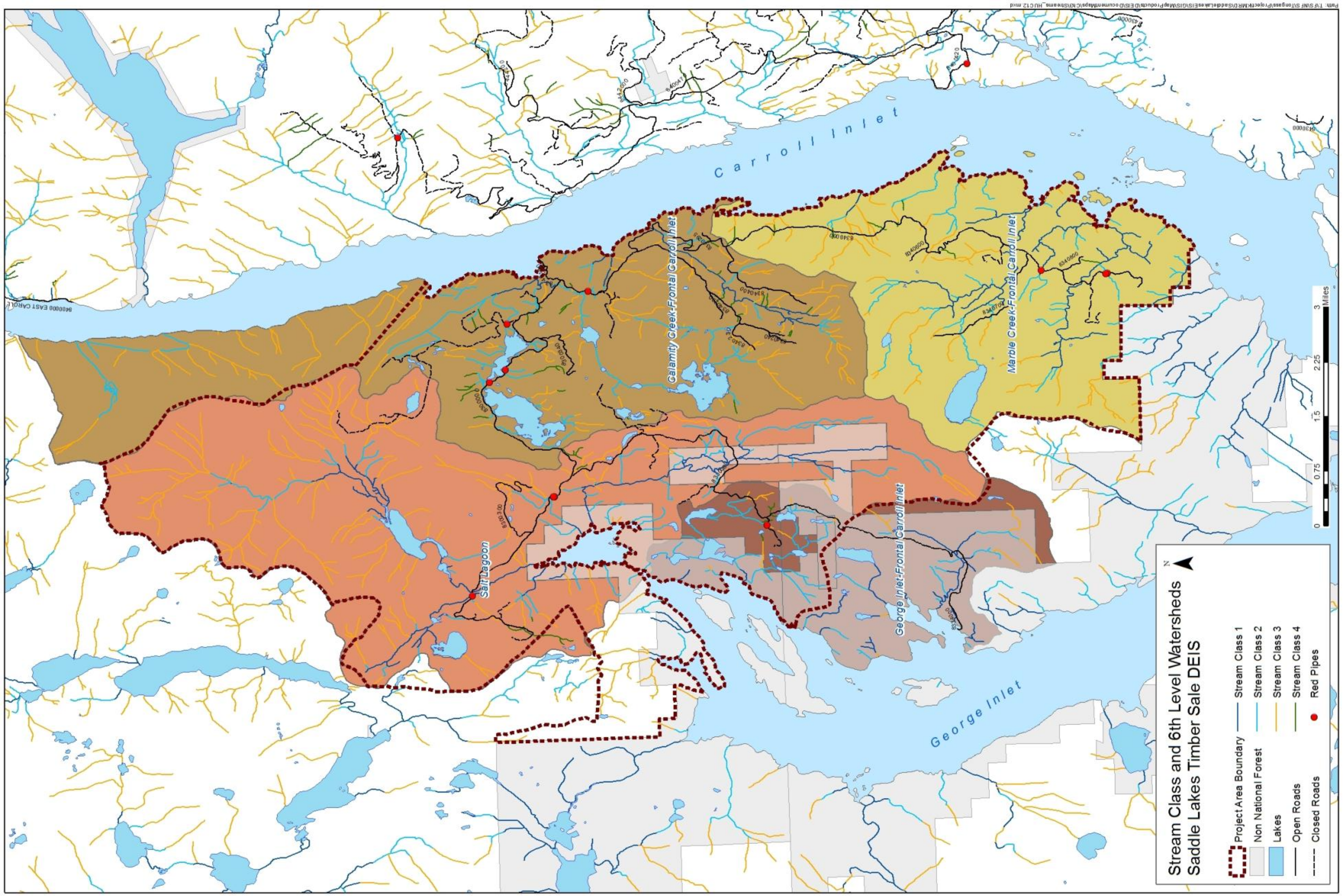


Figure 15. Hydrologic unit code (HUC) 6th-level watersheds, stream classes, and locations of red pipes (red fish crossings) in the Saddle Lakes project area

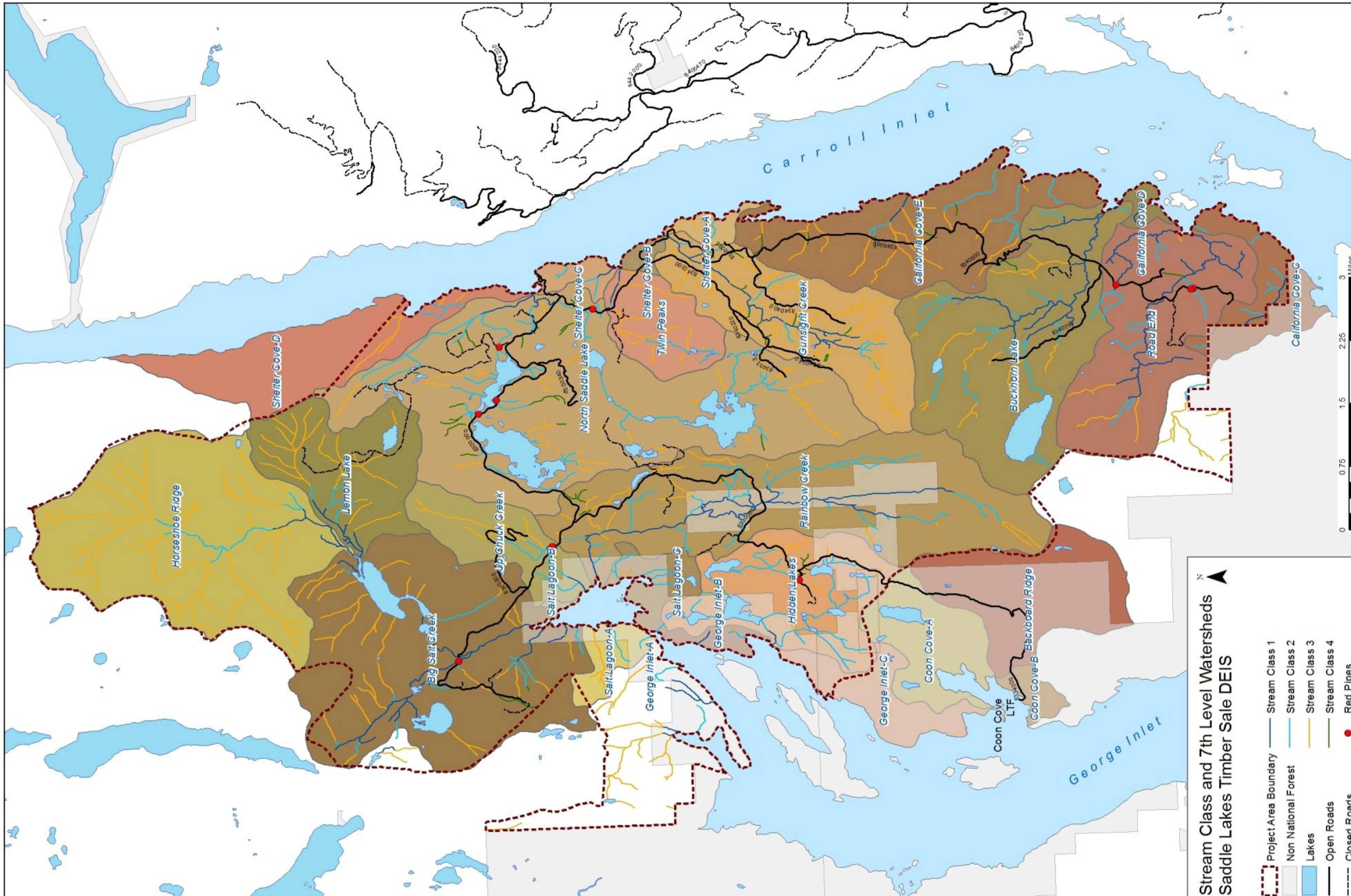


Figure 16. Hydrologic unit code (HUC) 7th-level watersheds, stream classes, and locations of red pipes (red fish crossings) in the Saddle Lakes project area

Affected Environment

Climate

Precipitation within the analysis area ranges from about 100 inches to 140 inches annually, with the highest rainfall occurring during October and lowest in June. Individual storms vary dramatically over short distances and can produce intense rainfall and high winds resulting in windthrow.

Streamflow

Timber harvest can change streamflow by altering the collection and storage of water, thus altering the amount and timing of water delivery to the stream. Reductions in canopy interception and plant transpiration rates resulting from harvest can increase annual water yield as well as peak flows in small streams (Jones and Grant, 1996). Rates of timber harvest in the project area have varied among watersheds, but were generally higher in the 1980s and 1990s. Harvest of suitable timber was primarily in valley bottoms and along toeslopes easily accessible from the road system.

Stream discharge within Southeast Alaska is predominantly controlled by rainfall events, with peak discharges occurring during fall and winter storms (Jones and Fahl, 1994). No active or historic stream gages exist within the project area. Evaluation of the data from nearby streamflow gages suggests that project area streamflow is likely influenced by spring snowmelt and winter rain-on-snow events placing the project area within the transitional snow zone. Although the project area contains elevations above 2,000 feet, most of the project area is below 1,500 feet in elevation.

Variable effects on low flows following harvest have been reported in rain-dominated coastal watersheds (Keppeler and Ziemer, 1990; Hicks et al., 1991). A study in Southeast Alaska concluded that timber harvest may result in higher levels of stream flow during dry periods (Bartos, 1989). However, recent analysis of these data suggests the change could be due to climatic cycles, not timber harvest (Neal, 2000). In another Southeast Alaska study, analysis of cumulative water yields in Staney Creek and a control watershed (Old Toms Creek) on Prince of Wales Island showed a decrease in Staney Creek's annual water yield between 1995 and 2002. This time frame is consistent with the period of hypothesized maximum young-growth canopy closure, and supports the inference that increased evapotranspiration rates resulted in decreased stream runoff during this period. However, the analysis also showed that after 2002, the Staney Creek-Old Toms Creek water yield relationship returned to pre-1981 conditions. Analysis of summer minimum stream flow patterns for the Staney Creek period of record did not show evidence that potential changes in forest canopy interception rates affected low flow regimes. During the pre-harvest period (1965 to 1970) Staney Creek actually exhibited higher variability in minimum summer streamflows than under young-growth forest conditions (1990 to 2010). As in the first study, this outcome may be related to the dominant influence of climatic regime shifts such as the Pacific decadal oscillation (Neal, personal communication 2010).

A conservative estimate of 15 percent of the timber harvested in the previous 30 years has been used as a measure of the time necessary for hydrologic recovery, referring to the decreasing impact of forest practices through time as a result of vegetation regrowth (Moore and Wondzell, 2005). More recent evidence supports the theory that increases in peak flows are only detectable in relatively small flows with a return period of six years or less in rain dominated and transitional snow zone watersheds, such as the transitional snow zone watersheds analyzed in the project area. According to the study, peak flow effects resulting from clearcut harvest within watersheds located in the transitional snow hydrologic zone are not detectable for cumulative harvest levels less than 15 percent with the presence of roads (Grant et al. 2008).

Table 84 summarizes harvest acres from 1984 to present, of the true watersheds which have had prior timber harvest within the project area. Three watersheds are close to, or exceed the 15 percent cumulative harvest in the last 30 years which have the potential to increase peak flow effects for watersheds in this transitional snow zone. Hidden Lakes has the highest cumulative harvest, followed by Upchuck Creek and Gunsight Creek.

Table 84. Past harvest in Saddle Lakes project area (True Watersheds)

7th HUC Watershed (all in 1901010205)	Total Acres	Total Harvested (acres)	Total Harvested (% watershed)	Total Harvested since 1984 (acres)	Total Harvested since 1984 (% watershed)
0305 (N. Saddle Lake)	5,879	544	9.3%	529	9.0%
0307 (Twin Peaks)	815	70	8.6%	70	8.6%
0308 (Gunsight Creek)	2,062	305	14.8%	305	14.8%
0901 (Hidden Lakes)	1,830	388	21.2%	376	20.5%
0503 (Buckhorn Lake)	3,441	242	7.0%	192	5.6%
0504 (Road End)	2,469	249	10.1%	245	9.9%
0602 (Lemon Lake)	1,560	222	14.2%	222	14.2%
0603 (Big Salt Creek)	4,654	380	8.2%	246	5.3%
0604 (Upchuck Creek)	938	169	18.0%	169	18.0%
0605 (Rainbow Creek)	4,078	795	19.5%	550	13.5%

Source: USDA Tongass National Forest GIS

Notes: Acres all rounded to nearest whole number. Percentages rounded to nearest tenth.

Water Quality

Beneficial Uses of Waters in the Project Area

The Alaska Integrated Water Quality Monitoring and Assessment Report provides information on water bodies within the state that do not fully or partially support their designated beneficial uses, known as the 303(d) list. None of the streams in the project area, including nearby waterbodies, are included on this list of impaired waters (ADEC, 2013).

No state-classified public water systems or potable water supply uses occur within the project area, but three pending or issued permit/certificates are located on state land downstream. No streams affected by this project are being used under these permits.

Sediment and Turbidity

The primary water quality parameters potentially affected by timber harvest and road building are suspended sediment loads, turbidity, and stream temperature. No sedimentation or turbidity data is available for the watersheds in the project area. Generally, in undisturbed watersheds in Southeast Alaska, suspended sediment loads in non-glacial streams are very low (Schmeige et al., 1974). Sediment can be introduced into streams from management-related and natural processes, including road building, timber harvest, landslides, debris flows, and erosion of stream banks.

Road surfaces are potential sediment sources to stream channels (Wemple and Jones 2003, Wemple et al. 1996, Megahan and Kidd 1972, Reid and Dunne 1984). Studies in Southeast Alaska have correlated higher rates of road erosion with heavy traffic, among other factors (Kahklen and Hartsog 1999).

There are 95 miles of existing road in the project area watersheds. This figure includes roads of any ownership including state and local roads, and all Forest Service roads (system and temporary) built, regardless of age or operational maintenance level. Percentage of the watershed area comprised of roads has been used to help quantify the risk of flow-related impacts to aquatic systems, including sediment introduction into streams. On Washington's Olympic Peninsula, accumulation of fine sediment in streambeds was found to be highest in basins where the road area exceeded 2.5 percent of the basin area (Cederholm et al. 1980). Basin area is measured in acres and square miles. A statistical relationship between fine streambed sediment and watershed disturbance has not been reported in Southeast Alaska studies (Bryant et al. 2004, Woodsmith et al. 2005). However, Cederholm's suggested threshold provides a way to evaluate the potential impacts of roaded area in the affected watersheds in comparison to findings elsewhere in the Pacific Northwest.

Table 85 summarizes the existing road miles in the affected watersheds. Short-term increases in sediment and turbidity likely occurred during road construction and maintenance in these watersheds.

Table 85. Existing roads and road density in True Watersheds

7th-level HUC Watershed (all in 1901010205)	Total Square Miles	Total Acres	Existing Roads (miles)[1/]	Total Road Density (mi/mi^2)	Percent Basin Area as Road[2/]
0305 (N. Saddle Lake)	9.19	5,879	15.93	1.7	1.3%
0307 (Twin Peaks)	1.27	815	1.78	1.4	1.1%
0308 (Gunsight Creek)	3.22	2,062	7.33	2.3	1.7%
0901 (Hidden Lakes)	2.86	1,830	7.01	2.5	1.9%
0503 (Buckhorn Lake)	5.38	3,441	5.21	1.0	0.7%
0504 (Road End)	3.86	2,469	5.88	1.5	1.2%
0602 (Lemon Lake)	2.44	1,560	2.71	1.1	0.8%
0603 (Big Salt Creek)	7.27	4,654	5.38	0.7	0.6%
0604 (Upchuck Creek)	1.47	938	2.4	1.6	1.2%
0605 (Rainbow Creek)	6.37	4,078	14.32	2.2	1.7%

Source: USDA FS GIS

Note: Square miles are rounded to nearest hundredth, percentages are rounded to nearest tenth, and acres all rounded to nearest whole number.

1/ Includes all roads, regardless of ownership, type, or operational level.

2/ Percent Basin as Roads calculated as: {[Existing road miles * 5,280ft/mi*40ft (assumed clearing width) / 43,560ft^2/acre] / watershed size (acres)} *100

Mass movement events such as landslides and debris torrents may be accelerated by forest management activity if surface or subsurface hydrologic characteristics of the site are altered, as can occur with timber harvest and road drainage diversions (Swanston and Swanson, 1976; Swanston and Marion, 1991; May, 2007). Watersheds in the project area are generally characterized by low relief (steepness) of the mainstem channels, with portions of the watershed having high concavity profiles where steep mountain slopes meet low-gradient valleys. Landslides and debris flows in these settings typically deliver sediment and debris in discrete deposits in the form of large log jams and alluvial fans at confluences, resulting in patchy disturbance patterns (Benda et al., 2004; May, 2007).

Landslide acreage is highest in Horseshoe Ridge watershed, but with the highest percentage of slopes greater than 72 percent, this can be expected. Buckhorn Lake is an anomaly with only 1 acre of steep slopes, yet with the highest occurrence of landslides. More information regarding mass movement events can be found within the Soils Report located in the project record.

Windthrow is also a source of natural disturbance potentially impacting sediment delivery to streams in project area watersheds (see Silviculture section for further discussion of windthrow). Aerial photo and field assessments of windthrow in proposed units within project area watersheds indicate natural riparian windthrow is not a significant stream disturbing process, although individual tree windthrow is likely an important source of Large Woody Debris (LWD) into stream channels.

Additional buffer protection would be considered and implemented as needed during harvest unit layout for any units within Riparian Management Areas (RMAs) (see unit and road cards located in the project record).

Stream Temperature

Removal of riparian vegetation and the resultant increase in solar radiation can lead to increased stream temperatures (Beschta et al., 2000). Riparian Management Areas are designed to protect riparian zone interactions between streams, floodplains, riparian wetlands and uplands (Paustian 2004). The Forest Plan Standards and Guidelines require that RMAs be delineated according to stream value classification and channel type process groups, with minimum protection standards defined for harvest and road building activities. RMAs are delineated for all Class I, II, and III streams within or adjacent to proposed harvest units according to guidelines established in the Aquatic Habitat Management Handbook (USDA 2001a) and the Forest Plan (USDA 2008b, pgs. D-1 to D-20).

Timber harvest in upland areas has also been linked to increases in maximum daily stream temperatures. Pollock et al. (2009) found that the strongest predictor of increased stream temperatures was the percentage of total watershed harvested rather than the percentage of riparian canopy harvested. However, the authors had difficulty parsing out the difference since most of the riparian vegetation was harvested concurrent with adjacent upland harvest. The results from that study show that only one in six basins with 25 to 50 percent cumulative harvest had the probability to exceed a seven-day average daily maximum (7DADM). The most harvested watershed (Coon Cove-B) has a 50 percent likelihood of exceeding the 7DADM. No further harvest is planned in this watershed.

Aquatic Habitat

The channel process groups used to classify and map streams in the project area reflect knowledge about inherent stream channel functions and processes affecting fish habitat (Paustian et al., 1992). The process groups also aid in the understanding of the effects of past practices. Channel types further categorize streams using physical attributes such as gradient, width, pattern, stream bank incision and containment, and riparian plant community composition.

Streams on the Tongass National Forest are also classified by value classes from I to IV indicating levels of habitat use by fish populations and are delineated according to the criteria described in the Aquatic Habitat Management Handbook (USDA Forest Service, 2001b).

Class I - Streams and lakes with anadromous or adfluvial fish or fish habitat; or high quality resident fish waters, or habitat above fish migration barriers known to be reasonable enhancement opportunities for anadromous fish.

Class II - Streams and lakes with resident fish or fish habitat and generally steep (6-25 percent or higher) gradient (can also include streams with a 0-6 percent gradient) where no anadromous fish occur, and otherwise not meeting Class I criteria.

Class III – Streams are perennial and intermittent streams that have no fish populations or fish habitat, but have sufficient flow or sediment and debris transport to directly influence downstream water quality or fish habitat capability. For streams less than 30% gradient, special care is needed to determine if resident fish are present.

Class IV - Other intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have immediate influence on downstream water quality or fish habitat capability. Class IV streams do not have the characteristics of Class I, II, or III streams, and have a bankfull width of at least 0.3 meter (1 foot).

Non-streams - Rills and other watercourses, generally intermittent and less than 1 foot in bankfull width, little or no incision into the surrounding hillslope, and with little or no evidence of scour.

Table 86. Stream class, density, and Class I/II lake and pond habitat in affected watersheds

6th HUC Watershed	Area[1/]	Miles of Stream by Stream Class[2/]				Stream Density[3/]	Class I / II Lakes and Ponds (acres)	Number of Class I / II Lakes and Ponds
	(mi²)	Class I	Class II	Class III	Class IV	(mi/mi²)		
Calamity Creek-Frontal Carroll Inlet	16.87	5.4	20.6	28.6	4.8	3.52	535	17
George Inlet-Frontal Carroll Inlet	8.47	7.0	12.2	3.7	0.6	2.77	192	20
Marble Creek-Frontal Carroll Inlet	14.36	16.3	14.9	13.9	1.6	3.25	168	3
Salt Lagoon	25.10	18.1	21.0	46.3	2	3.48	265	6
TOTALS	**64.79**	**46.9**	**68.7**	**92.5**	**9.0**	**3.35**	**1,160**	**46**

Note:
1/ The sum of the 7th level HUCs analyzed within each 6th HUC watershed.
2/ Total stream miles are rounded to nearest tenth and do not include linear lake miles.
3/ Stream density rounded to nearest hundredth.

The abundant Class I and Class II habitat described in Table 86 indicates high fisheries value within the project area. At the 6th-level scale, Salt Lagoon watershed has the highest total miles of Class I and II streams, while the Calamity Creek-Frontal Carroll Inlet watershed has more lake and pond surface area. Specifically, Rainbow Creek has the most Class I anadromous habitat of any watershed with over 8 miles, followed closely by Road End with 7.6 miles of Class I streams. North Saddle Lake has nearly double the amount of Class II stream habitat of any other watershed with close to 14.5 miles.

Fish Species in the Project Area

The Alaska Department of Fish and Game (ADF&G) maintains the Anadromous Water Catalog (AWC), which provides information about waters important for the spawning, rearing, or migration of anadromous fish (Johnson and Blanche, 2010). The AWC, along with field verification, provide information for the fish species found within each watershed. Each watershed contains small and medium-sized drainages which contribute to a marine sport and commercial fishery, and support a limited freshwater fishery. Both the recreational and commercial fisheries are important to the local economy of the area, and these fish populations contribute to the subsistence needs of local communities.

Seven anadromous and/or resident salmonid fish species are present in project area streams and listed in Table 87. Although no records were found, sculpin spp. and three-spine stickleback are also likely to occur in project area watersheds.

Table 87. Anadromous and resident fish species known to occur in Saddle Lakes project area watersheds

6th-level HUC Watershed	Anadromous Salmon, Char, and Trout						
	Pink Salmon (*Oncorhynchus. gorbuscha*)	Chum Salmon (*O. keta*)	Coho Salmon (*O. kisutch*)	Sockeye Salmon (*O. nerka*)	Dolly Varden (*Salvelinus malma*)	Cutthroat Trout (*O. clarki*)	Steelhead (*O. mykiss*)
Calamity Creek-Frontal Carroll Inlet	X	X	X		X	X	
George Inlet-Frontal Carroll Inlet	X		X		X	X	
Marble Creek-Frontal Carroll Inlet	X	X	X		X	X	
Salt Lagoon	X	X	X	X	X	X	X

Sources: ADF&G Anadromous Waters Catalog (see Anadromous Waters Catalog website) and USFS Tongass National Forest Field Sampling data.

Note: Fish scientific genus name: O. = *Oncorhynchus*

Threatened and Endangered Fish Species

No threatened and endangered fish species are generally found in the near-shore waters, nor do they utilize any of the freshwater habitats within the project area. A comprehensive discussion of fish species with this listing can be found in the Biological Evaluation (located in the project record). NMFS determined on April 02, 2014, that listing of the Southeast Alaska DPS of Pacific herring (*Clupea pallasii*) is not warranted at this time (79 FR 81518).

Fish Passage

The condition of existing roads, culverts, and drainage features was assessed using road condition surveys (RCS) done between 1995 and 2005. As part of these surveys, each road crossing structure in a fish stream is assessed for its ability to provide unimpeded fish passage (USDA 2001b). The Tongass National Forest developed a juvenile fish passage evaluation criteria matrix with an interagency group of professionals (Flanders and Cariello 2000). The evaluation matrix stratifies culverts by type, and establishes thresholds for culvert gradient, stream channel constriction, debris blockages, and vertical barriers (or perch) at culvert outlet. Fish crossings are categorized red, gray, or green according to passage conditions. Fish crossing categories are as follows (USDA 2012):

- **Green Category:** conditions have a high certainty of meeting adult and juvenile fish passage requirements at all desired stream flows;
- **Gray Category:** conditions are such that additional and more detailed analysis is required to determine their juvenile fish passage ability. This additional analysis includes use of the FishXing analytical software; and
- **Red Category:** conditions that have a high certainty of not providing juvenile fish passage at all desired stream flows (also called red pipes).

According to the most current RCS data (collected from 1995 to 2005), there are still 11 red, 2 gray, and 9 green fish crossings within the project area. Collectively, for the project area, there are about 15 linear miles of Class I and II habitat upstream of these red crossings (Table 88). While the linear miles of the lakes were not included in the summary, there are 508 acres of Class II lakes upstream of red crossings. Figure 15 and Figure 16 show the locations of red fish crossings. Table 88 shows the number of red crossings in each watershed within the project area, as well as the amount of potential habitat affected.

While red fish crossings have a high certainty of not providing juvenile fish passage at all desired stream flows, they are not necessarily complete barriers. More often they impede passage to juvenile fish at higher flows, and remain passable at lower flows. A study conducted on Mitkof Island found most cutthroat and Dolly Varden move within a narrow range of flows with few moving at higher flow volumes (Bryant et al., 2009). All fish in the study moved upstream at flows below bankfull conditions. A description of RCS data and red fish crossings information is located in the project record.

Table 88. Summary of red fish crossings by milepost and associated upstream fish habitat in the Saddle Lakes project area

6th HUC Watershed	Road Number	Milepost	Stream Class	Miles of Upstream Class I / II Habitat[1/]	Acres of Upstream Lake Class I / II Habitat[2/]
Salt Lagoon	8300000	13.528	II	0.1	0
Salt Lagoon	8300000	15.447	II	0.1	0
Salt Lagoon	8300000	15.465	II	0.9	0
George Inlet-Frontal Carroll Inlet	8330000	4.65	II	0.1	0
Calamity Creek-Frontal Carroll Inlet	8300000	18.082	II	1.9	218
Calamity Creek-Frontal Carroll Inlet	8300000	18.386	II	0.3	0
Calamity Creek-Frontal Carroll Inlet	8337000	0.153	II	5.2	290
Calamity Creek-Frontal Carroll Inlet	8340000	0.929	II	0.2	0
Marble Creek-Frontal Carroll Inlet	8340000	10.081	II	1.2	0
Marble Creek-Frontal Carroll Inlet	8340000	11.224	II	0.1	0
Marble Creek-Frontal Carroll Inlet	8340000	11.252	II	0.4	0
11 red crossings total		**11 Class II**		**10.5**	**508**

Source: USFS GIS

Note: Acres are rounded to the nearest whole number and miles are rounded to the nearest tenth.

1/ Upstream habitat lengths based on field-based habitat assessment data and GIS.

2/ Lake acres calculated in GIS.

Fish Passage Barrier Modification

A fish passage barrier modification at lower Salt Creek (ADF&G Anadromous Catalog # 101-45-10380), is proposed to improve access for coho salmon and steelhead to about 5 miles of upstream habitat and 106 acres of lake habitat. The 60 foot long cascade is located 0.25 miles above the intertidal zone in T. 73 S., R. 92 E., Section 17 of the Copper River Meridian (CRM), and is about 12 feet in vertical height consisting of two separate falls of 5.5 and 6.5 feet respectively. Coho salmon and steelhead can pass this natural partial barrier only at certain flows. Modifying these falls would allow adult coho salmon and steelhead to better pass these falls over a wider range of flow conditions. Explosives would be used to modify the partial barrier, creating a series of low step and resting pools for upstream fish migration. A small crew using hand tools and explosives would modify the partial barrier, reducing the height of the lower falls by one foot, and creating a series of two low step and resting pools between the lower and upper falls for upstream fish migration. No heavy machinery would be used. Access to the site would be by foot from Forest Road 8300000.

Marine Environment

Watersheds within the project area include shoreline along George and Carroll Inlets and contain diverse estuarine and tidal habitats, areas vital for some commercially important species such as Dungeness crab and juvenile salmon. These areas are part of a complex and diverse ecosystem that includes shrimp, flatfish, marine worms, starfish, sponges, anemones, sea cucumbers, urchins, shellfish, plankton, marine algae, and other organisms.

The Shelter Cove LTF, located on Carroll Inlet, would be used to barge or raft the logs for this project. For the purposes of this analysis, it is assumed that Shelter Cove LTF would be used to transfer logs to water for rafting or barging to another processing location.

The last underwater survey associated with the Shelter Cove Tideland Lease was completed in 2009 and bark accumulation was 0.24 acre of continuous bark debris and 0.48 acre of discontinuous bark debris, meeting permit requirements. The Transportation section in this chapter discusses LTFs in more depth.

Environmental Consequences

The ability to measure changes in streamflow, sediment, habitat features, or other aquatic parameters in response to the Saddle Lakes Timber Sale is limited due to the lack of baseline data, and the natural range of variability of these parameters in response to climate and other factors. Nonetheless, sufficient information is available for these watersheds to proceed with a credible comparison of the magnitude and extent of likely effects across alternatives.

Direct and Indirect Effects

Direct and indirect effects for all affected watersheds are estimated using surrogates for actual effects (e.g., stream crossings are a measure, or indicator, for increased sediment) as supported by the literature cited.

Effects Common to All Action Alternatives

Streamflow

Effects on streamflow in project watersheds may include an increase in annual water yield, increased peak flows, and altered timing of water delivery in small streams. Timber harvest causes changes in the collection, storage, and delivery of water in watersheds primarily by affecting evapotranspiration, canopy interception, cloud-water interception, snow accumulation and melt rates. Peak flow increases may be undetectable on the watershed scale when harvest levels are below 25 percent (Jones and

Grant, 1996; Beschta et al., 2000). Recent literature suggests that for watersheds located in the rain-dominated and transitional snow hydrologic zones, such as those in the project area, peak flow increases are only detectable in flows with a return period of six years or less, and that effects of forest harvest on extreme flows cannot be detected using current technologies and data record lengths (Grant et al., 2008). Forest harvest effects are maximized in small watersheds, and diminish or remain constant with increasing watershed size. Further, when present, peak flow effects on channels should be confined to a relatively discrete portion of the channel network (Grant et al., 2008).

Changes in water yield, peak flow, and timing of water delivery to channels for each alternative are difficult to measure and are likely to be undetectable, diminishing with time as a result of hydrologic recovery through vegetation regrowth. Changes in streamflow may occur based on cumulative harvest levels exceeding 15 percent (Grant et al., 2008). Nine watersheds would reach or exceed this level with implementation of Alternative 5 (Table 90). However, three of these watersheds don't function as true watersheds as their individual streams collect in the ocean. Three of the remaining six watersheds have substantial lakes within them that could buffer this effect. With the remaining three watersheds, Gunsight Creek, Upchuck Creek, and Rainbow Creek, only the last two are vulnerable due to having steep headwater slopes draining into floodplain or palustrine channels. Gunsight Creek has substantial wetlands in the headwaters that could buffer effects to downstream habitat

The method of harvest can also affect aquatic impacts. Helicopter logging generally creates fewer disturbances to the soil structure when compared to conventional (cable or shovel) logging methods. Harvest prescriptions including single tree selection, and those requiring a percentage of the available timber in a unit be retained may also help diminish the influence of altered peak flows to streams by lowering the intensity of the harvest treatment (Grant et al., 2008). Table 89 summarizes the percentage of uneven-aged prescriptions and helicopter clear cut logging by alternative. Effects to watershed hydrology and subsequent risk to downstream fisheries decrease with partial cutting.

Table 89. Logging system and silvicultural system with the least risks to aquatic habitat for the Saddle Lakes project area

Method/System	Acres of Harvest by Alternative				
	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Clearcut	129	171	774	921	530
Uneven-aged Management	589	27	148	61	185

Source: USFS Tongass National Forest FASTR data (January 8, 2014)

Roads may affect peak flows by intercepting shallow subsurface flows and leading it more rapidly to the stream network via ditches and culverts (Jones and Grant, 1996; Wemple and Jones, 2003). Harr et al. (1975) found peak flows increased significantly in a watershed with 12 percent of its area occupied by roads. The percentage of roads within the basin area is low in all project area watersheds with a total of 1.1 percent of the area of all watersheds as roads. Alternative 5 would increase this total percentage the most to 1.5 percent, with Alternatives 4 and 6 at 1.4 percent, and Alternatives 2 and 3 at 1.3 percent. All action alternatives would increase the risk runoff generation and sedimentation from roads.

Table 90. Summary of the 30-year cumulative harvest in affected watersheds

7th HUC Watershed (all in 1901010205)	Alt 1 (Existing Condition)		Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	Size (acres)	Harvest Since 1984 (%)	Basin Area Harvest	Basin Area Harvest	Basin Area Harvest	Basin Area Harvest	Basin Area Harvest
0305 (N. Saddle Lake)	5,879	9.0%	15.2%	11.3%	21.1%	23.3%	16.2%
0307 (Twin Peaks)	815	8.6%	10.1%	9.9%	10.1%	10.1%	10.1%
0308 (Gunsight Creek)	2,062	14.8%	20.1%	19.1%	22.4%	22.5%	22.4%
0310 (Shelter Cove-A)	163	9.2%	18.4%	18.4%	18.4%	18.4%	18.4%
0310 (Shelter Cove-B)	93	15.1%	23.7%	23.7%	23.7%	23.7%	23.7%
0310 (Shelter Cove-C)	194	5.2%	5.2%	5.2%	5.7%	5.7%	5.7%
0901 (Hidden Lakes)	1,830	20.5%	25.4%	25.4%	26.6%	28.4%	25.4%
0503 (Buckhorn Lake)	3,441	5.6%	9.8%	7.2%	9.4%	9.8%	9.8%
0504 (Road End)	2,469	9.9%	14.2%	14.1%	14.2%	14.2%	14.2%
0510 (California Cove-C)	791	1.4%	4.7%	4.7%	4.7%	4.7%	4.7%
0510 (California Cove-E)	2,375	14.7%	18.6%	15.1%	23.7%	26.9%	23.8%
0602 (Lemon Lake)	1,560	14.2%	19.6%	17.8%	22.5%	22.5%	18.8%
0603 (Big Salt Creek)	4,654	5.3%	6.4%	7.0%	7.4%	10.7%	7.4%
0604 (Upchuck Creek)	938	18.0%	26.1%	23.5%	26.7%	32.9%	24.6%
0605 (Rainbow Creek)	4,078	13.5%	19.4%	16.9%	23.0%	23.1%	22.4%
0606 (Salt Lagoon-C)	412	1.0%	8.7%	5.1%	8.7%	8.7%	8.7%

Note: Acres are rounded to the nearest whole number and the percentages are rounded to the nearest tenth. Acres are adjusted for partial harvest.

Sedimentation and Turbidity

Each of the action alternatives relies on the existing road system, and all would require the construction of both new NFS and temporary roads, and reconditioning of existing NFS roads. Road construction would increase the percentage of each basin comprised of roads.

All road construction would require the use of rock quarries. In general, a quarry is required for every two miles of new road built, and each quarry typically requires about five acres of clearing. Alternative 5 proposes the most miles of new road and would require an estimated 16 quarries and 80 acres of clearing to build. Alternative 3 would require an estimated 6 quarries and 30 acres of clearing.

All new and reconditioned NFS roads would be closed (except for road 8300280) and all new temporary roads would be decommissioned at the end of the timber sale. Closed roads continue to receive minimal maintenance depending on their maintenance level. See the Transportation Resource Report for more information. Decommissioning activities on temporary roads would include the removal of all structures, restoring streams to their natural widths, installing waterbars, and other erosion control measures as needed. Decommissioning roads decreases the potential for sediment delivery to streams from the failure of drainage structures; however, these roads can still have long-lasting effects to aquatic resources. Therefore, total road miles in each watershed were analyzed. Old road beds permanently influence the hydrology of the landscape and non-motorized use is allowed on decommissioned and closed roads.

In the action alternatives, proposed road construction would not exceed Cederholm's recommended threshold of 2.5 percent of the basin area as roads (BAAR). In Alternative 5, Hidden Lakes has 2.4 percent BAAR, Rainbow Creek has 2.3 percent, and North Saddle Lake has 2.2 percent BAAR proposed. Alternative 5 proposes the most new miles of road in each watershed, and would likely create the greatest amount of sediment and turbidity. However, given the relatively small increase of sediment and turbidity and proper application of Forest Plan Standards and Guidelines and BMPs during implementation, the effects would not be measurable.

All action alternatives would increase the number of crossings on Class II and III streams (Table 91). Alternative 5 proposes the greatest total number of Class II and III crossings, but has the most crossings that would be decommissioned post-project. There are no proposed crossings on Class I streams in the project area. Risk of sediment delivery to streams is higher at road crossings due to the lack of vegetation buffers at the interface. All crossings on proposed road segments would undergo additional verification by Forest Service personnel prior to implementation of any action alternative.

Table 91. Road-stream crossings by alternative and stream class in affected watersheds

Stream Class	Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	NFS	Temp	NFS	Temp	NFS	Temp	NFS	Temp	NFS	Temp
I	0	0	0	0	0	0	0	0	0	0
II	6	1	1	0	6	2	7	3	7	1
III	1	1	2	1	8	4	8	4	6	2

Source: USDA Tongass National Forest GIS

Notes: NFS = National Forest System road; Temp = temporary road

Road Cards describe road management objectives, construction timing restrictions, and the locations of all new stream crossings on NFS roads. Unit Cards also discuss temporary roads. Road and unit cards are located in the project record.

Removal of trees within 200 feet of NFS roads (for constructing log stringer bridges, expanding existing rock quarries, and constructing new rock quarries) would be addressed by applying Forest Plan Standards and Guidelines and BMPs. A quarry development plan would be reviewed prior to development of new rock quarries.

Each of the action alternatives increase landslide potential, with relative risk related to the amount of proposed even-aged (clearcut) harvest acres on soils with slopes over 72 percent. Effects are difficult to quantify since landslides may or may not occur in conjunction with timber harvest or road building activities. Alternatives 4 and 5 propose the most harvest acres on unstable soils however, only 12 acres out of 4,441 acres are proposed on slopes greater than 72 percent. Only two of these acres near a stream system, located in the Salt Lagoon watershed these acres are roughly 500 feet from a Class III stream channel. These acres are proposed in the Calamity Creek and Salt Lagoon watersheds. See the Soils report for more detail regarding mass movement events within the project area boundary.

Watershed-wide effects of the short-term sediment delivery from these activities are not expected to degrade Alaska State Water Quality Standards (ADEC, 2008). Erosion control plans would be developed before construction to minimize or mitigate erosion, sedimentation, and resulting water quality degradation (BMP 14.5).

Stream Temperature

The risk of changes to stream temperature is low, and would likely be site-specific, resulting from potential landslides or debris flows. Because watersheds with harvest have been linked to increases in stream temperatures (Pollock et al., 2009), there exists the possibility of higher temperatures on discrete portions of streams.

Riparian buffers provide protection from non-point-source pollution, help maintain stream temperature by reducing solar radiation, and maintain riparian and aquatic habitat. Harvest in units which contain Class IV streams or are adjacent to Class III streams flowing downstream into Class I/II fish-bearing streams would likely result in slight short-term increases in peak flow, temperature and runoff. However, these effects would not likely be measurable given the overall size of the drainage basins into which the streams flow.

Aquatic Habitat

All Class I and Class II streams that flow directly into Class I streams are protected from harvest activities within a minimum horizontal distance of 100 feet from the bankfull margins (see TTRA). Riparian buffer widths in excess of 100 feet are determined based on the stream process group classification. Forest Plan Standards and Guidelines provide for the protection of riparian buffers on all fish-bearing and Class III streams through designation of Riparian Management Areas (RMAs). RMA's are designed to protect riparian zone interactions between streams, floodplains, riparian wetlands and uplands (Paustian, 2004). RMA's are mapped in GIS according to a buffering routine where RMA widths are assigned to each Process Group stream segment (see unit card narrative in project record), and riparian polygons delineated by soil types and wetland plant communities (Paustian, 2004). These GIS generated RMA's can be queried for planning purposes, with final RMA buffer widths determined by site-specific assessment of riparian vegetation and soils, extent of the flood-prone width, occurrence of secondary flood plain channels, topography, and other indicators. RMA buffers reduce the risk of increased stream temperatures through shading provided by the riparian vegetation. Prior to passage of the Tongass Timber Reform Act (TTRA) in 1990, timber harvest in RMA's occurred in all project area watersheds (Table 6). Previous harvest within the RMA may have raised stream temperatures on isolated stream reaches; however, sufficient vegetation regrowth has occurred since the passage of the TTRA for these riparian areas to recover.

Protection and maintenance of naturally functioning aquatic ecosystems from ground-disturbing activities associated with timber harvest is provided through application of RMA buffers. RMA no-harvest buffers on Class I, II, and III streams would avoid direct impacts to aquatic habitat from timber harvest. Effects would be negligible for sediment and limited to those road/stream crossing locations due to the potential for culverts to become plugged with sediment and debris. Increased sediment effects can also be associated with watersheds containing 2.5 percent or greater basin area in roads. None of the watersheds in the project area would reach this level of road area under any of the alternatives.

Road crossings on Class I and II streams can directly affect fisheries resources. Effects to these resources would be minimized by following the BMPs during installation. Table 91 summarizes proposed road-stream crossings by alternative.

Increased peak flows can potentially result in wider channels for a given drainage area (Grant and Swanson 1990, Dose and Roper 1994, Jones and Grant 1996). Such conditions can affect stream temperature, as well as pool quantity and quality. According to Grant et al. (2008), data suggest that peak flow effects would likely be confined to relatively small portions of the stream network downstream of the harvest activity in areas where the channel gradient is less than approximately 2 percent. This, specifically, would include Class I reaches with the floodplain and palustrine process group designation. These process groups account for approximately 21 miles of stream. Gunsight Creek, Rainbow Creek, and Lemon Lake watersheds all have relatively high amounts of these process groups and exceed the "threshold" level where peak flow negative effects can become apparent for all action alternatives. However, large wetland systems within the headwaters of Gunsight Creek likely buffer effects to this system. Lemon Lake and Rainbow Creek are dominated by steep headwater slopes draining into floodplain or palustrine systems increasing their vulnerability to effects. Upchuck Creek and a portion of California Cove-E is also vulnerable to effects due to steep headwaters draining into floodplain channels. In contract the North Saddle Lake and Hidden Lake watersheds contain significant lake systems that would buffer effects to the stream environment.

Units with increased risk of windthrow have been identified and would receive consideration for reasonable assurance of windfirmness (RAW) buffers during unit layout using Landwehr (2007) RAW guidelines. The most recent monitoring of effectiveness of windfirm buffers, on the Tongass, indicated post-harvest windthrow was present to some degree in 55 percent of the 262 monitoring sites with a mean of 6.7 percent and a median of 0.8 percent (USDA, 2012). Windthrow mortality within the buffers was highly variable, ranging 0 to 85 percent, with 74 percent of the buffers having less than five percent cumulative windthrow mortality (USDA, 2012).

Minimal amounts of windthrow in Riparian Management Areas (RMAs) surrounding harvest units may occur in each action alternative. In the Saddle Lakes project area, prevailing storm winds are from the south, with areas exposed to Carroll and George Inlets and ridges that funnel wind experiencing stronger winds.

Implementation of BMPs and Forest Plan Standards and Guidelines has been shown to provide protection through RMA buffers and sedimentation mitigations that:

- Maintain natural and beneficial quantities of large woody debris over the short-term and long-term.
- Maintain stream banks and stream channel processes.
- Provide for the beneficial uses of riparian areas by maintaining water quality.

Lakes and ponds account for 2.8 percent of project area watersheds (Table 86). These bodies of water are assigned class designations like streams and receive similar consideration during unit layout. There would be negligible effects to lake and pond habitat due to lake riparian buffers and implementing Forest Plan Standards and Guidelines and BMPs.

Fish Passage

Effects to fish passage are assumed to be site-specific and related primarily to road crossings, but may also be affected by the increased risk of landslides due to timber harvest and road building. Effects of the proposed activities to fish passage are considered minor since culvert installation on proposed fish crossings would be conducted in accordance to Forest Plan Standards and Guidelines and BMPs, and provide fish passage as outlined on the Road Cards.

Fish Passage Barrier Modification

Effects from modifying the natural barrier on lower Salt Creek (ADF&G Anadromous Catalog # 101-45-10380) would improve access to coho salmon and steelhead for about five miles of additional habitat and 73 acres of lake habitat providing a beneficial effect to these species.

Marine Environment

Log Transfer Facility and Road Building

The marine waters in George and Carroll Inlets are likely to be affected by reconstruction and use of the Leask and Shelter Cove LTFs.

Rebuilding the bulkhead during LTF reconstructions may cause an increase in sediment but these effects would be localized to the project area and limited to the duration of work. In addition, Forest Plan Standards and Guidelines and BMPs further reduce the likelihood of effects to essential fish habitat or the marine environment during construction activities.

The potential effects on the marine environment from use of LTFs during timber operations include diminished habitat for managed species and their prey from bark accumulation and reduced rearing capability for juvenile salmon from potential water quality impacts. Sediment and hazardous materials control measures would be included in the design to minimize effects on water quality, and BMPs 12.8 (oil pollution prevention and servicing/refueling operations), 12.9 (oil and hazardous waste contingency planning), 12.16 (control of solid waste disposal), and 14.26 (log storage/sort yard erosion control) would be implemented. Negligible impacts to the marine environment are expected from any of the proposed LTF/log rafting activities. The effects are likely to be limited in both quantity and distribution as most activities and spills would be on-shore having only localized effects to nearshore fish and fish food resources from runoff to the marine environment.

Alternative 1

Alternative 1 would have no direct or indirect effects to aquatic resources. Post-harvest vegetation recovery would continue in all watersheds. Selection of this alternative would not preclude regular maintenance of existing roads, including erosion control measures and removal or replacement of culverts. Sediment delivery to streams from periodic road maintenance and ongoing use of existing roads is expected to be minor and within water quality standards set by the State of Alaska.

Alternative 2

Alternative 2 would result in minor effects on sedimentation and aquatic habitat. Road construction would increase the percent of basin area harvest since 1984 from 9.7 percent to 13.2 percent. Road construction would result in an additional ten stream crossings, with seven located on Class II streams. Under this Alternative, about 48 percent of the harvest in project area watersheds is even-aged (clearcut), of which 4 acres are on slopes greater than 72 percent.

Of the action alternatives, Alternative 2 would generate the second least amount of sedimentation to aquatic habitat.

Alternative 3

Alternative 3 would increase the percent of basin area harvest since 1983 from 9.7 percent to 11.8 percent. Road construction would result in an additional five stream crossings, with one located on a Class II stream. Under this alternative, about 81 percent of the harvest in project area watersheds is even-aged (clearcut), of which, 4 acres are on slopes greater than 72 percent.

Of the action alternatives, Alternative 3 would generate the least amount of sedimentation to aquatic habitat.

Alternative 4

Alternative 4 increases the percent basin area harvest since 1983 from 9.7 percent to 15 percent. Road construction would result in an additional 23 stream crossings, with eight being located on Class II streams. Under this alternative, about 87 percent of the harvest in project area watersheds is even-aged (clearcut), of which 12 acres are on slopes greater than 72 percent.

Of the action alternatives, Alternative 4 would generate the second greatest amount of sedimentation to aquatic habitat.

Alternative 5

Alternative 5 would increase the percent basin area harvest since 1983 from 9.7 percent to 16.2 percent. Road construction would result in an additional 25 stream crossings, with 10 being located on Class II streams. Under this alternative, about 90 percent of the harvest in project area watersheds is even-aged (clearcut), of which 12 acres are on slopes greater than 72 percent.

Compared to other action alternatives, Alternative 5 would generate the greatest amount of sedimentation to aquatic habitat due to the highest amount of new road construction.

Alternative 6

Alternative 6 would increase the percent basin area harvest since 1983 from 9.7 percent to 14.1 percent. Road construction would result in an additional 13 stream crossings, with eight being located on Class II streams. Under this alternative, about 77 percent of the harvest in project area watersheds is even-aged (clearcut), of which 4 acres are on slopes greater than 72 percent.

Of the action alternatives, Alternative 6 would generate the third greatest amount of sedimentation to aquatic habitat.

Cumulative Effects

For the cumulative effects analysis, the 6th-level HUC watersheds are broken down further into smaller 7th-level HUC basins to include the shoreline where watersheds (frontal watersheds) span inlets and waterways to include other land masses. Cumulative percent basin harvest over time is determined by using the 7th-level HUC watershed designation. Results are then evaluated to determine if there has been detectable peak flow increases attributable to past harvest.

Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the aquatics cumulative effects analysis.

Cumulatively, there is a general trend toward recovery of slope stability and pre-harvest rates of canopy interception and evapotranspiration rates in all of the watersheds due to vegetation regrowth since the 1990s. As of this report, about 624 acres have been harvested within the project area during the past decade (GIS data), with the latest harvest occurring in 2011 in the Calamity Creek-Frontal Carroll Inlet watershed.

Cumulative Effects Common to all Action Alternatives

Cumulative effects to aquatic resources from the majority of the past, present, and reasonably foreseeable future actions listed in Table 150 of Appendix B would be negligible for all action alternatives due to their small scope and scale, however three of these actions are larger and are discussed further below.

The cumulative effects of past and proposed timber harvest are similar among all action alternatives. Each of the action alternatives would increase cumulative harvest levels from current levels in all watersheds. Calamity Creek watershed would have the highest cumulative percent harvest, followed by Salt Lagoon watershed.

Cumulative changes would include water yield, peak flow, stream temperature, and timing of water delivery to channels for each Alternative. These changes are difficult to measure and are likely to be undetectable, diminishing with time as a result of hydrologic recovery through vegetation regrowth. For most watersheds, cumulative effects from past timber harvest are considered negligible.

The AMHTA Land Exchange could remove 8,170 acres of land from U.S. Forest Service management, BMP's and Standards and Guidelines protection measures within this area. The following watersheds lay within or downstream from the proposed land exchange area: Shelter Cove-A, Gunsight Creek, Rainbow Creek, Twin Peaks, North Saddle Lake, Salt Lagoon-B, Up Chuck Creek, Big Salt Creek, Salt Lagoon-A, Salt Lagoon-C, George Inlet-B, and hidden Lakes. Effects to these watersheds would be dependent on the type of activities that occur after land exchange.

The proposed Ketchikan to Shelter Cove Road connection could increase traffic resulting in increasing sediment delivery potential.. The road would need to be maintained and resurfaced more often to minimize sediment delivery to streams and erosion.

Alternative 1

Because there are no direct or indirect effects from Alternative 1, no cumulative effects would occur. Ongoing road and trail maintenance activities are expected to improve or sustain watershed hydrology conditions in the long-term by maintaining drainage efficiency through crossing structures, thereby minimizing sources of stream sedimentation. The risk of landslides associated with previously-built roads is ongoing and considered a potential indirect effect of past management activities, because if landslides do occur, they may or may not deliver sediment into streams.

Alternative 2, 3, 4, 5, and 6

See Cumulative Effects Common to all Action Alternatives.

Essential Fish Habitat Assessment

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act states that all federal agencies must consult the National Marine Fisheries Service (NMFS) for actions and proposed actions that may adversely affect essential fish habitat (EFH) for federally managed marine and anadromous fish species. The Act promotes the protection of essential fish habitat through review, assessment, and mitigation of activities that may adversely affect these habitats. EFH consultation has been combined with the Forest Service NEPA process. Consultation procedures have been documented in an attachment to a June 26, 2007 NMFS letter to the Regional Forester. Although this Consultation Procedures document expired as of June 28, 2012, consultation is still required under the Act and the 2007 procedures remain applicable and have been followed for this Assessment.

Federally managed fish species are those under the jurisdiction of the North Pacific Management Council, managed by the NMFS, and included in a fishery management plan (FMP). These common managed species include the salmon species: Chinook, chum, pink, coho, and sockeye salmon, as well as walleye Pollock, Pacific cod, arrowtooth flounder, yellowfin, rock, rex sole, dover and flathead sole, Alaska plaice, sablefish, Pacific Ocean perch, shortraker, rougheye, northern, thornyhead, yelloweye, dusky rockfish, sculpin, skates, squid, octopus, forage fish, and weathervane scallop. Several common species not managed under FMP include halibut, ling cod, Pacific herring, Dungeness crab, cutthroat trout, steelhead, and Dolly Varden char.

EFH is the water and substrate necessary for fish spawning, breeding, feeding, or growth to maturity. Freshwater EFH includes streams, rivers, lakes, ponds, wetlands and other bodies of water currently and historically accessible to salmon. Marine EFH in Alaska includes estuarine and marine areas from tidally submerged habitat to the 200-mile exclusive economic zone.

EFH for Pacific salmon recognizes six critical life history stages: (1) spawning and incubation of eggs, (2) juvenile rearing, (3) winter and summer rearing during freshwater residency, (4) juvenile migration between freshwater and estuarine rearing habitats, (5) marine residency of immature and maturing adults, and (6) adult spawning migration. Habitat requirements within these periods can differ significantly and any modification of the habitat within these periods can adversely affect EFH.

For the Saddle Lakes project area this would include the low gradient reaches of Calamity Creek-Frontal Carroll Inlet, Marble Creek-Frontal Carroll Inlet, George Inlet-Frontal Carroll Inlet, and Salt Lagoon. It also includes the marine environment adjacent to the Shelter Cove Logging Transfer Facility (LTF) located in Carroll Inlet.

Direct and Indirect Effects

All action alternatives have potential to impact EFH. Proposed road construction and road crossings could indirectly affect downstream Class I EFH.

Approximately 47 miles of Class I streams have been identified in the five watersheds of the Saddle Lakes Timber Project. Populations of state and federally managed species of pink, chum, coho, and sockeye salmon occur within the project area (ADF&G Anadromous Waters Catalog 2013). Freshwater life stages of pink, chum, coho, and sockeye salmon could be affected by the Saddle Lakes project. These life stages include: freshwater eggs; freshwater larvae and juveniles; estuarine juveniles; and freshwater adults.

There will likely be some sediment input to lower Salt Creek during blasting operations at the partial barrier falls but this will be small in scale and short in duration, clearing up quickly. The temporary addition of sediment to Salt Creek is offset by the long term benefit to coho salmon and steelhead.

New proposed crossings of Class II and III streams could indirectly affect downstream Class I EFH; no new Class I stream crossings proposed. Construction of new, reconditioned, and temporary roads varies by alternative and can also affect EFH in the project area. Potential effects on freshwater EFH include changes in water yield, peak flow volume and timing of flow delivery, sediment delivery, altered riparian vegetation (Class IV streams and the new road-stream crossings), and fish passage at road crossings. More thorough descriptions of road types can be found in the Transportation section.

Potential Adverse Effects on Marine EFH

Potential adverse effects on marine EFH include the Leask and Shelter Cove LTF reconstruction and bark deposition. The accumulation of bark and other woody debris on the ocean floor associated with the transfer and storage of logs can impact marine habitats by smothering organisms or creating unfavorable water quality conditions. All necessary federal or state permits would be obtained prior to any work for the reconstruction of the LTF. The Transportation section in this chapter discusses the LTF in more detail. Alternative 5 could have the greatest accumulation of bark and other woody debris because it would generate the highest volume of transferred logs.

The marine waters in Carroll Inlet are the only marine waters likely to be affected by the Saddle Lakes Timber Sale. It is expected that Shelter Cove will be used exclusively under all alternatives to transfer logs to water for rafting or barging to another processing location. All logs along the road system associated with action alternatives are being appraised to the Shelter Cove LTF. Export logs are being appraised to the Leask Cove LTF, but for the purposes of this analysis, it is being assumed logs will be hauled to the Shelter Cove LTF. The Transportation section in this chapter discusses all LTF options in more depth.

Rafting logs involves constructing small rafts in front of the LTF and towing them to a temporary staging area off shore. These small rafts are combined to form large rafts that are then towed to the mill. A staging area is needed because large rafts cannot be towed through channels, bays and fjords due to impacts on navigation. An Alaska Pollutant Discharge Elimination System Program (APDES) permit must be obtained from Alaska Department of Environmental Conservation (ADEC) to stage rafts if the timber sale operator chooses to raft and tow logs.

Activities with potential for spills of hazardous materials such as fuel require Spill Prevention, Control and Countermeasure plans (SPCC). Forest Service environmental engineers will review all SPCC plans prior to any petroleum products being on site. These plans must comply with all State and Federal laws and permits. LTFs, sort yards, and fuel storage areas must also comply with all applicable BMPs.

No impacts to the marine environment are expected from any of the proposed NFS or temporary roads. All roads are located away from the marine environment and applicable BMPs will be implemented to minimize effects to water quality and aquatic habitat, however there is a potential for minor effects to the marine environment from LTF/log rafting activities.

Marine benthic habitats dominated by bark accumulation support fewer and less abundant marine species. These bark accumulations can persist for up to 26 years (Kirkpatrick et al, 1998). APDES permit requirements limit bark accumulation depth to less than 10cm where coverage is continuous (100 percent) for more than one acre. The last dive associated with the Shelter Cove Tideland Lease was completed in 2009 and bark accumulation was 0.24 acres of continuous bark debris and 0.48 acres of discontinuous bark debris. The Shelter Cove LTF is owned and permitted by the Forest Service. It is in need of reconstruction due to its exposure to seawater and teredo worms (*Teredo navalis*). The existing native log bulkhead will be replaced in kind, or a less expensive low angle ramp may be constructed, depending on the transport method chosen by the timber purchaser. Work would be conducted during the normal operating season, typically May through October, and would have to be timed with low and extreme low tides. Because of the necessary tidal timing, work may take up to 6-8 weeks to complete construction of the new bulkhead. Whether a new bulkhead or a low angle ramp is constructed, work will be conducted within the existing disturbed areas. Work may include the following:

- Excavation and removal of existing rock and bulkhead. Excavation would be sloped inland at an angle to provide a safe work area and to minimize material from raveling into the marine environment.
- End haul of any unsuitable material to an approved location.
- Old log bulkhead will be placed in an approved location. Removal of other waste material would be the responsibility of the contractor.
- Haul of borrow material from existing pits if additional material is needed.
- Assembly of log crib, backfill, compaction, and placement of geotextiles.

All necessary Federal or State permits will be obtained prior to any work for the reconstruction of the LTF. Whether a new bulkhead or a low angle ramp is constructed and if logs are to be watered, all logs or log bundles will have a soft entry into the water.

Past surveys at the Leask Cove LTF noted the substrate changed from boulder to sand dominant at about 30 meters from the mean high tide line. Barnacle and rockweed were the most abundant species present, however the overall diversity and abundance of organisms was low. Bark residues at 40 meters from the mean high tide line were observed and appeared to continue with depth. Bark accumulations on the surveyed site were not of a depth or extent to be considered problematic. Divers also noted a narrow band of eelgrass (<10 meters wide) running the length of the project area but the growth was relatively sparse. In contrast eelgrass beds at the mouth of Leask Creek appeared to be extensive and dense. The Clean Water Act section 404(b)(1) guidelines consider eelgrass a special aquatic species because it provides habitat for a large number of marine species as well as providing important feeding and cover for juvenile salmon.

The following lists a number of fish species that may be found in the marine environment and their life stages that could be affected by the use of the LTFs for the Saddle Lakes timber sale. Marine species potentially affected by the Saddle Lakes project include:

Arrowtooth Flounder (*Atheresthes stomias*), Atka Mackerel (*Pleurogrammus monopterygius*), Dover Sole (*Microstomus pacificus*), Flathead Sole (*Hippoglossoides elassodon*), Pacific cod (*Gadus macrocephalus*), Pacific Ocean Perch (*Sebastes alutus*), Rex Sole (*Glyptocephalus zachirus*), Rock Sole (*Lepidopsetta bilineatus*), Sablefish (*Anoplopoma fimbria*), Sculpin (*Cottidae family*), Shortraker/Rougheye Rockfish (*Sebastes borealis*), Skates (*Rajidae family*), Squid (*Cephalopoda class*), Walleye Pollock (*Theragra chalcogramma*), Weathervane Scallops (*Patinopecten caurinus*), Yelloweye Rockfish (*Sebastes ruberrimus*), Yellowfin Sole (*Limanda aspera*).

In addition, salmon species include pink, chum, coho, and sockeye which could be affected during estuarine juvenile, marine juvenile, and marine immature and maturing adult stages. The potential effects on marine EFH by rafting logs include diminished habitat for managed species and their prey, as well as reduced rearing capability for juvenile salmon from potential water quality impacts.

Primary prey items for the following species are based on the Gulf of Alaska Fishery Management Plan (NPFMC 1998):

- Sablefish feed throughout the water column. Larval sablefish feed on a variety of zooplankton. Juveniles feed primarily on macrozooplankton and euphausiids. Adults are opportunistic feeders. Their main diet is other fish, including salmon fry and Pollock. Other food includes benthic invertebrates, squid, jellyfish, and fishery discards.
- Sculpins mainly feed near the bottom. Prey items include crabs, barnacles, and mussels. Larger sculpins eat fish.
- Adult chum, sockeye, coho and pink salmon are primarily fish eaters, although pelagic crustaceans and squid are also consumed (with the exception of chum), particularly by pink salmon. Juvenile salmon consume plankton and small crustaceans.
- Arrowtooth flounder feed in gravel-mud substrates near the seafloor. Adults feed on other groundfish. Juveniles feed on euphausiids, crustaceans, amphipods, and young pollock. Larvae feed on phytoplankton and zooplankton.
- Pacific cod are omnivorous. Adult cod feed mostly on other fish such as walleye Pollock, yellowfin sole, and fisheries discard. Young cod feed mostly on invertebrates such as amphipods, crangonid shrimp, polychaete worms, and bivalves.
- Skates feed on bottom invertebrates (crustaceans, mollusks, polychaetes) and fish.

- Walleye Pollock feed throughout the water column on copepods, euphausiids, young pollock, and other fish.
- Yelloweye rockfish eat primarily fish including other small rockfish, herring, sandlance, as well as caridean shrimp, small crabs, and lingcod eggs.
- Shortraker and Rougheye rockfish feed primarily on shrimp, squids, and myctophids. Juveniles feed on shrimp and amphipods.
- Pacific Ocean Perch are overwhelmingly planktivorous, and may eat small shrimp and squids. Juveniles eat mostly calanoid copepods and euphausiids.

Primary prey items for the following species are based on the Alaska Fisheries Science Center NOAA website:

- Atka Mackerel are a schooling semi-demersal fish. Juveniles and adults eat mainly copepods and euphausiids, but have been known to eat shrimp, gastropods, annelids, and fish eggs and larvae.
- Rock Sole eggs are adhesive and are laid on the bottom of the ocean. The larvae that hatch consume small zooplankton until they metamorphosis into juveniles. Juveniles are abundant in shallow, near-shore waters and feed on polychaetes and small crustaceans. Adult continue to eat small invertebrates throughout their lives.
- Yellowfin Sole adults exhibit a benthic lifestyle and occupy separate winter spawning and summertime feeding distributions feeding mainly on benthic infauna and epifauna, euphausiids, and fish.
- Flathead Sole adults exhibit a benthic lifestyle and occupy separate winter spawning and summertime feeding distributions with their diet composed primarily of organisms living on the bottom (epibenthic) and pelagic organisms in close association with the bottom (nektobenthic). Flathead sole less than 30 cm total length consumed mainly mysids, gammarid amphipods, and decapod shrimps, whereas flathead sole larger than 30 cm total length consumed mainly ophiuroids, walleye pollock, and decapod shrimps.
- Rex Sole feed almost exclusively on benthic invertebrates. Small (<15 cm SL) rex sole feed mainly on amphipods and other crustaceans. Large (15-45 cm SL) rex sole prey chiefly on polychaetes. Rex sole <20 cm SL prey primarily on euphausiids, decapod crab larvae, copepods, Oikopleura, and ostracods. Mollusks form only a minor part of rex sole diet. Euphausiids are principal prey only during summer and cumaceans and Oikopleura are more common during the winter.
- Dover sole feed almost exclusively on benthic infaunal and epifaunal invertebrates, mainly polychaetes, ophiuroids, and mollusks. Amphipods are important crustacean prey and pelecypods make up the most molluskan biomass consumed. Annelids are usually dominated in the diet of juvenile Dover sole.

Water quality effects include increased risk in fuel spills from equipment used for barge loading, increases in sediment levels from increased road use, and bark leachates and shading beneath log rafts and equipment floats. The effects are likely to be limited in both quantity and distribution as most activities and spills would be on-shore having only localized effects to near-shore fish and fish food resources from runoff to the marine environment. Following the best current direction, logs are proposed to be transported to Shelter Cove MAF via the road system and then barged around the end of the island to Leask Cove LTF. Barging logs instead of rafting them would have fewer effects on marine species.

Consultation

The four main steps in the consultation process are the following:

- The Forest Service determines if the proposed action will have "no adverse effect" or if it "may adversely affect" EFH. Only the "may adversely affect" determination triggers consultation.
- An EFH Assessment is prepared by the Forest Service as a component of the NEPA and forwarded to the NMFS to initiate formal consultation.
- The NMFS will respond in writing as to whether it concurs with the conclusion in the EFH Assessment and may provide conservation recommendations to further minimize effects of the action on EFH.
- The Forest Service must provide a written response to NMFS within 30 days explaining its evaluation of the conservation recommendations. The response may include reasons for not following the recommendation.

The formal consultation begins when NMFS receives a copy of the draft environmental impact statement (DEIS) with the EFH Assessment. Documentation of the consultation process, including a summary of how EFH may or may not be adversely affected and the consultation requirements have been satisfied will be included in the FEIS. The ROD will contain a summary of the EFH consultation conclusions.

This EFH Assessment satisfies the requirements by providing: (1) a description of the proposed action; (2) an analysis of the potential adverse effects of the action on EFH and the managed species; (3) the Forest Service's conclusions regarding the effects of the action on EFH; (4) a discussion of proposed mitigation, if applicable.

EFH Effects Determination

The Forest Service determines that the Saddle Lakes project may adversely affect freshwater and marine EFH for the following reasons:

- The project entails ground disturbing actions (i.e. timber harvest and road construction, including fish bearing stream crossings) in watersheds that contain anadromous species.
- Log hauling will occur on existing roads that cross anadromous fish streams.
- Log transfer would occur at facilities in the proximity of marine waters and inter-tidal habitats.
- Blasting operations on the partial barrier at Salt Creek Falls would have a temporary input of fine sediment immediately following blasting operations.
- Unforeseen events such as landslides, debris blockages of culverts, fuel spills, and road failures.

The Forest Service will ensure that adverse effects to EFH would be minimized through implementation of the following measures:

- All Class I and II streams within the project area will be protected by a no-harvest buffer (RMA) of 100 feet or more (see Unit Cards in Appendix B for site-specific activities).
- All Class III streams will be protected by no-harvest buffers to the top of the side slope (v-notch) according to the Forest Plan. This minimizes the potential impact to downstream EFH (see Unit Cards in Appendix B).

- Additional precautionary measures will be prescribed to minimize windthrow in RMA buffers where the risk of windthrow is high or where extensive windthrow has occurred. These measures include retaining additional trees adjacent to the RMA to help ensure resistance to windthrow.
- Temporal restrictions will be made to limit in-water work to protect critical fish life stages.
- Maintenance will be built into road construction contracts to correct existing erosion features.
- All proposed road crossing structures will adhere to Fish Standards and Guidelines for passage (pp 4--11-12) in the Forest Plan (USDA Forest Service, 2008b).
- New and reconditioned roads will be closed to motor vehicle use after silvicultural activities are complete.
- Temporary roads will be decommissioned after timber harvest is complete.
- Log staging activities will occur outside the minimum 300 foot buffer protecting Class I streams entering Shelter Cove (Appendix G, S-1).
- Standards and Guidelines of the Forest Plans and Best Management Practices (BMPs) will be implemented to protect water quality and aquatic habitat protection for all freshwater streams and for the LTFs within the project area. See unit cards for specific applications of BMPs in the vicinity of freshwater streams.
- Annual marine dive surveys around the LTF will ensure APDES requirements are met for bark accumulation.

Unavoidable Adverse Impacts

Unavoidable adverse impacts to EFH associated with this project include short-term increases in sediment delivery and subsequent turbidity in streams from road construction and maintenance activities. Other short-term impacts include bark accumulation, leachate, and shading impacts to the marine environment near the LTF.

Irreversible and Irretrievable Commitments of Resources

This project does not propose any irreversible or irretrievable commitments of aquatic resources.

Environmental Justice

Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States. Environmental Justice analysis considers whether there is a disproportionately high and adverse effect from any of the alternatives on low-income and minority populations in communities near the project area, and incorporates by reference the analyses presented in the Wildlife and Subsistence Resource Reports. The Saddle Lakes Timber Sale is a federal action that has potential environmental effects. The analysis area for environmental justice includes the communities of Ketchikan, Metlakatla, and Saxman.

The Council on Environmental Quality (CEQ) issued guidance on analyzing effects on environmental justice under NEPA in December 1997. This guidance clarified that such analyses should recognize the interrelationships between cultural, social, occupational, historical, and economic factors that may amplify the environmental impacts. Impacts on subsistence resource use also impact the social and cultural lives of residents. The CEQ guidance clarified that the identification of disproportionate effects does not preclude the agency from going forward with the proposed action, but should heighten attention to project alternatives, mitigation and monitoring needs, and the preferences of the affected communities (CEQ 1997, p. 10).

A more-detailed analysis is contained in the Environmental Justice Resource Report, in the project record.

Effects

The effects of the actions are indiscriminate and not expected to have a disproportionately high and adverse effect on the health or well-being of the minority or low-income populations that use the project area. There are no cumulative or foreseeable projects within the area of analysis that would cause a disproportionately high and adverse human health or environmental effect on any minority or low-income population.

Heritage Resources

Heritage resources include an array of historic and prehistoric cultural sites and traditional cultural properties (TCPs). The National Historic Preservation Act (NHPA) sets forth government policy and procedures regarding these "historic properties," that is, districts, sites, buildings, structures and objects included in or eligible for the National Register of Historic Places (NRHP). Section 106 of the NHPA (16 U.S.C. 470) requires that federal agencies consider the effects of their actions on such properties, following regulations issued by the Advisory Council on Historic Preservation (36 C.F.R. § 800).

The Section 106 review process occurs through consultation with the Alaska State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation (ACHP), federally-recognized tribal governments, and other parties with an interest in the effects of the proposed action on historic properties, commencing at the early stages of project planning. One of the goals of consultation is to identify historic properties or sacred sites (Executive Order 13007) that potentially may be affected by the proposed action, assess potential effects and seek ways to avoid, minimize, or mitigate any adverse effects on historic properties.

Consideration of the effects of the Saddle Lakes Timber Sale consisted of (1) defining the area of potential effects (APE), (2) conducting a review of existing historic and archaeological information about the project area including the results of past heritage surveys, and through consultations with affected tribes and groups, (3) implementation of any additional fieldwork deemed necessary to assess potential effects, (4) development of recommendations based on the results of 1, 2, and 3, and (5) consultation with the Alaska SHPO to seek concurrence with recommendations regarding significance and effect.

Methodology

Criteria used to evaluate the proposed harvest and road construction activities effects on heritage resources are defined by the Third Amended Programmatic Agreement (2010) among the Alaska Region of the Forest Service, ACHP, and the Alaska SHPO.

To ensure that the procedural requirements of 36 C.F.R. § 800 (Protection of Historic Properties) were met, additional heritage resource investigations of the project's APE were conducted during 2012 and 2013. This resulted in an additional 25.3 acres of new survey including a sampling of proposed harvest units, proposed road corridors, and the area of the proposed Salt Creek barrier modification. The heritage resource survey did not result in the identification of any new sites, and made a determination of no historic properties affected by the proposed project.

A review of previous cultural resource surveys in the areas around Carroll Inlet and George Inlet was conducted. Until the late 1970s, few significant cultural resource surveys had been conducted in these areas. However, as of 2013 there have been twenty-two cultural resource surveys of varying size and intensity conducted in or within five-miles of the APE for the proposed Saddle Lakes Timber Sale. Three were conducted by private contractors and were related to the Swan Lake Hydro Electric Project, the Swan Lake-Lake Tyee Intertie, and the proposed Mahoney Hydroelectric Project. All of the other surveys were conducted by Forest Service Archaeologists. Fifteen of these surveys were conducted within or very near the proposed Saddle Lakes Timber Sale APE. Approximately 3,052 acres have been surveyed within the project area for the proposed Saddle Lakes project. These cultural resource surveys were all completed to clear locations for previous timber sales, including timber harvest units, gravel pits, roads, bridges, and Log Transfer Facilities (LTFs). In all cases, no sites eligible for or listed on the NRHP were found to be located within the project areas.

Incomplete and Unavailable Information

A complete intensive survey for heritage resources has not been completed for the entire Area of Potential Effect (APE) for the proposed action.

Complete intensive heritage surveys are not possible due to limited time, budget, and personnel. Therefore it is possible that some heritage resources may not be discovered.

All past heritage surveys (covering ~3,052 acres) were conducted by qualified cultural resource managers including a survey in 2013 of ~25 acres in the Area of Potential Effect (APE) in both low and high sensitivity areas and a literature search for the project area revealed three Alaska Heritage Research Site (AHRS) sites to be located within or adjacent to the APE for the proposed project. KET-306, a Subsistence Camp is located within the APE for the proposed project However, the site is located within the 1,000 foot wide beach fringe that is protected from development by Forest wide Standards and Guidelines (USDA 2008:4-4) and would not be affected by the proposed timber harvest activities. The two other sites KET-15 and KET-18 are located in the intertidal areas and should not be affected by the proposed project. Tribal consultation regarding the proposed project did not reveal significant concerns by local Native peoples and no sacred sites were identified to the Forest Service by them. The locations of heritage sites and surveys were recorded with GPS and delineated in the GIS system.

Building on experience gained through past and ongoing surveys and other inventory activities, the Forest Service has developed, tested, and improved the accuracy of its site predictive locational modeling, to better characterize areas of high and low cultural resource sensitivity. This locational model has been approved by the State Historic Preservation Officer (SHPO) and Advisory Council on Historic Preservation within a programmatic agreement of 2010. Using this model has been proven very effective in locating cultural sites. Within the last fifteen years no historic properties have been adversely affected in the KMRD due to timber harvest or other types of activities.

Survey strategy for potential impacts to heritage resources was based on the fact that new ground disturbance would take place in areas of low cultural resource sensitivity and that the utilization of Forest Service Standards and Guidelines, and Best Management Practices would eliminate or reduce the risk of any potential impacts. The chances of adverse effects to unknown historic properties are therefore considered low.

Analysis Area

The APE is the analysis area and includes the federal lands located within the project boundary, and the areas immediately adjacent to Shelter Cove, Coon Cove, and Leask Cove.

Affected Environment

At one time George Inlet, and Carroll Inlet were both a portion of the Tlingit Saxman (Cape Fox people) territory, but Natives are not in agreement that this area is now territory of the Tlingit Tongass people. Though this area is now claimed by the Tongass people, and their right is recognized by the Saxman people, both groups actually use the area for hunting, trapping, fishing and berry collecting at the present time as do the Tsimshian people (Goldschmidt and Haas 1998). Cedar bark was also collected along the shorelines of George Inlet and Carroll Inlet as evidenced by many culturally modified trees (CMTs) observed in the area.

The Native Peoples of this area have left their mark on the land evidenced by a variety of site types including seasonal villages or campsites, middens, both stone and wood fish traps and weirs, rock art, sacred and religious areas, and subsistence or resource gathering places. The Cape Fox, Tongass, and Tsimshian peoples continue to recreate, hunt, and gather on these lands today.

Mammals, fish, shellfish and aquatic plants have provided important resources for people from prehistoric time until today. Fish traps have been identified in Carroll Inlet and George Inlet that attest to prehistoric use of the area. There are is only one known archaeological site located within the proposed Saddle Lakes Timber Sale project area. This site is modern subsistence camp showing recent use (KET-00306). Within three miles of the APE are two dated archaeological sites including a shell midden (prehistoric garbage concentration including shell, bone, and charcoal) dating to 2,230 ± 70 radio carbon years BP (Before Present) and the oldest site in near the project area which is a wooden fish weir dated to 2,630 ± 70 radio carbon years BP. These sites show use of the area for more than two and a half thousand years.

Certain types of heritage resources, such as sites, artifacts, and other observable results of human activity, have a greater probability of being located in specific areas, which create patterns of human use across the landscape through time. The environmental characteristics that invited human use and habitation in ancient times are often the same factors that invite use today. These high sensitivity areas [lakes and marine shorelines], which are not evenly distributed across the landscape, are often below 100 feet in elevation and/or are areas of animal, plant, or mineral resource abundance USDA 2008c, p. 3-437).

Heritage Resources in the Saddle Lakes Project Area

There are thirty-nine Alaska Heritage Resource Sites (AHRS) located within a five-mile radius of the APE for the proposed Saddle Lakes Timber Sale project (Table 92).

Table 92. Known Alaska heritage resource sites located within a five-mile radius of the Saddle Lakes project area

Heritage Sites					
KET-00015	KET-00017	KET-00018	KET-00026	KET-00078	KET-00079
KET-00102	KET-00107	KET-00108	KET-00302	KET-00306	KET-00412
KET-00418	KET-00422	KET-00423	KET-00424	KET-00426	KET-00427
KET-00444	KET-00448	KET-00449	KET-00473	KET-00497	KET-00498
KET-00499	KET-00500	KET-00501	KET-00502	KET-00551	KET-00568
KET-00644	KET-00747	KET-00748	KET-00749	KET-01098	KET-01099
KET-01100	KET-01121	KET-01256			

These sites are predominantly prehistoric in nature and include shell middens, rock art, fish traps (both wooden and stone in composition), and a rock shelter burial. Two of the sites are historic mines. Others include ruins of a salmon hatchery, an Adirondack style shelter built by the Civilian Conservation Corps (CCC), a homestead, several collapsed shacks, and two modern fish camps. Only a very small portion of the recorded sites have been evaluated as to their eligibility for the NRHP and are considered eligible for management purposes. The Forest Service consulted with the Organized Village of Saxman (OVS), the Metlakatla Indian Community (MIC), the Ketchikan Indian Community (KIC), and the Tongass Tribe who are the tribal groups that historically were culturally affiliated with the proposed Saddle Lakes project area. No significant concerns or recommendations were voiced by these entities.

Within the APE for the proposed Saddle Lakes Timber Sale, three AHRS sites were found. The first is a modern subsistence camp (KET-00306), and is situated within the protected 1,000-foot coastal (beach) buffer zone (Forest Plan 2008b, pg. 4-4). The other two sites are a fish trap (KET-00015) and a fish trap complex with petroglyphs (KET-00018). Both are located within the APE. Past monitoring of these fish trap sites during LTF construction and previous timber harvesting activities showed no affect to fish traps or petroglyphs. Monitoring and documentation of the traps and petroglyphs in 2012 only showed natural weathering occurring at the sites.

Environmental Consequences

The APE for all alternatives is considered to be the "project area" as defined in this document. Direct effects include damage to heritage resources due to timber harvest activities. Therefore, areas of direct effect are defined as planned timber harvest units and road corridors. Indirect effects result from activities peripheral to the timber harvest itself. These would include the risk of increased damage of historic properties due to increased visitation in the project area. Increased visitation might result from higher numbers of workers in the area during road construction and timber harvest activities, or from increased accessibility to the area due to road improvements.

As stated in the Programmatic Agreement, Section VIIB, and the Forest Plan, Heritage Resources section (HSS1, IVB, pg. 4-17) the preferred management of sites listed in, nominated to, or eligible for the NRHP is avoidance and protection. All of the sites recorded in the APE of the project area would be fully avoided. As per the Programmatic Agreement, while there are historic properties present in the APE, the project would have no effect on them as defined by 36 CFR 800.16(i). The imposition of a 1,000-foot coastal (beach) buffer aids in the avoidance of heritage properties because it reduces harvest and road construction activities from areas with the highest potential for heritage sites. Proposed harvest units and roads are, for the most part located in low-sensitivity areas for heritage resources.

The proposed projects activities are not expected to result in the discovery or disturbance of human remains. However, if human remains are discovered, they would fall under the inadvertent discovery provisions of the Native American Graves Protection and Repatriation Act (NAGPRA).

No sacred sites have been identified in the project area, either by tribal governments or traditional practitioners (Executive Order 13007).

The proposed projects activities are not expected to restrict Alaska Native access to traditional religious or spiritual sites protected under the American Indian Religious Freedom Act (AIRFA) and Forest Service Standards and Guidelines for the treatment of sacred sites (USDA 2008, pg. 4-19).

Direct and Indirect Effects

Direct effects include damage due to harvest and road construction activities. Therefore, areas of direct effect are defined as planned harvest units and road corridors. Potential direct effects to historic properties due to human activities come primarily from road construction, vandalism, or theft. Sites can be bulldozed, collapsed, dug up, looted, or destroyed. Indirect effects can occur to historic properties by trampling, increased erosion, disturbance and displacement of cultural artifacts. For example, trampling the surrounding area can result in site erosion or plant cover loss, thereby exposing the site to weathering.

Indirect effects result from activities peripheral to the harvest itself. These would include the risk of increased damage of historic properties due to increased visitation of the project area. Increased visitation might result from higher numbers of workers in the area during harvest or from increased accessibility to the area due to road improvements.

Effects on historic properties can be eliminated or reduced by avoiding the cultural resources sites or by using mitigation measures to reduce the potential impacts (see mitigation and monitoring section below).

Alternative 1

Alternative 1 would result in no changes to the existing condition, and no direct or indirect effects would occur. Ongoing activities in the project area would continue, such as recreation and subsistence uses associated with lake and marine shorelines, and activities associated with existing roads that facilitate access to locations of high sensitivity for heritage resources.

Alternatives 2, 3, 4, 5, and 6

No direct effects to heritage resources are anticipated under the action alternatives. All of the proposed timber harvest units and roads are inland and on relatively steep terrain, within the low probability zone for cultural resources (Programmatic Agreement 2010). Based on the results of the archaeological examination of the APE, harvest units and roads were designed to avoid all heritage resources. All historic properties found during the field investigations were used to modify the project to completely avoid potential effects to heritage resources.

No direct impacts on the three AHRS sites located within the APE are anticipated. Site KET-00306 is situated within the protected 1,000-foot coastal (beach) buffer zone and would therefore not be affected since no activities are proposed here. Past monitoring of sites KET-00015 and KET-00018 showed no affect, and therefore, no direct or indirect effects to the sites or historic properties are anticipated under the action alternatives.

No direct or indirect effects are anticipated to any of the nearby (within a five-mile radius of the APE) archaeological sites (Table 92) and culturally modified trees since these are located either in the intertidal zone or within a protected buffer established along the beach fringe.

The proposed modification to the fish passage barrier on lower Salt Creek (ADF&G Anadromous Catalog # 101-45-10380) as described in Chapter 2, would not directly or indirectly affect any known cultural resources. Also, no effects to heritage resources from the Shelter Cove LTF reconstruction are anticipated.

Harvest and road construction under the action alternatives is not anticipated to significantly increase access and visitation to areas of high sensitivity for heritage resources. All new road construction would be closed to motorized use after timber harvest except for the 1.1 mile public road ROW.

Cumulative Effects

Cumulative effects to heritage resources result from the collective impacts of natural decay, erosion, and forest processes as well as modern cultural processes, which may include recreational artifact collection and vandalism of historic properties and developments such as timber harvest and road construction.

Effects Common to All Alternatives

No past or present activities in the project area are expected to contribute to cumulative effects on heritage resources.

Alternative 1

Since no direct or indirect effects to heritage resources would occur under Alternative 1, there would be no cumulative effects.

Alternatives 2, 3, 4, 5, and 6

Recreational activities would likely increase into and throughout the project area when the Ketchikan to Shelter Cove Road is built connecting the Ketchikan road system to the Shelter Cove road system, including the public road ROW across NFS lands. As a result of increased visitation in the project area, future expanded use of the intertidal and beach fringe areas could eventually affect historic properties.

Cumulative effects of the action alternatives are considered minimal for all action alternatives. Harvest and road construction are not in areas of high potential for heritage resources or near known historic properties. The action alternatives would not contribute significantly to the degradation of known historic properties in the project area.

NHPA Section 106 Compliance

The Heritage Resource Report (R2013100552001) was sent for review and consultation to the Alaska State Preservation Officer on September 18, 2013. As per the Programmatic Agreement (2010), if there are historic properties present but the undertaking would have no effect upon them as defined in 36 CFR 800.16(i), then the Heritage Specialist may make a determination of “No Historic Properties Affected” and the Forest may proceed with the undertaking in lieu of a consensus determination of eligibility pursuant to 36 CFR 800.4. The statute (36 CFR 800.16(i)) states that “effect” means alteration to the characteristics of a historic property qualifying if for inclusion in or eligibility for the National Register of Historic Places. Since all the known historic properties located with the APE for this undertaking would be fully avoided, the characteristics of the historic properties would not be impacted.

The District Archaeologist for the Saddle Lakes project has determined that the activities proposed under any of the alternatives for the Saddle Lakes Timber Sale would have “No Effect on Historic Properties.” However, should previously unidentified cultural resources including prehistoric sites, historic sites, cultural objects, or burials be encountered during timber harvest or road building or other activities, the project administrator shall halt operations within 100 feet of the area and immediately notify the Forest Supervisor and the Ketchikan Misty-Fiords District Archaeologist, who would in turn notify the State Historic Preservation Officer (SHPO), representatives of the Ketchikan Indian Community and the Organized Village of Saxman. Work may not be resumed in that area until so authorized by the Forest Supervisor.

Mitigation Measures

Log rafting and/or storage would only be allowed at approved locations positioned well away from the fish trap and petroglyph sites. Log rafting activities would also be monitored by the District Archaeologist throughout the duration of timber sale activities.

A monitoring program can help assure that proposed activities do not affect cultural resources or historic properties through soil disturbance, rutting, compaction, and erosion. Monitoring also addresses issues of additional use of the area that may increase the potential for deliberate looting or inadvertent disturbance of fragile sites in or near the project area.

Should previously unidentified cultural resources be encountered during project activities, the project administrator shall halt operations within 100 feet of the area and immediately notify the Forest

Supervisor and the District Archaeologist, who would in turn notify the State Historic Preservation Officer (SHPO). Mitigation measures would be implemented before those project activities may resume.

Monitoring Recommendations

The Third Amended Programmatic Agreement (2010) among the Alaska Region of the Forest Service, the ACHP, and the Alaska SHPO stipulates how archaeological inventory and monitoring is to be conducted for a proposed project. Archaeological inventory and monitoring is based upon the likelihood of locating archeological and historic sites based upon the physical, biological, and cultural features and history of the area to be investigated.

The Forest Service recognizes two sensitivity zones in the Alaska Region: high sensitivity and low sensitivity. The Programmatic Agreement states that a sample of all areas of high sensitivity subject to direct impact is to be monitored during and/or after the actual ground disturbance. The impact areas to be monitored would be determined on a case-by-case basis. For areas considered low sensitivity, a sample of all areas of actual ground disturbance is to be subjected to post-disturbance monitoring. Again, the location and acreage sampled would be determined on a case-by-case basis. Monitoring of these areas would commence with the start of the project’s timber harvest work and conclude with some post-disturbance surveys.

The two sensitivity zones are as follows:

1. High sensitivity zones:
    a. All land between mean lower low water and 100 ft. of elevation above mean high water, with no consideration of slope.
    b. Areas of former lode and placer mining activity.
    c. River valleys, lake, and river systems providing passes or portages across larger land masses.
    d. Lake and stream systems containing, or known to have contained, anadromous fish runs; including a focus on barrier falls locations in such systems.
    e. Elevated/fossil marine, river, and lake terrace systems.
    f. Caves and rockshelters, areas of karst landforms, and rock formations known for caves and rockshelters.
    g. Areas associated with myths and legends such as traditional cultural properties or cultural landscapes.
    h. Known sources of potential raw materials (obsidian sources; exceptional concentrations of cedar trees, etc.).
    i. Alpine areas if ethnographic or historic evidence or previous surveys conducted nearby indicate cultural use, such as high elevation mountain peaks overlooking saltwater that may contain rock cairns.
    j. Other areas identified through or oral history research and information sources.

2. Low sensitivity zones:
    a. The low sensitivity zone includes all land not relegated to the high sensitivity zone.

To verify affect assumptions the District Archeologist would periodically visit the project area and follow standard monitoring protocols. Monitoring would ensure that such activities do not adversely affect cultural resources and address issues of future recreational use that may increase the potential for looting or inadvertent disturbance of heritage resources. District Archeologists would conduct a visual inspection of the use area, focusing particular attention on areas with known heritage or high sensitivity areas for potential heritage resources. Soil probes and other subsurface tests may be used to determine the integrity of buried sites. Photographic reference and GPS waypoints may be established at each monitored location to serve as a visual baseline as future visits are made. Information gathered during monitoring would be recorded in the District Historical Sites database. Maps, drawings, photos, and other references would also be collected to gauge future site conditions.

Invasive Plants

Invasive plants directly compete with native plants and can cause displacement of the native plants by site occupancy. In addition, these species can have a number of indirect effects including changes to biological diversity and ecosystem services (D'Antonio et al. 2004). Potential impacts include changes in the food base for wildlife and possible changes in the natural soil erosion and sediment accumulation dynamics. In addition, altered recreational quality may also be a product of some invasive plant infestations on NFS lands (D'Antonio et al. 2004; Mack et al. 2000). EO 13112 directs all federal agencies to address the impacts their actions may have on invasive species.

In determining what plants qualify as "invasive," the Alaska Natural Heritage Program's (ANHP) Weed Ranking Project results were used (http://akweeds.uaa.alaska.edu/akweeds_ranking_page.htm). The ranking process takes into account documentation of each plant species, including climatic comparison of Alaska's climates to climates where the plant is known to thrive, potential ecological impact, biological characteristics and dispersal ability of the plant, the plant's distribution, and feasibility of control. Plants are then ranked on a scale of 0-100, 100 having the highest invasiveness rank.

The Tongass National Forest High Priority Invasive Plant Species List is a list of target plants of which the Forest is most concerned (USDA 2007). This list uses the Alaska Natural Heritage Program's (ANHP) Weed Ranking Project results to rank the invasiveness of each species. This list of plants includes those with which we have initiated some control measures across the Forest. Generally speaking, a plant with a ranking higher than 60 (out of 100) is a high priority plant for control, however there are a few exceptions. Reed canary grass (*Phalaris arundinacea*) is well established, and eradication would be impossible to achieve, so it is not a high priority plant for control, despite the fact that it has a very high invasiveness ranking of 83. Likewise, common dandelion (*Taraxacum officinale*) is well established, and therefore would not be a high priority plant, even though it has a relatively high invasiveness ranking of 62.

This section provides a summary of the current status of invasive plants within the Saddle Lakes project area, and their relative risk of expanding their current infestation area as a result of the proposed action or the Alternatives. A risk assessment also documents the risk for new infestations of invasive plants not yet on the Shelter Cove road system due to the actions proposed in the project and several proposed non Forest Service actions.

Methodology

Invasive plant surveys were conducted by a qualified botanist on the Shelter Cove road system and Shelter Cove Log Transfer Facility (LTF) in 2007. This includes driving or walking the road system and stopping at different locations to survey more intensely for invasive plants. The entire main road and temporary road system was not completely surveyed. However, the most important vector locations were identified as the LTF and float plane dock area, rock pits, and other disturbed areas along the main roads. Surveys were done at the appropriate time of year to identify the broadest range of possible invasive plant species. The locations of the invasive plants were documented with a GPS, and delineated in GIS.

Incomplete and Unavailable Information

A complete survey for invasive species has not been performed for the entire proposed action area.

Surveys for invasive species are labor intensive and expensive, and generally become obsolete in a short period due to the speed with which weeds can expand in the new areas.

The lack of a complete census on the locations and aerial extent of invasive plants within or adjacent to the proposed action area was not critical for the analysis of the potential impacts. Potential impacts were based on the assumption that all existing and new disturbance is at risk for invasive plant establishment and that implementation of Standards and Guidelines and Best Management Practices would eliminate or reduce the risk of potential impacts.

Analysis Area

For invasive plants, two elements usually exist which promote their spread: open sunlight and exposed mineral soil (disturbance). Since risk to further spread occurs along the road system, the analysis area is directly adjacent to existing roads.

Affected Environment

A total of eight invasive plant species are documented to occur within the Saddle Lakes project area. Of these eight plants, two are classified as high priority invasive plant species by the Tongass National Forest: *Phalaris arundinacea* and *Leucanthemum vulgare*. In Table 93 a summary of plants and their invasive ranking and general locations in the project area is provided.

Table 93. Invasive species known in the Saddle Lakes project area

Scientific name	Common name	Rank[1/]	General locations
Festuca rubra	Red fescue	NR[2/]	Log transfer area and road system
Leucanthemum vulgare	Oxeye daisy	61	Log transfer area and road system
Phalaris arundinacea	Reed canary grass	83	Log transfer area and road system
Plantago major	Common plantain	44	Log transfer area and road system
Ranunculus repens	Creeping buttercup	54	Log transfer area and road system
Sonchus arvensis ssp. arvensis	Field Sowthistle	NR[2/]	Log transfer area
Taraxacum officinale	Common dandelion	58	Log transfer area and road system
Trifolium repens	White clover	59	Log transfer area and road system

Note:
1/ Ranking (0-100) designated by the Alaska Natural Heritage Program.
2/ Not ranked by Alaska Natural Heritage Program.

Invasive Plant Risk Assessment

This risk assessment evaluates the locations of known invasive plants, existing habitat vulnerability, and the potential response of invasive plants as a result of project actions that result in habitat alterations and increased vectors.

Two high priority species occur commonly along Saddle Lakes area roads in the project area: Oxeye daisy (*Leucanthemum vulgare*) and Reed canary grass (*Phalaris arundinacea*). These species are primarily selected for treatment in Land Use Designations (LUDs) where the Forest is managing for natural and near natural desired conditions. These do not generally include development LUDs with road systems. This is due to the widespread nature of these species and the low probability of success in control.

Environmental Consequences

Habitat vulnerability is a review of site-specific factors present in the Saddle Lakes project area which would make the project area vulnerable or resistant to invasive plant infestation. For most invasive plants, two elements usually exist which promote their spread: open sunlight and exposed mineral soil (disturbance). Since the majority of risk to further spread occurs along the existing road system, this analysis considers only those habitats directly adjacent to existing roads. Table 94 lists vegetation types found in the project area adjacent to the existing road corridor, and their vulnerability to invasive plant infestation.

Table 94. Existing vegetation types within and near the Saddle Lakes project area and their associated habitat vulnerability

Vegetation Type	Habitat vulnerability due to light	Habitat vulnerability due to disturbance
Forested, undisturbed	Low	Low
Young-growth:		
Sapling to pole size classes	High	Low
Stem exclusion stage	Low	Low
Stem re-initiation stage	Low	Low
Wetlands (marshes, muskegs, meadows)	High	Moderate
Riparian areas (floodplains, alluvial fans, lake edges and other stream crossings)	Moderate	Moderate to High

Soil cover includes mosses, lichens, rocks and ground vegetation. Within the Tongass National Forest, soil cover is generally high due to the prolific vegetative growth that exists here. Exposed mineral soils naturally occur only along areas of dynamic water movement and as a result of gravity, such as riparian areas, including streams of all types, and landslides. Even so, these areas are often covered with layers of moss and vegetated with forbs and shrubs. It is uncommon to see naturally produced areas of exposed mineral soils except along the beach fringe, in estuaries, floodplains and alluvial fans, as well as in areas of high mass movement such as landslides. Therefore, the majority of soil disturbance is generated by management actions as a result of road building, recreation activities and timber harvest operations.

The type of soil exposed is correlated to the habitat vulnerability. Exposed mineral soils have a higher vulnerability to invasive plant infestations than exposed organic soils. Mineral soils are generally found along riparian areas, estuaries, and mountain and hill slopes of forested habitats. Organic soils are generally found in wetlands, beach fringes, and alpine areas. Therefore, the habitats with the highest vulnerability related to soil type is riparian areas, estuaries, and other stream corridors directly adjacent to road corridors. In the case of the Saddle Lakes project area, the lake shore near the roads is also a vulnerable habitat.

The degree of soil disturbance within forested habitats as a result of timber harvest is related to the type of logging systems used to remove the timber. For example, cable systems using suspension (partial or full) would create little or no soil disturbance. However, ground-based systems (high lead and shovel) have the potential to create more soil disturbance. Certainly, road corridors, landings, trails, and LTFs are the most disturbed areas on the Forest. Within the project area, previous soil disturbance occurs in roads, rockpits, and to a lesser degree in previously harvested timber units.

Low risk areas are currently roadless areas (about 48 percent of the project area), undisturbed habitats, and closed canopy second growth forests. Moderate and high risk areas include wetlands, floodplains, lake margins, open forests having soil disturbance, and newly disturbed areas such as roads, clearcut areas, landings, and rock quarries.

Non-project Dependent Vectors

Non-project vectors present in the Saddle Lakes project area include roads, wildlife migration, wind, water, and land use modification.

Effects by wildlife and other environmental factors (i.e. wind and water) are expected to be similar to current conditions.

Road construction, maintenance, and use have high potential for spreading invasive plants. Current road use includes hunters, fishermen, and Forest Service administrative use. Use is considered low since the road system is currently isolated; however the Saddle Lakes road system is proposed for connection to the Ketchikan road system. This action would become a source of invasive plants, as the Ketchikan road system has numerous highly invasive plants and is discussed in the mitigation measures section.

A land exchange involving about 8,170 acres has been proposed between the Forest Service and the State of Alaska Mental Health Trust Authority. It is expected that there would be a change in land use management that could result in the increase in propagation of invasive species.

The LTFs at Shelter Cove and Coon Cove are used for shore transfer of materials, vehicles and equipment. Consequently, these areas are highly prone to established communities since vehicle travel begins and ends at these locations. Use of the LTFs would increase with the timber sale implementation.

No additional risks are anticipated to the spread of invasive plants as a result of implementing the fish passage barrier modification and Shelter Cove LTF reconstruction.

Habitat Alteration Expected as a Result of Project

Long-term habitat alterations expected as a result timber harvest activities include vegetation removal (light intensity alterations) and some minimal level of exposure of mineral and organic soils as a result of new road construction and rockpits. The ground disturbance and open habitat created by shovel and cable harvest do create an opportunity for invasive plants to invade previously forested habitat, particularly with higher levels of soil disturbance created using high lead and shovel logging systems (see Soils section for more information on soil disturbance related to logging systems). However, none of the known invasive plants currently in the project area near proposed clearcut harvest units are expected to thrive inside a unit once the young forest regenerates.

The other primary long-term habitat change in a timber sale area are the rock quarries, roads, timber landings, bridges, camp areas, sort yards and LTFs built or repaired to support timber harvest operations. These types of sites already exist in the project area from previous timber sales, and would not expand substantially with the proposed timber sale. The roads, rock quarries, camp areas, sort yards and LTFs are large, open, disturbed sites ideally suited for many invasive plants.

This project proposes to construct up to 32.3 miles of new road and would create a number of new rock quarries. Potential existing rockpits and possible locations of new rockpits have been identified, but the exact rock sources to be used for the project have not been finalized.

This project also proposes to alter up to 2,875 acres of forested habitat into open stands of varying size. It is also predicted that timber harvest would create some soil disturbance as a result of harvest operations (see Soils and Watersheds section). Overall, these proposed activities would result in low to moderate alterations to the current habitat conditions as a result of this project.

Secondary long-term alterations in habitat as a result of this project are changes in light availability and wind patterns on the ground. The additional light, wind speed (especially along roads), and increased water runoff along roads can all favor the spread of invasive plants.

Increased Vectors as a Result of Project Implementation

The primary vector as a result of this project is new road construction. Use of old rock quarries creates additional vectors for spreading invasive plants. Secondarily, construction and logging equipment brought from other locations may be new vectors for spreading invasive plant seeds and roots. New stream crossings create openings and have exposed soils which can act as vectors to spread invasive plants along waterways. Barges or ships used to transport logs may be a vector for aquatic plants and other invasive aquatic species, primarily through ballast water. Seed sources used to revegetate the roadsides and rock quarries are no longer a vector, since the Tongass National Forest uses virtually “weed-free” seeding specifications in all revegetation efforts. The Saddle Lakes Timber Sale would increase traffic use on the roads in the project area temporarily. The increased traffic would increase the potential vectors of spread.

Since the primary vectors for the spread of invasive plants in the Saddle Lakes project area are new road construction and infested rock quarries, we consider how much takes place in order to assess the risk of increased or new introductions of invasive plants.

- Up to 32.3 miles of new road construction
- Unknown how many existing and new rock quarries identified for future rock sources for this project are infested with high priority invasive plants. Sites would be inventoried before project implementation.

Management Considerations/Mitigation and Monitoring

The invasive plant management goals and strategies for this project follows guidance contained in Forest Service Manual 2900 (Invasive Species Management) and the Region 10 and Tongass Invasive Plant Management Plan (USDA 2005). The primary goal for this project is prevention and minimization of spreading certain invasive plants further into the project area. It focuses on limiting the introduction and spread of existing high priority invasive plants into new areas, especially in the process of road construction.

Factors for management are considered:

1. Management considerations for this project do not include those high priority invasive plants known in the project area which are ubiquitous. The Tongass National Forest only controls these plants in certain locations, such as wilderness and other non-management LUDs, when infestation sizes are manageable (< 1 acre). These include the following species:
   a. Oxeye daisy – *L. vulgare*
   b. Reed canary grass – *P. arundinacea*

The logic for not treating these species at this time is due to their widespread distribution along the road system, and the low likelihood of success in their ultimate control. However, the application of soil erosion BMPs assists in reducing the risk of continued spread While management efforts focus on avoiding the introduction of these species into pristine habitats and LUDs managed for natural and near natural conditions. These do not include the Timber Production LUD, of which this project area is located.

Summary and Overall Risk Assessment for All Alternatives

The anticipated overall invasive plant response to the proposed actions in all five Action Alternatives in the Saddle Lakes Timber Sale project is moderate to high for known invasive plant species spreading into new roads, and possibly into some vulnerable areas such as stream crossings. This risk is associated with the known invasive plant species currently in the project area along the existing road systems. This risk level was determined based on the following factors:

- Locations of high priority invasive plants occur at the LTF and along existing road corridors.
- Control of the two high priority species is not feasible at this time due to extensive distribution in the project area.

Alternative 1, the No Action Alternative, would have little to no impact in the spread of invasive plants. The five action Alternatives (Alternatives 2 to 6) are relatively equal in contribution to the introduction and spread of invasive plants, as all contain road building, stream crossings of roads, and rockpit expansion. The risk of introduction of new invasive plants or the spread of existing plants into forested areas, other natural habitats, and along temporary roads and landings is moderate. This risk was determined based on the following factors:

- Forested areas harvested in this project are expected to regenerate rapidly which lessens the susceptibility to invasion.
- Temporary roads would be decommissioned and revegetate with naturally, eventually forming a closed canopy reducing spread if invasive plants are not introduced during operations.
- Mitigation and monitoring recommendations should help prevent further spread of new high priority invasive species and those not yet widely distributed.

The focus would be in keeping current populations along the road sides and within contained rockpit areas, and avoiding introduction into the project area.

Risks increase considerably in the project area upon completion the Ketchikan to Shelter Cove road as it presents the opportunity to bring several highly invasive plants to the Saddle Lakes project area. Additionally, the proposed land exchange between the US Forest Service and AMHTA adds complicating issues in regards to invasive plants, as AMHTA has a different management strategy for treating invasive plants.

Design Features and Mitigation Measures

With the above stated management consideration, the following mitigation measures are recommended for management to consider in lowering the risk of spread of invasive plants:

1. Require contractors to access rock material that is free of any high priority invasive plants (see Appendix A in Invasive Plant Risk Assessment for list of species) from existing quarries prior to constructing new roads. All rock/fill sources would be inspected by certified personnel.
    a. If any rock sources become contaminated with high-priority species and certification cannot be attained without treatment or avoidance methods, consider the use of weed infested rock for re-constructing existing roads only.

   b. Rock material free from high-priority species would be required on all new road constructions and new landings.

2. Monitor the newly constructed roads, the active quarries, and the project area for at least 3 years after the project for new invasive plant introductions.
3. Eradicate or control any newly introduced high priority invasive plant species not currently in the project area after the project completion, and prior to closing temporary roads as part of the District 5-year program of work for invasive species management. Prioritize controlling any new populations relative to other populations of high priority species needing treatment on the District. This recommendation may change if the road from Ketchikan is completed, as eradication may be impossible for some species once the road is connected.
4. Require washing of any off-road equipment and road brushers brought to the LTF from other locations prior to arrival at the Saddle Lakes project area.

Inventoried Roadless Areas

Inventoried Roadless Areas (IRAs) are defined as undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act. In 1972, the Forest Service initiated a review of National Forest System roadless areas larger than 5,000 acres to determine their suitability for inclusion in the National Wilderness Preservation System. The second and final review process, known as Roadless Area Review and Evaluation II (RARE II), resulted in a nationwide inventory of roadless areas. Since the completion of RARE II, Congress has designated some areas as wilderness, and additional reviews have been conducted through the land management planning process and other large-scale assessments.

Roadless areas within the Tongass National Forest were evaluated and considered for recommendation as potential wilderness in the Tongass Land Management Plan Revision Final Supplemental Environmental Impact Statement (SEIS) - Roadless Area Evaluation for Wilderness Recommendations (USDA 2003b). The 2008 Forest Plan FEIS tiers to the 2003 Final SEIS. However, the Roadless Area Conservation Rule published in the Federal Register (FR) on January 12, 2001, prohibits, with specific exceptions, road construction and road reconstruction, and timber harvest in IRAs (66 FR 3272-3273).

The Saddle Lakes project area includes portions of the North Revilla (526) and Carroll (535) IRAs. Combined, they encompass about 18,597 acres (about 48 percent) of the project area. A small portion (about 4 percent) of the North Revilla IRA is located in the northern portion of the project area, and a large portion (about 88 percent) of the Carroll IRA is generally located from the middle of the project area and continues south (Figure 17).

Units of Measure:

The following units of measure were used to evaluate effects of the proposed action and compare Alternatives:

- Percent of IRAs affected by acres of timber harvest and miles of new and temporary road construction, including 600-foot buffers around harvest units, and 1,200-foot buffers around roads; and
- Potential change to the roadless characteristics of IRAs.

Methodology

Although none of the action alternatives propose harvest or road construction within the IRAs, this analysis focuses on proposed activities within the "zones of influence" which include 600-foot buffers around harvest units, and 1,200-foot buffers around roads. The analysis also focuses on the potential impacts to the unique or outstanding biological, physical or social values of the IRAs. Roadless characteristics (i.e., values or features that make the area appropriate and valuable for wilderness) are described in the November 2000 Forest Service Roadless Area Conservation FEIS (USDA 2000, Vol. 1, pp. 3-3 to 3-7) and are also described in the Roadless Area Conservation Rule (66 FR 3,254).

This project-level analysis does not evaluate roadless areas for wilderness recommendation. However, roadless characteristics are used in this DEIS to analyze and disclose the potential changes to these characteristics. Potential effects are also discussed in more detail in the individual resource analysis sections. Effects to roadless characteristics are summarized at the end of this section. Table 95 summarizes the roadless characteristics considered, and the section in Chapter 3 of the DEIS where potential effects are discussed in more detail. As previously mentioned, none of the action alternatives propose harvest or road construction within the IRAs, and therefore no direct effects are anticipated.

The 2003 Final SEIS (Volume III: Appendix C - Part 2) provides roadless area descriptions for the North Revilla (526) and Carroll (535) IRAs.

The 2001 roadless dataset from the Tongass Corporate GIS has been used in this analysis to analyze the anticipated indirect effects within the "zone of influence." Anticipated indirect and cumulative effects on the roadless characteristics are discussed in terms of potential change to roadless characteristics in the North Revilla and Carroll IRAs.

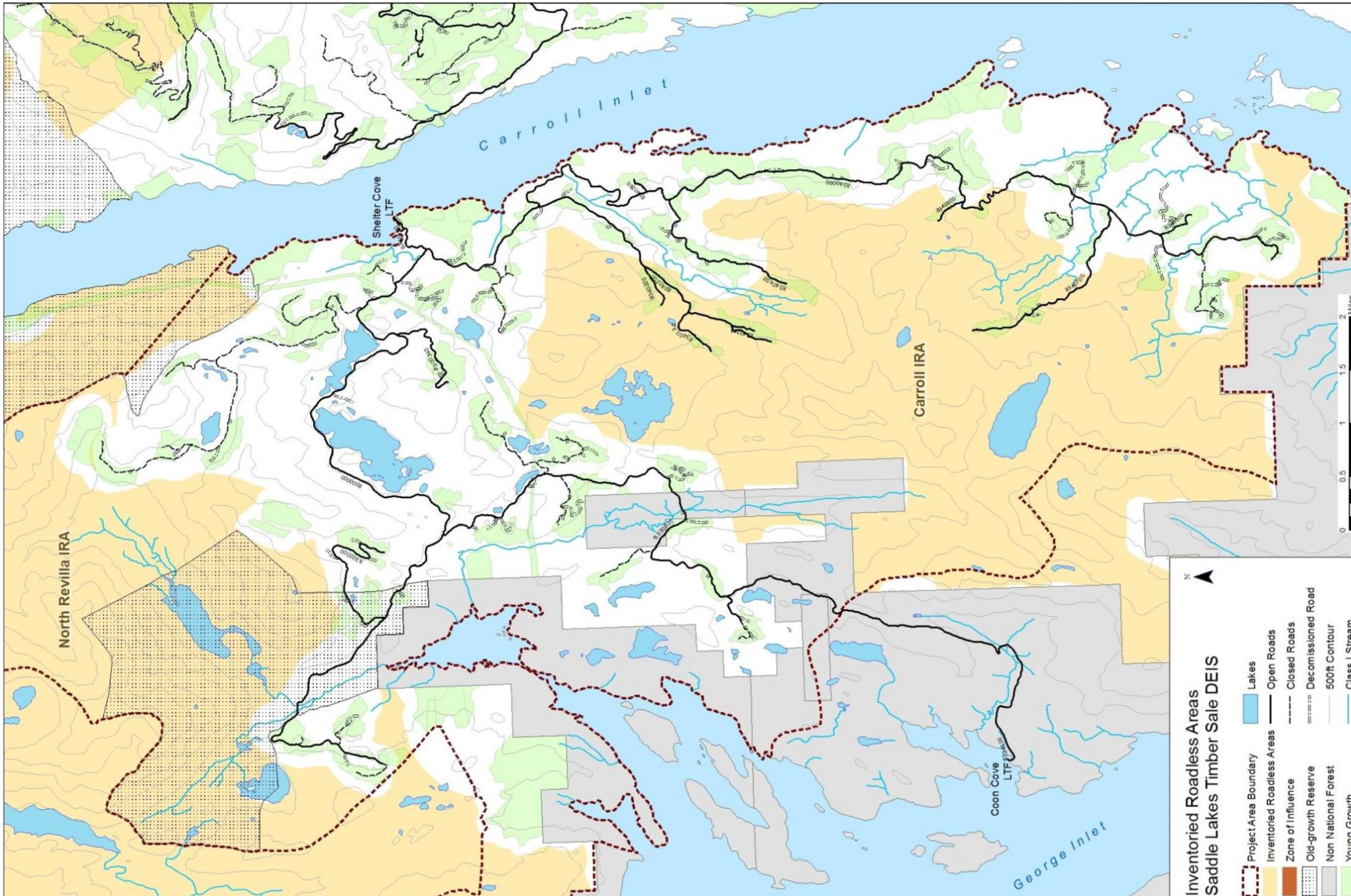


Figure 17. Inventoried Roadless Areas in the Saddle Lakes project area

Table 95. Roadless characteristics and discussion

Roadless Characteristics[1/]	Chapter 3 Section
Biological Values	
Diversity of plant and animal communities	Issue 3A, Aquatics, Plants
Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land	Issue 3A, Aquatics, Plants
Physical Values	
High quality or undisturbed soil, water, and air	Aquatics, Climate Change, Soils, Wetlands
Sources of public drinking water	Lands and Minerals
Social Values	
Primitive, Semi-Primitive Non-Motorized, and Semi-Primitive Motorized classes of dispersed Recreation opportunities	Issue 4B (Recreation)
Reference landscapes	Issue 4A (Scenery)
Natural appearing landscapes with high scenic quality	Issue 4A (Scenery)
Traditional cultural properties and sacred sites	Heritage
Other locally identified unique characteristics	Issue 3B (Subsistence)

Sources:
1/ USDA 2000, pp. 3-3 to 3-7; 66 Fed. Reg. 3,254 (January 12, 2001).

Analysis Area

The analysis area for the roadless resource includes the entire North Revilla and Carroll IRAs. Maps of these IRAs can be found in the map section of the SEIS CD (USDA 2003b).

Affected Environment

Southeast Alaska residents are, for the most part, surrounded by land that has many of the characteristics of wilderness. Routine travel and ordinary outdoor recreation activities typically require a higher degree of skill, risk-taking, and self-reliance than is usually required of adventurous backcountry visitors on other National Forests. This wildness and the lifestyles associated with it are highly prized by residents and visitors alike (USDA 2008c).

Portions of the North Revilla (526) and Carroll (535) roadless areas are located in the Saddle Lakes project area. The project area (38,459 acres) contains about 18,598 acres of roadless. This equates to about 48 percent of the project area. Table 96 summarizes the total number of acres associated with these two roadless areas; total IRA acres and IRA acres in the Saddle Lakes project area. Table 97 summarizes the Land Use Designations (LUDs) in the two IRAs and their acreages.

Table 96. Roadless area acres and roadless acres within the project area for the 2001 Roadless Rule

Roadless Area	Total Roadless Area Acres	Roadless Area Acres	Percent[1/] of Total Roadless Area
North Revilla	215,414	8,639	4%
Carroll	11,364	9,958	88%
Totals	226,778	18,597	48%

Source: USDA Forest Service GIS. Numbers are rounded to nearest whole number
1/ percentage of the IRA within the Saddle Lakes project area.

Table 97. LUD acres in roadless areas

LUD	LUD Acres in Roadless	LUD Percentage of Roadless
North Revilla IRA		
Old Growth Habitat	2,709	31%
Modified Landscape	1,886	22%
Timber Production	4,010	46%
Carroll IRA		
Modified Landscape	3,551	36%
Timber Production	6,293	63%

Source: USDA Forest Service GIS

North Revilla IRA

The North Revilla IRA is situated on the west coast of Revillagigedo Island and is bordered to the east by Misty Fiords National Monument Wilderness. Behm Canal borders the IRA to the north, and saltwater and areas of timber harvest and associated roads border the IRA to the west. The west shoreline of the area has been developed from Naha Bay north to Gedney Pass, with roads and harvest units extending along drainages into the IRA. The city of Ketchikan is located approximately 5 miles south of the southern portion of this IRA. The rural part of Ketchikan, north of the city (Ketchikan Gateway Borough) defines the boundary all the way to Naha Bay and Loring along the Behm Canal (Figure 2).

The IRA is characterized by rugged terrain. Mountain slopes are steep, causing deeply incised drainages. The central portion of the North Revilla IRA is dominated by an extensive lake chain associated with the Naha River and its tributaries. Elevation ranges from sea level to over 4,000 feet. Vegetation is typical Southeast Alaska coastal temperate rain forest; primarily western hemlock and Sitka spruce with moderate components of cedar. The Traitors Cove Metasediments Ecological Subsection is the dominant subsection within the IRA (USDA 2003).

Biological Values

The only federally listed threatened and endangered species that occur adjacent to the North Revilla IRA is the humpback whale (endangered). Yellow-billed loons (candidate) and Pacific herring (candidate) are also known to occur in the waters near the IRA.

No federally listed fish species or State of Alaska listed fish species occur in the streams and lakes of the Tongass National Forest. However, fourteen evolutionarily significant units (ESUs) for salmon and distinct population segments (DPSs) for steelhead that originate from either the Columbia River system or the Puget Sound area could potentially be present in Alaskan waters during some period of their marine life stage. The southern DPS of Green Sturgeon that originates from the Sacramento River could also be present in the inside waters of Southeast Alaska, particularly during the winter. However, existing data suggests that most do not migrate this far north and they would only be in the area seasonally. No critical habitat has been designated for these species in Alaskan waters. In 2009, the Region 10 Sensitive fish species was updated and stated no sensitive fish species occurred within the Tongass National Forest (USDA Forest Service, 2009b).

Northern goshawks have been found along major drainages in the North Revilla IRA (USDA 2003). Two sightings for the Queen Charlotte goshawk (R10 Sensitive Species) were recorded in 2012. More information on goshawks can be found in this chapter under Issue 3A.

No federally listed threatened or endangered plant species are known or suspected to occur on the Tongass National Forest. Eleven Forest Service Region 10 sensitive plants are known or suspected to occur on the Ketchikan-Misty Fiords Ranger District. Of these, six are suspected to occur within the North Revilla IRA. More information on sensitive and rare plants can be found in this chapter under the Plants section.

The North Revilla IRA has populations of Sitka black-tailed deer, wolves, black bear, otter, marten, beaver, mink, eagles, loon, and common waterfowl (USDA 2003). Based on MacDonald and Cook (2007, 2009), 24 mammalian species are known to occur on Revillagigedo Island. Large, undisturbed areas of land, with important old-growth forested habitat for foraging, breeding, nesting and denning are important for most wildlife species viability. More details on wildlife and wildlife habitat can be found under Issue 3A in this chapter.

Maintenance of wildlife habitat corridors is important to minimize isolation and potential local extirpation of wildlife species associated with interior old-growth (Hunter 1990, USDA 2008b, p. 3-380). A few elevational connectivity corridors were designed within the Saddle Lakes project area through the Modified Landscape LUD to link non-development LUDs through the IRAs (see Corridor discussion under Issue 3A). Portions of the small Old Growth Reserve in VCU 7470 at the head of George Inlet salt chuck is within the North Revilla IRA. This corridor maintains connectivity between Naha LUD II and the George Inlet salt chuck thereby facilitating dispersal and re-colonization of vacant territories.

Streams and lakes within the North Revilla IRA provide habitat and contribute to the production of fish that support the local subsistence, sport, and commercial fisheries of the area, and are a major food source for many wildlife species. Fish and aquatic resources on the Tongass National Forest provide major subsistence, commercial, and sport fisheries, as well as traditional and cultural values. Abundant rainfall and watersheds with high stream densities provide for the diversity of freshwater habitats. Seven anadromous and/or resident salmonid fish species are present in project area streams and include coho, pink, chum, and sockeye salmon, cutthroat and steelhead trout, and Dolly Varden char.

Physical Values

There are no glaciers or unique geologic features in the North Revilla IRA (USDA 2003). There is a swath of mid- to high-vulnerability karst that overlaps with this IRA in two small areas near Painted Peak, Marble and Licking Creek. However, there are no karst resources mapped within the project area and none have been reported during resource evaluation for the project (Baichtal 2013). There are no Research Natural Areas in the IRA. The IRA is part of a larger unroaded land area, which includes the Misty Fiords National Monument located east of the IRA.

Soils in the North Revilla IRA range from very poorly drained to well drained soils. Most soils in the Saddle Lakes project area have a thick organic or duff layer that prevents erosion of the underlying mineral soil from raindrop impact and supplies many nutrients for plant growth. There are several areas of very unstable soils within the North Revilla IRA, primarily located in the northwestern portion inside the project area boundary. See the Soils section in this chapter for more details.

Five broad types of wetlands occur within the project area. These wetland types have different soil and vegetative communities, occupy different landscape positions, and have somewhat different functions and values. Wetland types in the North Revilla IRA include forested wetlands, scrub-shrub/muskeg, alpine wetland, lakes and ponds and tall sedge fens. See the Wetlands section in this chapter for more details on wetlands.

The Swan Lake Hydroelectric Project is located in this IRA, but is northeast of the project area. There are no existing or planned water projects within the IRA and no additional hydroelectric water projects are planned (USDA 2003). There are no mining claims located within this IRA and the potential for mineral development is considered to be low (USDA 2003).

Social Values

There is high opportunity for solitude and the entire IRA provides primarily primitive recreation opportunities (see Recreation discussion under Issue 4B in this chapter). The recreation settings in this IRA within the project area boundary include Semi-primitive Motorized (SPM) (area adjacent to the Naha LUD II) with the remainder being Roaded Modified (RM) due to the area surrounding existing roads and previous harvest units (see USDA 2008b Appendix I for a full description of these recreation settings). Although no roads exist in SPM settings, there is float plane traffic to many of the lakes in the Naha watershed. Frequent floatplane landings bring people to and from the five public recreation cabins in the IRA (USDA 2003); however, these cabins are located outside the project area. The Misty-Fiords National Monument Wilderness Area, just east of the IRA, also contains many recreation attractions.

The Forest Service Scenery Management System (SMS) uses the term Scenic Integrity Objective (SIO) to describe the desired visual condition of the landscape. The SIO for the portion of the IRA within the Saddle Lakes project area that is adjacent to the Naha LUD II boundary to the North and along the west side of Carroll Inlet is rated as “High,” and represents about nine percent of the lands within the project area all within the Old Growth Habitat LUD. The portion of the IRA within the project area just North of North Saddle Lakes is rated as “Very Low” due to past harvest and road construction (see Scenery discussion under Issue 4A). Overall, the land within the entire North Revilla IRA (215,414 acres) has high natural integrity and moderate apparent naturalness (USDA 2003), but is influenced along its borders in many places by ongoing urban developments and developments associated with timber management on federal, state, and private lands. The State of Alaska and Alaska Native Corporations have made extensive land selections in the headwaters of Ward Creek, along George and Carroll Inlets, and along the south boundary of this IRA. Development in the IRA also includes the Swan Lake Hydroelectric Facility, northeast of the project area. About seven acres of the Swan Lake Powerline corridor is located in the IRA inside the project area boundary. The Upper Carroll Timber Sale FEIS (USDA Forest Service, 1996) resulted in a sale area that extends into the North Revilla IRA. These modifications have had a low impact on the overall natural appearance of the IRA. However, the developments that have occurred on adjacent lands, affect the areas near them and the apparent naturalness of portions of this IRA.

Within the project area, about 4,010 acres of the IRA (roughly 46 percent) is allocated to the Timber Production LUD, about 1,886 acres (roughly 22 percent) to the Modified Landscape LUD, and about 2,709 acres (roughly 31 percent) to the Old Growth Habitat LUD (Table 97).

Viewed from nearby travel routes, the North Revilla IRA provides a natural backdrop to the developed areas in the foreground. Visual Priority Routes and Use Areas identified by the Forest Plan in the vicinity of the IRA include Carroll Inlet (Saltwater Use Area) and the Harriet Hunt-Shelter Cove Road Connection (Planned Route) (USDA 2008b, Appendix F). The State of Alaska Department of Transportation and Public Facilities (DOT&PF) has been planning a road (i.e., Ketchikan to Shelter Cove Road) that would extend the Ketchikan road system from the end of Revilla Road near Lake Harriet Hunt to Shelter Cove on Carroll Inlet. This road is identified in the 2004 Southeast Alaska Transportation Plan (SATP). Funding for future state road construction has been approved, and construction is anticipated to begin in 2015. The proposed road would cross NFS land just above the Salt Lagoon, and a Right-of-Way (ROW) authorization is needed from the Forest Service. The one mile ROW is outside the North Revilla IRA, but is in close proximity to it.

The 2008 Forest Plan FEIS (USDA 2008c, 3-575) lists subsistence resources of greatest importance to be salmon, other finfish, marine invertebrates, and deer. Communities that may potentially use the Saddle Lakes project area for subsistence and personal-use fishing and hunting are Metlakatla and Saxman and, to a lesser extent, Ketchikan. For more information on subsistence, see Issue 3B in this chapter.

Many people visit IRAs to experience spiritual renewal, and this includes Alaska Native sites. The North Revilla IRA has a rich history. Prehistoric and historic Alaska Native cultures used this area. Their activities mostly centered in the Naha Bay area and probably extended into the interior in the Naha drainage (USDA 2003). The Naha River, which is inside the IRA but outside the Saddle Lakes project area, has been an important subsistence use area through recent history. A number of prehistoric and historic sites have been identified through archeological surveys, oral histories, and other historical records. The heritage resource survey did not result in the identification of any new sites. No sacred sites have been identified in the project area, either by tribal governments or traditional practitioners (see the Heritage section in this chapter for more information).

Carroll IRA

The Carroll IRA is bordered to the north, east, and part of the west by areas developed for forest management. Developed non-National Forest System lands border the area to the south and part of the west. The area is located on a peninsula bordered by George Inlet and Carroll Inlet to the west and east, respectively (Figure 17). The area is characterized by rugged terrain, steep mountain slopes, and lakes (USDA 2003).

Biological Values

Occurrences of federally listed plant and animal threatened and endangered species are the same as those discussed above for North Revilla IRA. Similarly, the Queen Charlotte goshawk is expected to occur within this IRA. More information on goshawks can be found in this chapter under Issue 3A. No federally listed fish species or State of Alaska listed fish species occur in the streams and lakes of the Tongass National Forest. See discussion above for North Revilla IRA Biological Values section regarding fish ESUs and DPSs. No sensitive fish species occurs within the Tongass National Forest (USDA Forest Service, 2009b).

Similar to the North Revilla IRA, six Forest Service Region 10 sensitive plants are suspected to occur within the Carroll IRA. See discussion above for North Revilla IRA Biological Values section regarding plants.

Similar to the North Revilla IRA, the Carroll IRA also has populations of Sitka black-tailed deer, black bear, wolves, otter, marten, beaver, mink, eagles, loon, and common waterfowl. See discussion above for North Revilla IRA Biological Values section regarding wildlife and their habitat.

Elevational connectivity corridors were designed within the Saddle Lakes project area through the Modified Landscape LUD to link non-development LUDs through the IRAs (see Corridor discussion under Issue 3A). The Carroll IRA helps to preserve the linkage between the medium OGR located in the northeast portion of the project area, and the semi-remote LUD south of the project area.

Similar to the North Revilla IRA, the Carroll IRA includes streams and lakes that provide habitat and contribute to the production of fish that support the local subsistence, sport, and commercial fisheries of the area, and are a major food source for many wildlife species. Similar to the North Revilla IRA seven anadromous and/or resident salmonid fish species are present in project area streams.

Physical Values

There are no glaciers or unique geologic features in the Carroll IRA. There is a small area of high vulnerability karst located in the mountainous region southwest of Buckhorn Lake. The karst resources are mapped as 101 acres, or one percent, of the entire IRA. About two-thirds of the karst is mapped as high vulnerability karst. However, there are no karst resources mapped within the project area and none have been reported during resource evaluation for this project (Baichtal, 2013).

Soils in the Carroll IRA are similar to soils in the North Revilla IRA; however, there are less very unstable soils in this IRA (see Soils section in this chapter).

Similar to the discussions under the North Revilla IRA above, there are five broad types of wetlands in the Carroll IRA. However, unlike the North Revilla IRA, the Carroll IRA contains more wetland types that are relatively scarce within the larger landscape (Tall Sedge Fens, Lakes and Ponds, and Alpine Wetlands) and are considered high-value wetlands (see Wetlands section in this chapter for more details).

There are no existing or planned hydroelectric or domestic water projects within the IRA. Mineral development potential in this IRA is very low.

Social Values

The Carroll IRA provides low opportunity for solitude and moderate opportunity for primitive recreation within the area, thus providing primarily semi-primitive recreation opportunities (see Recreation discussion under Issue 4B). The recreation settings in this IRA within the project area boundary include Semi-primitive Non-motorized (SPNM) in the interior non-roaded portion of the IRA, and Roaded Modified (RM) adjacent to areas that have been developed (see USDA 2008b Appendix I for a full description of these recreation settings). Aircraft noise can be heard virtually everywhere year-round. There are no developed recreation facilities in this IRA (USDA 2003).

The Carroll IRA appears unmodified and in a natural condition. However, a large portion of developed areas surrounding this IRA, particularly on the west side along George Inlet, affects the natural integrity and apparent naturalness of the area. The Scenery Integrity Objective (SIO) for the majority of the Carroll IRA within the project area boundary is rated as “Very Low” with smaller portions rated as “Low” or “Moderate.” There is no “High” SIO for this IRA (see Scenery discussion under Issue 4A). The State of Alaska and Alaska Native Corporations have received extensive land selections along George and Carroll Inlets and ongoing development has occurred on these lands. The State of Alaska owns the parcel adjacent to the northeast end of George Inlet and surrounding the salt lagoon. Within this parcel, plots have been laid out and some plots deeded to private individuals. The Alaska Mental Health Trust Authority owns the parcel adjacent and to the northwest of George Inlet. Cape Fox Corporation also owns a parcel located east of George Inlet that is adjacent to the Carroll IRA. Past harvest and associated road construction has also occurred in the IRA. One Forest Service timber sale (Buckdance Madder Reoffer) from the Sea Level Timber Sale FEIS (USDA Forest Service, 1999) occurred partly within the Carroll IRA. About five acres of the Swan Lake Powerline corridor is also located in the northern portion of the IRA inside the project area boundary. Visual Priority Routes and Use Areas identified by the Forest Plan in the vicinity of the area include Carroll Inlet and George Inlet (Saltwater Use Areas) (USDA 2008b, Appendix F).

Within the project area, about 6,293 acres of the IRA (roughly 63 percent) is allocated to the Timber Production LUD, and about 3,551 acres (roughly 36 percent) to the Modified Landscape LUD (Table 97).

Subsistence fishing and hunting in the Carroll IRA is similar to what is discussed above under Social Values for the North Revilla IRA.

Similar to discussions under the North Revilla IRA above, prehistoric and historic Alaska Native cultures used the Carroll IRA. A number of prehistoric and historic sites have been identified through archeological survey, oral history, and historic documentation (USDA 2003). See the Heritage section in this chapter for more information. There are no areas of scientific interest in this IRA.

Environmental Consequences

Incomplete and Unavailable Information

Detailed information about the future use of the lands proposed for exchange by the Alaska Mental Health Trust Authority (AMHTA) is unavailable. However, the November 2013 Forest Resource Management Plan (published as part of the Trust Land Office Resource Management Strategy) states that "TLO will be better positioned to fulfill its mandate of maximizing Trust timber assets after the exchange is complete. If successful, The Trust would own forest resources in areas more suitable for timber harvest…" (AMHTA 2013). The IDT GIS Specialist provided the acres of the land exchange within both IRAs. Cumulative effects are qualitatively discussed, and the analysis just assumed that the proposed parcels would no longer be managed by the U.S. Forest Service. The lack of specific data on the future use of the lands proposed for exchange by the AMHTA was not critical for the analysis of the potential impacts. Since this is a proposal by AMHTA and has not been moving forward very fast, when the NEPA is done for the land exchange that IDT can consider the Saddle Lakes NEPA document in their analysis.

Effects Common to All Action Alternatives

No direct effects to roadless characteristics would occur in any action alternative because no timber harvest or road construction is proposed in the North Revilla and Carroll IRAs.

NFS and temporary roads were given the same buffer (1,200 feet) and are similarly treated in this analysis, although temporary and closed system roads may have a lower degree of influence on some roadless characteristics (e.g., ecologic values, natural integrity and appearance, scenic values, and semi-primitive and primitive recreation opportunities) after the timber harvest is complete. Temporary roads in particular are anticipated to continue having a diminishing effect on roadless characteristics over time as natural vegetation and water drainage are re-established. In all action alternatives, the largest reduction in the number of acres retaining roadless character is a result of the 600-foot buffer and 1,200-foot buffer around harvest acres and roads. The Roadless Resource Report includes a map showing the zones of influence used in the analysis

The North Revilla and Carroll IRAs would remain greater than 5,000 acres in size.

Under all action alternatives, less than one percent of the North Revilla IRA and between 3 and 5 percent of the Carroll IRA would be indirectly affected due to the application of a 600-foot buffer around harvest units and 1,200-foot buffer for road construction (Table 98 and Table 99). The roadless characteristics of both IRAs would be minimally to moderately modified throughout, but no unique attributes would be affected, and impacts on the overall natural appearance of these IRAs would be low.

The State of Alaska ROW and public road on NFS lands would affect the zone of influence within the North Revilla IRA. Total acres affecting the zone of influence are shown in Table 98. The cumulative effects of the future road construction associated with the Ketchikan to Shelter Cove Road are disclosed under the Social Values section in cumulative effects below.

No indirect effects are anticipated to roadless characteristics as a result of implementing the fish passage barrier modification and the Shelter Cove LTF reconstruction.

Comparison of Alternatives

Potential indirect effects are anticipated under all action alternatives. Table 98 and Table 99 display the effects to roadless areas by alternative.

Table 98. Indirect effects of proposed Saddle Lakes Project on the North Revilla Inventoried Roadless Area

Measure of Direct and Indirect Effects	Alternative					
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Acres of timber harvest (outside of IRA)	0	2,207	1,012	2,424	2,875	2,138
Total acres affecting zone of influence (600’ buffer for harvest units; 1,200’ buffer for roads)	0	276	177	312	403	225
Total acres affecting zone of influence (1,200’ buffer for State road in ROW on NFS land)	0	19	19	4	4	4
Percent of North Revilla IRA affected	0	0.1	0.2	0.1	0.2	0.1

Source: USDA Forest Service GIS

Note: Acres are rounded to the nearest whole number.

Table 99. Indirect Effects of Proposed Saddle Lakes Project on the Carroll Inventoried Roadless Area

Measure of Direct and Indirect Effects	Alternative					
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Total acres of timber harvest (outside of IRA)	0	2,207	1,012	2,424	2,875	2,138
Total acres affecting zone of influence (600’ buffer for harvest units; 1,200’ buffer for roads)	0	533	311	487	588	487
Percent of Carroll IRA affected	0	4.7	2.7	4.3	5.2	4.3

Source: USDA Forest Service GIS

Note: Acres are rounded to the nearest whole number.

Indirect Effects

Alternative 1

Under this alternative, no road construction or timber harvest is proposed. Therefore, this alternative would have no direct or indirect effects on the roadless characteristics in either the North Revilla or Carroll IRA beyond the existing condition.

Alternative 2

Of the action alternatives, Alternative 2 proposes the most uneven-aged management resulting in up to 67 percent of the stand remaining after harvest. Therefore, changes to naturally appearing landscapes with high scenic quality would only be slightly changed in the project area adjacent to the IRAs. Alternative 2 would also maintain the elevational and connectivity corridors for wildlife through the IRAs.

Alternative 3

Alternative 3 proposes the least amount of road construction of all action alternatives, and the least amount of harvest. Development outside the IRAs would be subordinate to the existing landscape character. There would be no changes to the Recreation Opportunity Spectrum (ROS) classes, and indirect effects from timber harvest occurring adjacent to the IRAs would not be easily noticed by the average forest visitor recreating in the area. In addition, Alternative 3 was specifically designed to maintain the identified elevational and connectivity corridors. Alternative 3 would maintain portions of the existing Old-Growth Reserve (OGR) in VCU 7470 adjacent to the North Revilla IRA, and the connectivity between the Naha LUD II and George and Carroll Inlets would be maintained.

Alternative 4

Alternative 4 proposes more harvest and road construction outside the IRAs than Alternatives 2 and 3, but would maintain portions of the existing OGR in VCU 7470 adjacent to the North Revilla IRA, and connectivity between the Naha LUD II and George and Carroll Inlets would be maintained. Alternative 4 would lower the scenic integrity in several Visual Priority Routes adjacent to the IRAs, which may in turn indirectly affect the recreational experience of some visitors (see scenery and recreation effects discussions under Issue 4A and 4B). These indirect effects to roadless characteristics in the entire IRAs are anticipated to be minimal to moderate.

Alternative 5

Timber harvest activities proposed under Alternative 5 would indirectly affect the natural appearing landscapes with high scenic quality adjacent to the North Revilla and Carroll IRAs, which could in turn indirectly affect the recreational experience of some visitors (see scenery and recreation effects discussion under Issue 4A and 4B). However, minimal to moderate modifications to landscapes and recreation opportunities are anticipated throughout the entire IRAs.

The proposed harvest (clearcut) of units within the Old Growth Habitat LUD adjacent to the North Revilla IRA could indirectly impact wildlife habitat in this IRA. Although these proposed harvest units are outside this IRA, there would be indirect effects to wildlife habitat within this portion of the IRA due to the loss of connectivity between Naha LUD II and the George Inlet salt chuck (see discussion of effects to connectivity under Issue 3A in this chapter). Modifications to wildlife habitat throughout the entire North Revilla IRA would be minimal. Alternative 5 would move the small OGR in VCU 7470 into the North Revilla IRA.

Alternative 6

Similar to Alternatives 4 and 5, Alternative 6 would indirectly affect the natural appearing landscapes with high scenic quality adjacent to the North Revilla and Carroll IRAs, but to a lesser degree (see scenery and recreation effects discussion under Issue 4A and 4B). Similar to Alternatives 2, 3, and 4, Alternative 6 would maintain portions of the existing OGR in VCU 7470 in the North Revilla IRA, and connectivity between the Naha LUD II and George and Carroll Inlets would be maintained.

Cumulative Effects

Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the cumulative effects analysis.

Biological Values

In terms of potential changes to the biological values of the IRAs, the proposed Alaska Mental Health Trust Authority land exchange would likely contribute to cumulative effects on plant and wildlife habitat, and for those species dependent on large, undisturbed areas of land. Because future use of these lands is not known, the effects cannot be quantified. The land exchange would result in a reduction of 638 acres (less than 1 percent) of the North Revilla IRA, including the small old-growth reserve in VCU 7470, which maintains connectivity between Naha LUD II and the George Inlet salt chuck. The incremental effect of the proposed land exchange on the diversity of wildlife and plant habitat would likely be minimal throughout this IRA.

The proposed land exchange would result in a greater reduction in the size of Carroll IRA. About 3,302 acres (roughly 29 percent of the IRA) would be lost; however, the IRA size would remain over 5,000 acres (i.e., minimum criteria for wilderness consideration under the Wilderness Act). Exchanging lands in the Carroll IRA would likely change the existing condition of plant and animal habitat by reducing it for some plant and animal species. Rare and sensitive plants are suspected to occur within these IRAs (see affected environment under Plants section in this chapter). It is unknown what effects the land exchange would have on known or undocumented sensitive and rare plant species, and therefore, cumulative effects cannot be quantified. There would be an incremental effect from the proposed land exchange on the diversity of wildlife and plant habitat in the Carroll IRA, but until future land use is disclosed, it is uncertain what the cumulative effects would be. Management of these lands would no longer be administered by the U.S. Forest Service, and Forest Plan Standards and Guidelines would no longer apply.

Physical Values

In terms of the potential changes to the physical values of these IRAs, the proposed Alaska Mental Health Trust Authority land exchange could contribute to cumulative effects. Most of the incremental impacts would occur in the Carroll IRA since about 29 percent of the IRA would be subject to the exchange. Similar to the conclusions about biological values in this IRA, management of these lands would no longer be administered by the U.S. Forest Service, and Forest Plan Standards and Guidelines and Best Management Practices would no longer apply to physical values such as soil, water and air. For example, all known and field-verified Very Unstable (soils) areas were deferred from timber harvest in the Saddle Lakes Timber Sale, but possible future harvest may not employ the same deferment for activities that may potentially impact soils. Similarly, if Region 10 soil and water BMPs are not applied, there could be anticipated short-term or temporary impacts to water, such as temporary increases in sediment delivery in streams. Although there is uncertainty about the context and intensity of incremental impacts to physical values, exchanging lands in this IRA could have cumulative impacts.

Social Values

Both IRAs are included in the proposed Alaska Mental Health Trust Authority land exchange (about 8,170 acres), but the North Revilla IRA to a lesser extent (638 acres). Because of its large size (215,414 acres) and the small amount of land proposed for exchange (638 acres), the North Revilla IRA would still provide large areas in natural settings that could serve as reference landscapes and overall scenic qualities would not change. Past modifications by ongoing urban developments and developments associated with timber management on state, private and federal lands have had a low impact on the overall natural appearance of the IRA.

The proposed land exchange would reduce the Carroll IRA from 11,364 acres to 8,062 acres in size, and depending on the future land use, could potentially reduce the scenic qualities of this IRA. This IRA is bordered to the north, east, and part of the west by areas developed for forest management, and the area to the south and part of the west by developed non-NFS lands. Combined with the indirect effects anticipated under Alternatives 4, 5 and 6, the proposed exchange could further reduce the natural integrity and apparent naturalness of the area from serving as a reference landscape.

The Ketchikan to Shelter Cove Road would expand dispersed recreational opportunities for Ketchikan residents and visitors, as well as opportunities for hunting, firewood cutting, microsales and free use permits. These changes could contribute to beneficial cumulative effects on social values in the North Revilla and Carroll IRAs. The Ketchikan to Shelter Cove Road is not located within either IRA; however, portions of it are adjacent to the IRAs. This road connection would enable more access for sport and subsistence fishing in the project area IRAs. Increased road access to deer by both rural and non-rural hunters, combined with a potential increase in hunter demand for deer, could affect competition for deer between subsistence users who hunt in the IRAs. Traffic would increase along the road, and associated noise and dust in the IRAs could change the recreation experience.

Lands and Minerals

This section focuses on land ownership and administration on National Forest System (NFS) and non-NFS lands, including authorizations, permits, land conveyance and minerals. Authorized uses include powerlines, tideland permits, easements, and water rights. This section also discloses the conflicts, if any, that Saddle Lakes Timber Sale may have on these property interests. To the extent that a conflict creates an effect on a resource, the effects are analyzed at the end of this section.

Methodology

Information in this analysis was obtained by reviewing:

- Master Title Plats prepared by the Bureau of Land Management (Bureau of Land Management 2013a) in conjunction with the State of Alaska Land Records (Alaska 2013a);
- Bureau of Land Management Public Records (Bureau of Land Management 2013a and b);
- Status Plats and Land Records prepared by the State of Alaska Land Administration System (State of Alaska 2013a);
- State of Alaska Recorder's Office (State of Alaska 2013b);
- Alaska Department of Natural Resources permit/certificate database (State of Alaska 2013a, c, d, e, and 2014);
- Ketchikan Gateway Borough GIS (Ketchikan Gateway Borough 2013);
- Ketchikan Misty Fiords Ranger District special uses permit files; and
- Alaska Mental Health Trust Authority (Alaska Mental Health Trust Authority 2009, 2013a and b).

Incomplete and Unavailable Information

All known current information and sources for information were explored. Due to the dynamic situation of individuals purchasing land, requesting permits or certificates, or filing mining claims with multiple state and federal agencies, the information reported is time sensitive. A thorough search was made from state and federal databases for activities that occur within this area. Other agencies' proposed projects were also considered, including the state's Ketchikan to Shelter Cove Road and the Alaska Mental Health Trust Authority land exchange. The state's road project is in an active planning/analysis phase and information may change as the project moves forward. Discussions pertaining to the proposed land exchange with the Alaska Mental Health Trust Authority have occurred since 2009, but as of June 2014, there is no formal proposal. This project is also subject to change.

Analysis Area

The Lands and Minerals analysis area (both direct/indirect and cumulative effects) consists of all sections in the Public Land Survey System (or rectangular survey system) that contain a unit, road, marine access facility (MAF) or log transfer facility (LTF) proposed or used under any alternative (Figure 21). The analysis area also includes specific sections where the Ketchikan to Shelter Cove Road and the Alaska Mental Health Trust Authority land exchange are proposed. This approach was chosen because it covers all the pertinent land components previously discussed and other agencies' potential projects.

Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the lands and minerals cumulative effects analysis

Affected Environment

Both NFS and non-NFS lands exist within the analysis area (Table 100). Federal and state permits/certificates are issued and may need to be considered during implementation. State land conveyances and mineral claims are either completed or closed. Native selected and conveyed lands lie within the analysis area.

Table 100. Lands and minerals ownership in the lands analysis area Saddle Lakes project area

Ownership	Acres	Percent of Analysis Area
National Forest System Lands	28,636	77
State of Alaska	2,113	5
Alaska Mental Health Trust Authority	2,830	8
Cape Fox Corporation	3,554	10
Total	**37,133**	**100**

Source: USFS Tongass National Forest GIS

Land Ownership

National Forest System Lands

The analysis area contains 28,636 acres of NFS lands. There are five Land Use Designations (LUDs) in the lands and minerals analysis area, Timber Production, Modified Landscape, Old-growth Habitat, Semi-Remote Recreation and Land Use Designation II, and Non-National Forest System lands. The Forest Plan provides Standards and Guidelines for Lands and Mineral activities in these LUDs.

Non-National Forest System Lands

Ownership of non-NFS lands in the analysis area includes the State of Alaska, Alaska Mental Health Trust Authority, Cape Fox Corporation, and a small amount of private inholdings (Ketchikan Gateway Borough 2013).

State of Alaska

The State of Alaska owns the parcel adjacent to the northeast end of George Inlet and surrounding the salt lagoon. Within the parcel, plots have been laid out and some plots deeded to private individuals.

The state parcel includes lands in:

> Copper River Meridian (C.R.M.), T. 73 S., R. 92 E., Sections 16, 17, 20, 21, 28, 29, 30, 32, and 33.

Alaska Mental Health Trust Authority

The Alaska Mental Health Trust Authority owns the parcel adjacent and to the northwest of George Inlet including lands in:

> C.R.M., T. 73 S., R. 91 E., Sections 23 to 26 inclusive, 35 and 36.

Cape Fox Corporation

Cape Fox Corporation (Cape Fox) owns the surface rights on a parcel, either through patent or an interim conveyance[4]. This parcel is located east of George Inlet and in the center of the analysis area. The subsurface rights for all parcels were conveyed to Sealaska Corporation.

C.R.M., T. 73 S., R. 92 E., Sections 27 and 34.

C.R.M., T. 74 S., R. 92 E., Sections 3 to 5 inclusive, 9, 16 to 18 inclusive, 25 and 36.

Land Administration

Forest Service Special Use Authorizations

The Southeast Alaska Power Agency (SEAPA) maintains a special use permit for operation and maintenance of a power transmission lines (KET39). The permit for power transmission lines associated with the Swan Lake Hydropower Project, Federal Energy Regulatory Commission (FERC) P-2911, expires June 30, 2030. The permit authorizes a corridor, 200 feet wide by 60,313 feet long (total). The permit holder is authorized to clear and maintain the power line right-of-way. The structures are cleared frequently to allow access to the towers; the lines are cleared as needed when trees get 15 feet tall. Within the analysis area (NFS lands), the power line lies within C.R.M., T. 73 S., R. 92 E., Sections 12, 13, and 22 to 24 inclusive.

The State of Alaska requests a right-of-way authorizing the construction, operation and maintenance of a public road on NFS lands. See Chapter 2, Items Common to All Action Alternatives, State of Alaska right-of-way on National Forest System lands.

State Issued Permits

Within the analysis area, the State of Alaska has multiple permits on state land (State of Alaska 2013a, b and e). Permits which may affect the project are listed below. The Lands and Minerals Resource Report contains all the permits within the analysis area.

Tidelands permits

- LAS 25104 – Alcan Forest Products (Alcan) maintained a permit for the upland sort yard, LTF and rafting, log storage and ship moorage for the Leask Cove LTF site. This permit associated with the Lease Lake Timber Sale was extended to and expired on October 05, 2012. Alcan is not renewing the permit, however it remains on file with the state. The Alaska Department of Forestry has requested management control of this site; the request is pending as of April 2, 2014.
- ADL106318 – Cape Fox Corporation maintained a permit for a LTF in Coon Cove until the permit closed in 2007. The permit includes land in Alaska Tidelands Survey No. 1136 Tract A and B, Section 18, T. 74 S., R 92 E., C.R.M.
- ADL 107571 Cape Fox Corporation was cited with a trespass after the LTF permit (Section 18, T. 74 S., R 92 E., C.R.M.) was closed. The site was relinquished, improvements removed, the trespass resolved, and the case closed in 2011.

[4] Interim Conveyance (IC): Documents that transfer title of unsurveyed land to ANCSA Native Corporations. Lands received by village corporations have two ICs issued. One for the surface estate to the village and the second issued to the regional corporation for subsurface estate. Land received by a regional corporation has one IC for both surface and subsurface estate. There are a few exceptions to the normal pattern of issue. (Bureau of Land Management 2013a).

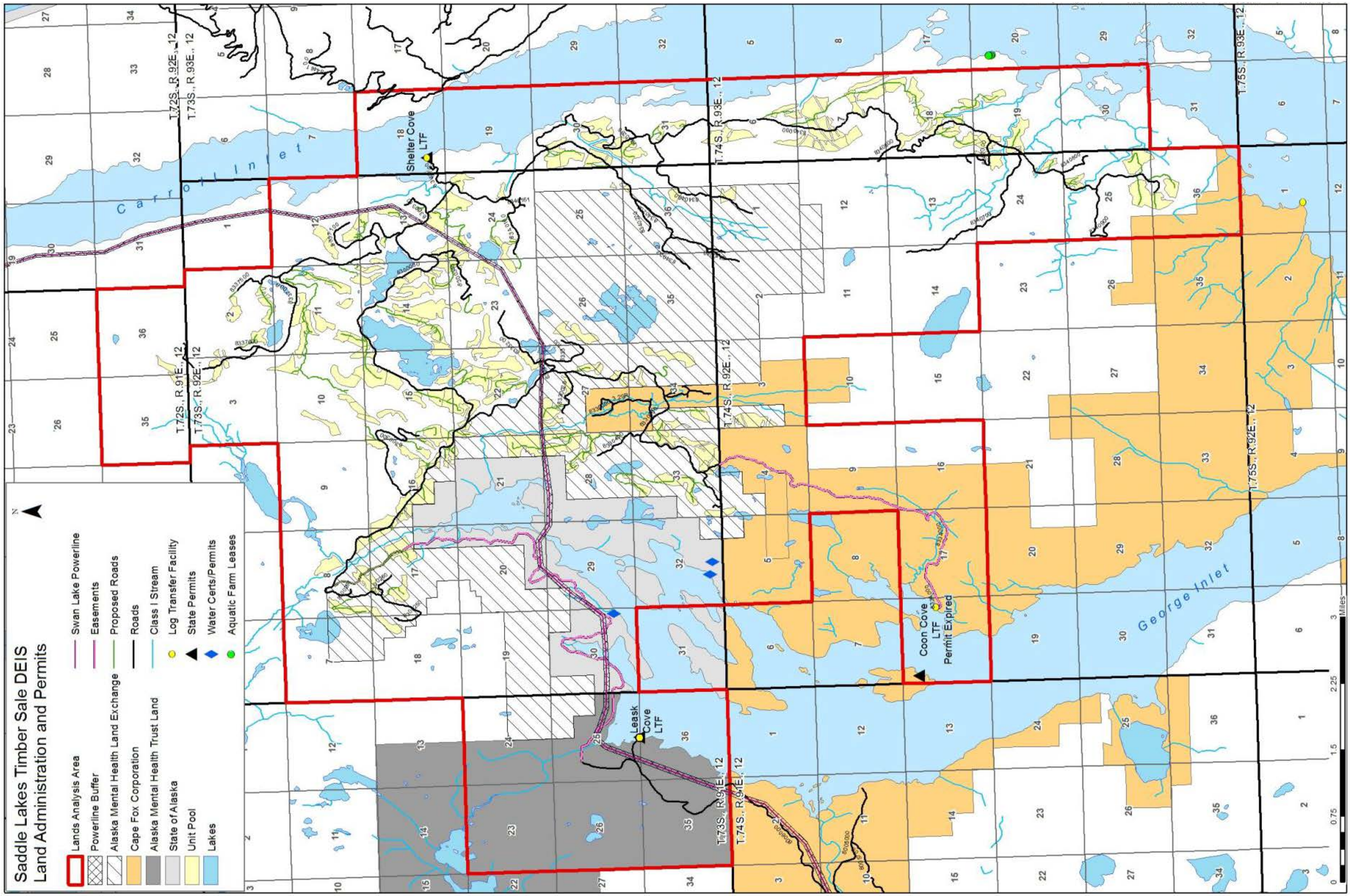


Figure 18. Lands and minerals analysis area

Easement Permits

- ADL 106839 – SEAPA maintains a public easement for power transmission lines, 300 feet wide by 23,000 feet long (total). This permit expires June 30, 2030. Within the analysis area, the power line transects: C.R.M., T. 73 S., R. 92 E., Sections 20, 21, and 28 to 30 inclusive, and T. 73 S., R. 91 E., Sections 25, 35, and 36.
- ADL 105601 – Forest Service maintains a public easement for a LTF at Shelter Cove. The easement includes all of Tracts 1 and 2 of Alaska Tidelands Survey No. 1459, located within Section 18, T. 73 S., R. 93 E., and Section 13, T. 73 S., R. 92 E., C.R.M.. The expiration date is August 14, 2020.

Other Permits

- ADL107083 – 107086 – Four ten acre aquatic farm permit/leases are available for the public. These permits are for suspended culture sites located within Sections 17, 19, 20, 29, T. 74 S., R. 93 E., C.R.M. These leases are outside the Lands and Minerals analysis area but are within the Saddle Lakes project area.

State Issued Water Rights

Three water permit/certificates for family dwellings are pending or issued in section 30 and 32, T. 73 S., R. 92 E., C.R.M. (State of Alaska 2013c and d).

Cape Fox Easement to Forest Service

Within the Cape Fox lands, the Forest Service has a 66-foot road easement for Coon Cove Road. The rights conveyed to the United States include:

> "...the right to cut timber within the easement to the extent necessary for construction, reconstruction, and maintaining the road. Timber so cut may be utilized by the United States for construction, reconstruction, and maintenance of the road. Timber that is not utilized by the United States shall be cut into logs of lengths specified by Cape Fox and decked along the road for disposal by Cape Fox."

An annual maintenance plan with respect to recurrent or emergency road maintenance should be prepared and implemented jointly by Cape Fox and the United States (State of Alaska 2013b).

Federal Energy Regulatory Commission Withdrawal/Easement

Per Section 24 of the Federal Power Act, all patented lands shall contain an exception/reservation in their title to the United States for purposes of the power line associated with the Swan Lake Hydropower Project P-2911 (Federal Power Act of June 10, 1920).

Legislated Alaska Conveyances

State Land Selections

The 1958 Alaska Statehood Act authorized the State of Alaska to select lands from within the Tongass National Forest to further the development and expansion of Alaskan communities (Forest Plan FEIS page 3-300). The Saddle Lakes analysis area does not include any state land selections under the Statehood Act that have not already been patented.

Native Land Selections

The Alaska Native Allotment Act of 1906 provided for Native individuals who had occupied lands prior to their designation as national forest to apply for conveyance. In addition, the Alaska Native Claims Settlement Act (ANSCA) established a process for transfer of federal land to Alaska Native.

Other than land previously patented, Native selected lands include all NFS lands in T. 74 S., R. 92 E, except section 25, N 1/2 SE and N 1/2 SW (Bureau of Land Management 2013a and b). All proceeds derived from contracts on these selected lands shall be deposited in an escrow account until the selected lands have been conveyed or released (ANILCA).

Minerals

Currently, there are no mineral claims or mineral material permits in the analysis area.

Future Proposed Easement

State of Alaska Ketchikan to Shelter Cove Road

The State of Alaska Department of Transportation and Public Facilities (DOT&PF) proposes to construct, operate and maintain a public road from Ketchikan to Shelter Cove, State Project 68405. The project's purpose is to provide vehicle access to Shelter Cove allowing access to public and private lands between Lake Harriet Hunt and Shelter Cove LTF on Carroll Inlet. This would increase the public's opportunities for recreation, subsistence hunting and gathering, tourism, and economic development (State of Alaska 2013f).

The initial scoping for this project began in November of 2006. The state proposes that the entire length of road be incorporated into the state road system which would then be managed and maintained by the state. In January of 2012, the State of Alaska purchased the surface right-of-way on the White River Road from Cape Fox Corporation. The State and Alaska Mental Health Trust Authority are in negotiation for the ROW through Alaska Mental Health Trust lands; however, the state expects to have a ROW agreement executed by June of 2014. (Garner, D. 2014).

Federal Public Law 109-59, Section 4407, provided the impetus for the Forest Service and the State of Alaska to enter into a Memorandum of Understanding (MOU). Through this MOU, a recorded reciprocal easement was granted to the state from near the end of Revilla Road by Lake Harriet Hunt to Shelter Cove (State of Alaska 2013b, USDA Forest Service 2006).

Future Proposed Land Exchange

Alaska Mental Health Trust Authority

The Alaska Mental Health Trust Authority (AMHTA) owns lands surrounding Southeast Alaska communities. These lands are visual backdrops to communities and provide scenery and public recreation opportunities. The AMHTA having fiduciary responsibilities to protect and enhance Trust assets, proposes to exchange these lands rather than develop them (AMHTA 2009).

In October 2009, the AMHTA proposed an administrative land exchange in southeast Alaska between the AMHTA and the Forest Service. One of the proposed federal parcels is within the proposed Saddle Lakes project area (AMHTA 2009 and 2013a). The proposed federal exchange parcel is 8,170 acres.

As of May 2013, the Trust Land Office (TLO) and the Forest Service began working jointly toward the signing of an Agreement to Initiate (ATI) the proposed land exchange. The TLO, which manages the AMHTA non-cash asset base, developed a Resource Management Strategy in November of 2013 including a Forest Resource Management Plan. This plan states, "Timber revenue has been a major source of financial contribution…however those opportunities are mostly depleted…TLO's pursuit of a land exchange with the U.S. Forest Service (USFS), if successful, would provide AMHTA with a timber basket that under current conditions can provide a continuous rotation and cycle of timber harvest revenues and opportunities" (AMHTA 2013b).

Environmental Consequences

Direct and Indirect Effects

Alternative 1

No road construction or timber harvest, fish passage, or Shelter Cove LTF reconstruction is proposed under Alternative 1. Therefore, this alternative would have no direct or indirect effects on lands or minerals.

Alternative 2, 3, 4, 5 and 6

None of the action alternatives propose to acquire or dispose of any property, or terminate any special use authorizations. The Forest Service proposes to issue an easement to the state for the construction, operation and maintenance of an approximate one mile section of road. From a Lands and Minerals perspective, the proposed Saddle Lakes Timber Sale, fish passage barrier modification, or Shelter Cove LTF reconstruction would not interfere with the issuance of the one mile easement to the state, or any state issued permits and would have no direct or indirect effects under any action alternative. All proceeds from timber harvested in units within the Native land selection in T. 74 S., R. 92 E., would need to be deposited into an escrow account. There are no current mineral operations to interfere.

Information pertaining to implementation specific to federal or state permits and Native Selected lands would be documented in the unit or road cards. These comments deal solely with boundary marking needs when units or roads are within 0.25 miles of non-NFS lands, being aware of the transmission line and its easement, and Native selection escrow needs.

Cumulative Effects

Alternative 1

Because there are no direct or indirect effects under this Alternative, there would be no contribution of cumulative effects.

Alternative 2, 3, 4, 5 and 6

Past timber sales or other resource projects have not affected lands and minerals resources as they have not interfered with permits or mineral opportunities. Future Forest Service projects would be analyzed and an up-to-date review on existing permits and mineral claims would be researched at that time. All state selected lands have been conveyed.

The proposed Ketchikan to Shelter Cove Road would increase access thereby increasing recreational use, subsistence and non-subsistence hunting and gathering access, and tourism. Increased access may open the area for mineral or mineral material opportunities and special use permits, either lands or recreation. The 4407 easement for this road would be an administrative change of road management.

If the AMHTA land exchange moves forward, the exchange would remove land from the federal timber base. The SEAPA maintains a special use permit for operation and maintenance of a power transmission line which runs through the proposed federal exchange parcel. Reserving a transmission line easement in the title would be needed in the exchange. No mineral claims exist in the area at this time; however a minerals analysis may need to be completed prior to an exchange. Native selected lands within the proposed exchange parcel would need to be noted and appropriately compensated

Design Features and Mitigation Measures

Property boundaries need to be posted if a timber sale or road is constructed within ¼ mile of non-NFS lands. This would be accomplished prior to implementation. Ensuring that no trespass occurs would be the responsibility of the timber sale contract administrator.

Be aware of the special use authorization for the Swan Lake powerline (total clearing width – 200 feet) and the lack of potential tail holds.

Through the state, four ten acre aquatic farm permit/leases for suspended culture sites are available for the public. Should these leases be issued, attention/care may be needed when barging or rafting logs past this area.

Plants

This section summarizes the botanical data available for the plants in the project area and analyzes and discloses the effects of the proposed Saddle Lakes Timber Sale in relation to threatened, endangered, sensitive, and rare plants. The plant species evaluated include those sensitive plant species known or suspected to occur in the Ketchikan Misty Fiords Ranger District, according to the 2009 Forest Service Region 10 Sensitive Plant List, and rare plants ranked S1 or S2 (critically imperiled or imperiled in the state) by the Alaska Natural Heritage Program.

Units of Measure:

The following units of measure were used to evaluate effects of the proposed action and compare Alternatives:

- Number of individuals and known locations of sensitive and rare plants impacted directly and indirectly through timber harvest or road construction.

Methodology

For this project, the Forest Service Alaska Region Sensitive Plant Species List (USDA 2009) was used to determine which sensitive plants to consider in the analysis. The Alaska Natural Heritage Program (ANHP) website (http://aknhp.uaa.alaska.edu/botany/rare-plants-species-lists/rare-vascular-hulten/#content) (accessed December 2013) was used for accessing the ANHP Rare Vascular Plant Tracking List, and using the ranking of rare plants, and definitions of these rankings for known rare plants in the area (ANHP 2013). A plant species is considered rare in the project area if it is ranked S1 or S2 (ANHP). The Regional Sensitive Plant Species List identifies certain rare plants on the ANHP list as sensitive, known or suspected to occur on the Tongass (Table 101).

Botanical surveys were conducted in the Saddle Lakes project area by the Forest Service and focused on probable habitat of rare and sensitive plants such as old growth forests, wetlands, riparian areas, meadows, bogs, lake margins, and rock outcrops. Surveys were conducted in 2007, 2011 and 2012 during planning stages of this project. As of May 2013, 61 sensitive and rare plant surveys were conducted by the Forest Service in the project area. Forty-six of the surveys were conducted in 36 different units within the five Action Alternatives, along six proposed temporary roads. Another 15 surveys were conducted outside the boundaries of proposed units and roads in sensitive plant habitats. See the project Biological Evaluation for Plants (Dillman 2013b) in the project record for further information on the pre-field review and field surveys.

Within the project area there are two known sensitive plant populations documented for the Tongass National Forest (date of search 3/2013). The Lesser -round leaf orchids were discovered during botanical surveys for this project and other similar timber management projects in the area. No additional rare and sensitive plants for the project area were identified.

This section is based in part, on the results of these surveys. The number of individuals and populations in a particular location are evaluated in association with the proposed actions under each alternative. The characteristics of their locations are indicators of habitat conditions that may also be affected by the proposed actions

Analysis Area

The spatial context for the direct and indirect effects analysis includes all proposed timber units and road corridors, and nearby areas in which habitat alteration associated with harvest and road construction can reasonably be expected to occur. The temporal context for direct effects is immediately or shortly after an action is made that may impact rare and sensitive plants. Indirect and cumulative effects may be measured in years, since it may take a long time-period before deleterious effects are evident in relation to sensitive plant numbers or populations.

Affected Environment

Sensitive and rare plant habitats present in the Saddle Lakes project area are diverse, from beach forest to alpine. Terrestrial habitats are characterized by the abundance and movement of water. Well-drained site conditions support productive forest habitats, while poorly-drained site conditions support wetlands and unproductive forests (Schoen and Dovichin 2007, USDA 2008c). Surface and subsurface water within the terrestrial habitats is influenced by geomorphology, geology, soil drainage, hydrology and climate (USDA 2001).

The project area lies within the maritime climatic zone. The average rainfall for the Ketchikan area is 150 inches per year. During the winter, higher elevations receive snow. Wind is the dominant natural disturbance regime, causing natural openings in the forest structure (Schoen and Dovichin 2007). Avalanche and landslides are also common natural disturbance factors.

No federally listed threatened or endangered plants are known or suspected to occur on the Tongass National Forest. Therefore, effects on federally listed plants is not discussed in this section.

Sensitive Plants

Sensitive plants are those plant species identified by the Regional Forester for which population viability is a concern, as evidenced by: a) Significant current or predicted downward trends in population numbers or density, and b) Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (USDA 2005). Seventeen vascular plants and one lichen are designated as sensitive in the Alaska Region (Table 101). Sensitive plants and their habitats known or suspected to occur on the Ketchikan-Misty Fiords Ranger District are delineated by bold text in table cells. The rationale for analyzing or not analyzing these plants further is also provided in Table 101.

Table 101. U. S. Forest Service, Alaska Region (R10) sensitive plants

Common Name	Scientific Name	Occurrence	Rationale for Analyzing/Not Analyzing Further
Eschscholtz's little nightmare	*Aphragmus eschscholtzianus*	S	Plants and their habitats are not known or suspected to occur on the Ketchikan-Misty Fiords Ranger District.
Moosewort fern	*Botrychium tunux*	Y	Plants and their habitats are not known or suspected to occur on the Ketchikan-Misty Fiords Ranger District.
Spatulate moonwort fern	***Botrychium spathulatum***	**Y**	**Suspected: Sandy beach habitat not occurring in the project area. Dropped from analysis.**
Moonwort, no common name	*Botrychium yaaxudakeit*	Y	Plants and their habitats are not known or suspected to occur on the Ketchikan-Misty Fiords Ranger District.
Edible thistle	***Cirsium edule var. macounii***	**Y**	**Known: Preferred habitat not occurring in the project area where timber harvest activities are proposed. Dropped from analysis.**
Sessileleaf scurvygrass	*Cochlearia sessilifolia*	N	Plants and their habitats are not known or suspected to occur on the Ketchikan-Misty

Common Name	Scientific Name	Occurrence	Rationale for Analyzing/Not Analyzing Further
			Fiords Ranger District.
Spotted lady's slipper	*Cypripedium guttatum*	N	Plants and their habitats are not known or suspected to occur on the Ketchikan-Misty Fiords Ranger District.
Mountain lady's slipper	***Cypripedium montanum***	**Y**	**Suspected: Some habitat for this plant occurs in the project area and includes open forests and wet meadows.**
Large yellow lady's slipper	***Cypripedium parviflorum var. pubescens***	**Y**	**Suspected: Some habitat for this plant occurs in the project area and includes bogs and wet meadows.**
Calder's loveage	***Ligusticum calderi***	**Y**	**Suspected: Proposed harvest activities would not occur on calcareous substrates in subalpine meadows. Dropped from analysis.**
Pale poppy	*Papaver alboroseum*	S	Plants and their habitats are not known or suspected to occur on the Ketchikan-Misty Fiords Ranger District.
Alaska rein orchid	***Piperia unalascensis***	**Y**	**Suspected: Some habitat for this plant occurs in the project area and includes dry open sites, under tall shrubs in riparian zones, mesic meadows, and drier areas in coniferous and mixed evergreen forests from low elevation to subalpine.**
Lesser round-leaved orchid	***Platanthera orbiculata***	**Y**	**Known: There are two known locations of this orchid in the project area in forested habitats where timber harvest activities are planned.**
Kruckeberg's swordfern	***Polystichum kruckebergii***	**Y**	**Known: Preferred habitat not occurring in project area where timber harvest activities are proposed. Dropped from analysis.**
Unalaska mist-maid	***Romanzoffia unalaschcensis***	**Y**	**Suspected: Some habitat for this plant in the project area includes gravelly areas along streams, and on ledges and crevices in rock outcrops.**
Henderson's checkermallow	***Sidalcea hendersonii***	**Y**	**Suspected: Habitat does not occur within the footprint of the proposed road building and timber harvest activities.**
Dune tansy	*Tanacetum bipinnatum subsp. huronense*	Y	Plants and their habitats are not known or suspected to occur on the Ketchikan-Misty Fiords Ranger District.
Lichen, no common name	***Lobaria amplissima***	**Y**	**Known: Habitat is scarcely present in Carroll Inlet as the beaches on the Saddle Lakes side are not exposed to open ocean; habitat is not preferable because most of the beaches in the project area have been logged and contain young growth forests less than 50 years; and ho timber harvest activities are proposed in beach buffer. Dropped from analysis.**

Source: USDA 2009

Notes: Occurrence - S = suspected, Y = known, N= no.

The following sensitive plants are known or suspected in the project area. Please refer to the Plant Biological Evaluation (Dillman 2013) for detailed description of each species known range and other information relative to their rarity:

Mountain Lady Slipper Orchid

The ANHP ranks the mountain lady's slipper orchid as G4S1 (apparently secure globally and critically imperiled in Alaska). On National Forest System (NFS) lands the plant is known from three locations: the Stikine River near the mouth of Clearwater River (Kikahe River), Etolin Island, and upper Lynn Canal near the mouth of Endicott River. Habitat for this plant in the project area includes open forests and wet meadows.

Large Yellow Lady's Slipper Orchid

The large yellow lady's slipper orchid is ranked as G5S1 (secure globally and critically imperiled in Alaska). *Cypripedium parviflorum* Salisb. is comprised of three varieties (Sheviak 2002) var. *parviflorum*, var. *makasin* (Farw.) Sheviak and var. *pubescens*. It is known from two populations on northern Prince of Wales Island, where it is growing in peatlands. Habitat for this plant in the project area includes bogs and wet meadows.

Alaska Rein Orchid

The ANHP ranks the Alaska rein orchid as G5S3 (secure globally; and rare/uncommon within Alaska). On the Tongass National Forest it is known from Duke Island (on ultramafic rocks), Doolth Mountain on Chichagof Island, Gravina Island, Red Bluff Bay on Baranof Island, and Rio Roberts on Prince of Wales Island. Habitat for this plant in the project area includes dry open sites, under tall shrubs in riparian zones, mesic meadows, and drier areas in coniferous and mixed evergreen forests from low elevation to subalpine.

Lesser Round-Leaf Orchid

The ANHP ranks the lesser round-leaved orchid as G5S3S4 (secure globally; and rare to uncommon). On Revillagigedo Island, the orchid is known from 71 populations on the project area and 291 populations across the Forest. The most common habitat for the orchid that also occurs in the project area includes low elevation forested wetlands, medium to high volume old growth hemlock forests with slopes between 15 and 75 percent and high bryophyte cover (Dillman 2008). The orchid is also found in redcedar dominated forests with low forb cover as well as forest edges and gaps in otherwise shady forests, which also occur in the project area. There are two known populations of this orchid in the project area in forested habitats with redcedar component where timber harvest activities are planned.

Unalaska Mist-Maiden

The ANHP ranks the Unalaska mist-maiden as G3S3S4 (rare or uncommon globally, and rare or uncommon in Alaska. It is known from one location on the Tongass National Forest, Bald Mountain on Heceta Island. Two other plants are documented from Southeastern Alaska, one from the Grindle Hills near Bering Glacier, and the other was collected near Sitka. The Sitka population has not been relocated, and was apparently destroyed in connection with road building. Habitat for this plant in the project area includes gravelly areas along streams, and on ledges and crevices in rock outcrops.

Rare Plants

Plants are designated as rare on the Tongass National Forest for several reasons. These plant species are very uncommon, and some may have conservation concerns but have not been designated by the Regional Forester as sensitive plants. No rare plant populations with an S1 or S2 ranking were found in the project area. See Botany Resource Report for this project for more information (Dillman 2013a).

Environmental Consequences

The direct, indirect, and cumulative effects of the proposed Saddle Lakes Timber Sale are used to determine the risk of the project on sensitive species that may potentially be affected. This is conducted through a risk assessment, included in the Biological Evaluation for Plants (Dillman 2013b).

Direct/Indirect Effects

Direct effects are those effects that would occur immediately or soon after the implementation of the action. Direct effects to sensitive and rare plants due to project activities include:

Physical Damage: Plants may be destroyed or damaged through crushing by logging equipment and activities associated with tree felling and yarding. Road building would completely bury or remove plants or entire populations if they were located within the road prism, and could also damage plants or populations of plants located along the perimeter of the road embankment (road right-of-way). Individual tree species would be harvested and removed from the forest. Other trees may be knocked over or broken off due to logging practices.

Indirect effects are those effects that may occur at a later point in time, perhaps after the project has been implemented. Indirect effects to sensitive and rare plants due to project activities may include the following:

Hydrology: Road building can alter the hydrology, as surface and ground water may be redirected and channelized by roadside ditches, altering the hydrologic regime. Increased water levels may result in the death or decline in vigor of plants not adapted to a high water table. Conversely, plants adapted to wetland conditions may become desiccated by a decrease in water availability. Best Management Practices (BMPs) would be implemented that limit alterations to hydrology (see Aquatics section).

Light Levels: Partial or complete removal of the tree canopy results in an increase in the light levels in the understory, potentially resulting in light levels beyond the tolerance for shade dependent species. Once the stand regenerates, light levels would decrease with increasing canopy cover due to high density of small conifers. This too may alter normal light requirements for many species, including sensitive and rare plants.

Effects Common to All Alternatives

Individuals of Mountain lady’s slipper, Large yellow lady’s slipper, Alaska rein orchid, and Unalaska mist-maiden were not found in the project area. No other rare plants with an S1 or S2 rating were found in the project area. Therefore, no direct impacts to these sensitive or rare plants are anticipated under any of the alternatives. Under all Alternatives, undocumented individuals of Mountain lady’s slipper, Large yellow lady’s slipper orchid, Alaska rein orchid and Unalaska mist-maiden or other rare plants could be indirectly impacted through light level changes and changes in hydrology if individuals exist in the project area. However, habitats associated with these plants are scarce in the project area overall and those present are not associated with proposed disturbance areas (harvest units and roads).

No effects are anticipated to the botany resource as a result of implementing the fish passage barrier modification and Shelter Cove LTF reconstruction.

Alternative 1

For all the assessed species, Alternative 1, the No-Action Alternative would not result in direct or indirect effects on sensitive or rare plant populations or their habitats.

Alternative 2

Alternative 2 has the potential to directly impact one population consisting of one individual of Lesser round leaf orchid in Unit 67 without design features. Changes in light levels and hydrology due to timber harvest may indirectly impact the one known individual of the Lesser round leaf orchid in Unit 67

Alternative 3

Alternative 3 may directly impact approximately 41 individuals (or 2 populations) of Lesser round leaf orchid in Units 111 and 67. Lesser round leaf orchid may be indirectly impacted through light levels changes and hydrology

Alternative 4

Alternative 4 may directly impact one population of one individual of Lesser round leaf orchid in Unit 67. One individual of Lesser round leaf orchid may be indirectly impacted through light levels and hydrology changes

Alternative 5

Alternative 5 may directly impact one individual of Lesser round leaf orchid in Unit 67, and roughly 40 plants in Units 111, 311 and 307, or 2 populations. Lesser round leaf orchid may be indirectly impacted by Alternative 5 through light levels and hydrology changes

Alternative 6

Alternative 6 could directly impact one individual of Lesser round leaf orchid in Unit 67, or 1 population. This individual of Lesser round leaf orchid could be indirectly impacted through changes in light levels and hydrology

Cumulative Effects

The spatial context for cumulative effects of project activities is Revillagigedo Island. Past, present and reasonably foreseeable future actions on Revillagigedo Island that may have impacted or have the potential to impact individuals, populations, and the reproductive and dispersal capabilities of sensitive or rare plants or their habitats have been considered in the cumulative effects analysis. Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the cumulative effects analysis. Cumulative effects to sensitive and rare plants due to project activities may include the following: road construction, road storage or decommissioning, gravel extraction, timber harvest, subsistence use, the proposed Alaska Mental Health Trust land exchange, and recreation.

Individually these effects may be minor, but together can result in incremental effects over time. The effects of past Forest Service actions in areas where known sensitive and rare plants occur were analyzed through the NEPA process for each past project. None of the past Forest Service projects on Revillagigedo Island threatened to impact the viability of known sensitive or rare plants to become listed as threatened or endangered.

However, the impacts to sensitive and rare plant habitat cannot be avoided as the nature of most proposed actions contain ground disturbing actions. Since most ground disturbing actions predominantly occur in old growth habitat, the Forest Service acknowledges the importance of this habitat through a network of old growth reserves within the cumulative effects area. Other non-forest habitat types that may be associated with potential sensitive or rare plant habitat, while present in the cumulative effects analysis area, have minimal disturbance associated with them and are therefore of lesser concern than the old growth habitat.

The following section describes the cumulative effects to plant resources by Alternative. For each action alternative, the cumulative effects are similar in that past surveys on Revillagigedo Island have documented the Lesser round-leaf orchid in 71 populations, with a total of 435 individuals. All of the locations with more than one individual have recommendations to be protected or avoided during management activities to the extent feasible. If any of the populations are associated with future Forest Service projects, they would have botanical surveys conducted and project design features or mitigation measures recommended to help protect this orchid. With current design features in place to help mitigate impacts, all Action Alternatives would not cumulatively affect the viability of this species in the project area.

There are no known individuals of Mountain lady's slipper orchid, large yellow lady's slipper orchid, Alaska rein orchid and Unalaska mist-maiden on Revillagigedo Island. Some small areas of habitat may be impacted in any action Alternative but those impacts would not cumulatively affect these species.

The determination for Lesser round leaf orchid under all action Alternatives is that this project may adversely impact individuals, but is not likely to result in a loss of viability in the project area nor cause a trend toward federal listing. The determination for Mountain lady's slipper orchid, Large yellow lady's slipper orchid, Alaska reins orchid, and Unalaska mist-maiden is no impact for all action alternatives. See the project Biological Evaluation for Plants (Dillman 2013b) in the Saddle Lakes project record for further information.

Alternative 1

Since no direct or indirect effects would occur under Alternative 1, there would be no cumulative effects. Past timber harvest, road construction, and other activities have resulted in some impacts to the habitats of these assessed species. In all cases, none of these actions have threatened sensitive plant species viability, or the viability of known rare plants.

Alternative 2

One individual of Lesser round leaf orchid was found in this alternative. This individual equates to less than 1% of the known individuals or populations of this plant in the cumulative effects area of Revillagigedo Island. The possible negative effects to this plant as a result of project activities would not affect the viability of this species in the cumulative effects area. With design features in place to help mitigate impacts to known sensitive plants, Alternative 2 would not cumulatively affect the viability of this species.

Alternative 3

The two known populations of Lesser round leaf orchid have very few individuals. One location has one plant and the other population contains approximately 40 individuals. This amounts to less than 5% of the known individuals and populations possibly impacted in the Cumulative effects area. The possible negative effects to these plants as a result of project activities would not affect the viability of this species in the cumulative effects area. With design features in place to help mitigate impacts to known sensitive plants, Alternative 3 would not cumulatively affect the viability of this species.

Alternative 4

There was one individual of Lesser round leaf orchid under this Alternative. This individual equates to less than 1% of the known individuals or populations of this plant in the cumulative effects area of Revillagigedo Island. The possible negative effects to this one individual as a result of project activities would not affect the viability of this species in the cumulative effects area. With design features in place to help mitigate impacts to known sensitive plants, Alternative 4 would not cumulatively affect the viability of this species.

Alternative 5

There are two known populations of Lesser round leaf orchid under this alternative. One population has one individual and the other consists of about 40 individuals that could be affected. This amounts to less than 5% of the known individuals and populations possibly impacted in the Cumulative effects area. The possible negative effects to these plants as a result of project activities would not affect the viability of this species in the cumulative effects area. With design features in place to help mitigate impacts to known sensitive plants, Alternative 5 would not cumulatively affect the viability of this species.

Alternative 6

One population of Lesser round leaf orchid in the project area for Alternative 6 contains one plant. This individual equates to less than 1% of the known individuals or populations of this plant in the cumulative effects area of Revillagigedo Island. The possible negative effects to this one individual as a result of project activities would not affect the viability of this species in the cumulative effects area. With design features in place to help mitigate impacts to known sensitive plants, Alternative 6 would not cumulatively affect the viability of this species.

Design Features and Mitigation Measures

To maintain known sensitive plants in the project area, viable populations would be flagged and avoidance measures implemented such as direct felling and yarding in accordance with Forest-wide Standards and Guidelines for sensitive plants (USDA 2008b).

If any previously undiscovered sensitive plants are encountered at any time prior to or during implementation of this project, protect the population and avoid any disturbance in the area containing the population (and similar habitats in that vicinity). The District or Forest botanist or ecologist should be notified immediately to evaluate the population and recommend avoidance or mitigation measures.

Silviculture

This section discusses the rationale used in selecting silvicultural prescriptions for harvest units analyzed in the proposed Saddle Lakes Timber Sale project. The timber sale project proposes timber harvest resulting in a change of vegetation in portions of the project area. Proposed harvest units can be described as Productive Old-Growth (POG) stands where tree growth is generally offset by decay resulting in decadent stands of timber. Vegetation modification may include changes to forest structure, species composition, and stand health and stability. Changes in vegetation are determined by a prescribed silvicultural system that meets project goals and objectives while staying within Forest Plan Standards and Guidelines.

Units of Measure:

The following units of measure were used to evaluate effects of the proposed action and compare Alternatives:

- Changes to forest stand structure over time;
- Changes in forest health and productivity;
- Changes in regeneration and species composition of each individual stand; and
- Windthrow hazard and the effects of windthrow.

Methodology

The area covered by this analysis is the Saddle Lakes Timber Sale project area. Information was obtained from the GIS data library, aerial photos, and the Forest Service Activity Tracking System (FACTS).

Inventory data of the project area was collected during the 2008, and 2011through 2013 field seasons using a combination of walk through stand exams and sample plots (using the Common Stand Exam protocol in a grid system of one plot per ten acres). The data was summarized using the Natural Resource Information System (NRIS): Field Sampled Vegetation program. This information is available from KMRD district files.

The information gathered by this inventory was used to determine the following stand characteristics, which contributed to the development of a site-specific Silvicultural Diagnosis for each harvest unit. Observations include stand development stage; stand structure; windthrow potential; and disease and decay severity. Logging system feasibility for each harvest unit was also confirmed during field visits.

Even-aged and uneven-aged silvicultural systems are prescribed for proposed harvest units within the Saddle Lakes project area, and were developed with guidance by a certified silviculturist to meet the objectives identified by the Planning Interdisciplinary Team (IDT). The following criteria were used to select the appropriate silvicultural system for each harvest unit:

- Desired condition, as determined by the Forest Plan;
- Forest Plan Standards and Guidelines;
- Operational feasibility (logging systems);
- Economics;
- Stand conditions (diseases and decay fungi);

- Windthrow hazard (the presence of tree and stand attributes determining windthrow potential); and
- Species composition of regeneration.

Incomplete and Unavailable Information

Please refer to this discussion under Issue 2. Timber Availability on page 73.

Analysis Area

National Forest Service (NFS) lands are classified by vegetative cover, soil type, and administratively designated land use. This classification scheme is intended to show the amount of land that is covered by forested vegetation, with further divisions to show the amount of that land that is capable of, and available for, timber production (Figure 19). The Saddle Lakes project area is 38,459 acres and is used as the analysis area for this project. The project area is made up of NFS land (34,898 acres) and Non-NFS land (3,557 acres).

Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the silviculture cumulative effects analysis

Forest Land

About 93 percent (32,619 acres) of the NFS land in the Saddle Lakes project area is classified as forest land. Forest land has at least 10 percent of the area occupied by forest trees of any size, or formerly had such a tree cover and is not currently developed for non-forest use.

Non-Forest Land

About 7 percent (2,279 acres) of the NFS land in the Saddle Lakes project area is classified as non-forest. Non-forest land is defined as having fewer than ten percent of the area occupied by forest trees of any size, or formerly had such a tree cover and is now developed for non-forest use.

Productive Forest Land

About 59 percent (20,635 acres) of the NFS land in the Saddle Lakes project area (63 percent of the project area’s forest land) is classified as productive forest land. These lands have timber volumes of greater than or equal to 8,000 board feet per acre, or have the potential to achieve this volume and are capable of maintaining that volume. This land is capable of producing 20 cubic feet/acre/year of industrial wood per year. Productive forest land includes young-growth stands that have regenerated with conifer species after natural or human disturbance. Productive forest land does not necessarily mean that the stand is within the timber base that is available for commercial timber harvest.

Non-Productive Forest Land

About 34 percent (11,984 acres) of the NFS land in the Saddle Lakes project area (37 percent of the project area’s forest land) is classified as non-productive forest land. These lands are forest lands that do not support enough timber volume to meet the criteria for productive forest land.

Suitable and Available Forest Land

About 28 percent (9,784 acres) of the NFS land in the Saddle Lakes project area (47 percent of the productive forest land in the project area) is classified as suitable and available forest land. These lands include areas physically suitable for timber harvest, can be adequately restocked in five years, and have been identified in the Forest Plan as within a LUD that is available for timber production.

Some land was removed from the suitable timber base due to Forest Plan Standards and Guidelines within those areas.

Unsuitable and Unavailable Forest Land

About 31 percent (10,851 acres) of the NFS land in the Saddle Lakes project area (53 percent of the productive forest land in the project area) is classified as unsuitable and unavailable forest land. These lands have resource concerns or are in LUDs that preclude timber harvest. Unsuitable and unavailable lands include areas within riparian, beach, and estuary buffers, land on slopes greater than 72 percent that have unstable soils (harvest is allowed on slopes exceeding 72 percent, but requires an onsite slope stability analysis to determine suitability), and other lands currently withdrawn from timber production by the Forest Plan or IRAs.

Volume Strata

Volume strata was determined by using the GIS volume class layer and combining it with GIS soils and aspect information. The gross board foot volume of live trees per acre (MBF per acre) by volume strata was determined by the re-aggregation of stand exam plot data by volume strata (Table 102). Seven stand types have been defined and delineated. The seven stand types can be stratified into high, medium, and low volume strata, which are defined below:

High Volume Strata: Areas within timber inventory volume classes 5, 6, and 7 that are on non-hydric soils and have a north or south aspect.

Medium Volume Strata: Areas within timber inventory volume class 5 located on hydric soils or areas within timber inventory Volume class 4 located on non-hydric soils.

Low Volume Strata: Areas within timber inventory volume class 4 located on hydric soils.

Table 102. Gross volume/acre by volume strata in the Saddle Lakes Timber Sale project area

Volume Strata	Gross Average Volume/Acre (MBF/acre)[1/]	Suitable/Available Forest Land Acres[2/]
Low	21.2	1,150
Medium	24.9	2,553
High	32.2	2,334
Total	**27.12**	**6,037**

Source: USFS Tongass National Forest GIS.

1/ Gross average volume/acre for live trees based on re-aggregated Common Stand Exam plot data.

2/ This is a weighted average based on the Suitable/Available Forest Land project area acres.

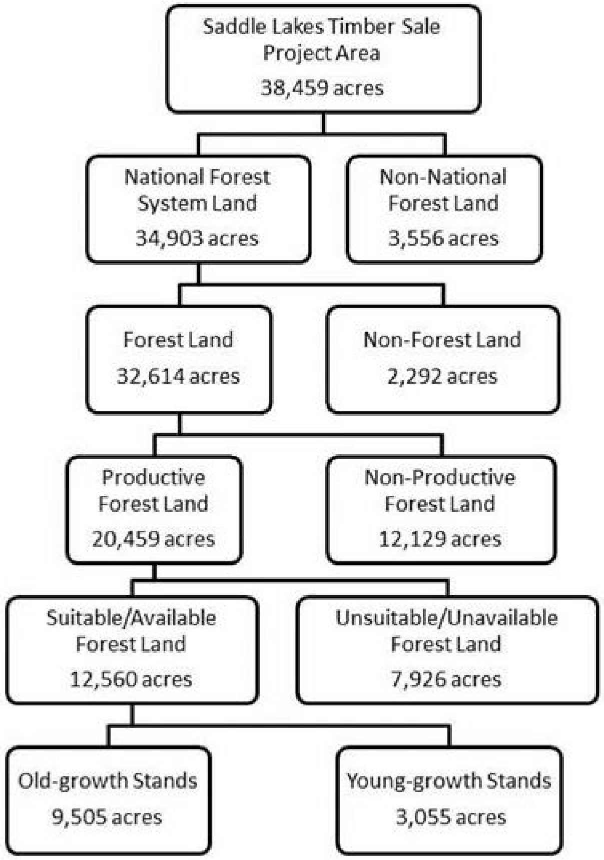


Figure 19. Land classifications and acreages in the Saddle Lakes Timber Sale

Affected Environment

Project Area Vegetation Description

The Saddle Lakes project area is a mosaic of coniferous forests in managed and unmanaged conditions, interspersed with muskeg, scrubland, and alpine plant communities. The forests are primarily dominated by western hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*) stands, and scattered stands of Alaska yellow-cedar (*Callitropsis nootkatensis*) and western redcedar (*Thuja plicata*). Pacific silver fir (*Abies amabilis*) is also found scattered in the project area as a minor stand component. Higher percentages of Sitka spruce are found along streams and other well-drained sites. The understory shrubs are primarily blueberry (*Vaccinium spp*.), red huckleberry (*Vaccinium parvifolium*), and rusty menziesia (*Menziesia ferruginea*). Many species of vascular plants, lichens, and mosses occur throughout all habitat types. Forested muskeg with a high percentage of Alaska yellow-cedar occurs throughout the project area, especially in the lower elevations. Muskeg areas also support shore pine (*Pinus contorta* var. *contorta*) and mountain hemlock (*Tsuga mertensiana*). Red alder (*Alnus rubra*) is found on disturbed sites such as roadsides, landslides, managed stands, and along stream banks.

Stand Structure

All of the stands proposed for timber harvest in the proposed Saddle Lakes project have an old-growth structure, and have not had any previous commercial harvesting activities. Old-growth stand structure varies depending on habitat type, but generally contains large trees over 100 years in age, multi-layered canopies, and moderate shrub understory.

Species Composition

Plant associations are a type of vegetation classification system based on the climax plant community. Stands within a specified plant association are comprised of vegetation with similar species composition and abundance. Plant associations can be used to predict site response to changes caused by management practices.

The species composition of the unit pool proposed for harvest based on stand exam plots and walk-through exam data is: western hemlock 44 percent; western redcedar 26 percent; Alaska yellow-cedar 15 percent; Sitka spruce 11 percent; and mountain hemlock 3 percent. These percentages are based on the percent of gross board foot volume (mbf) of live trees in the original Logging System Transportation Analysis (LSTA). Pacific silver fir, red alder, and shore pine comprise about 1 percent of the total gross volume.

Forest Health and Natural Disturbance Issues

Forest health and natural disturbance issues in the Saddle Lakes Timber Sale project area include hemlock dwarf mistletoe infestations, decay-causing fungi, windthrow potential, and Alaska yellow-cedar decline. The Silviculture Resource Report discusses the presence and severity rating of these forest damaging agents in each of the proposed harvest units (Bramstadt 2013). A generalized discussion of each of these forest damaging agents is presented below.

Hemlock Dwarf Mistletoe

Hemlock dwarf mistletoe (*Arceuthobium tsugense*) is widespread throughout the western hemlock dominated old-growth forests of Southeast Alaska, including the Saddle Lakes project area. This parasitic plant is also “the leading cause of disease of western hemlock in unmanaged old-growth stands in Southeast Alaska” (Mulvey and Lamb 2012, pg. 37). It reduces the vigor and growth rate of hemlock trees and often produces a low quality of timber. Cankerous swellings often occur at the point of infection on limbs and main stems.

Stands which are partially harvested by uneven-aged management may have some residual infested trees. Managers should recognize the potential reduction in timber volume and value from hemlock dwarf mistletoe under uneven-aged management scenarios. In some situations, the Saddle Lakes Project proposes to partially harvest stands with high mistletoe ratings in order to mitigate the effects of clearcut harvest on wildlife and scenery resources. Complete harvesting is an effective method of controlling hemlock dwarf mistletoe, as reduction or eradication of the disease is consistent with management objectives (Hennon et al. 2001, pg. 7).

Hemlock dwarf mistletoe infestation was found in most of the proposed harvest units in the Saddle Lakes project area. About 22 units had no mistletoe infestation observed, 69 units had a low severity rating, 37 units had a moderate severity rating, and 35 units had a high severity rating. Hemlock trees in units were rated using the 6-class dwarf mistletoe rating system developed by Frank Hawksworth (Hawksworth and Wiens 1996, pg. 124).

Decay Fungi

Approximately one-third of the old-growth timber volume is defective in Southeast Alaskan old-growth stands (Mulvey and Lamb 2012, pg. 36). While heart rot causes considerable damage in all southeast Alaskan conifer species, it is most common in western hemlock, mountain hemlock, and Sitka spruce.

Decay centered in the boles of trees can weaken the support structures, thereby leading to breakage. As the broken portion of the tree falls to the forest floor, it may wound adjacent trees and lead to eventual infection of the damaged trees. This is a continual process in old-growth forests in Southeast Alaska and contributes to the diversity of the stand structure. This process decreases the health and windfirmness of the stand, leading to decreased ability to provide a future timber supply and therefore reducing the stand's ability to reach its desired condition. The merchantable timber volume increase resulting in tree growth in most old-growth units in the Saddle Lakes Project is predicted to currently being either offset or exceeded by decay

Decay-causing fungi are present in all of the stands within the Saddle Lakes project area. Harvest units in the project area were rated high, moderate, or low for decay fungi presence. There are 10 units in the proposed unit pool that were rated high for the occurrence of decay fungi, 95 units were rated moderate, and 53 units were rated low. A high rating was given when it appeared that the average defect per tree exceeded 30 percent of the gross volume. A moderate rating was given when it appeared that the average defect per tree was between 20 to 30 percent of the gross volume. A low rating was given when the average defect per tree appeared to be less than 20 percent of the gross volume. A low rating was usually only given where a large amount of the trees in the stand are young.

Wind Disturbance

Wind is the major natural disturbance agent affecting forest dynamics in Southeast Alaska. It recycles forest stands, maintains and renews the forest ecosystem, and provides woody material for wildlife use. Wind also affects stand structure and development, causes the mixing of soil by uprooting trees, and exposes bare mineral soil, which is the preferred seedbed for Sitka spruce and cedars (Harris 1989, pg. 13-14).

Windthrow, or the act of trees being uprooted by the wind, plays an important role in the stand development of Southeast Alaskan forests. The creation of canopy gaps by the loss of individual trees or groups of trees allows more available light to reach the forest floor. This allows for understory shrub species and less shade tolerant conifers (such as Sitka spruce and cedars) to become established in a stand. Winds can break off portions of trees, thereby wounding nearby trees and allowing for their infection by decay fungi.

The severity and frequency of wind disturbance is determined by many interrelated factors. Existing windthrow in a stand is an important indicator or potential hazard. Individual tree characteristics that aid in evaluating windthrow potential include tree height/diameter ratio, size of crown, rooting depth, degree of exposure, root and stem decay, tree lean, seedbed, and species. Western hemlock, mountain hemlock, and Sitka spruce are generally less windfirm than western redcedar and Alaska yellow-cedar. Stand characteristics that aid in evaluating windthrow potential include stand age, stand height, stand density, species composition, topography and aspect. Areas exposed to southerly storm winds are generally more susceptible to windthrow risk (Harris 1989, pg. 19-27).

Individual tree and entire stand characteristics and the stand's observed windthrow history were used to rate the windthrow hazard potential for each proposed harvest unit in the Saddle Lakes project area. Within the project area 40 units were rated high, 115 units were rated moderate, and 8 units were rated low for windthrow hazard.

Yellow-Cedar Decline

Yellow-cedar decline has resulted in considerable mortality to Alaska yellow-cedar trees in Southeast Alaska since 1900. Mortality can be in small patches or can cover large expansive areas. Affected trees may die quickly (in 2 to 3 years) or slowly (over the course of 15 years or longer), with their crowns progressively thinning. Yellow-cedar decline is characterized by extensive tree deaths occurring in and around open-canopy forests on poorly drained soils. The distribution of yellow-cedar decline suggests climate as a trigger, with the presence of snow as the key environmental factor. Yellow-cedar decline is associated with freezing injury to fine roots that results when early spring snowpacks are not deep enough to insulate and protect the roots from late-season cold events. Where sufficient snow is present in spring, Alaska yellow-cedar tree roots appear to be protected from freezing injury. Thus, weather events in late winter and early spring that result in low snowpack cause injury, and sometimes mortality (Mulvey and Lamb 2012, pg. 45-47).

In terms of ecological effects, yellow-cedar decline has altered stand structure and stand composition. This has led to succession favoring other conifer species, such as western hemlock, mountain hemlock, and (to some extent) western redcedar. Given the extent of yellow-cedar decline and poor regeneration of this tree species, Alaska yellow-cedar populations can be expected to diminish regionally, although extinction is not likely (Mulvey and Lamb. 2012, pg 47-48).

There are about 1,797 acres of yellow-cedar decline mapped in the proposed Saddle Lakes project area, with the majority occurring at elevations below 1,400 feet (Source: GIS Cedar Decline layer). Within the proposed project unit pool 15 units were rated high, 51 units were rated moderate, and 36 units were rated low for yellow-cedar decline, while 56 units had no yellow-cedar decline present. Units were rated based on the percentage of the unit affected by yellow-cedar decline. Units with over 66 percent of the area affected were rated as high, units between 33 to 66 percent affected were rated as moderate, and units with some yellow-cedar decline (less than 33 percent) were rated as low.

Precommercial Thinning

Precommercial thinning (PCT) removes excessive stand stocking through the cutting of less desirable trees, while leaving the most desirable trees in a free-to-grow condition. PCT can be used to achieve various residual stand densities depending on the overall resource objectives. PCT is a treatment which not only redistributes stand growth on selected trees (stems), but also delays canopy closure and extends the time that forage is available for wildlife species (Hanley et al 2013, Cole et al. 2010, Doerr and Sandberb 1986). PCT is a common intermediate silvicultural treatment employed in young-growth stands on the Tongass National Forest. Current PCT activities across Revillagigedo Island are favoring the retention of Alaska yellow-cedar. This is expected to maintain and/or increase the amount of yellow-cedar in future stands.

The first PCT program for young-growth stands in the Saddle Lakes project area was completed in 1990. A total of 1,094 acres of young-growth stands have been thinned between 1990 and 2012.

Environmental Consequences

Actions Common to all Alternatives

The Forest Service proposes to grant a Right-of-Way (ROW) to the State of Alaska to provide for future road construction as part of the Ketchikan to Shelter Cove Road. The proposed Ketchikan to Shelter Cove Road (ROW Corridor) is about 1 mile long and 300-feet wide. The exact location/alignment of the future State of Alaska road construction is unknown at this time, but would be along a 66-foot wide by about 1 mile long ROW inside the Ketchikan to Shelter Cove Road (ROW Corridor). The future road would provide additional access to existing and new road systems on Revillagigedo Island. The Forest Service is reviewing the ROW grant application from the State of Alaska now. Future road construction within the ROW would be consistent with Forest Plan Standards and Guidelines and BMPs. The timing of the ROW grant is unknown at this time.

The construction of the Ketchikan to Shelter Cove Road would have a minimal impact to forest vegetation due to the small footprint of the proposed action. The majority of the ROW affects small portions of old-growth vegetation, but a small portion of young-growth would be affected along the northern portion. There is an increased potential for future damages from wind in areas affected by road construction, however past experience has shown that this increase would be minimal and not extend beyond the ROW corridor. There are many advantages to having this road connection built as ease of access to the Shelter Cove area would help facilitate and lower costs for future vegetation management projects such as forest stand improvement, watershed improvement, and wildlife habitat improvement.

Desired Condition

The desired future condition for stands within the Saddle Lakes Timber Sale project area is determined by the LUDs established by the Forest Plan, and to some degree by the proposed Saddle Lakes Timber Sale project's goals and objectives. The goals and objectives of the LUDs in the Saddle Lakes project area are presented in Chapter 1 of this document (pgs. 1-10 to 1-12). Also, see Figure 3 in Chapter 1.

Vegetation Management/Silvicultural Systems

Silvicultural systems are used to manage, harvest, and re-establish stands of forest trees for the purpose of meeting pre-determined objectives. Silvicultural systems have been developed to increase commercially valuable timber more rapidly, maintain wildlife habitat, and either maintain or enhance scenery values. No single silvicultural system for a forest stand can be used to achieve all the desired combinations of amenities and products. Instead, a variety of treatments applied over an area results in a mosaic of stands for different uses. Existing stands are altered by proposed management actions through timber harvest and/or other treatments, such as thinning or pruning.

The Forest Plan Standards and Guidelines and USDA FSM 2400 (Timber Management) provide detailed information about the silvicultural systems recommended for the Tongass National Forest. Even-aged management results in the conversion of mature stands to faster growing stands of a single age. Uneven-aged management results in a stand of younger trees interspersed with older trees distributed either in clumps or more evenly across the stand. The post-harvest conditions of the forest stand for all systems are dependent upon the existing plant community, the retained canopy structure, and advanced regeneration. Species composition is monitored to ensure that the mix of species is roughly the same as expected on the existing site.

The Saddle Lakes Project uses two silvicultural systems, even-aged and uneven-aged to meet site-specific objectives of the Saddle Lakes project area. The silvicultural systems chosen are based upon LUD direction and desired conditions, Forest Plan Standards and Guidelines, and stand conditions. The site-specific objectives include:

- Retention of old-growth characteristics to maintain biodiversity;
- Favorable timber sale economics and logging feasibility;
- Protection of soil, watershed, wildlife habitat, and scenery characteristics of the project area;
- Regeneration of decadent, defective, and damaged stands to establish a vigorous new cohort for future timber production; and
- Maximized wood-fiber production for future human use.

A complete silvicultural prescription for the entire length of the rotation would be written for each stand selected for harvest. These prescriptions provide guidance for treatments following the proposed timber harvest for this project, and may including subsequent entries, thinning, and pruning.

Silvicultural prescriptions sometimes vary by alternative in order to address the different management objectives being analyzed in the range of alternatives. These differences in alternatives are driven by issues identified during the scoping process for this project. For example, a harvest unit may be planned for even-aged management under an alternative emphasizing the maximum timber harvest from the project area. Under an alternative using helicopter yarding methods to minimize road impacts and retain forest structure in alternatives emphasizing wildlife or scenery issues, a harvest unit may be planned for uneven-aged management. In most cases, the silvicultural prescription for a treatment area remains the same between the different alternatives. Table 103 shows acres by silvicultural system and the regeneration method for each alternative.

Table 103. Acres of silvicultural system and prescription by alternative for the Saddle Lakes Timber Sale unit pool

<table>
<tr><th rowspan="2">Silvicultural System</th><th rowspan="2">Silvicultural Prescription</th><th rowspan="2">Logging system</th><th colspan="6">Alternative (in acres)</th></tr>
<tr><th>Alt. 1</th><th>Alt. 2</th><th>Alt. 3</th><th>Alt. 4</th><th>Alt. 5</th><th>Alt. 6</th></tr>
<tr><td rowspan="3">Even-aged Management</td><td rowspan="2">Clearcutting</td><td>Cable/Shovel</td><td>0</td><td>1,055</td><td>816</td><td>1,882</td><td>2,150</td><td>1,654</td></tr>
<tr><td>Helicopter</td><td>0</td><td>0</td><td>0</td><td>190</td><td>443</td><td>0</td></tr>
<tr><td colspan="2">Even-aged Total</td><td>0</td><td>1,055</td><td>816</td><td>2,072</td><td>2,554</td><td>1,654</td></tr>
<tr><td rowspan="4">Uneven-aged Management</td><td rowspan="3">Single-tree Selection (up to 33% removal)</td><td>Shovel</td><td>0</td><td>52</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Helicopter</td><td>0</td><td>1,100</td><td>196</td><td>307</td><td>275</td><td>494</td></tr>
<tr><td>Cable</td><td>0</td><td>0</td><td>0</td><td>5</td><td>5</td><td>5</td></tr>
<tr><td colspan="2">Uneven-aged Total</td><td>0</td><td>1,152</td><td>196</td><td>312</td><td>280</td><td>499</td></tr>
<tr><td colspan="3">All Prescriptions Total</td><td>0</td><td>2,207</td><td>1,012</td><td>2,384</td><td>2,834</td><td>2,153</td></tr>
</table>

Note: Data obtained from the Ketchikan-Misty Fiords Ranger District GIS library.

Even-aged Silvicultural System (Clearcutting)

The objectives of this system are to create a fast-growing stand of trees to maximize wood-fiber production, and to provide favorable timber sale harvest economics and logging feasibility. Natural regeneration in these stands is expected to be abundant, and would represent the original species composition in a mostly single-aged stand. The even-aged management prescription entails the cutting of all or the majority of the merchantable trees in a stand (clearcutting), leaving less than 10 percent of the original stand's basal area following one harvest entry. It produces a fully exposed microsite for the development of a new age class.

Maintaining a reasonable assurance of windfirmness (RAW or Windfirming) would typically be applied to unit edges or stream and visual buffers determined to be at risk for wind damage after harvest. These would generally be the edges of harvest units or stream buffers that have high exposure to southeast storm winds. Where windfirming is applied would vary depending on the topography and location of the buffer within the unit.

Justification for Clearcutting

Even-aged management (clearcutting) is prescribed in the Saddle Lakes project area to regenerate stands poorly stocked with desirable trees, and are not expected to obtain the desired condition given their current growth trajectory. Even-aged clearcutting would target stands that are mature to over-mature where the current stand growth is being offset or exceeded by decay. Clearcutting would preclude or minimize the risk of windthrow post-harvest, promote natural regeneration by opening up the canopy, minimize logging damage, and minimize tree defect and disease in the future stand to the maximum extent possible. (Forest Plan, page 4-72). Finally, clearcutting maximizes the use of conventional yarding systems (cable and shovel), which maintains the potential for an economic timber sale offering.

Size of Even-aged Openings

National Forest Management Act (NFMA) regulations provide that 100 acres is the maximum size of created openings allowed for the forest types of coastal Alaska, unless specific conditions exist. The Forest Plan defines these conditions (USDA 2008b, TIM5, III.A, pg. 4-72). With Forest Supervisor approval, where it is determined by environmental analysis that exceptions to the size limit are warranted, the actual size of openings may total 150 acres if increased unit sizes produce more desirable benefits (USDA 2008b, TIM5, III.C, pg. 4-72). Leave strips between openings must be of sufficient size and composition to be managed as a separate stand, with a minimum stand mapping size of 10 acres (USDA 2008b, TIM5, III.F, pg. 4-72). Some proposed harvest units lie adjacent to recently created even-aged openings. Previously created openings must be adequately stocked with desirable tree species, which are approximately 5 feet in height, before the area would no longer be considered an opening for the purposes of determining limitations on scheduling, locating, and calculating the size of additional created openings (USDA 2008b, TIM5, III.E, pg. 4-72).

Alternative 5 of the Saddle Lakes Timber Sale project proposes three harvest openings which may exceed 100 acres in size. This is the only Alternative that contains harvest openings greater than 100 acres. All of these openings contain unit designs that best utilize the topography and available logging systems, in order to avoid the isolation of suitable timber and have the greatest impact on forest health (specifically in terms of providing windfirm boundaries and reducing hemlock dwarf mistletoe infestations in nearby young-growth stands). These larger openings also reduce the overall costs of preparation, logging, and administration of harvest activities over unit block designs that would limit opening sizes to 100 acres or less. The unit groups, overall acreages, and applicable opening size mitigations are shown in Table 104 below.

Table 104. Unit group information for each opening over 100 acres in size that is proposed under Alternative 5 of the Saddle Lakes Timber Sale Project

Unit Group	Total Opening Size (acres)
31, 33, 39, 40, 41, 112, 113, 114, 310, 312	135
36, 110, 111, 301, 302, 303, 305, 306, 307, 308, 311	143
46, 74, 115, 146	108

Source: USFS Tongass National Forest GIS.

Uneven-aged Silvicultural System (Single-tree Selection)

Stands are proposed for uneven-aged management depending upon the identified resource concerns for each harvest unit. This system regenerates and maintains a multi-aged structure by removing some trees in various age (size) classes throughout the stands either singly, in small groups, or in strips. The objective of uneven-aged management is to maintain a stand with trees of three or more distinct age (size) classes, either mixed throughout the stand or in small groups. The remaining structure provides wildlife habitat and reduces visual impacts. The next entry into these stands would be in 50 to 100 years, when additional basal area would be removed from each stand in patches or as single trees. The silvicultural prescription chosen to achieve the goals of this system is single-tree selection (STS). This silvicultural system is sometimes referred to as a partial-cut.

Single-tree selection: Stands proposed for these prescriptions would have a minimum of 66 percent of the basal area retained (33 percent removed) following harvest. Trees would be removed individually and/or in small groups of generally two acres or less in size. Trees remaining after harvest would be about the same species mix as the original stand. The objective of this system is to economically harvest a percentage of each stand while retaining timber for future entries that is economically viable and sustainable. These types of prescriptions usually involve more intensive management than even-aged systems. There is no final rotation age associated with this system, as periodic entries are designed to maintain multiple age and diameter classes throughout the stands.

Uneven-aged management would be achieved by leaving 66 percent of a harvest unit's pre-treatment basal area, based on standing live trees left uncut. Healthy, young trees in the intermediate crown class would be a priority for retention to promote economic future entries. Older trees with low timber value, but high wildlife value would also be a priority for retention. The canopy gaps and disturbance created by harvesting the remaining trees would promote new tree regeneration to facilitate future harvest entries, as well as promote the growth of understory plants important for wildlife. A retention level of 66 percent is used in harvest units that were identified as having particular visual and/or wildlife concerns. Future harvest entries would continue the process of developing additional age classes. The next entry would likely occur in 50 years. This would allow the intermediate age class to develop into mature trees and provide for another economical harvest. Small diameter trees would be retained that would have better economic value in the future. The silvicultural prescription would maximize the flexibility of helicopter yarding.

Direct and Indirect Effects

The following section describes the direct and indirect effects to silvicultural resources by alternative:

Alternative 1

Direct Effects

Under Alternative 1, no new timber harvesting would occur. There would be no direct effects to forest structure, forest health and productivity, regeneration and species composition, and windthrow risk from the proposed Saddle Lakes Timber Sale project.

Indirect Effects

Indirect effects to forest structure, forest health and productivity, regeneration and species composition, and windthrow risk would include:

Stand Structure

Old-growth stands in the project area would remain in a predominantly old-growth condition. However, frequent small-scale disturbance events would likely continue in the stands until a large-scale event occurs. At some point in the future it is expected that some stands in the project area would experience larger-scale damage from a severe storm event, leading to the regeneration of these stands. Stand regeneration would likely lead to a two-aged stand condition, or possibly an even-aged stand condition. Forested lands would remain in a relatively similar stand structure condition. No opportunity would exist to modify the stand structure to achieve a more diverse landscape that more closely mimics historical stand structure.

Forest Health and Productivity

Only natural changes in forest health and productivity would occur. It would be expected that forest growth would continue to be offset by decay. Insect and disease processes currently at work would persist at their existing levels but due to the general lack of thrift, the forest remains at risk and vulnerable to insect and disease attack. Hemlock dwarf mistletoe, where present, would remain in the stand and may infect hemlock stems that regenerate in the gaps adjacent to infected overstory trees. This would reduce the vigor and growth rate of hemlock trees, while producing a low quality of timber. There would be no noticeable increase or decrease in the productivity of the land for the production of timber products.

Diseases present in the residual trees would likely infect the new stand to some degree. Where present, hemlock dwarf mistletoe would remain in the stands, and may infect hemlock stems (trees) that regenerate in the gaps adjacent to infested overstory trees.

Regeneration and Species Composition

Openings in the forest canopy would be created by windthrow and trees falling as a result of decay. Hemlock regeneration would have a competitive advantage over other species when small openings in the canopy occurred, further reducing the Alaska yellow-cedar and western redcedar components. Sitka spruce regeneration may have somewhat of a competitive advantage in these stands, due to the resulting soil disturbance and from uprooted trees.

Windthrow Risk

Stands would remain in a predominantly old-growth condition. Small-scale, frequent disturbance events would continue in the stands until a large-scale event occurred. The inherent windthrow risk within stands would not change appreciably.

Alternatives 2, 3, 4, 5, and 6

Direct Effects

Direct effects to forest structure, forest health and productivity, regeneration and species composition, and windthrow risk would include:

Stand Structure

Stand structure would be changed by timber harvesting under all of the action alternatives. The change would vary by alternative, based on the silvicultural prescriptions and the number of acres harvested (see Table 103). Where the prescription is even-aged management, harvest would take place by cable, shovel, and helicopter yarding systems. The direct effects would result in the creation of young-growth stands that have a species composition similar to the former stand, but with a potentially higher component of more shade intolerant species. Even-aged management would primarily lead to stands without any older residual trees present within the harvest unit boundaries.

In harvest units where 66 percent basal area retention is prescribed, the stand structure change post-harvest would be expected to be minor. These stands would remain in the old-growth structural stage after harvest, as well as through to the next harvest entry, if unaffected by a major natural disturbance event.

Forest Health and Productivity

In harvest units where even-aged management is prescribed, the productivity of the land for timber production would be maximized. The risk of insect, disease, and decay outbreaks within the newly established growing timber crop would be minimized. The new trees that regenerate after even-aged treatments would be vigorous and free from decay. The insect and disease processes at work in the stands prior to harvest, including hemlock dwarf mistletoe, would be mostly eliminated.

In harvest units where uneven-aged management is prescribed, forest health concerns could be used as factors to determine which trees to harvest. An attempt would be made to remove the trees that pose the greatest risk to the health of the new stands. However, due to the amount of disease and decay found within old-growth stands proposed for harvest under this system, it is unlikely that all, or even a significant portion, of the trees with disease and decay would be removed. This is because of constraints related to visuals, economics, and windthrow risk.

In harvest units were uneven-aged management is prescribed, either individual trees or small groups of trees would be removed. These stands would retain some old-growth forest characteristics (older trees, wider variation in tree sizes and spacing, decadent timber, and multiple canopy layers). The stands immediate potential to grow commercial timber is expected to be reduced, in proportion to the amount of growing space occupied by remaining old-growth trees.

Regeneration and Species Composition

For harvest units where even-aged management is prescribed, the resulting tree regeneration is expected to be vigorous and representative of the species mixture of the former stands.

Where uneven-aged management is prescribed, growing space would be limited by the retention of overstory trees. Natural regeneration would occur in the stands in satisfactory amounts, but the limited openings in the canopy combined with the low ground disturbance of helicopter yarding would promote hemlock regeneration, and could limit the regeneration of Sitka spruce and cedar trees. To offset this, it would be important to consider retaining smaller diameter, intermediate Sitka spruce and cedar advanced regeneration with good vigor (Deal and Tappeiner 2002, pg. 183-185).

Windthrow Risk

Where even-aged management is prescribed, windthrow risk would be eliminated within the harvest units due to the removal of all large trees. The future young-growth stands created would typically be more windfirm than the old-growth stands they replaced.

However, exposed stand edges would have an increased risk of windthrow in the first few years post-harvest, due to the presence of an adjacent opening. In units where windthrow risk has been determined to be of concern, Reasonable Assurance of Windfirmness (RAW) buffers have been prescribed in order to reduce or minimize the windthrow risk adjacent to unit edges, or along stream buffers that protrude into the harvest openings.

Where uneven-age management is prescribed, the basal area retention requirements were increased to offset the potential for blowdown in high windthrow risk areas. As a result, it is expected that wind risk would remain approximately the same as in the stand prior to harvest. Monitoring results from the Alternatives to Clearcutting Study, five years post-harvest in wind prone areas reveal approximately 5 percent loss of basal area with the 75 percent basal area retention prescription (McClellan, 2007). Based on these results, only minor amounts of windthrow are expected to occur following harvest within proposed uneven-age management units with high windthrow risk.

A mostly unbroken, continuous canopy would remain post-harvest in uneven-aged management units. This would reduce the risk of windthrow along edges and adjacent to stream buffers that protrude into harvest areas. In most cases, this prescription would eliminate the need for additional windfirming treatments in RAW zones.

In all harvest areas, whether even-aged or uneven-aged, Riparian Management Areas (RMAs) that have stream channel stability concerns and potential for windthrow have been identified. The RMAs are reviewed in the field once preliminary unit boundaries are in place. The specific windfirming prescriptions for each RMA would be determined at that time, as well as whether additional windfirming treatments may need to be applied, generally in the form of RAW buffers.

Indirect Effects

Indirect effects to forest structure, forest health and productivity, regeneration and species composition, and windthrow risk would include:

Stand Structure

In harvest units where even-aged management is prescribed (clearcut), new stands would naturally grow through a number of structural changes into the future. This would begin with a stand initiation stage where tree regeneration would first become established and understory plants would flourish. The stand initiation stage would be followed by a period of stem exclusion where inter-tree competition would shade-out the understory. After that, the stands would enter the stage of understory re-initiation, where tree mortality opens-up growing space and an understory, as well as the return of some old-growth characteristics (Oliver and Larson 1996, pg. 142-154). The time that any young-growth stand spends in any given structural stage would be dependent upon the natural growing capacity of the land, and any future treatments that are applied, such as precommercial thinning.

In harvest units where uneven-aged management is prescribed, an overstory of residual trees would remain in the stands. The stand initiation stage would not generally occur under the 66 percent basal area retention prescription, except where group selection resulted in the creation of openings larger than 1 acre. The stem exclusion stage would generally occur at a smaller magnitude than in even-aged stands, except in the larger openings created. After harvest, these stands would continue to develop, and should regain old-growth characteristics quickly if unaffected by a major natural disturbance event.

Forest Health and Productivity

There would be no indirect effects to forest health and productivity for stands prescribed with even-aged management.

For harvest units prescribed with uneven-aged management, there would be a risk of the new stands becoming infested with the same disease and decay agents that were present in the stands prior to harvest (Hennon et al. 2001, pg. 7). This risk would generally be proportional to the amount of basal area retained. Therefore, a higher basal area retention would result in a greater risk of future infection than would a lower basal area retention. Decay organisms would be transferred between trees when decay-ridden trees fall and strike adjacent healthy trees, either during harvest operations or weather events post-harvest. Hemlock dwarf mistletoe would remain in the stands, and likely infest hemlock regeneration even with selection criteria favoring the removal of infested overstory trees first. The larger old trees retained for wildlife would be of low vigor. These trees would not be expected to grow or change in any way as a result of the growing space created by harvest activities. The productivity of these stands would be reduced in proportion to the amount of old trees that remain and occupy growing space.

Regeneration and Species Composition

There would be no indirect effects to regeneration and species composition for stands prescribed with even-aged management.

For harvest units prescribed with uneven-aged management, high basal area retention could increase the abundance of hemlock trees in the stands. These stands could undergo a species conversion to nearly pure hemlock stands.

Windthrow Risk

For harvest units prescribed with even-aged management, current moderate to high windthrow risk areas are expected to have a lower windthrow risk after stand conversion because trees in even-aged stands develop structural resistance to prevailing wind patterns from increased canopy exposure, and contain highly windfirm trees along the edges that buffer the interior portions of the stand from the full force of the wind. The lower windthrow risk in these regenerating stands is expected to last through the next rotation (almost 100 years into the future). In harvest units prescribed with uneven-aged management, windthrow risk is expected to remain about the same as the stand prior to harvest.

Cumulative Effects

The analysis area for cumulative effects is the entire Saddle Lakes project area. Cumulative effects to forest vegetation would result from timber harvest and intermediate silvicultural treatments. Timber harvesting in the Saddle Lakes project area began in 1959 and peaked in the 1990s (see Table 118). The project area has about 5,192 acres of young-growth stands, originating from previous even-aged harvesting. About 1,183 acres of young-growth stands are located on Non-NFS land. Young-growth stands on NFS lands account for 3,747 acres of the suitable and available forest land in the project area, while the remaining 262 acres are unavailable for harvest. Total acreage of young-growth stands on suitable and available lands for future timber harvest in the project area would increase under all action alternatives as shown in Table 105. Acreages would vary based on the silvicultural prescriptions used and the number of acres harvested.

Table 105. Increase in total young-growth stand acreage located on suitable/available forest lands in the Saddle Lakes project area under all alternatives

Alternative	Acreage Converted to Young-growth Stands (acres)[1/]	Resulting Total Young-growth Stand Acreage (acres)[2/]
1	0	3,747
2	1,055	4,802
3	816	4,563
4	2,112	5,859
5	2,594	6,341
6	1,654	5,401

Source: USFS Tongass National Forest GIS.

1/ Acreages converted to young-growth stands are based on total acres prescribed to even-aged management.

2/ Resulting total young-growth stand acreages are based on 3,747 acres of young-growth stands currently located on Suitable/Available Forest Lands in the project area.

Scattered windthrow has occurred throughout the project area along exposed stand boundaries after past harvesting, and due to road construction activities.

All previously harvested stands in the project area, with the exception of units harvested within the last three years, have been certified as regenerated. Regeneration stocking surveys are scheduled to be conducted in 2014 on about 31 acres. These former harvest units are expected to be adequately regenerated and certified at that time.

Between 1990 and 2012, about 1,094 acres of young-growth stands were PCT in the project area to reduce stocking and improve tree growth and vigor. An additional 1,136 acres of young-growth stands are planned for PCT in the project area sometime before 2018, under the 2013 KMRD Timber Stand Improvement Categorical Exclusion (CE).

This project proposes to re-establish a log raft and/or barge staging area on the west side of Carroll Inlet, at the already-existing Shelter Cove LTF. A permit would allow for log raft and/or barge staging to facilitate safe log movement from the project area to regional mills and export facilities. The log raft/barge staging and associated activities have no potential effects on vegetation resources.

Completion of the proposed Ketchikan to Shelter Cove Road would allow for more economical timber harvests from the project area. Road access to and from Ketchikan would give purchasers the ability to transport logs via trucks instead of relying solely on more expensive rafting or barging methods. The proposed road would also grant the population of Ketchikan more access to needed or desired forest resources such as firewood, personal use timber, Christmas trees, etc.

The proposed Alaska Mental Health Trust Authority land exchange includes old-growth and young-growth acreage in the three LUDs in the project area, as well as Inventoried Roadless Areas (IRAs). This proposal would decrease the amount of NFS suitable and available forest land in the project area.

The following section describes the cumulative effects to silvicultural resources by alternative:

Alternative 1

Under this Alternative, there would be no change in the young-growth acreage that is suitable and available for future harvesting in the project area, and therefore no cumulative effects. Stands in the project area would follow a natural course of forest succession. There would be no cumulative effects to forest structure, forest health and productivity, regeneration and species composition, and windthrow risk.

Alternatives 2, 3, 4, 5, and 6

Stand Structure

Harvest associated with the Saddle Lake project would increase the amount of early seral stands in the project area where even-aged management is prescribed. Conversely in areas where uneven-aged management is prescribed there would be little change to the old-growth structure of these stands and these stands continue along the gap phase cycle of development.

Cumulatively the large snag component of the project area would decrease in proportion to the amount of even-aged harvest. This decrease would likely be long-term as young-growth stands may have another regeneration harvest prior to developing a snag component similar to old-growth stands. However, some existing large snags could be left on site depending on operating conditions and would therefore lessen this effect.

Future precommercial thinning (PCT) activities would provide an opportunity to promote or maintain the growth of understory vegetation while promoting vigorous growth of remaining crop trees for future harvest. Prescriptions would be developed to manage stands for multiple resource values. Implementation options may include the following: leave tree spacing based on site-specific objectives; species manipulation; maintaining a minimum 10 foot buffer adjacent to streams; maintaining unthinned travel corridors for wildlife species; creation of canopy gaps; and retaining unharvested thickets.

Where PCT is prescribed in young-growth stands, the canopy of the stands would be opened up allowing more light to reach the forest floor. Trees would generally be evenly spaced across the stand. The stand structure would be expected to change from stem exclusion to more understory re-initiation. Residual trees would receive more direct sunlight and most defective co-dominant and dominant trees would be removed from the stand. Understory vegetation would increase for a period of time until the crown of the residual trees expanded and closed the canopy again. The heavier the level of thinning, the longer the increase in understory vegetation would occur. Some natural regeneration of conifer (primarily hemlock) would occur.

Untreated young-growth stands would progress through the shrubby stand-initiation phase of development and would eventually enter into the stem exclusion phase at approximately age 15 to 30 years, depending on the site. The stem exclusion phase is defined by a high level of fairly uniform stocking where trees and the shrubby and herbaceous vegetation are typically poorly represented.

Young-growth stands would continue to develop and receive a variety of intermediate treatments at varying times which cumulatively increase the structural complexity of the landscape. The early seral structures provided by young-growth stands combined with existing old-growth, muskeg, and non-forest vegetation types provide a shifting matrix of vegetation structural types and development throughout the Saddle Lakes project area. The harvest and future treatment activities prescribed for forest stands under any of the action alternatives represent a favorable cumulative effect in terms of forest structure.

Forest Health and Productivity

Forest health would increase due to the removal of decadent, decaying, and damaged stands. New trees that regenerate on harvested sites would be vigorous and free from decay. Insect and disease processes, including hemlock dwarf mistletoe, would mostly be eliminated from regenerating stands. Future PCT activities would provide an opportunity to maintain stand growth and productivity by achieving optimal stocking and availability of resources. Cumulatively, the project area would contain old-growth stands with high levels of decay and disease interspersed with older and newly regenerated stands of young-growth that are vigorous and essentially free of decay and disease growing at optimum levels. The harvest and future treatment activities prescribed for forest stands under any of the Action Alternatives represent a favorable cumulative effect in terms of forest health and productivity.

Regeneration and Species Composition

Changes in species composition of the stands may occur as a result of harvest operations and intermediate treatments, such as PCT. Sitka spruce is expected to occur at higher levels in harvested stands due to the excellent regeneration of this species under favorable light and soil conditions created by even-aged management, and by favoring this species as a crop tree during future PCT treatments. Conversely, the hemlock component may be reduced in proportion to the amount of Sitka spruce in these stands as this species is typically targeted for removal during PCT. While hemlock is not a favored crop tree, it is usually well represented in young-growth stands due to the high number of stems and cones available on site.

Both cedar species are expected to be represented in similar proportions to their occurrence in stands before harvest activities. Both cedar species are shade intolerant, and would benefit from the removal of overstory hemlock trees, if advanced cedar regeneration is present on site. Both cedar species are favored crop trees when implementing PCT and could increase in proportion depending on regeneration.

Based on previous regeneration surveys, Pacific silver fir is expected to regenerate in even-aged stands in similar proportions to before harvest activities. In stands that have a Pacific silver component but are prescribed for uneven-aged management it is likely that the silver fir component of these stands could increase as site conditions would be favorable for the regeneration of shade tolerant species.

Cumulatively regeneration and species composition would remain similar to existing conditions in the project area, but as stands develop future intermediate treatments could favor more desirable and/or under-represented species.

Windthrow Risk

Scattered windthrow has occurred along exposed forest stand boundaries after past harvests and along recent road construction activities. No effort to buffer or stabilize these exposed boundaries and edges was previously made. Older, exposed stand boundaries have stabilized naturally, and recently created edges along new road construction are expected to stabilize as well. Where abrupt stand edges are created, either by timber harvest or road construction, some windthrow may occur. Windfirming efforts minimize windthrow, but not completely eliminate it. Future treatments, like PCT, would provide an opportunity to improve windfirmness in previously harvested stands. Thinning of young-growth stands allows crop trees to be exposed to typical wind forces and therefore allows these crop trees to develop structural characteristics necessary to cope with the stresses of wind. Large-scale wind events that significantly modify large areas of old-growth stand structure in the project area may occur in the future, regardless of either of the Alternatives selected. If events of this magnitude do occur, it is unlikely that mitigation measures proposed for this project to assure reasonable windfirmness of stand edges or stream buffers would be effective. However, the harvest and future treatment activities prescribed for the stands under any of the action alternatives represent a favorable cumulative effect in terms of windthrow risk.

Design Features and Mitigation Measures

Reasonable Assurance of Windfirmness (RAW) buffers have been prescribed in units where even-aged management is prescribed, and windthrow risk has been identified as a concern. RAW buffers serve the purpose of reducing or minimizing the windthrow risk adjacent to unit edges, or along stream buffers that protrude into harvest openings. In terms of streams, Riparian Management Areas (RMAs) that have stream channel stability concerns and potential for windthrow have also been identified. The RMAs are reviewed in the field once preliminary unit boundaries are in place. The specific windfirm prescriptions for each RMA would be determined at that time, as well as whether additional windfirm treatments may need to be applied, generally in the form of RAW buffers.

Socioeconomics

This section provides an assessment of the current economic conditions in Southeast Alaska and the potential social effects of economic change as a result of implementing the proposed Saddle Lakes Timber Sale. The analysis concentrates on the potential effects associated with old-growth timber harvest and road construction/reconditioning, and focuses on projected jobs and income associated with the Saddle Lakes Timber Sale.

Other natural resource-based industries that contribute to the Southeast Alaska economy include the Southeast Alaska commercial seafood industry, and the recreation and tourism industries. These industries have been considered in this analysis to show the general economic trends in Southeast Alaska along with the forest products industry. Ecosystem services are benefits people obtain from ecosystems and include many non-market values. For this analysis assessing impacts cannot be readily expressed in monetary terms.

The Environmental Justice section in this DEIS discusses the potential environmental, social and economic effects of the Saddle Lakes Timber Sale on minority and low-income populations.

Units of Measure:

The following units of measure were used to evaluate effects of the proposed action and compare alternatives:

- Timber industry employment and income - Number of annualized direct jobs and associated income;
- Other Natural Resource-based Industries - Qualitative assessment of likely impacts from proposed timber harvest and road construction/reconditioning on other natural resource-based industries, primarily the commercial seafood industry and recreation and tourism industries; and
- Non-market goods and services - Qualitative discussion;

Methodology

Socioeconomic conditions are characterized using existing data from the U.S. Department of Labor, Alaska Department of Labor and others. Timber industry sector employment information is gathered from the 2011 Alaska National Interest Lands Conservation Act (ANILCA) 706(a) Timber Supply and Demand Report to Congress, Statistical Appendix (USDA 2011a). Some of the ANILCA report statistics are sourced from Alaska Department of Labor. Estimates of annualized timber jobs and related income used in timber planning were developed using the Forest Service's NEPA financial analysis spreadsheet tool (FASTR) and is discussed in more detail under Issue 1 -Timber Economics. Information from Tongass Forest Plan Monitoring and Evaluation Reports and resource-specific analyses for the Saddle Lakes Timber Sale has also been used. A complete list of references and resource information used is in the Socioeconomic Resource Report.

Information on other natural resource-based industries was derived from McDowell Group Reports, Forest Service National Visitor Use Monitoring (NVUM), 2011 Alaska National Survey of Fishing, Hunting, and Wildlife-Associated Recreation and other resource-specific analyses developed for this Project. The discussion on Ecosystem services tiers to and incorporates by reference the 2008 Forest Plan FEIS, which contains a discussion of ecosystem services at the forest planning level for the Tongass National Forest (USDA Forest Service 2008c, p. 3-544 to 3-556).

Socioeconomic data and analysis in the 2010 Ketchikan to Shelter Cove Road Socioeconomic Report (prepared for the State of Alaska Department of Transportation and Public Facilities is incorporated by reference under cumulative effects to disclose the economic impacts for Southeast Alaska stemming from construction and maintenance of the Ketchikan to Shelter Cove Road (Northern Economics 2010).

The precision and reliability of employment data is limited by the type and accuracy of data collected by the Alaska Department of Labor and Workforce Development. For example, regional industry sector employment statistics exclude self-employed workers, fishers, domestics, and unpaid family workers (Alaska Department of Labor 2013). This affects some employment sector data used in this report, notably, the salmon harvesting and processing, where available employment information is limited to the seafood processing sector and excludes fishers. Recreation and tourism-related employment is also difficult to accurately quantify because visitors spend their money throughout the local economy.

Analysis Area

The analysis area for the Saddle Lakes Timber Sale's social and economic influence is Southeast Alaska. Southeast Alaska is divided into six boroughs and three census areas. The six boroughs correspond with the county governments found elsewhere in the United States. Four of these boroughs, Juneau, Sitka, Wrangell and Yakutat, are city/boroughs. The other two, Ketchikan Gateway and Haines, have independent incorporated communities within their boundaries. The remaining areas not part of a borough are allocated to three census areas: Prince of Wales-Hyder Census Area, Hoonah-Angoon Census Area, and Petersburg Census Area. While census areas are only statistical units, they are widely recognized from a data reporting standpoint by federal agencies and most state agencies as county equivalents.

The Southeast Alaska communities located outside of, but in close proximity to the project area, and whose residents may use the project area for social and economic activities (e.g., wood products, commercial and sport fishing, subsistence, recreation and tourism) include Ketchikan, Saxman and to a lesser degree, Metlakatla. Metlakatla is located on Annette Island, 15 miles south of Ketchikan and is within the Prince of Wales-Hyder Census Area. More information about these communities can be found in the Forest Plan FEIS (USDA 2008c, pp. 3-636 to 3-681).

Affected Environment

Forest products and recreation and tourism are the primary natural resource-based industries that could be affected by the Saddle Lakes Timber Sale. Information on the Southeast Alaska commercial fishing industry is also provided for a more complete overview of the contribution of this natural resource-based industry to the regional economy of Southeast Alaska.

Economic Conditions and Trends

In the1950s, the timber industry assumed the primary position when Ketchikan Pulp Company (KPC) opened. The pulp mill, which became the community's largest employer, was sustained by timber supplied from the Tongass National Forest through a 50-year contract with the U.S. Forest Service. In October 1996, Louisiana- Pacific, KPC's parent company, announced it would close the pulp mill, and in March 1997 laid off 516 workers (Alaska Department of Labor 1997; 2001). The recent (2010) book entitled, "Tongass Timber: A History of Logging and Timber Utilization in Southeast Alaska," the author describes the impacts these mill closures have had on Southeast Alaska as follows: "Though numerous businesses have come and gone in Southeast Alaska, none have done so as spectacularly and with such long-term impacts as the pulp mills that the Forest Service had worked so long and hard to establish and maintain" (Mackovjak 2010).

Job growth in the Southeast Region slowed beginning around 1990, primarily due to the declines of the timber and pulp industries and subsequent population loss. The structure of the Southeast Region's economy changed, and although economic growth has slowed as compared to 1960-1990 timeframe, the Region has shown modest job growth since the timber declines (Alaska Department of Labor 2014, exhibit 2, p. 16). Shelly Wright, the Executive Director of the Southeast Conference, summarized a five-year snapshot analysis of the Southeast Alaska economy saying, "the economy of the region is no longer trending down following the crash of our timber economy, but has begun improving… over the past five years there has been slight improvement in government, seafood, visitor industry, health care, and mining jobs. Population is up" (Southeast Conference 2012).

According to State Economist M. Abrahamson, "The private sector produced 500 new jobs in Southeast in 2012, with a diverse set of industries contributing — much more diverse than in 2011, when gains were exclusively in mining, seafood processing, health care, and professional services" (Alaska Department of Labor 2013f).

Forest Products Industry

The forest products industry in Southeast Alaska consists of individual- and family-owned sawmills and independent logging businesses. Timber harvest within Southeast Alaska is the main source of raw materials for the region's wood products industry (USDA 2008c, p. 3-500) and has historically been an important part of the economy of Southeast Alaska. In Southeast Alaska, harvest levels and associated employment have shown an overall pattern of decline since 1990 (see Issue 1 – Timber Economics).

Timber employment dropped sharply in the 1990s and has continued to decline over the past decade, falling from a high of 561 jobs in 2003 to a low of 262 jobs in 2011. Tongass National Forest-related employment in logging and sawmilling declined from 199 jobs in 2003 to 109 in 2011, a drop of about 55 percent. Non-Tongass timber employment (i.e., other sawmill and logging) also declined over this period, falling from 362 jobs in 2003 to 153 in 2011, a decrease of 58 percent (see Table 4 under Issue 1 – Timber Economics).

Overall, sawmill employment in Southeast Alaska dropped from 155 jobs in 2003 to 50 jobs in 2011, a decline of 68 percent; logging employment fell from 406 to 212 jobs over the same period, a 48 percent reduction (Table 4). Southeast Conference (2012) stated, "In 2011, timber accounted for only 1 percent of jobs and wages in the region with 422 jobs in Southeast (sawmill, logging, logging support and wood product manufacturing jobs)." Sawmill employment has historically been created by Forest Service timber sales, with a small contribution from state timber harvest and other ownerships, including State of Alaska and Native Corporation lands.

Table 106 compares projected annual average 2008 FEIS employment, and annual average employment between 2008 and 2011. The 2008 FEIS employment projections assumed maximum allowable timber harvest levels given the amount of suitable and available forest land base and logging/sawmill sector employment from 2000 to 2005 (USDA 2008c, p. 3-537).

Table 106. Average annual employment in the timber industry

Projected annual average 2008 FEIS employment[1/]	1,343 employees
2008-2011 Annual Average Employment[2/]	248 employees

Sources:
1/ USDA 2008c, P. 2-47, Table 2-19.
2/ USDA 2011, Table A-2.

Timber harvest on the Tongass National Forest also peaked in the late 1980s, with harvest levels slightly below 500 MMBF annually (an average of 467 MMBF) in 1989 and 1990 and providing between 2,569 and 2,522 jobs, respectively (Brackley et al. 2009, Appendix Table 1; USDA 2011a, Table A-2). A decade later, Tongass harvest levels dropped considerably to just above 30 million board feet annually (an average of 32 MMBF) in 2009 and 2010 (see Table 4), and the employment numbers followed the timber decline with 87 and 107 jobs, respectively (Table 4). The Tongass National Forest has averaged about 37 MMBF per fiscal year between 2002 to and 2011.Total harvest in Southeast Alaska in 2011 was 112 MMBF, with harvest on the Tongass accounting for 29 percent (33 MMBF) of this total, and with more than half the total (63 MMBF) provided by Native Corporation lands (Table 4).

According to the Alaska Division of Forestry 2012 Annual Report, “the timber industry in Southeast Alaska continues to struggle due to the lack of a short-term and long-term timber supply coming from the Tongass National Forest and the lack of harvestable timber on Native corporation land” (ADNR 2012, p. 10).

Providing economic timber sales in Southeast Alaska has always been a challenge due to basic lack of infrastructure in a relatively isolated and harsh environment (USDA 2008a, p.66). The Forest Service has received a request from the State of Alaska Department of Transportation and Public Facilities for a right-of-way (ROW) on NFS lands for construction, operation and maintenance of a public road that would connect existing roads within the project area. This State of Alaska ROW is needed for completing the proposed Ketchikan to Shelter Cove Road. It is important to mention this road connection as it would provide some benefits to the local economy and the forest products industry. A road accessing the project area would provide employment during the construction phases and likely benefit the forest products industry in the future. The potential economic benefits of the Ketchikan to Shelter Cove Road to the forest products industry are discussed in more detail under cumulative effects in Issue 1 – Timber Economics in this chapter. According to the 2010 Ketchikan to Shelter Cove Road Socioeconomic Report, the road construction for the Ketchikan to Shelter Cove Road would be in two phases: 1) improvements of the existing forest roads and the construction of a new segment in the middle; and 2) additional construction, draining improvements, and realignments, resulting in a paved, 35 mile per hour road. Road maintenance would also occur after each phase of construction is completed (Northern Economics 2010).

Sawmills

The forest products industry in Southeast Alaska in its current form consists of individual- and family-owned sawmills and independent logging businesses. The Tongass Sawmill Capacity and Production Report for calendar year 2011 identified 10 active and 3 inactive sawmills in Southeast Alaska, with a total installed production capacity of 160 MMBF (Alexander and Parrent 2012, Table 4). The original list of mills to be surveyed, initially identified in 2001, consisted of the 20 largest and/or most active sawmills at that time. Of these 20 mills (increased to 22 in 2007), 10 were active in 2010, 3 were inactive, and the other 9 had been decommissioned or were no longer in production (Alexander and Parrent 2012). More information about mill capacity, production, and utilization for Southeast Alaska from Alexander and Parent 2012 can be found in the Socioeconomics Resource Report.

The capacity utilization rate of the only operating medium-sized sawmill in southeast Alaska (Viking Lumber) in 2011 was estimated at about 13 percent (Alexander and Parrent 2012). According to the Alaska Division of Forestry 2012 Annual Report, Viking Lumber in Klawock, purchased one state sale in 2011, for about 4.5 MMBF and a large Forest Service sale for approximately 38 MMBF”

(ADNR 2012, p. 10). More information about the forest products industry in Southeast Alaska and in the Ketchikan vicinity is provided under Issue 1 – Timber Economics in this chapter.

Fisheries and the Commercial Seafood Industry

Since Ketchikan's establishment as a community, fishing has been integral to its economy. People travel from all over the world to fish in Southeast Alaska. The Tongass includes over 17,000 miles of salmon habitat, made up of freshwater streams and lakes where salmon return each year to spawn. The Tongass National Forest along with many partners is working to restore salmon streams on the Tongass. Streams and lakes within the Saddle Lakes project area provide habitat and contribute to the production of fish that supports the local subsistence, sport, and commercial fisheries of the area.

Commercial fishing is a major industry in Ketchikan. The salmon fishery drives most of the economic effects associated with the commercial seafood industry in Southeast Alaska (McDowell Group 2013b). Statewide, 2013 proved to be a record year for salmon with 272 million fish harvested. Southeast Alaska proved to be the most valuable salmon fishing area in 2013 with the largest number of salmon (38 percent) caught in the state, and an all-species harvest value of over $219 million (ADF&G 2013).

The economic drivers for the commercial seafood industry in Southeast Alaska include commercial fishing, seafood processing, government, salmon hatcheries, and tender operators. According to the McDowell Group (2013a), the seafood industry directly employed about 13,500 individuals within the Southeast Alaska region and generated an estimated $321 million dollars in labor income in 2011. On an average monthly basis, the seafood industry directly created 6,500 jobs. Indirect and induced jobs and income are created as a result of business and personal spending stemming from the seafood industry. In 2011, indirect and induced employment and income resulted in employment of 4,000 individuals (3,150 average monthly jobs), and an estimated $147 million dollars in labor income. The Socioeconomics Resource Report provides a complete summary of the 2011 economic data for the commercial seafood industry.

Recreation and Tourism

Recreation and tourism are heavily represented in the economy of Southeast Alaska (USDA 2008c, p. 3-494); however, recreation and tourism-related employment is difficult to accurately quantify because visitors spend their money throughout the local economy. There is no single “tourism industry” and no direct measures of tourist-related income or employment (USDA 2008c, p. 3-511).

Because the Saddle Lakes project area is remotely located (only boat and plane accessible) from Ketchikan, large numbers of people do not frequent the area. Information about recreation and tourism in the Saddle Lakes project area is discussed under Issue 4B above in this chapter. The economic contributions of recreation and tourism to the Southeast Alaska economy are discussed below to facilitate an understanding about the potential cumulative economic impacts as a result of future recreation and tourism opportunities in the Saddle Lakes project area. As mentioned above under the Forest Products Industry discussion in this section, the future Ketchikan to Shelter Cove Road would provide a new public road connection into and through the project area. The Ketchikan to Shelter Cove Road is listed as the Harriet Hunt - Shelter Cove Connection Road in Appendix F of the 2008 Tongass Land and Resource Management Plan (Forest Plan). Having public road access to and through the project area would provide for increased recreational and tourism-related opportunities and likely contribute to the local economy.

Resident recreation demand is influenced by a number of factors, including regional population levels, per capita participation rates, and recreation travel behavior. Over time, the supply of certain recreation opportunities in Southeast Alaska has increased. Road systems have expanded into previously inaccessible areas and visitor services and tourism marketing have also increased (USDA 2008c, pp. 3-373 and 3-374).

According to the 2012 Tongass National Forest Monitoring and Evaluation Report, the Alaska Department of Labor employment statistics are compiled by industry sector and [as mentioned previously] there is no single sector representing recreation and tourism (USDA 2012b). Employment in the recreation and tourism sector is a component of a number of related sectors such as leisure and hospitality and other services. Studies conducted by the McDowell Group for the State of Alaska Department of Commerce, Community, and Economic Development provide useful information on visitor volume (McDowell Group 2013c) and the economic impact of Alaska's visitor industry (McDowell Group 2013b).

According to the McDowell Group (2013b), Alaska's visitor industry accounted for an estimated 37,800 full- and part-time jobs between May 2011 through April 2012 in Southeast Alaska, and generated $3.72 billion in spending, including all direct, indirect, and induced impacts (McDowell Group 2013b). Table 107 summarizes the estimated visitor industry employment, labor income and spending in Southeast Alaska in 2011 to 2012 and provides a comparison to the state totals. These data include direct, indirect and induced effects of jobs and income created as the visitor dollar is re-spent by visitor industry businesses and their employees. Induced effects include jobs and income created as a result of employees of the visitor industry spending their payroll dollars in support of their households.

Table 107. Estimated visitor industry employment, labor income and spending in Southeast Alaska, 2011 to 2012

Region	Employment	Labor Income	Visitor Spending
Southeast	10,200	$370 million	$1,966 million
State of Alaska	37,800	$1.24 billion	$3.72 billion

Source: McDowell Group 2013b, p. 17.
Note: Study period of May 2011 through April 2012.

Statewide, visitor industry-related employment of 37,800 accounted for 8 percent of all employment. In terms of relative contribution to the regional economy, visitor industry employment is most important in Southeast Alaska. Visitor industry-related employment of approximately 10,200 jobs represented 21 percent of the region's 49,000 full- and part-time jobs (McDowell Group 2013b, p 18).

Cruise Ship Revenues

Southeast Alaska's Inside Passage is advertised and promoted by the Division of Tourism, cruise ship operators, and the Southeast Alaska Tourism Council. Their marketing strategy focuses on the scenery of the Tongass National Forest as a major attraction. The 2011 cruise ship dockage/moorage revenues to Southeast Alaska municipalities (primarily Ketchikan, Juneau, Sitka and Haines), was $15,225,000 (McDowell 2013b, p. 26). Ketchikan is a principal destination for visitors to the Tongass National Forest, receiving close to a million cruise ship visitors annually as well as independent travelers that arrive via the ferry system, private boats, and flights. It is the second most visited destination in Alaska, with 58 percent of all visitors stopping in Ketchikan (McDowell Group 2012c). Ketchikan experienced a record year in 2013 for the number of cruise ship passengers. According to the January 2014 State of Alaska report on Commercial Passenger Vessel Excise Tax, in Ketchikan there were just over 950,000 cruise ship passengers, which is an increase of almost 54,400 passengers from 2012, and breaks the record of nearly 942,000 visitors in 2008 (State of Alaska DCCED 2014). According to the 2008 Forest Plan FEIS, shore excursions have become an important part of the cruise ship experience, with much of this activity centered around communities. Half-day and day excursions into the Forest are increasing in popularity (USDA 2008c, pp. 3-374 to 3-375). If current trends continue, demand for on-shore excursions and tours may continue to increase, adding seasonal employment.

The Socioeconomics Resource Report also includes a summary of the annual Alaska visitor volume from 2003-2013, but is not specific to Southeast Alaska.

Forest Recreation Use

Some recreational use activity is known for areas on NFS lands in the Saddle Lakes project area and is discussed above under Issue 4B – Recreation Opportunities. During the recent planning efforts associated with the 2012 Ketchikan-Misty Fiords Ranger District Outfitter and Guide Management Plan, guides requested more opportunities close town as a potential means to grow their recreation-related businesses. Commercial boat-based tours use both George and Carroll Inlets, but do not have any shore stops and therefore do not have a special use permit from the Forest Service.

Forest Service National Visitor Use Monitoring (NVUM) is a national monitoring program with a goal of assessing levels of Forest recreation use, demographics of users and economic contributions of Forest visitors. Examined employment sectors are complex and depend on many factors including local, state and national economies. The NVUM data provides estimates for economic contributions of the Tongass on the recreation and tourism industry, though employment estimates should not be compared with employment projections provided in the 2008 FEIS. Forest-related economic contributions reported by NVUM include the amount of money spent during visits. According to the 2012 Tongass National Forest Monitoring Report, the reported annual average employment for industry sectors which may include recreation and tourism employment show a slight decline but have remained relatively stable from 2008 to 2012 (USDA 2012b).

Wildlife-related Recreation

The diversity of wildlife on the Forest provides many opportunities for consumptive and non-consumptive uses including commercial, sport, and subsistence hunting and fishing, and photographic and viewing activities. Commercial, sport, and subsistence fisheries are important to the way of life for Southeast Alaskan residents. Sport fishing is a favorite activity of residents and visitors (USDA 2008c).

The Saddle Lakes project area and WAAs 406/407 fall within the community use areas of Metlakatla, Saxman, and Ketchikan. Hunting and trapping occur in the Saddle Lakes project area, and deer hunting is the predominate activity, although black bear hunting has also occurred in the area. The affected environment for wildlife subsistence use in the Saddle Lakes project area is described under Issue 3B – Subsistence Use in this chapter. The Sitka black-tailed deer is the wildlife species receiving the highest hunting and subsistence use of all terrestrial species in Southeast Alaska (USDA 2008c, p. 3-230). Fish and aquatic resources on the Tongass National Forest provide important subsistence, commercial, and sport fisheries, as well as traditional and cultural values. Roughly 50 percent of the streams (Class I and II) in the Saddle Lakes project area contain anadromous or resident fish, indicating high fisheries value within the project area. Currently there is no regulated sockeye subsistence or personal-use fishery within the Saddle Lakes project area, and there is no known freshwater subsistence activities taking place in the project area.

The Socioeconomics Resource Report also includes a summary of the U.S. Fish and Wildlife Service 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation Alaska, but is not specific to Southeast Alaska.

Ecosystem Services

Healthy forest ecosystems are ecological life-support systems. Forests provide a full suite of goods and services important to public and community needs, livelihoods, and preferences. Many of these goods and services are traditionally viewed as free benefits to society, or "public goods" - wildlife habitat and diversity, watershed services, carbon storage, and scenic landscapes, for example. These natural assets are known as ecosystem services. The concept of ecosystem services has emerged as a way of framing and describing the comprehensive set of benefits that people receive from nature.

Lacking a formal market, these natural benefits are absent from traditional market "balance sheets," and their contributions are often overlooked in public, corporate, and individual decision-making. While the natural benefits associated with the Tongass National Forest as a whole are no doubt considerable, they are extremely difficult to accurately measure, particularly on a per acre basis. The Forest Plan FEIS does not assign a monetary value to ecosystem services (USDA 2008a, p. 51), but recognizes their importance and gives them full consideration.

Ecosystem services are described in a number of different ways including the typology developed by the 2005 Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2005). According to the Millennium Assessment, there are four general categories of ecosystem services: provisioning, regulating, cultural, and supporting. Provisioning services include the products or commodities obtained from forest ecosystems, such as clean air, fresh water, fiber, forage, fuel, minerals and food. Regulating services are the benefits obtained from ecosystem impacts on natural processes, such as air quality, climate stabilization, water quality, and erosion. Cultural services are the nonmaterial benefits people derive from forests, such as educational, aesthetic, spiritual and cultural heritage values, recreational experiences, and tourism opportunities. Supporting services are a category of ecosystem services often described as intermediate services (e.g., biodiversity) that contribute to the production of other ecosystem services often described as final ecosystem services (e.g., food). Supporting services include such things as pollination, seed dispersal, soil formation, nutrient cycling, biodiversity and resilience.

A large proportion of the Forest Plan FEIS is devoted to assessing impacts to the Forest resource that cannot be readily expressed in monetary terms. Similarly, this DEIS assesses impacts to the forest resources that cannot be readily expressed in monetary terms. Under the current Forest Plan, LUDs specify ways of managing an area of land and the resources it contains. LUDs may emphasize certain resources, such as remote recreation or old-growth wildlife habitat, or combinations of resources, such as providing scenic quality in combination with timber harvesting. Each LUD has a detailed management prescription, which includes Standards and Guidelines. Ecosystem services are discussed at the forest planning level for the Tongass National Forest in the 2008 Forest Plan EIS (USDA 2008c, p. 3-544 to 3-556).

Potential impacts to ecosystem services other than timber are not addressed in monetary terms, but are discussed in the other resource-specific sections of this EIS. The effects of the action alternatives on these types of services and benefits are assessed in the sections of this DEIS that address watersheds, fisheries, soils, wildlife and subsistence use, heritage resources, and timber and vegetation, among others. Monetary values are not assigned to these services, but this does not lessen their importance in the decision making process. The Responsible Official will consider the economic values presented under the Issue 1: Timber Economics section in this chapter within the context of the information presented elsewhere in this document, much of which cannot readily be translated into economic terms.

Environmental Consequences

Effects to the timber industry are assessed in terms of employment and income at the regional scale (i.e., Southeast Alaska), where effects are expected to occur. Effects to fisheries and commercial fishing and recreation and tourism sectors are assessed in terms of the analysis areas assessed for those resources. Ecosystem services are assessed by resource throughout this DEIS, with analysis areas established for each resource.

Direct and Indirect Effects

Alternative 1

No timber harvest would occur in the project area. There would be no additional contribution to the local or regional Southeast Alaska economy, and there would be no additional support to the local or regional forest products industry employment from this project area. Alternative 1would not meet the Purpose and Need, which is to contribute to an even-flow, long-term supply of economic timber that contributes to the local and regional economies of Southeast Alaska (including both large and small operators).

As discussed in the Issue 1: Timber Economics section above, the provision of a long-term stable and economic timber supply is intended to support local operators and encourage investment in the wood products industry as it transitions to second-growth harvesting and restoration activities. The absence of a long-term supply of economic timber could adversely affect future investment and the potential for increased wood products employment in the future, as well as the anticipated transition of the wood products industry to second growth harvesting and restoration activities.

In the absence of a long-term (i.e., multiple year) stable supply of economic timber from the Saddle Lakes Timber Sale or elsewhere, the future viability of existing mill operators could be adversely affected. Closure of one or more of the existing mills would result in a further reduction in jobs in the logging and sawmilling industries and could also affect local businesses that provide goods and services to these industries.

There would be no timber harvest or associated road construction/reconditioning under this alternative and no impacts to fisheries and the commercial seafood industry or the recreation and tourism industries in Ketchikan or elsewhere in the region are anticipated.

Effects Common to All Action Alternatives

The effects of road construction, operation and maintenance associated with the State of Alaska ROW on NFS lands would provide some economic benefits to the Southeast Alaska economy. No direct or indirect economic effects to fisheries or the Southeast Alaska commercial seafood industry are anticipated.

The fish passage barrier modification at Salt Creek would improve both salmon stream and lake habitat, offering more opportunities for dispersed recreation (i.e., fishing).

Reconstruction of the Shelter Cove log transfer facility is a cost associated with the timber sale, but would not impact timber industry employment and income.

Alternatives 2, 3, 4, 5, and 6

A stable timber industry in Southeast Alaska depends on a steady flow of economic timber sales in order for operators and processors to make investments in machinery and employ qualified workers. Potential impacts in terms of timber industry employment and income (i.e., direct logging and sawmill/export employment) that would be supported by the projected harvest volumes under each action alternative are described under Issue 1- Timber Economics (see Table 6 and Table 7). The potential impact to nearby communities with processing facilities that may utilize the timber depend on many elements associated with the competitiveness and efficiency of individual operations.

Implementation of the applicable Forest Plan Standards and Guidelines and Best Management Practices (Appendix C) would mitigate potential impacts to fisheries. As a result, none of the action alternatives are expected to have measurable effects on fish habitat and are, therefore, unlikely to affect the commercial seafood industry.

Potential impacts to recreation are discussed under Issue 4B - Recreational Opportunities in this chapter. Although none of the action alternatives are expected to have measurable effects on fish habitat, road building and timber harvest activities could affect access to freshwater fishing outfitter-guide locations in the project area, as well as the quality of the recreation experience of outfitter-guide clients in these areas. The action alternatives would all have short-term impacts on recreation and outfitter-guide use in the project area. No long-term impacts (i.e., impacts that extend beyond the duration of localized project activities) are anticipated regarding the ability of outfitter-guides to use currently permitted locations. Wildlife- and nature-based recreation and tourism in Ketchikan is mainly related to saltwater fishing, hunting, and shore excursions offered by the cruise ship industry. Because the Saddle Lakes project area is remotely located and visitation is low, very minimal effects to these recreational experiences is anticipated. Saltwater fishing-related recreation and tourism is not expected to be affected under the action alternatives. Since none of the action alternatives are expected to have measurable effects on fish habitat, the action alternatives are unlikely to affect businesses that focus on sport fishing. Alternatives 4, 5 and 6 would lower the scenic integrity in some of the project area Visual Priority Routes (VPRs), which may in turn affect the recreational experience of some visitors. As discussed under the Issue 3A -Wildlife Habitat section in this chapter, the action alternatives would permanently reduce deer habitat capability (DHC) up to 6 percent from existing conditions, and up to 27 percent from historic habitat capabilities. Reductions in deer habitat resulting from the action alternatives would further impact subsistence and sport deer hunter success making it harder for hunters to obtain deer.

Cumulative Effects

Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the cumulative effects analysis. Table 150 in Appendix B identifies the interrelated projects considered in this cumulative effects analysis.

Alternative 1

Under Alternative 1, there would be no timber made available under the Saddle Lakes Timber Sale and timber operators in Ketchikan and elsewhere in Southeast Alaska would not be able to bid on future timber offerings under this project. Timber projects listed in Appendix A, and discussed above in the Issue 1. Timber Sale Economics and Issue 2. Timber Availability sections in this chapter would also contribute to the timber supply. As discussed above under direct and indirect effects, in the absence of this project and other sources of long-term (multiple-year) economic timber, the future viability of existing operators in Southeast Alaska could be adversely affected. Closure of one or more mills would result in a further reduction in jobs in the logging and sawmilling industries and could also affect local businesses that provide goods and services to these industries. Further, the absence of a multiple-year timber supply could adversely affect the anticipated transition of the wood products industry to young-growth harvesting and restoration activities.

The future Ketchikan to Shelter Cove Road would provide access to the Saddle Lakes project area, and would likely provide benefits to the forest products industry on other timber sales in the area. Forest products could more easily be transported from the project area and other operational costs would likely be reduced since more options would exist for hauling timber (e.g., Leask Cove and Ward Cove).

Effects Common to All Action Alternatives

Under all action alternatives, when added to the action alternatives, the future Ketchikan to Shelter Cove Road would create beneficial cumulative effects onbenefit the forest products industry. The forest products industry would realize an economic benefit with this road connection since the costs of transporting forest products from the project area and other operational costs would likely be reduced since there would bewith more options for hauling timber (e.g., Leask Cove and Ward Cove). Estimates provided by the State of Alaska Division of Forestry (personal communication from SOA DOF, with input from ALCAN Forest Products LP, 2014) indicate that economic benefits of the DOT & PF road to timber purchasers may be substantial. These benefits are discussed in more detail in cumulative effects under Issue 1- Timber Economics. Completion of this road would also reduce the economic risk for timber sale purchasers, and increase the economic viability of future timber sales in the area. The future road connection would also present more opportunities for the Ketchikan-Misty Fiords Ranger District to offer small sales to local purchasers and free use permits.

In addition, The Ketchikan to Shelter Cove Road is expected to benefit the recreation and tourism industry. This road would provide access into and through the project area allowing local residents to drive to the area instead of having to boat or fly. Sightseeing and driving for pleasure is desired by local residents, and would likely lead to increased recreation use in the project area, and possibly increased spending in Ketchikan Cruise ship clients would likely spend money on shore excursions into the Saddle Lakes project area. The Ketchikan to Shelter Cove Road would contribute social benefits to the local communities since increased access would present more opportunities for dispersed recreation (e.g., sightseeing, camping, berry-picking, hunting, and fishing) and subsistence activities on NFS lands and on adjacent saltwater.

Alternatives 2, 3, 4, 5, and 6

Past timber sales have contributed to the development of the existing NFS road system (8300000 road) in the Saddle Lakes project area that would be used under all action alternatives. Timber harvest under the action alternatives would contribute to meeting projected market demand for timber in Southeast Alaska and support logging, sawmilling, and transportation and other services jobs.

The future Saddle Lakes Recreation Area, if completed, would be a likely destination in the project area for dispersed camping, and use of the North Saddle Lakes for kayaking and canoeing is probable. Freshwater fishing in the lakes and streams would also likely increase. An increase in Outfitter/Guide use is projected and could be realized with this future road connection. Use of the 4.6 miles of Off Highway Vehicle (OHV) Trail (8337000 road) is expected to increase via this road connection since people would be able drive to the project area. The tourism industry is expected to take advantage of this increased road-based access by offering tours and activities in this area. Currently, there are several non-NFS tours and recreation offerings, and these offerings may expand to include obtaining a Forest Service special use permit to take visitors into the project area. Additional recreation and tourism opportunities as a result of this road connection would translate to more visitor spending and more seasonal employment in Ketchikan.

The future road connection would make the area more accessible to wildlife-related recreation and could create incremental impacts to hunting in the area. Decommissioned roads (post-timber harvest) would allow for easier walk-in access to the project area by both rural and non-rural users. Direct road access from Ketchikan, combined with a potential increase in user demand for fish, shellfish and deer, could increase competition between subsistence and sport users and decrease success. Increased competition may result when less expensive and more convenient access to the area or within the area is provided. Such is the case when road systems are established to local communities (USDA 2008c, p. 3-421). There is currently no regulated subsistence or personal-use fishery in the project area and cumulative impacts to fish subsistence cannot be quantified. There would be a potential increase in hunter demand for deer, which could affect competition for deer between subsistence users. Hunting use patterns could also change with the Ketchikan to Shelter Cove Road, affecting the demand and/or the amount of competition in the area (Wildlife Resource Report). According to the 2008 Forest Plan FEIS, if a restriction were necessary, sport hunting by Ketchikan residents would be restricted before subsistence hunting by rural hunters is restricted (USDA 2008c, p. 3-640).

According to the 2010 Ketchikan to Shelter Cove Road Socioeconomic Report, the two-phased road construction of the Ketchikan to Shelter Cove Road (on both NFS and non-NFS lands) would generate about 1,333 part-time and full-time jobs in the Region and a personal income of $72 million dollars. Maintenance of the road would generate 1 to 2 part-time or full-time jobs in the Ketchikan Gateway Borough and a personal income of about $100,000 dollars (Northern Economics 2010, p. 27).

The proposed Alaska Mental Health Trust Authority Land Exchange would decrease the amount of NFS suitable and available forest land resulting in less future volume available for harvest for the Tongass timber program. The Alaska Mental Health Trust Authority would likely use this land for future timber harvest activities, and the volume generated would contribute to the Southeast Alaska regional economy.

Soils

This section provides a summary of the soil resources in the Saddle Lakes project area. The analysis presented centers around soils concerns associated with landslides (mass movement erosion) and soil productivity.

Timber harvest and road building can adversely affect the soils resource by:

- Disturbing, displacing, or burying the nutrient-rich forest floor and exposing mineral soils to erosion; and
- Increasing the frequency of landslides which also displace nutrient rich soils and increase erosion potential.

Units of Measure:

Effects to soil productivity are based on the following indicators:

- Estimates of detrimental soil conditions in harvest units based on over 20 years of soil disturbance monitoring by logging system; and
- Estimate of future landslide activity based on a landslide inventory of the project area and the amount of timber harvest and road construction proposed on steep or unstable slopes.

Methodology

Estimates of detrimental soil conditions by logging system are based on data presented in several soil quality monitoring white papers, the most pertinent of which are Landwehr and Nowacki (1999) and Landwehr et al (2012). Detrimental soil conditions are estimated for both existing young-growth stands and proposed harvest areas.

Landslides were estimated by using the best available stability mapping of the soil cumulative effects area, a current landslide layer, aerial photographs, and a current point layer for the initiation point of each landslide. A stability map and a point layer for landslide initiation locations were created specifically for this analysis. Proposed harvest units on slopes steeper than 72 percent gradient or unstable soils were reviewed in the field. Based on field review recommendations for avoiding very unstable areas or changes to yarding methods or road locations or road construction methods were made to minimize potential for management induced landslides.

Analysis Area

The analysis area for direct and indirect effects to productivity includes the “activity area” (FSM 2554). For this project, the “activity area” includes individual proposed timber harvest units and associated land impacted by proposed road construction. Consequently, the direct and indirect effects analysis areas for productivity are different for each alternative when displayed as a sum of all activity areas.

The analysis area for cumulative effects includes the project area minus the private lands where no soil information exists

Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the soils cumulative effects analysis

Affected Environment

The project area is located within the Traitors Cove Metasediment Ecological Subsection (Nowacki et al 2001). Metasedimentary and sedimentary bedrock is present within the Saddle Lakes project area. However, many of the road cuts are plutonic intrusions of tonolite or granodiorite. At least one small area of pyroclastic rock exists in the southern part of the project area, thought to have originated from the eruption of Painted Peak on the east side of Carroll Inlet (personal communication, James Baichtal, Forest Geologist, Tongass National Forest, 2013).

Most soils in the project area have a thick organic or duff layer that prevents erosion of the underlying mineral soil from raindrop impact and supplies many nutrients for plant growth. Keeping the organic mat in place during management activities is a key to maintaining soil productivity.

As a part of this analysis, a refined soil stability map was created using soil surveys, digital elevation maps, knowledge gained from current field observations, and interpretations of aerial photographs. Soil stability classes used in this analysis are interpreted approximations of the Mass Movement Index, and are interpreted as follows: Very Unstable (V Unstable) Areas = MMI 4; Unstable Areas = MMI 3; and Stable Areas = MMI 2 and 1. Slopes over 72 percent is a criterion for very unstable areas.

Landslides

Landslides in natural areas and managed stands in the Saddle Lakes project area have initiated predominantly in very unstable areas. Since 1929 a total of 42 landslides (67 acres) have initiated in non-harvested, old-growth stands within the project area. A total of 30 landslides (19 acres) have initiated in harvested areas.

The last landslide inducing storm on the project area was in October 2010 and resulted in 8 landslides in natural areas and 27 landslides in harvested areas. The landslide analysis for this project considered storm event timing and age of young-growth when estimating future landslide activity for the next 30 years for each alternative.

Soil Productivity

Alaska Regional Soil Quality Standards state that “a minimum of 85 percent of an area should be left in a condition of acceptable productivity potential for trees and other managed vegetation following land management activities. Currently, detrimental soil conditions occupy an estimated 0.6 percent of the cumulative effects area. This amount is well within the Alaska Regional Soil Quality Standard of 15 percent maximum. Management related landslides, yarding disturbances, and temporary roads make up the detrimental disturbance for existing soil productivity. Recovery of productive soil conditions is occurring in soil disturbances within previously harvested areas (Landwehr et al 2012). Roads and landslides generally have slower recovery rates.

Harvest on Slopes Greater than 72 Percent Gradient

Past harvest activities have partially avoided slopes greater than 72 percent gradient. The digital elevation model for the project area was used as a primary data source for mapping Very Unstable areas. Specifically, lands greater than 72 percent slope are considered Very Unstable unless ground measurements indicated they are suitable for timber harvest (Unstable rather than Very Unstable). There are about 49 acres of landslides on slopes greater than 72 percent (Very Unstable) within the project analysis area. Most landslide activity resulting from timber harvest and road construction occurred on lands harvested before current Forest Plan Standards and Guidelines were implemented.

Past effects are likely to be greater than those that have occurred following more recent timber harvest and road construction due to use of current BMPs (Landwehr 1998). Therefore, impacts from proposed activities are likely to be less than from past activities.

Environmental Consequences

Desired Condition

The desired condition for soils resources is to avoid irreversible or serious and adverse effects on soil resources, and to prevent detrimental soil disturbance. This is achieved by following Forest-wide Standards and Guidelines for soils, which are found on pages 4-64 through 4-67 of the Forest Plan (USDA 2008b). Application of soil conservation practices to meet Alaska Region Soil Quality Standards (Soil Management Handbook, FSM 2554). Key BMPs for maintaining soil productivity are 13.5 (Identification and Avoidance of Unstable Areas), BMP 14.7 (Minimization of Mass Failures), and BMP 13.9 (Guidelines for Yarding Operations).

Direct and Indirect Effects

Effects Common to all Action Alternatives

No effects are anticipated to soil resources as a result of implementing the State of Alaska Right-of-way on NFS Lands, the fish passage barrier modification, and the Shelter Cove LTF reconstruction.

Landslides, Harvest on Slopes Greater than 72 Percent Gradient, and Soil Productivity

For all alternatives, detrimental soil disturbances across the analysis area would be well within the Region 10 soil quality Standards and Guidelines. This finding is based on analysis summarized in the Soil and Wetland Resource Report for the Saddle Lakes project area (Silkworth 2014) and over 20 years of soil quality monitoring data collected on the forest and documented in numerous soil quality monitoring reports, the most pertinent of which are: Landwehr and Nowacki 1999, and Landwehr et. al. 2012. The monitoring data indicates that about 3 percent of harvest units yarded with cable or shovel system incur detrimental soil conditions. Temporary roads and landslides are also considered detrimental soil conditions. Existing detrimental soil disturbance (including temporary roads and landslides was estimated for each proposed harvest unit. The detailed data can be found in Silkworth (2014).

Increased landslide frequencies can occur when harvesting timber or building roads on steep slopes, especially slopes greater than 72 percent. The analysis uses the existing landslide inventory for the Saddle Lakes project area to estimate future landslide activity over the next 30 years. To date a total of about 450 acres of Very Unstable areas have been dropped from all action alternatives, either by removing the entire harvest unit, adjusting harvest unit boundaries, or avoiding the Very Unstable area through a partial cut silvicultural prescription.

BMPs and site specific recommendations for soil and slope protection in harvest units and road segments are based on field data. Project wide analysis was completed using soil survey data in GIS and aerial photos and is summarized in the Soil and Wetlands Resource Report (Silkworth 2014).

Tabular comparison of alternatives can be found at the end of Chapter 2. The Soil and Wetland Resource Report for the Saddle Lakes project area (Silkworth 2014) in the project record provides more detail of the analysis

Alternative 1

Under Alternative 1, no timber harvest or road building would take place from the proposed Saddle Lakes Timber Sale project. No soil disturbances would be caused by new management activities associated with the Saddle Lakes project Vegetation in harvested areas would continue to grow and add stability to soils on those sites. Detrimental disturbance for soil productivity is calculated at 0.6 percent of the project area.

Alternative 2

This Alternative results in an estimated 77 acres of detrimental soil disturbance from 49 acres of yarding disturbances, 27 acres of temporary road construction, and about 1 acre of management related landslides (in the next 50 years). This would result in a detrimental soil disturbance of 3.4 percent of the direct and indirect effects analysis area.

About 88 acres of slopes greater than 72 percent gradient would be suitable for timber harvest. About 0.1 acre of road is located on slopes greater than 67 percent gradient.

Alternative 3

This Alternative results in about 57 acres of detrimental soil disturbance from 32 acres of yarding disturbance, 24 acres of temporary road construction, and about 1 acre of management related landslides (in the next 50 years). This would result in a detrimental soil disturbance of 5.5 percent of the direct and indirect effects analysis area. About 42 acres of slopes greater than 72 percent gradient would be suitable for timber harvest. About 0.3 acre of road is located on slopes greater than 67 percent gradient.

Alternative 4

This Alternative includes about 126 acres of detrimental soil disturbance from 76 acres of yarding disturbance, 47 acres of temporary road construction, and about 3 acres of management related landslides (in the next 50 years). This would result in a detrimental soil disturbance of 5.1 percent of the direct and indirect effects analysis area.

About 123 acres of slopes greater than 72 percent gradient would be suitable for timber harvest. About 0.5 acre of road is located on slopes greater than 67 percent gradient.

Alternative 5

This Alternative includes about 155 acres of detrimental soil disturbance from 95 acres of yarding disturbance, 56 acres of temporary road construction, and about 4 acres of management related landslides (in the next 50 years). This would result in a detrimental soil disturbance of 5.3 percent of the direct and indirect effects analysis area.

About 163 acres of slopes greater than 72 percent gradient would be suitable for timber harvest. About 0.8 acre of road is located on slopes greater than 67 percent gradient.

Alternative 6

This Alternative would result in about 106 acres of detrimental soil disturbance from 65 acres of yarding disturbance, 39 acres of temporary road construction, and about 2 acres of management related landslides (in the next 50 years). This would result in a detrimental soil disturbance of 4.9 percent of the direct and indirect effects analysis area.

About 84acres of slopes greater than 72 percent gradient would be suitable for timber harvest. About 0.5 acre of road is located on slopes greater than 67 percent gradient.

Cumulative Effects

Landslides, Harvest on Slopes Greater than 72 Percent Gradient, and Soil Productivity

Eighty-six acres of existing landslides are found in the Saddle Lakes project area (cumulative effects area). Natural soil disturbances, including landslides would continue to occur. Natural soil erosion due to ice, wind, water, or gravity that usually occurs in small patches would continue. Vegetation in harvested areas would continue to grow and add root mass and stability to the soil reducing landslide frequency in previously harvested areas. Disturbed soil in existing harvest areas would continue to recover.

Alternative 1

Under Alternative 1, detrimental disturbance for soil productivity would be 278 acres, or about 0.8 percent of the cumulative effects area. The detrimental soil conditions include 86 acres of existing landslides, 54 acres of estimated future landslides, 42 acres of temporary roads, and 96 acres of existing yarding disturbances..

Alternative 2

Under Alternative 2 detrimental soil conditions would be about 355 acres, or about 1.2 percent of the cumulative effects area. The detrimental soil conditions include 86 acres of existing landslides, 55 acres of estimated future landslides, 99 acres of temporary roads, and 191 acres of yarding disturbances.

Alternative 3

Under Alternative 3 detrimental soil conditions would be about 335 acres, or about 0.9 percent of the cumulative effects area. The detrimental soil conditions include 86 acres of existing landslides, 55 acres of estimated future landslides, 66 acres of temporary roads, and 128 acres of yarding disturbances.

Alternative 4

Under Alternative 4 detrimental soil conditions would be about 404 acres, or about 1.1 percent of the cumulative effects area. The detrimental soil conditions include 86 acres of existing landslides, 57 acres of estimated future landslides, 89 acres of temporary roads, and 172 acres of yarding disturbances.

Alternative 5

Under Alternative 5 detrimental soil conditions would be about 434 acres, or about 1.2 percent of the cumulative effects area. The detrimental soil conditions include 86 acres of existing landslides, 58 acres of estimated future landslides, 99 acres of temporary roads, and 191 acres of yarding disturbances.

Alternative 6

Under Alternative 6 detrimental soil conditions would be about 486 acres, or about 1.1 percent of the cumulative effects area. The detrimental soil conditions include 86 acres of existing landslides, 56 acres of estimated future landslides, 82 acres of temporary roads, and 162 acres of yarding disturbances.

The effects to soils for all alternatives are within Alaska Region Soil Quality Standards which require 85 percent of an area to be in a condition of acceptable productivity for growth of desired vegetation.

Transportation

National Forest Transportation System roads are constructed to provide access to National Forest System (NFS) lands and are included in the Forest Development Transportation Plan (see Transportation Standards and Guidelines in Chapter 4 of the Forest Plan, USDA Forest Service 2008a). They are considered NFS roads or system roads, for short, as are other roads wholly or partially on NFS lands and are intended to be maintained for the long-term. Most forest roads are single lane, constructed with blasted quarry rock, and designed for off-highway loads.

Roads have the potential to affect fish habitat, soils, and water quality by increasing erosion and landslide potential, changing recreation settings and opportunities, altering scenery, and increasing legal and illegal wildlife harvest. These types of effects are discussed in the resource sections in this Chapter. This analysis considers the effects of the new construction and reconstruction of roads used to access the proposed timber harvest. It also analyzes the status of these roads after timber harvest (open or closed) and the total transportation related costs.

Units of Measure:

The following units of measure were used to evaluate effects of the proposed action and compare alternatives:

- Miles of NFS road construction;
- Miles of temporary road construction;
- Miles of NFS road reconditioning;
- Miles of road to remain open to motorized vehicle traffic;
- Miles of road to be closed associated with this timber harvest activities;
- Total transportation related costs (cost of new road construction (NFS and temporary), road reconditioning, and LTF reconstruction); and
- Total road and LTF costs per net sawlog volume harvested (cost per NMBF).

Methodology

Information sources for transportation analysis include the transportation GIS records which house the spatial data for road locations. An inventory of road attributes for National Forest System (NFS) roads is maintained on National Forest through the I-Web database. A complete list of road attributes and definitions of these attributes is located in the project record.

The Forest Service has conducted road condition surveys (USDA 2000; Transportation System Maintenance Handbook FSH 7709.58 – Section 12.5) on many of the existing roads in the Saddle Lakes project area. These surveys supply site-specific detailed information about each road (and section of road) surveyed as of the date of the survey, including:

- Whether the road, or a particular section of the road, is drivable;
- Number, size, and condition of drainage structures and bridges;
- Barriers to vehicle access (e.g., vegetation, barrier ditches, pulled bridges, slides);
- Maintenance requirements; and
- Barriers to fish passage through road drainage structures.

This information is used to: 1) identify maintenance trends; 2) provide information for problem analysis; and 3) set priorities for scheduling and funding work. The majority of the road condition surveys within the project area were completed between 2000 and 2005. Updates on fish stream crossing information for the road condition survey data are ongoing. Road condition survey data has been uploaded to the national INFRA database and is updated in that database. Existing data are being used for the remaining road condition survey data, which was updated by the Forest Service as recently as 2008.

Proposed new road construction routes were spatially displayed by transportation specialists and field reviewed by resource specialists during 2010 through 2014. All routes have been or currently are being field reviewed, however they may not all have been flagged on the ground. Transportation specialists are currently verifying and flagging the routes as needed.

Specific comments and concerns along with site-specific mitigation measures are discussed in the respective resource reports, in the road cards for system roads, and on the unit cards for temporary roads. The methodology for road location and field review does not vary by alternative. The roads are included or excluded by alternative based on the design criteria of each alternative.

Incomplete and Unavailable Information

. Many, but not all, non-Forest Service road alignments are available in GIS. NFS road data for this project area is within the Routed Road layer and is complete. Most Forest Service decommissioned temporary roads have data within the Routed Road layer. Most of the remaining Forest Service decommissioned temporary roads have been digitized using aerial photos and are within the Non-Routed Roads layer. State and private roads are also within the Non-Routed Road layer; however, non Forest Service lands within this project area are less than 10 percent.

The approach to developing the impact analysis primarily focuses on the potential for additional miles of NFS and temp roads, their costs, and their costs in relation to the volume of timber harvested.

The best available information was used for this analysis and additional information on proposed stream-road crossings is still being obtained.

Analysis Area

The analysis area for the transportation system includes the Saddle Lakes project area, and road and trail segments within this area. There are no roads or trails extending from within the project area and terminating outside the project area.

Appendix B includes the interrelated projects (i.e., past, present and reasonably foreseeable future actions) that have been considered in the transportation cumulative effects analysis

Affected Environment

To facilitate the understanding of road terminology, a road may be classified, temporary, or unauthorized (36 CFR 212.1). Classified roads are wholly or partially within or adjacent to NFS lands that are determined to be needed for long-term motor vehicle access, including state roads, county roads, privately owned roads, NFS roads, and other roads authorized by the Forest Service. Temporary roads are authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be part of the forest transportation system, and not necessary for long-term resource management. Road decommissioning consists of activities that result in the stabilization and restoration of unneeded roads to a more natural state.

The NFS roads in the analysis area were originally built for logging and the associated administration, though incidental recreational and subsistence use occurs throughout the area. Road construction in support of logging activities in the project area began in the 1990s.

Road Maintenance and Reconditioning

For the Tongass National Forest, the demand for roads has primarily been a function of the demand for access to timber resources. The maintenance and reconditioning of the existing system depends largely on the volume of timber hauled and, to a lesser extent, on recreation use. Road maintenance consists of superficial periodic repairs to the existing road surface, brushing, cleaning, and repairing drainage features. These tasks are performed to keep the roads in a safe and useful condition for which they were designed. Repairs may be accomplished as annual maintenance. Road reconditioning is heavier maintenance of an existing road, such as culvert replacement, surface rock replacement and subgrade repair.

NFS roads are managed by a system of maintenance levels (ML), depending on their intended use and suitability for various types of vehicles. These levels range between ML 1 (closed), ML 2 (suitable for high-clearance vehicles), ML 3 (suitable for passenger vehicles, rough surface), ML 4 (suitable for passenger vehicles, smooth surface), and ML 5 (suitable for passenger cars, dust free, possibly paved).

Management of NFS roads is dynamic in the sense that roads are given both an operational maintenance level (OPML) and an objective maintenance level (OBML). The purpose of maintenance levels is to define the level of service provided by, and maintenance required for, a specific road or road segment. Roads are often built and operated at a higher maintenance level during the timber sale or other activities than they are afterwards.

The OPML is the maintenance level currently assigned to a road considering today’s needs, road condition, budget constraints, and environmental concerns. It defines the level to which the road is currently being maintained. It reflects the current condition and the ability to drive on the roads in the project area. The OBML is the maintenance level to be assigned at a future date considering future road management objectives, traffic needs, budget constraints, and environmental concerns. The OBML may be the same as, or higher or lower than, the OPML.

Currently, there are 52.7 miles of NFS roads, 4.6 miles of NFS trails, and 31.3 miles of non-NFS roads in the Saddle Lakes project area. Existing roads and their maintenance level in the Saddle Lakes analysis area are displayed in Table 108. As described above, the analysis area for the transportation system includes the Saddle Lakes project area and road and trail segments within this area. There are no roads or trails extending from within the project area and terminating outside the project area.

Table 108. Existing roads and trails in the Saddle Lakes project area

Operational Maintenance Level (OPML)	Miles
1 - Basic Custodial Care (Closed)	13.9
2 - Suitable for High-clearance Vehicles	38.8
Total NFS Road	**52.7**
NFS Motorized Trail - All Terrain Vehicle (ATV)	4.6
Non-NFS Road	31.3

Source: Forest Service INFRA database.

Non-NFS roads include decommissioned temporary roads, other public roads, and private roads. Past temporary road construction totals 13.8 miles.

Marine Access Facilities and Log Transfer Facilities

A Marine Access Facility (MAF) is an area used by humans to transfer items from land to saltwater or vice versa, that contains a structure such as a mooring buoy, dock, Log Transfer Facility, boat ramp, or a combination of these. A Log Transfer Facility (LTF) is used to transfer logs and timber products from land-based transportation forms to water-based transportation forms (or vice-versa). These facilities are often used for the movement of equipment needed for logging and road building.

There are two existing LTFs in or near the project area; one at Shelter Cove and the other at Leask Cove (Figure 3). The Shelter Cove LTF is owned by the Forest Service, which was granted a 55 year tideland easement (ADL 105601) by the Alaska Department of Natural Resources, and would be used to transport logs. The Leask Cove LTF is not federally owned. The State of Alaska Division of Forestry (DOF) has applied for a long-term authorization. Agreements would need to be sought by the purchaser, as well as permits from regulatory agencies to use this LTF. In 2012, ALCAN decommissioned the privately owned Coon Cove LTF by removing the bulkhead, and restoring the shoreline to its natural contour.

Shelter Cove

The Shelter Cove MAF consists of a seaplane and boat float, a barge loading and unloading ramp, a sort yard, and a LTF. The LTF is a single level, native log bulkhead with about a one acre sort yard attached to it within an existing rock pit. Currently the lower logs of the bulkhead have deteriorated enough to require the reconstruction of the bulkhead.

The Alaska Department of Environmental Conservation (ADEC) issued authorization AKG-70-1009 under Alaska Pollutant Discharge Elimination system (APDES) General Permit AKG-70-1000 allowing for the discharge of bark and wood debris associated with in-water log transfer and log storage. Effective date of this permit is April 15, 2009 and has expired. Renewal of this permit is in process.

The last dive associated with the Shelter Cove Tideland Lease was completed in 2009. Bark accumulation was 0.24 acres of continuous bark debris and 0.48 acres of discontinuous bark debris, within the requirements of the permit.

Leask Cove

Leask Cove is outside of the project area, and currently is not connected to the Shelter Cove road system. Leask Cove is connected to the Ketchikan road system, but is not accessible to the public as roads crossing private lands are closed to the general public. This site is an approved export appraisal location.

The Leask Cove MAF consists of a boat float, LTF, two 30 ton mooring buoys and a large sort yard. The LTF consists of a low angle ramp for placing logs in the water. Recent dive survey information is not available.

Coon Cove

The Coon Cove MAF consists of a deconstructed LTF. Prior to the deconstruction, there had been a native log bulkhead for loading barges and for placing logs in the water. Less than one-half mile up the road from the LTF is a several acre sort yard. The Forest Service does not have a tidelands lease for this site, and the upland landowner (LTF, sort yard, and adjacent lands) is the Cape Fox Corporation.

Minerals and Geology

There are no mining claims in the project area.

Bridges

There are 5 steel bridges that have an "open" operational status, and 5 bridges that have a "disposed" operational status in the project area. More details regarding bridges can be found in the Draft Transportation Report for the Saddle Lakes Timber Sale.

Fish Stream Crossings

There are a total of 13 red and gray known fish crossings currently in the project area boundary. Any road crossings involving Class I and Class II streams are addressed in the Aquatics section of this chapter. The Tongass National Forest developed juvenile fish passage evaluation criteria matrix with an interagency group of professionals (Flanders and Cariello 2000). The evaluation matrix stratifies culverts by type, and establishes criteria thresholds for culvert gradient, stream channel constriction, debris blockages, and vertical barrier (or perch) at the culvert outlet. Culvert categories are as follows (USDA 2012):

- Green Category: conditions have a high certainty of meeting adult and juvenile fish passage requirements at all desired stream flows;
- Gray Category: conditions are such that additional and more detailed analysis is required to determine their juvenile fish passage ability. This additional analysis includes use of the FishXing analytical software; and
- Red Category: conditions that have a high certainty of not providing juvenile fish passage at all desired stream flows.

Most fish stream crossing structures on roads in the Saddles Lakes project area have been surveyed and have been categorized as green, gray or red. Table 109 shows the number of crossings in each subwatershed within the project area.

Table 109. Fish stream crossings in the Saddle Lakes project area

Subwatershed	Culvert Category			Total Crossings
	Green	Gray	Red	
Calamity Creek-Frontal Carroll Inlet	5	2	4	11
George Inlet-Frontal Carroll Inlet	0	0	1	1
Marble Creek-Frontal Carroll Inlet	0	0	3	3
Salt Lagoon	4	0	3	7
Total	**9**	**2**	**11**	**22**

Source: Forest Service INFRA database.
Note: Includes only crossings within the Saddle Lakes project area.

Travel Analysis Process

The desired condition for the forest transportation system is guided in part by 36 CFR 212.5(b), which provides guidance for determining the minimum road system needed. The Travel Analysis Process (TAP), formally referred to as the Roads Analysis Process (RAP), is a tiered, science-based system of analysis.

The first tier is the Forest-wide Roads Analysis, which is an analysis for the entire Tongass National Forest (USDA 2003). The Forest-wide Roads Analysis provided management recommendations for Maintenance Level (ML) 3, 4, and 5 roads.

The second tier, or mid-level tier, is the Ketchikan-Misty Fiords Ranger District Roads Analysis, which includes the Saddle Lakes project area (USDA 2008d). This analysis details the methods and recommendations for travel management of ML 1 and 2 roads on the Ketchikan-Misty Fiords Ranger District. Combined, these analyses recommend road management objectives for all existing NFS roads on the Ranger District. Recommendations documented in the Ketchikan-Misty Fiords Ranger District Roads Analysis, supplemented by input from public comment, led to the proposed action developed for Access Travel Management (ATM) Plan for Ketchikan-Misty Fiords Ranger District (USDA 2008d).

The third tier is the project-level analysis found in the Transportation Resource Report for the Saddle Lakes Timber Sale. The Road Management Objectives (RMO) for each proposed system road in the project area is detailed on the Road Cards of this DEIS, located in the project record, and those roads selected would become part of the FEIS Record of Decision. The RMO presents the OPML and OBML designated for each proposed NFS road.

The proposed Saddle Lakes Timber Sale incorporates the Decision Notice for the ATM Plan for Ketchikan-Misty Fiords Ranger District dated July 11, 2008. The ATM Plan institutes a system of routes designated for motor vehicle use including class of vehicle, and if appropriate, time of year for motor vehicle use. The designated route system is shown on a Motor Vehicle Use Map (MVUM). The map can be updated annually and adjusted as conditions change. These maps are available at the Ketchikan-Misty Fiords Ranger District. The existing road management objectives for the Saddle Lakes project area are summarized in Table 108.

Environmental Consequences

Effects Common to Alternatives 2 through 6

Alternatives 2, 3, 4, 5 and 6 all propose varying amounts of timber harvest and, subsequently, varying amounts of road construction. Table 110 shows proposed miles by alternative. Each Action Alternative emphasizes a management objective. The effects of road construction, road reconditioning, and access management on resources are discussed in their respective resource sections and reports. Site-specific design criteria can be found on road cards and unit cards located in the project record.

Table 110. Existing and proposed road miles in the Saddle Lakes project area

Measure	Miles of Road					
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Total Proposed Road Construction	0	15.8	11.7	29.4	32.3	24.5
Proposed New NFS Road	0	10.2	6.7	19.6	20.6	16.3
Proposed Temporary Road	0	5.6	5.0	9.8	11.7	8.2
Existing NFS Road	52.7	52.7	52.7	52.7	52.7	52.7
Existing Decommissioned Temporary Road[1/]	13.8	11.9	12.6	11.9	11.9	11.9
Total Decommissioned Temporary Road – after implementation	13.8	17.5	17.6	21.7	23.6	20.1
Total NFS Road – after	52.7	62.9	59.4	72.3	73.3	69.0

implementation						
Road Reconditioning (maintenance of closed roads)	0	10.8	7.7	10.8	11.1	10.8

Source: Forest Service GIS database.

1/ The difference in Existing Decommissioned Temporary Road miles are accounted for in new construction.

Short-term effects (i.e., during implementation) to access and travel management are anticipated as a result from conflicts that may occur during the timber sale where hunters and loggers are using the roads simultaneously during the fall deer season. Long-term effects (after silvicultural activities are completed) would vary by alternative, and would be limited since all new roads (except for road 8300280) in each action alternative and current OPML 1 roads would managed as ML 1 (closed). Table 111 shows miles of road by OBML.

Projects can often become cost prohibitive due to the high road building costs in Southeast Alaska. NFS roads in Southeast Alaska are more expensive to build than in other parts of the nation. The major factor that contributes to higher costs is obtaining the rock for the roadbed. Rock is obtained by blasting bedrock, which is then hauled and shaped into a road over typically soft and uneven terrain. Other factors that contribute to the high cost of constructing Southeast Alaskan roads include the higher costs of shipping, labor, the numerous drainage structures needed, and more complex logistics. To offset these high road costs, sufficient volume must be harvested. In terms of road costs and efficiencies, it is more economical to offer a single large sale versus multiple small sales where roads would be opened and then closed with each entry.

Table 111. Miles of road by objective maintenance level (OBML) in the Saddle Lakes project area

Roads	Objective Maintenance Level	Miles of Road					
		Alt.1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Proposed Roads	1 - Basic Custodial Care (Closed)	0	9.8	6.3	18.6	19.6	15.3
	2 - High Clearance Vehicles	0	0.4	0.4	1.0	1.0	1.0
	3 - Suitable for Passenger Cars	0	0	0	0	0	0
	Decommission Temporary	0	5.6	5.0	9.8	11.7	8.2
Existing & Proposed Roads	1 - Basic Custodial Care (Closed)	23.9	33.7	30.2	42.5	43.5	39.2
	2 - High Clearance Vehicles	8.1	8.5	8.5	9.1	9.1	9.1
	3 - Suitable for Passenger Cars	20.7	20.7	20.7	20.7	20.7	20.7
	Decommission Temporary	13.8	17.5	17.6	21.7	23.6	20.1

Source: Forest Service GIS database.

Road development costs are based upon regional average costs for constructing roads in Southeast Alaska. Costs are applied based upon an average cost per mile for different classifications of road construction and reconstruction, with an additional cost per fish stream crossing. Table 112 displays the estimated transportation related costs of the proposed Saddle Lakes Timber Sale. Costs used for estimating the road development costs for each alternative can be found in the Transportation Resource Report.

Table 112. Estimated transportation related costs and efficiencies for the Saddle Lakes Timber Sale

	Alternative					
	Alt. 1	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**
Total Transportation Related Cost[1/]	$0	$2,210,890	$1,601,121	$4,139,636	$4,540,160	$3,456,697
Proposed New NFS Road	$0	$1,406,147	$899,541	$2,841,422	$2,999,501	$2,340,626
Proposed Temporary Road	$0	$658,343	$579,980	$1,151,814	$1,391,860	$969,671
NFS Road Reconditioning	$0	$86,400	$61,600	$86,400	$88,800	$86,400
LTF Reconstruction	$0	$60,000	$60,000	$60,000	$60,000	$60,000
Total Road & LTF Costs / Net MBF Sawlog ($/NMBF)[2/]	$0	$81	$105	$91	$84	$95

Source: Powell , 2014.

1/ Costs are estimated by road, but are not exact values; these values are presented to provide a relative comparison between the alternatives. All costs are subject to change.

2/ This measure is used to show the relationship between road costs and volume harvested.

New construction over decommissioned roads would require less rock and would have lessened impacts than would an entirely new road that was constructed in an alternate location. Typically this type of construction would utilize existing borrow quarries.

Direct/Indirect Effects

Alternative 1

Under Alternative 1, no new road construction or reconstruction would occur as a result of the Saddle Lakes Project, and current management plans would continue to guide the management of NFS roads. There would be no direct effects resulting from this alternative. All system roads would be managed as directed by the Forest Plan, road management objectives, and previous NEPA decisions. Alternative 1 would neither increase, nor decrease access within the area. This alternative would not impact projects already planned or currently being implemented.

No changes would be made to the Ketchikan-Misty Fiords Ranger District ATM Plan for existing roads. The OBML is the maintenance level to be designated at a future date considering future road management objectives, traffic needs, budget constraints, and environmental concerns. The OBML may be the same, higher, or lower than the OPML. Each NFS road has an OBML assigned. The current OBMLs designated to each road would guide the future management of that road. As resources and funding become available, roads would be closed or upgraded to match the currently designated OBML. Table 108 summarizes the miles of available roads and trails respectively.

The Forest Plan's transportation goal is to "Develop and manage roads and utility systems to support resource management activities; recognize the potential for future development of major Transportation and Utility Systems." Since Alternative 1 proposes no new development of roads, this alternative would forfeit any opportunity to develop or enhance the current road system. Road maintenance, culvert replacement, and road closures prescribed by the Ketchikan-Misty Fiords Ranger District ATM Plan would continue as funding allows.

Alternative 2

Alternative 2 proposes construction of 10.2 miles of NFS road, 5.6 miles of temporary road, and the reconditioning of 10.8 miles of existing NFS roads (Table 110).

Future harvest along these roads is a possibility, as well as future road extensions. However, future opportunities for economical road construction and future land management options would be limited due to the high proportion of helicopter logging systems, and single-tree selection and group selection prescriptions. With a third of a unit's volume and a third or more of its value (dependent upon harvest prescriptions) removed using uneven-aged silvicultural systems, the remaining volume would likely not support future road development.

Of the five action alternatives, Alternative 2 proposes the second lowest amount of new road construction (Table 110). This alternative also ranks the second lowest in transportation development costs (Table 112). The road development proposed in this alternative is the minimum amount of road required to harvest the units in accordance with the objectives of this alternative. Alternative 2 has a high proportion of helicopter logging systems being used, as opposed to conventional logging systems (i.e., shovel and cable). Conventional logging systems require more road development to allow access to the harvest units. However, the additional road development costs are offset by the lower harvest costs achieved by even-aged silvicultural systems, and also allow for greater management options in the future. In areas where road development costs or resource concerns outweigh the benefits of road development, helicopter logging systems were used to allow harvest without additional road development.

In terms of the relationship between road costs and net volume harvested, Alternative 2, at $81 per NMBF, ranked the most efficient in road costs (Table 112). New NFS and temporary road construction would cross seven fish streams. See the Aquatics section for detailed information on fish crossings.

Alternative 3

Alternative 3 proposes construction of 6.7 miles of NFS road, 5.0 miles of temporary road, and the reconditioning of 7.7 miles of existing NFS roads. Future harvest along these roads is a possibility, as well as future road extensions.

Of the five action alternatives, Alternative 3 proposes the least amount of new road construction (Table 110). This alternative also ranks the lowest in transportation development costs (Table 112). The road development proposed in Alternative 3 is the minimum amount of road required to harvest the units in accordance with the objectives of this alternative.

In terms of the relationship between road costs and net volume harvested, Alternative 3, at $105 per NMBF, ranks the least efficient and surpassed the next least efficient in road costs by $10 per NMBF (Table 112). To seek to meet the market demand for timber, Alternative 3 would increase the costs of doing business by reducing road cost efficiencies. New NFS and temporary road construction would cross one fish stream. See the Aquatics section for detailed information on fish crossings.

Alternative 4

Alternative 4 proposes construction of 19.6 miles of NFS road, 9.8 miles of temporary road, and the reconditioning of 10.8 miles of existing NFS roads. Future harvest along these roads is a possibility, as well as future road extensions.

Of the five action alternatives, Alternative 4 proposes the second highest amount of new road construction (Table 110). This alternative also ranks the second highest in transportation development costs (Table 112). The road development proposed in this alternative is the minimum amount of road required to harvest the units in accordance with the objectives of this alternative. Alternative 4 would harvest the second largest amount of timber of any alternative. This alternative also proposes a high proportion of conventional logging systems, as opposed to helicopter. Conventional logging systems require more road development to allow access to the harvest units. However, the additional road development costs are offset by the lower harvest costs achieved by even-aged silvicultural systems. The additional road development also allows for greater management options in the future. In areas where road development costs or resource concerns outweighed the benefits of road development, helicopter logging systems were used to allow harvest without additional road development.

In terms of the relationship between road costs and net volume harvested, Alternative 4, at $91 per NMBF, ranked the third most efficient in road costs (Table 112). New NFS and temporary road construction would cross eight fish streams. See the Aquatics section for detailed information on fish crossings.

Alternative 5

Alternative 5 proposes construction of 20.6 miles of NFS road, 11.7 miles of temporary road, and the reconditioning of 11.1 miles of existing NFS roads. Future harvest along these roads is a possibility, as well as future road extensions.

Of the five action alternatives, Alternative 5 proposes the highest amount of new road construction and road conditioning (Table 110). This alternative also ranks the highest in transportation development costs (Table 112) among the action alternatives. The road development proposed in this alternative is the minimum amount of road required to harvest the units in accordance with the objectives of this alternative. This alternative would harvest the largest amount of timber of any alternative. Alternative 5 also has a high proportion of conventional logging systems being used, as opposed to helicopter. Conventional logging systems require more road development to allow access to the harvest units. The additional road development costs are offset by the lower harvest costs achieved by even-aged silvicultural systems, and also allows for greater management options in the future. In areas where road development costs or resource concerns outweighed the benefits of road development, helicopter logging systems were used to allow harvest without additional road development.

In terms of the relationship between road costs and net volume harvested, Alternative 5, at $84 per NMBF, ranked the second most efficient in road costs (Table 112). New NFS and temporary road construction would cross ten fish streams. See the Aquatics section for detailed information on fish crossings.

Alternative 6

Alternative 6 proposes construction of 16.3 miles of NFS road, 8.2 miles of temporary road, and the reconditioning of 10.8 miles of existing NFS roads. Future harvest along these roads is a possibility, as well as future road extensions.

Of the five action alternatives, Alternative 6 is ranked third highest for the amount of proposed new road construction and road conditioning (Table 110), and third highest for transportation development costs (Table 112). The road development proposed in this alternative is the minimum amount of road required to harvest the units in accordance with the objectives of this alternative. Alternative 6 also proposes a high proportion of conventional logging systems to be used, as opposed to helicopter. Conventional logging systems require more road development to allow access to the harvest units. The additional road development costs are offset by the lower harvest costs achieved by these systems, and also allows for greater management options in the future. In areas where road development costs or resource concerns outweighed the benefits of road development, helicopter logging systems were used to allow harvest without additional road development, or units were deferred for future harvests.

In terms of the relationship between road costs and net volume harvested, Alternative 6, at $91/NMBF, ranked the second least efficient in road costs (Table 112). New NFS and temporary road construction would cross eight fish streams. See the Aquatics section for detailed information on fish crossings.

Cumulative Effects

Alternative 1

Past timber harvests have resulted in a total of 52.7 miles of NFS road and 13.8 miles of decommissioned temporary roads within the Saddle Lakes project area (Table 108). In addition to the existing miles of road in the project area, the proposed State of Alaska Department of Transportation & Public Facilities (ADOT&PF) Ketchikan to Shelter Cove Road connection would add up to 5 miles of open roads within the project area.

The proposed road connection would affect transportation by changing accessibility to the project area from currently only accessible by air or boat, to being accessible by vehicle. About one mile of new road on NFS land would connect with the existing Shelter Cove Road (NFSR 8300000), opening up a considerable amount of access to NFS lands between George and Carroll Inlets. This change in access would likely result in an increase in use of the roads in the project area. However, because the proposed road connection and the 8300000 road are part of the ADOT&PF 2004 Southeast Alaska Transportation Plan, the State of Alaska would assume the maintenance responsibilities of about 8 miles of NFSR 8300000. In all action alternatives this would result in reduced maintenance responsibilities on the part of the Forest Service. Also, for all action alternatives this change in access would require an update the Ketchikan-Misty Fiords Ranger District ATM Plan, and a Travel Analysis of the area, but it is not part of the proposed Saddle Lakes Timber Sale.

Additionally, with the construction of the proposed Ketchikan to Shelter Cove Road connection, transportation development costs may be reduced depending on the timing of ADOT&PF construction as reconstruction of the Shelter Cove LTF may not be needed.

Another cumulative effect of the no action alternative would be a forfeiture of any opportunity to offer restoration and enhancement projects if it is decided to offer the Saddle Lakes project as Stewardship contracts rather than standard Timber Sale contracts.

Alternative 2

Road miles associated with past timber harvest and proposed timber harvest under Alternative 2 would result in a total of 62.9 miles of NFS road and 17.5 miles of decommissioned temporary roads within the Saddle Lakes project area. This is the second lowest incremental increase of NFS and temporary roads created among the action alternatives. Although this is an increase in the cumulative amount of NFS roads proposed, Alternative 2 would minimally help to achieve Forest Plan objectives and desired conditions for transportation as compared to Alternatives 4, 5 and 6.

Alternative 3

Road miles associated with past timber harvest and proposed timber harvest under Alternative 3 would result in a total of 59.4 miles of NFS roads and 17.6 miles of decommissioned temporary roads within the Saddle Lakes project area. This is the lowest incremental increase of NFS and temporary road created among the action alternatives, and would not be as helpful in achieving Forest Plan objectives and desired conditions for transportation as the other action alternatives.

Alternative 4

Road miles associated with past timber harvest and proposed timber harvest under Alternative 4 would result in a total of 72.3 miles of NFS roads and 21.7 miles of decommissioned temporary roads within the Saddle Lakes project area. This is the second highest of the action alternatives in incremental increase of NFS and temporary road. The increase in the cumulative amount of NFS roads would help achieve Forest Plan objectives and desired conditions for transportation.

Alternative 5

Road miles associated with past timber harvest and proposed timber harvest under Alternative 5 would result in a total of 73.3 miles of NFS roads and 23.6 miles of decommissioned temporary roads within the Saddle Lakes project area. This is the highest incremental increase of NFS and temporary road of all the Action Alternatives. The increase in the cumulative amount of NFS roads would help achieve Forest Plan objectives and desired conditions for transportation more than all the other action alternatives.

Alternative 6

Road miles associated with past timber harvest and proposed timber harvest under Alternative 6 would result in a total of 69.0 miles of NFS roads and 20.1 miles of decommissioned temporary roads within the Saddle Lakes project area. This is the third highest incremental increase of NFS and temporary road among the action alternatives. The increase in the cumulative amount of NFS roads would help achieve Forest Plan objectives and desired conditions for transportation.

Design Features and Mitigation Measures

Invasive Species Prevention

Contracts, permits, road maintenance plans and project design documents would contain appropriate provisions concerning the prevention and/or spread of invasive species along the road system (see Invasive Species section in this chapter and mitigation in Appendix C).

New rock quarries may be developed to support new road construction and road maintenance. Quarry sites would be developed within 500 feet of a road, and avoid Class I and Class II stream buffers, eagle and goshawk nest tree buffers, and the Old Growth Habitat LUD. With either the expansion of an existing quarry or the development of a new site, the area footprint would not exceed five acres.

The numerous rock quarries existing throughout the Saddle Lakes project area would allow for easy accessibility to those quarries and may eliminate the need to develop new sites. See the Transportation Resource Report for a listing and location of existing rock quarries in the project area available for future use and expansion.

Fish Crossings

All fish bearing streams would be crossed with a bridge, log culvert structure, or a designed fish passage culvert. These structures would be removed from any temporary road after timber harvest and associated activities are complete.

New Road Construction

In addition to using the existing roads, new NFS and temporary road construction would be needed to access harvest units within the project area for silvicultural activities. All new road construction would be off of the existing road system.

Linear grading would be used to construct the new NFS roads. Linear grading is a construction tool used to reduce survey and design costs. The end result of a road constructed by linear grading is almost identical to normal construction. All streams would receive adequate structures under the specifications, and major structures (bridges and large culverts) are still surveyed and designed. All applicable Best Management Practices (BMPs) would apply (see Appendix C, Table 125).

The effects of the Saddle Lakes Project on transportation would be limited through the site-specific application of Forest Plan Standards and Guidelines and BMPs in all action alternatives (see Appendix C). BMPs are used to ensure soil and water resources are considered in transportation planning activities. Specific BMPs and site-specific design criteria are listed by resource on the road cards in the project record for new NFS roads and in unit cards for temporary roads. In particular, the following measures would reduce overall transportation system effects for the action alternatives:

- Cutslope erosion would be mitigated by timely erosion control;
- Side-slopes of greater than 55 percent grade would be mitigated by full bench construction and slope stabilization, if necessary. See the road cards for site-specific requirements for other areas requiring full bench construction;
- Road construction across muskegs would be mitigated by using wetland protection measures; and
- Open road density, road induced sedimentation, and road maintenance requirements would all be mitigated through timely road storage after silvicultural activities are complete.

All newly constructed NFS roads would have an OBML of 1, but managed as ML 2 (open by permit) during timber sale activities. All of these roads (except for proposed NFS Road 8300280, see below) would be constructed and, after completion of the silvicultural activities, would be placed in a self-maintaining hydrologic status and managed as ML 1 (closed). This would include the placement of drivable water bars or dips at necessary drainage culvert locations to direct water across the road in event the culvert is obstructed. Other design elements, such as oversized culverts, may be used to help reduce the need for routine drainage maintenance.

The ADOT&PF has requested approval from the Forest Service for a right-of-way (ROW) to build, operate, and maintain about one-mile of the Ketchikan to Shelter Cove road on NFS land (proposed NFS Road 8300280). This section of new road would remain open to the public as it would become part of the Ketchikan to Shelter Cove road system.

NFS roads are needed for long term-management of the National Forest to access future timber lands or have resource-specific requirements for engineering controls in construction. Closed NFS roads needed in the future could be re-opened by filling in waterbars or re-installing stream structures. Each of the closed NFS roads would be needed periodically in the future for silvicultural activities or further expansion into development LUDs.

Temporary roads are not needed for long term management of the National Forest. Temporary roads do not access future timber lands, and do not have resource concerns that require major engineering controls in construction. All temporary roads would be decommissioned after timber harvest. This involves removing culverts and bridges, restoring natural drainage patterns, and allowing the roadway to re-vegetate.

Road Reconditioning

Roads proposed for reconditioning are existing NFS roads currently managed as ML 1 (closed). Road closure methods can vary depending on administrative access needs and the timeframe for the next silvicultural entry. Because of the varying closure methods, road reconditioning can vary from replacing all removed structures and brushing the revegetated roadway, to simply blading drivable waterbars. Reconditioning would keep the roads in a safe and useful condition for which they are managed, while meeting Forest Plan Standards and Guidelines and following all applicable BMPs (see Road Cards for road-specific items).

Wetlands Avoidance

Proposed roads are located to minimize impacts to soils, water and associated resources in accordance with BMPs. Wetlands are, at times, unavoidable on some portions of the location due to safety concerns, engineering design constraints and consideration for other resources. Alternatives to the location on wetlands could mean longer, higher-cost roads that may have impacted similar areas of wetlands. High value wetlands (estuaries and tall sedge fens) are located within the Saddle Lakes project area (see Wetlands Resource Report) however no high value wetlands, requiring practicable avoidance, are crossed by any new road locations.

Log Transfer Facilities and Sort Yards

Typically, a sort yard, fuel facility, equipment compound, repair shop, and field office are located at Log Transfer Facility (LTF) sites. Activities with potential for spills of hazardous materials such as fuel require Spill Prevention, Control and Countermeasure plans (SPCC). Forest Service environmental engineers would review all SPCC plans prior to any petroleum products being on site. These plans must comply with all state and federal permits and laws.

In addition, LTFs, sort yards, and fuel storage areas would comply with all applicable Best Management Practices (BMPs) listed in FSH 2509.22, R-10 2509.22 to 2006-2 including, but not limited to the following sections:

- 12.8 – Oil Pollution Prevention and Servicing/Refueling Operations;
- 14.25 – Surface Erosion Control at Facilities;
- 14.26 – Daily LTF Cleanup; and
- 14.27 – Log Storage/Sort Yard Erosion Control.

National Core BMPs (USDA 2012) to be followed include:

- Road-9 – Parking and Staging Areas;

- Road-10 – Equipment Refueling and Servicing; and
- Fac-2 – Facility Construction and Stormwater Control.

Camping facilities could be located either on land or on a barge near an LTF. Existing sites would be used where possible. All camps must obtain the appropriate state permits.

Land camps typically include a water supply, garage disposal, and sewage disposal. Water would be sourced from streams. Garbage would be disposed of by incineration or transported to a municipal disposal site. And sewage would require an approved drain field or septic tank.

A float camp would also get their water from a stream source. Garbage would be incinerated or transported to a municipal disposal site. Sewage would be treated prior to discharge into the ocean.

Due to the remote nature of the Shelter Cove road system, all harvested timber would be hauled by log trucks to a LTF, transferred to the saltwater or barges, and then towed to either a lumber mill or an approved export site. All logs along the road system associated with the action alternatives are being appraised to the Shelter Cove LTF. Export logs are being appraised to the Leask Cove LTF. For the purposes of this analysis, it is assumed all logs would be hauled to the Shelter Cove LTF.

Storms in 2013 damaged the Shelter Cove LTF enough to require replacement of the log bulkhead. Work would be conducted during the normal operating season, typically May through October, and would have to be timed with low and extreme low tides. Because of the necessary tidal timing, work may take up to 6 to 8 weeks to complete construction of the new bulkhead. Work would be conducted within the existing disturbed areas. Work may include:

1. Excavation and removal of existing rock and bulkhead. Excavation would be sloped inland at an angle to provide a safe work area and to minimize material from raveling into the marine environment;
2. End haul of any unsuitable material to an approved location;
3. Old log bulkhead would be placed in an approved location. Removal of other waste material would be the responsibility of the contractor;
4. Haul of borrow material from existing pits if additional material is needed; and
5. Assembly of log crib, backfill, compaction, and placement of geotextiles.

All necessary federal or state permits would be obtained prior to any work for the reconstruction of the LTF. If logs are to be watered, all logs or log bundles would have a soft entry into the water.

Wetlands

This analysis considers the effects of timber harvest and road construction on the wetlands in the proposed Saddle Lakes project area. Additional detailed information regarding the analysis of wetlands and discussion of the literature used to estimate effects can be found in the Soil and Wetland Resource Report for the Saddle Lakes Project area (Silkworth 2014) in the project record.

Timber harvest can affect wetlands by changing the hydrology of the site, and elevating soil moisture. Road building can affect wetlands by displacing wetlands with fill and disconnecting hydrologic connectivity across the wetland due to road ditches or road fills.

Units of Measure:

The following units of measure were used to evaluate effects of the proposed action and compare Alternatives:

- Acres of wetlands lost due to road construction; and
- Acres of wetlands affected by timber harvest.

Methodology

Soil resource inventory maps, including correlations between soil series and plant communities were used, in part, to determine the extent of wetlands in the project area. Field observations and photo interpretations were used to refine the wetland map. Wetland hydrology is inferred from the soil moisture regime. Avoidance of wetlands can be indicated by comparing the overall percentage of wetlands in an area with the percentage of the road that covers wetlands.

Analysis Area

The analysis area for the wetland resource includes individual proposed timber harvest units and the associated land impacted by proposed road construction. Consequently, the direct and indirect effects analysis areas are different for each alternative.

Affected Environment

Wetlands are found throughout the project area, covering about one-quarter of the project area. Due to the extent of wetlands in the project area and because forested wetlands are managed for their timber resources, complete avoidance of wetlands during timber harvest and road construction activities is not feasible or desired. Six wetland types are found in the project area.

Wetland Types

Forested Wetlands: These wetlands typically have hemlock, cedar, or mixed conifer overstories, and ground cover consisting largely of skunk cabbage and deer cabbage. They occur on poorly or very poorly drained hydric soils. They are most common on broad glacial valley bottoms, and on gently sloping hill slopes or benches. These wetlands function as recharge areas for groundwater and streams, and for deposition of sediment and nutrients. They produce commercial forest products and occupy 4,130 acres of the project area. About 94 acres of forested wetlands have been harvested and 54 acres are occupied by roads.

Scrub-Shrub/Muskeg: This type is a combination of muskeg and sedge meadows on peat deposits, and low-growing blueberry and heath on higher rises. Stunted lodge pole pine and mountain hemlock are common. Few stands support commercial timber. They provide summer habitat for terrestrial wildlife species. These wetlands are located at elevations below 1,500 feet and occupy about 4,571 acres of the project area. About 28 acres have been harvested and roads occupy about 34 acres of Scrub-shrub/muskeg wetlands.

Alpine Wetland: This type is a combination of sedge meadows and scrub-shrub on peat deposits, and low-growing blueberry and heath on higher rises. Stunted lodge pole pine and mountain hemlock are common. These wetlands are important for snow storage and can be a source of snowmelt water throughout the summer. These wetlands are located at elevations above 1,200 feet. These habitats provide summer habitat for terrestrial wildlife species. Alpine wetlands occupy about 984 acres of the project area. No timber harvest or road construction has occurred on these wetlands and none is planned under any alternative. Alpine wetlands are not discussed further in this document.

Lakes and Ponds: This wetland type consists of open freshwater on a variety of scales, from small ponds on muskegs to relatively large lakes. No timber harvest or road construction has occurred on this type and none is planned. These wetland types are not discussed further in this document..

Tall Sedge Fens: Tall sedge fens are diverse communities of sedges dominated by tall sedges such as Sitka sedge, with a variety of forbs and occasional stunted trees, usually spruce or hemlock. Soils are deep organic, often with thin layers of alluvial mineral soil. They occur in landscape positions where they receive some runoff from adjacent slopes, resulting in richer nutrient status than muskegs. These wetlands function as areas for recharge of groundwater and streams, deposition and storage of sediment and nutrients, and as waterfowl and terrestrial wildlife habitat, including black bear, mink, river otter, and beaver. Many tall sedge fens contain beaver ponds that provide high-quality waterfowl and salmon-rearing habitat. About 6 acres of existing roads occur on these wetlands. Tall sedge fens are considered high value wetlands and are given protection under riparian Standards and Guidelines in the Forest Plan. No road construction or timber harvest is planned on these wetlands under any alternative and is not be discussed further in this document

Estuaries: Estuaries are unique brackish environments where freshwater mixes with saltwater. They are the most valuable wetland in the project area, supporting complex and productive ecosystems for critical fish and wildlife habitat. These areas are valuable for their habitat for both aquatic and terrestrial species. A high diversity of wildlife is typically found in estuaries. The Forest Plan Standards and Guidelines give estuaries a 1,000-foot buffer. About 3 acres of estuaries occur on the project area and no road construction or timber harvest has occurred in estuaries and none is planned under any alternative. Estuaries are considered high value wetlands and are given a 1,000 foot no harvest buffer in the Forest Plan. Estuaries are not discussed further in this document.

Non-wetlands: Those habitats that do not meet the criteria for being classified as wetlands.

Environmental Consequences

The effect of timber harvest on wetlands (primarily increased soil moisture) is expected to be temporary. All harvested sites are expected to regenerate naturally based on many decades of regeneration surveys. Trees are expected to grow more slowly on wetland sites. The detailed effects are described in the Soil and Wetland Resource Report for the Saddle Lakes project area (Silkworth 2014).

The effects of road building on wetlands may vary based on the substrate (soil type) and the landscape position of the wetland. Regardless of the type and location, road construction on wetlands results in an overall loss of wetland acreage. Hydrologic effects beyond the disturbed soil (road) corridor are expected to be limited to within a few meters of the road. The analysis is based on pertinent pieces of literature discussed in the Soil and Wetland Resource Report for the Saddle Lakes project area (Silkworth 2014). Key pieces of literature include Glaser 1999, Kahklen and Moll 1999, McGee 2000, and Landwehr 2011.Due to the preponderance of wetlands and the interspersed nature of wetlands with uplands on the project area, complete avoidance of wetlands from proposed road construction activities is not practicable. All proposed roads would be constructed according to state-approved BMPs as required by 33 CFR 323. All roads through wetlands would also follow the 15 baseline provisions provided in 33 CFR 323.

Direct and Indirect Effects

Effects Common to all Action Alternatives

No effects are anticipated to wetland resources as a result of implementing the State of Alaska Right-of-way on NFS Lands, the fish passage barrier modification, and the Shelter Cove LTF reconstruction.

Alternative 1

Under Alternative 1, no timber harvest or road construction activities in wetlands would take place as a result of the proposed Saddle Lakes Timber Sale. Therefore, no wetlands would be impacted by timber harvest or road construction activities under Alternative 1.

Vegetation on harvested wetlands would continue to grow toward hydrologic maturity (older stands have already reached this stage).Wetlands impacted by roads in the past would continue to be impacted. Vegetation would occupy ditch lines and, in the case of closed roads the roadbed, may be occupied by red alder. The road prism would remain in an upland condition. Road ditches, where present, support a variety of upland and wetland vegetation depending on local conditions and seed sources.

Alternative 2

Alternative 2 would harvest timber on 364 acres on forested wetlands and 36 acres on scrub-shrub and open muskegs wetlands. Road construction under this alternative would result in conversion of 18 acres of forested wetlands and 6 acres of scrub-shrub and open muskegs to road. Under Alternative 2, 29 percent of proposed road construction is on wetlands.

Alternative 3

Alternative 3 would harvest timber on 207 acres on forested wetlands and 20 acres on scrub-shrub and open muskegs wetlands. Road construction under this alternative would result in conversion of 11 acres of forested wetlands and 3 acres of scrub-shrub and open muskegs to road. Under Alternative 3, 29 percent of proposed road construction is on wetlands.

Alternative 4

Alternative 4 would harvest timber on 374 acres on forested wetlands and 35 acres on scrub-shrub and open muskegs wetland. Road construction under this alternative would result in conversion of 24 acres of forested wetlands and 9 acres of scrub-shrub and open muskegs to road. Under Alternative 4, 25 percent of proposed road construction is on wetlands..

Alternative 5

Alternative 5 would harvest timber 442 acres on forested wetlands and 57 acres on scrub-shrub and open muskeg wetland. Road construction under this Alternative would result in conversion of 26 acres of forested wetlands and 10 acres of scrub-shrub and open muskegs to road. Under Alternative 5, 25 percent of proposed roads are on wetlands.

Alternative 6

Alternative 6 would harvest timber on 374 acres on forested wetlands and 34 acres on scrub-shrub and open muskeg wetland. Road construction under this alternative would result in conversion of 24 acres of forested wetlands and 5 acres of scrub-shrub and open muskegs to road. Under Alternative 6, 27 percent of proposed roads are on wetlands.

Cumulative Effects

The analysis area for cumulative effects to wetlands is the project area. Since the non-Forest Service lands around George Inlet were not needed for the analysis, the Wetland Analysis Area for cumulative effects does not include those lands.

Alternative 1

Under Alternative 1, no timber harvest or road building in wetlands would take place from the proposed Saddle Lakes Timber Sale project. No wetlands would be impacted by direct or indirect effects from new land management. One-hundred twenty-two acres of wetlands have been impacted due to past harvest activity on wetlands.

Alternative 2

Cumulative timber harvest following implementation of Alternative 2 would be 522 acres (5 percent of wetlands on the project area). Cumulative wetland converted to road under alternative 2 is 116 acres (1 percent of the wetlands on the project area).

Alternative 3

Following implementation of Alternative 3 cumulative timber harvest would be 349 acres (3 percent of the project areas wetlands). Following implementation of alternative 3 there would be 108 acres of wetland converted to road (1 percent of the project area wetlands).

Alternative 4

Following implementation of Alternative 4 cumulative timber harvest on wetlands is about 531 acres (5 percent of the wetlands on the project area). Cumulative road construction in wetlands is about 127 acres (1 percent of project area wetlands).

Alternative 5

Following implementation of Alternative 5 cumulative timber harvest in wetlands would be about 621 acres (6 percent of project area wetlands). Roads would occupy about 130 acres of wetland habitat (1 percent of wetlands on the project area).

Alternative 6

Under Alternative 6, cumulative timber harvest in wetlands would be about 522 acres (5 percent of project area wetlands). Roads would occupy 116 acres of wetland habitat (1 percent of wetlands on the project area).

Cumulative Effects of Other Foreseeable Projects

The Ketchikan to Shelter Cove Road Project could add about 2 acres of wetland converted to road on the project area. Cumulatively, implementation of any of the alternatives could result in less than about 1.2 percent of the project area wetlands converted to road.

Other Environmental Considerations

Unavoidable Adverse Impacts

Unavoidable adverse impacts are those impacts that cannot be avoided due to constraints in alternatives. Implementation of Standards and Guidelines, Best Management Practices (BMPs) and specific mitigation would reduce most adverse impacts that would result from the proposed actions (see unit and road cards in Project Record), but the adverse impacts (residual impacts) that would remain are summarized below by resource. Unavoidable adverse impacts result from managing the land for one resource at the expense of the use or condition of other resources. Adverse impacts can be reduced or mitigated by limiting the extent or duration of impacts. Unavoidable adverse impacts for the action alternatives would be the same as those for the proposed action, except where specifically noted.

Table 113 describes the unavoidable adverse impacts of resources in the Saddle Lakes project area.

Table 113. Unavoidable adverse impacts of resources in the Saddle Lakes project area

Resource	Unavoidable Adverse Impacts
Air Quality and Climate Change	None
Aquatics	Unavoidable adverse impacts resulting from the action alternatives include short-term increases in sediment delivery and subsequent turbidity in streams from road construction and increased stream temperatures from removal of canopy cover over feeder streams (Class III/IV). Other short-term impacts include bark accumulation, leachate, and shading impacts to the marine environment near the Shelter Cove LTF. Sediment delivery to streams from on-going road use, crossing structures, and maintenance would be minor, but more long-term in nature.
Environmental Justice	None
Floodplains	None
Heritage	None
Invasive Species	Some invasive plant seed or plant parts could be transported to other areas of the Saddle Lakes project area regardless of mitigation measures taken to eliminate this risk.
Lands and Minerals	None
Plants	Some sensitive plants could be inadvertently trampled during logging operations in spite of directional felling or other spatial protection given around known populations.
Recreation	There would be adverse effects to recreation opportunities with the removal of the Saddle Lakes Recreation Area VPR (Alternatives 4 and 5).
Roadless	None
Scenery	Much of the Saddle Lakes Timber Sale takes place in areas categorized as having Very Low, Low, and Moderate Existing Scenic Integrity (ESI). Generally, proposed harvest would maintain the scenic integrity of the areas at the existing level or lower it a level or two. The Saddle Lakes Recreation Area viewshed has 1,890 acres of Very High and High ESI. Harvest proposed under Alternatives 4 and 5 would change the scenic integrity of the viewshed to Very Low. This reduction of 4 to 5 levels of Scenic Integrity is an adverse effect to the scenery of the area. The scenic integrity of the viewshed would change from one where the scenery is or appears visually intact, to one where harvest

Resource	Unavoidable Adverse Impacts
	activities would dominate the view.
Silviculture	None
Socioeconomics	None
Soils	None
Subsistence	The Saddle Lakes Timber Sale may have a significant possibility of a significant restriction of subsistence uses on deer due to changes in access and demand, but not result in a significant restriction of fisheries subsistence uses, or other wildlife uses.
Timber	None
Transportation	None
Wetlands	Road construction would result in a long-term loss of wetland acreage.
Wildlife	There would be long-term (150-300 years) to permanent loss of old-growth habitat (and habitat capability) for management indicator species (MIS), R10 Sensitive species, and other species of interest (SOI). Alternative 3 would maintain more old-growth habitat than Alternative 2, whereas Alternatives 6, 4, and 5 (in increasing order of impacts) would maintain less old-growth habitat than Alternative 2.

Relationship between the Short-term Use of the Environment and the Maintenance of Long-term Productivity

This section provides the tradeoffs between short-term impacts and long-term impacts to environmental resources that would occur with implementation of the proposed action. Short-term uses, and their environmental effects, are those that occur within the first 10 years following implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services for 50 years and beyond (USDA 2008c, p. 3-2).

The intensity and duration of the effects described in the DEIS depend on the alternative and the mitigation measures applied to protect the resources. Most unavoidable effects (discussed above) are expected to be short-term. Effects would be managed to comply with established legal limits in all cases, such as maximum time for regeneration. Mitigation measures and/or monitoring procedures have been planned for those areas that may be affected to reduce these effects. Specific mitigation measures are documented in the unit and road cards (located in the Project Record; if a decision is made to harvest, mitigation measures for harvest units and roads will be disclosed in the ROD).

Maintaining the productivity of the land is a complex, long-term objective. All alternatives protect the long-term productivity of the project area through the use of specific Standards and Guidelines, BMPs, and mitigation measures. Long-term productivity could change as a result of various management activities proposed in the alternatives. Timber management activities would have direct, indirect, and cumulative effects on the economic, social, and biological environment.

Short-term adverse impacts associated with the proposed action would include the temporary loss of vegetation, loss of soil productivity, temporary increase in erosion potential and sedimentation in streams, potential increase of non-native invasive species, loss of wildlife habitat and displacement of wildlife, slight increases in fugitive dust emissions and other emissions from other sources, temporary loss of public access to roads for recreation and other uses, temporary noticeable changes to the viewshed, and a temporary increase in noise. Some localized adverse effects may occur on a recurring, though temporary, basis. Effects such as road construction, timber harvest, timber hauling, and the operation of internal combustion engines may cause temporary adverse effects to air quality.

Short-term beneficial impacts would include an increase in employment and spending revenue for the local communities and an increase in employment for Southeast Alaska (primarily Ketchikan Gateway Borough and Prince of Wales Island). Counties (i.e., Boroughs) also receive a portion of the revenues generated on NFS lands through the Secure Rural Schools and Community Self Determination Act (2000) and subsequent reauthorizations of this Act. Payments are allocated to counties for use in different types of programs or projects including: schools and roads (Title I); projects to benefit forest lands (Title II); and search, rescue, and firewise community efforts (Title III).

Long-term impacts are highly dependent on the success of mitigation. The loss of the soil resource due to erosion and mass failures would be a long-term adverse impact. There would also be a long-term loss of soil productivity due to the disturbance of the soil structure, which may result in a change in vegetation productivity or an increase in invasive species. However, specific Standards and Guidelines, mitigation measures, and BMPs are required, and it is anticipated there would be minimal long-term impacts for most resources. Long-term impacts to resources would vary with changes in vegetation resulting in long-term adverse impacts to wildlife. Some long-term adverse effects may be unavoidable, such as a permanent loss of old-growth habitat within the development LUDs and a permanent loss of habitat capability to support wildlife populations. This could result in a long-term loss of area for productive old growth and for forage for wildlife.

Irreversible and/or Irretrievable Commitments of Resources

Irreversible and/or irretrievable commitments of resources refer to impacts or losses to resources that cannot be reversed or recovered. The term “irreversible commitments” describes the loss of future options. Irreversible commitments are decisions affecting nonrenewable resources, such as soils, minerals, plant and animal species, and heritage resources. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or the resource has been destroyed or removed. Irreversible effects cannot be reversed. Examples are the extinction of a species or the loss of soil due to erosion and mass wasting (landslides), where the loss is permanent and not reversible. The gradual decline in old-growth habitat may be considered an irreversible commitment (USDA 2008c, pg. 3-2) because the resource has deteriorated to the point that renewal can only occur over a long period of time, 150 years or more for old-growth forest (USDA 2008c, pg. 3-137).

The term “irretrievable commitment” applies to the loss of production or use of natural resources. Irretrievable commitments represent opportunities foregone for the period during which resource use or production cannot be realized. Irretrievable effects change the outputs or commodities of the land’s use. These decisions are reversible, but the production opportunities foregone are irretrievable. An example of such commitments is the allocation of LUDs that do not allow timber harvest to areas containing suitable and accessible timberlands. For the time over which such allocations are made, the opportunity to obtain timber from those areas is foregone and irretrievable. The commitment is irretrievable rather than irreversible because future entries could harvest timber in those areas if they are still classified as part of the suitable timber base. However, irretrievable commitments are reversible. An example of such commitment includes the development of a recreation area within suitable and available timber lands. For the time over which such development is in place, the opportunity to harvest timber from the recreation area is foregone, thus irretrievable.

Identified irreversible or irretrievable commitments in the proposed Saddle Lakes project area are summarized in Table 114.

Table 114. Irreversible and/or irretrievable commitments[1/] of resources identified in the proposed Saddle Lakes project area

Resource	Irreversible Effects	Irretrievable Effects	Explanation
Air Quality and Climate Change	No	No	None of the alternatives are expected to have a measurable impact on the local or global climate or on air quality. The insignificant increase in GHG emissions produced as a result of the project operations would likely be insignificant to any long-term climatic changes. The rate of carbon sequestration would likely continue at the current rate for several years. All action alternatives would likely result in a similar rate of yellow-cedar decline as current conditions. Regeneration rates would also not likely change under any action alternative
Aquatics	No	Yes	Removal of canopy would increase stream temperatures and road crossings would increase sediment inputs to resident and anadromous fish habitat. Use of BMPS would minimize the effects.
Floodplains	No	No	None of the alternatives propose new road construction or timber harvest in floodplains.
Heritage	No	No	Loss of heritage resource sites resulting from accidental damage or vandalism would be an irreversible impact but is unlikely. Standards and guidelines, survey methodology prior to activities, and mitigation measures as specified in this document provide reasonable assurance that no irreversible loss of heritage resources would occur.
Invasive Species	No	Yes	Invasive species spreading into disturbed areas would be irretrievable because the impact would be reversible. Specific Standards and Guidelines, BMPs, mitigation and monitoring would prevent and/or minimize spreading certain invasive plants further into the project area.
Lands and Minerals	No	No	There are no commitments of resources which would affect lands or minerals.
Plants	No	No	Specific Standards and Guidelines for sensitive plants would prevent these losses.
Recreation	No	Yes	There would be a loss of recreation opportunities with the removal of the planned Saddle Lakes Recreation Area VPR designation (Alternatives 4 and 5). This would be an irretrievable commitment because the recreation opportunity in this area would be foregone.
Roadless	No	No	Inventoried roadless areas (IRAs) are set aside to determine their eligibility for inclusion into the National Wilderness Preservation System. No direct effects to IRAs are anticipated, and indirect effects

Resource	Irreversible Effects	Irretrievable Effects	Explanation
			would not lead to a loss of this resource.
Scenery	No	Yes	Reduction in the visual quality of an area due to timber harvesting would be an irretrievable impact; however, impacted viewsheds typically recover (from a visual quality standpoint) after about 40 years.
Silviculture	No	Yes	It is not expected that old-growth characteristics would naturally reoccur within harvest areas for 150 years or more; however, old-growth forest structure would eventually return to the landscape.
Socioeconomics	No	No	There would be increased use of local contractors during timber sale operations. This commitment could be viewed as a beneficial impact because of the jobs created and/or maintained, particularly in an economy where timber jobs have been declining.
Soils	Yes	Yes	The loss of the soil resource due to detrimental disturbance may be considered a partial irreversible impact because soil productivity may be permanently altered. Impacts have been minimized to the extent feasible in all action alternatives by following Region 10 Soil Quality Standards, incorporating BMPs and applying mitigation measures as specified in this document. Future studies may determine to what extent recovery occurs from soil displacements. Soils displaced by road construction activities are considered an irretrievable impact. Long-term loss of soil productivity is irreversible because the soil resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense
Subsistence	Yes	No	Reductions in deer could result in a significant possibility of a significant restriction on subsistence use of deer. Effects from action alternatives are expected to be minor for subsistence fishery resources. Any effects would likely be small, localized to the site or affected stream reach, and short-term.
Timber	No	Yes	Foregoing timber harvest opportunities at this time in certain areas, due to resource concerns or economics, may represent an irretrievable commitment of resources because that volume cannot be harvested. The commitment is irretrievable rather than irreversible because future entries could harvest those areas if they are still classified as part of the suitable timber base.
Transportation	Yes	No	Road construction is an irreversible action because of the time it takes for a

Resource	Irreversible Effects	Irretrievable Effects	Explanation
			constructed road to revert to natural conditions. Irreversible actions also include the associated rock quarries which are developed in conjunction with these roads.
Wetlands	Yes	No	Wetlands displaced by road construction activities are irreversible commitments because the wetland resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or because the wetland soils have been destroyed or removed. In road construction, wetland soils are either scraped away or are buried beneath road fill, greatly limiting their pre-disturbance function.
Wildlife	Yes	No	Under the current Forest Plan 100 year rotation, young growth timber in development LUDs, would be re-harvested before the stands develop old-growth characteristics (150+ years). Following complete removal of the overstory, it may take 300 years or more for a stands in Southeast Alaska and Northern coastal British Columbia to develop old growth ecological characteristics (Orians and Schoen 2013). Therefore, clearcut timber harvest creates a permanent loss of old-growth habitat within development LUDs and a permanent loss of habitat capability to support wildlife populations.

1/ Irreversible commitments describe the loss of future options to a given resource; these effects cannot be reversed. Irretrievable commitments apply to the loss of production, harvest or use of natural resources; these effects can be reversed.

Chapter 4. Lists and References

Chapter 4 includes lists of the document contributors (both IDT members and other contributors), a distribution list for agencies, individuals, organizations, municipalities, Indian Reorganization Act (IRA) tribes and other tribal groups that will be sent the DEIS, literature cited in the DEIS, and an index of key words by page number.

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A copy of the Saddle Lakes Timber Sale DEIS was sent to the following agencies, organizations, businesses, public officials, municipalities, individuals, and tribal groups. These parties either commented on the project, requested a copy of the EIS at some time in the NEPA process, are part of the Forest Service's mandatory mailing list (Forest Service Handbook (FSH) 1909.15, Sections 23.2 and 63.1) or are recognized municipalities or tribal groups potentially affected by, or interested in, the Saddle Lakes Timber Sale project.

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Appendix A – Reasons for Scheduling the Environmental Analysis of the Saddle Lake Project

Introduction

Coordinated timber harvest project planning is essential for meeting the goals of the Tongass Land and Resource Management Plan (Forest Plan) and to provide an orderly flow of timber to local industry. To determine the volume of timber to offer each year, the Forest Service can look to current market conditions and the level of industry operations. However, the planning process for timber harvest projects requires the Forest Service to rely on projections of future harvest levels to decide how many timber harvest projects to begin each year. This document explains how the Forest Service uses information about future markets and past experience to determine the volume of timber that needs to be started through this process each year. This appendix relies on the current annual timber demand analysis and the most recent project schedule.

The purpose of this appendix is two-fold: first, to explain why this project was selected for inclusion into the Tongass Timber Program and second, to explain the basis and components of the Tongass Timber program. To accomplish this, the following questions are answered:

How does the Saddle Lakes Project fit into the Tongass Timber Program?

Why is timber from the Tongass National Forest being offered?

How does the Forest Service develop forecasts about future timber market demand?

What steps must be completed to prepare a contract for offer?

How does the Forest Service maintain an orderly and predictable timber program?

How Does the Saddle Lakes Project Fit into the Tongass Timber Program? How Does the Forest Service decide where Timber Harvest Projects are Located?

This project is currently in Gate 2, Project Analysis and Design (See Forest Service Handbook 2409.18, Chapter 30 and subsequent discussion about the Gate System) and involves environmental analysis and public disclosure as required by the National Environmental Policy Act (NEPA). The sawlog volume considered for harvest under the Alternatives ranges from an estimated 15.3 to 54.3 MMBF of sawtimber volume and the utility Volume ranges from 1.8 to 6.4 MMBF with harvest potentially beginning in 2015. This volume would contribute to the Tongass timber program. A no-action alternative was also analyzed in the DEIS. If an action alternative is selected in the decision for this project, this volume will be added to the volume available for offer.

This project contributes to the timber program planning objective of providing an orderly flow of timber from planning through harvest to meet timber supply requirements. A position statement (Gate 1) was completed to document that this project warrants additional investment of funds and personnel. Therefore, it is reasonable to be conducting the environmental analysis for this project at this time.

This project meets all laws and regulations governing the removal of timber from National Forest System lands, including Forest Service policies as described in Forest Service manuals and handbooks, and the Forest Plan and Record of Decision. Based on current year and anticipated future timber demand and the timber supply provisions of the Tongass Timber Reform Act, the Saddle Lakes project is needed at this time to meet timber volume needs identified on the approved multiple-year timber plan. Anticipated budget allocations and resources are sufficient to prepare and offer this project as scheduled.

Why is This Project Occurring in This Location?

Areas are selected for environmental analysis for timber harvest projects for a variety of reasons. The reasons this project was considered in this area include:

The project area offers economic timber that could contribute to local demand.

The project area includes a developed road system that provides access to many of the proposed timber harvest units and may be used to transport harvested logs. The existing MAFs at Shelter Cove and Leask Cove could be used.

The project area is on the 8300000 road system, about 14 miles northeast of Ketchikan, AK and would help support direct and indirect employment through the supply of personnel, goods and services.

The Saddle Lakes project area contains sufficient acres of suitable and available forest land to make this timber harvest proposal reasonable. Areas with available timber need to be considered for harvest in order to provide a supply of timber from the Tongass National Forest which (1) seeks to meet- the annual market demand from such forest, and (2) seeks to meet- the market demand from such forest for each planning cycle, pursuant to Section 101 of the Tongass Timber Reform Act (TTRA).

The proposed harvest units are within development land use designations (LUD) as allocated by the Forest Plan.

Effects on subsistence resources from timber harvest are projected to have few differences based on the sequence in which areas are harvested. Harvesting other areas with available timber on the Tongass National Forest is expected to have similar potential effects on resources, including subsistence resources, because of widespread distribution of subsistence use and other factors. Harvest within other areas is foreseeable under the Forest Plan.

In conclusion, this project area can provide a mixture of uses in compliance with the laws that govern National Forest management and is consistent with direction in the Forest Plan.

Why is Timber Volume from the Tongass National Forest Being Offered?

National Legislation

On a national level, the legislative record is clear about the role of the timber program in the multiple-use mandate of the national forests. One of the original objectives for creation of national forests was to provide natural resources, including timber, for the American public. The Organic Administration Act of 1897 (partially repealed in 1976) directed the agency to manage the forests in order to "improve and protect the forest ... [and] for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of the citizens of the United States" (emphasis added). The Multiple-Use Sustained Yield Act of 1960 directs the Forest

Service to administer federal lands for "outdoor recreation, range, timber, watershed, and wildlife and fish purposes."

The National Forest Management Act (NFMA) of 1976 states that "the Secretary of Agriculture...may sell, at not less than appraised value, trees, portions of trees, or forest products located on National Forest System Lands." Although the heart of the Act is the land management planning process for national forests, the Act also sets policy direction for timber management and public participation in Forest Service decision making. Under NFMA, the Forest Service was directed to "limit the sale of timber from each national forest to a quantity equal to or less than a quantity which can be removed from such forest annually in perpetuity on a sustained-yield basis."

The NFMA directs the Forest Service to complete land management plans for all units of the National Forest System. Forest plans are developed by an interdisciplinary team to provide for the coordination of outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness. Forest plans designate areas of national forest where different management activities and uses are considered appropriate, including those areas suitable for timber harvest.

Alaska-Specific Legislation

Timber volume from the Tongass National Forest is being offered as part of the multiple-use mission of the Forest Service identified in the public laws guiding the agency. In addition, Alaska-specific legislation and the Tongass Forest Plan direct the Forest Service to provide timber so as to seek to meet market demand, subject to certain limitations.

The Alaska National Interest Lands Conservation Act (ANILCA) and the Tongass Timber Reform Act (TTRA) provide direction on the issue of Tongass timber supply. TTRA, Section 101 deleted ANILCA, Section 705 (a), which mandated a fixed timber supply and fixed budget appropriations, and inserted the following :

> "Sec. 705 (a) Subject to appropriations, other applicable law, and the requirements of the National Forest Management Act of 1976 (P.L. 94-588); except as provided in subsection (d) of this section, the Secretary shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the annual market demand from such forest for each planning cycle."

Tongass National Forest Land and Resource Management Plan (Forest Plan, as amended)

The Tongass Land Management Plan was completed in 1979 and revised in 1997. The Record of Decision (ROD) for the 2008 Tongass Land Management Plan Amendment (Forest Plan) was signed by the Alaska Regional Forester on January 23, 2008. The Forest Plan incorporates new resource information and scientific studies and reflects an extensive public involvement process. The 2008 Forest Plan defines appropriate activities within each of 19 land use designations (LUDs). Approximately 79 percent of the Tongass was allocated to LUDs where commercial timber harvest is not allowed.

The decision for the 2008 Forest Plan establishes the annual average Allowable Sale Quantity (ASQ) at 267 million board feet (MMBF). This is the same as the ASQ established for the previous Forest Plan in 1997.

The environmental effects analysis in the Final EIS for the 2008 Forest Plan assumed the maximum timber harvest allowed under each alternative would occur annually over the next 100 to 150 years. In that way, the Forest Plan analysis displayed the maximum environmental effects that could be reasonably foreseen. However, substantially less timber volume and acres have actually been harvested over the last several years than the maximum level allowed under the 1997 Forest Plan (see Figure 20). Thus, the effects on resources are expected to be less than projected in the 2008 Forest Plan Amendment Final EIS.

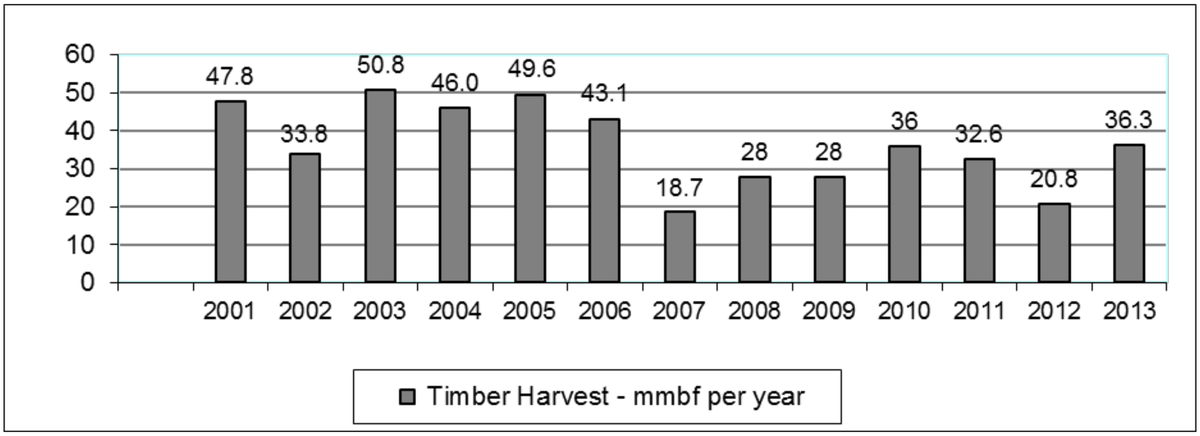

Figure 20. Tongass timber harvest, fiscal years 2001 to 2013

The Record of Decision for the 2008 Forest Plan Amendment includes transition language for projects that were being planned when the Forest Plan was completed. That language identifies three different categories of projects, depending on how far along they were in the project planning process when the Forest Plan Amendment was completed, and specifies the extent to which projects in each category must comply with the amended Forest Plan. The transition language lists the Saddle Lakes project as being in Category 3, which requires the Forest Supervisor to incorporate the direction in the 2008 Forest Plan.

USDA Investment Strategy for Creating Jobs and Healthy Communities in Southeast Alaska

Most rural communities in Southeast Alaska are experiencing declining populations especially in the younger age groups, fewer job opportunities, and increasing energy costs. USDA agencies (Farm Service Agency, Forest Service, and Rural Development) and the U.S. Economic Development Administration (USEDA) are partnering to revitalize communities by moving towards a more diversified economy and restore public lands by supporting job creation in areas that offer growth potential: fisheries and mariculture, recreation and tourism, forest management, and renewable energy.

The goals of this USDA Investment Strategy include:

- creating quality jobs and sustainable economic growth;
- promoting small business creation, expansion, and retention;
- improving access to capital; and
- promoting job training and educational opportunities.

Working with the Juneau Economic Development Council (JEDC), USDA agencies collaborated with over 120 leaders from local businesses and communities to identify initiatives in four areas—Ocean

Products, Visitor Services, Forest Products, and Renewable Energy— creating a regional competitive advantage, raising the economic conditions for all of Southeast Alaskans.

The partnership recently released a report that lists job creation initiatives for Southeast Alaska. The report (USDA Forest Service 2011d) was developed by these four economic cluster working groups made up of Southeast Alaska leaders in business, academia, nongovernmental organizations and state, local and tribal governments. The process brings business leaders together with government and others to collaborate rather than compete; providing a platform where ideas to create economic opportunities can emerge.

Addressing Sustainable Forestry in Southeast Alaska

On July 2, 2013, the Secretary of Agriculture issued a memorandum (1044-009) to support the transition away from old-growth timber harvesting towards a forest industry based on the utilization of young- growth timber. The goal is to transition from the dependence on harvest of old-growth forest to young growth forest management in a manner that allows the timber industry to adapt to these changed conditions to provide jobs and economic support for the communities of Southeast Alaska. The maintenance of the timber industry in Southeast Alaska will contribute to the diversity of the economy with the on-going development of other economic sectors such as tourism, recreation, fishing and mariculture and renewable energy.

To achieve this transition, a supply of old-growth timber will continue to be offered for sale while commercial young- growth timber processing and marketing opportunities are explored and developed. The amount of old-growth timber harvested will decrease as more young-growth timber becomes economically viable to harvest. Small amounts of old-growth harvest will continue occur to supply niche markets and small mills, such as music wood, during and after the young-growth markets are established. The Saddle Lake project, which is scheduled to be offered in 2015, provides some of this old-growth timber that can be used to bridge industry’s needs during the transition to young-growth management.

How Does the Forest Service Develop Forecasts about Future Timber Market Demand?

Consistent with the provisions of the Tongass Timber Reform Act, the Forest Service makes two types of forecasts of market demand for timber from the Tongass National Forest. The first, “planning cycle market demand,” forecasts the long-term demand for timber from the Tongass over the life of the Forest Plan, derived from trends in international demand for end products manufactured from such timber. Based on these long-term projections, the Forest Service also estimates annual market demand in order to determine how much timber to plan to offer.

Market Demand for the Planning Cycle

Research economists with the Forest Service’s Pacific Northwest (PNW) Research Station have prepared several studies of “planning cycle market demand” for Tongass timber, including three General Technical Reports by Brooks and Haynes (1990, 1994, and 1997). In 2006, the PNW Research Station published new harvest projections (Brackley et al. 2006). This report and an addendum to it (Brackley and Haynes, 2008) provided key information for the 2008 Forest Plan Amendment analysis.

The Brackley et al. 2006 projections include four scenarios: 1) limited lumber production, which represents the situation the timber industry in Southeast Alaska has faced over the last several years; 2) expanded lumber production, which assumes some form of demand stimulus occurs; 3) medium integrated industry, which assumes sufficient demand stimulus occurs to cause an expansion of the current industry capacity and better utilization of forest products removed from public timber contracts; and 4) high integrated industry, assumes some kind of additional demand stimulation to result in full utilization of all types of forest products available from the Tongass. More detailed information about these scenarios and their assumptions is in the Forest Plan Amendment Final EIS and ROD (January 2008), and in Brackley and Haynes, 2008.

The Brackley et al. 2006 study displays alternative projections of derived demand for timber from the Tongass National Forest. For the first two scenarios, which assume no market for low-grade sawlogs and utility volume, the estimates of planning cycle demand include sawtimber only. For the two integrated industry scenarios, the projections include total volume, including both sawlogs and utility. All scenarios include timber with a wide range of diameters and ages. Utility volume must be cut down along with higher-quality timber even if there is no demand for it. It is the total volume of timber cut on the Tongass that is of most interest, in part because environmental effects result from total volume cut. In addition, any comparison of scenarios must be based on comparable figures. Table 115 shows annualized Brackley et al 2006 projections for all four scenarios in terms of total Volume.

Table 115. Tongass National Forest timber volume necessary to supply derived demand for decked log volume and chips, in million board feet (MMBF) (Alexander 2008)[1/]

Year	Scenario 1 Limited lumber	Scenario 2 Expanded lumber	Scenario 3 Medium integrated	Scenario 4 High integrated
2007	49.8	61.9	67	67
2008	49.8	66.4	139	139
2009	51.3	72.4	151	151
2010	52.8	78.5	166	166
2011	52.8	84.5	184	184
2012	54.3	90.5	204	286
2013	55.8	98.1	204	291
2014	57.3	105.6	204	295
2015	58.9	113.2	204	299
2016	58.9	122.2	204	303
2017	60.4	131.3	204	308
2018	61.9	140.3	204	312
2019	63.4	150.1	204	317
2020	64.9	163.0	204	325
2021	66.4	175.0	204	333
2022	67.9	187.1	204	342
2023	69.4	200.7	204	351
2024	70.9	215.8	204	360
2025	72.4	230.9	204	370

1/ Annualized calculation to fulfill derived demand scenarios from Brackley et al. (2006). This table was created using annualized values provided by Dr. Allen Brackley (personal communication, Nov 29 2006) from the model used to develop derived demand estimates in Brackley et al. (2006). The values for Limited Lumber Scenario and Expanded Lumber scenarios reported in this table have been adjusted to include low quality material not included in the demand projections and include saw logs, cedar export, and utility (chip) volumes available from sawmill production. The Medium and High Integrated Scenarios are not adjusted and include saw logs, cedar exports, chip volumes, low-grade material, and utility in Brackley et al. (2006).

Annual Market Demand

The annual market demand forecast is a methodology used to set the short-term goals for the Tongass Timber Program – volume the Forest plans to offer in the current year, pending sufficient funding and sufficient NEPA-cleared volume.

The formulas and procedures used in forecasting annual market demand are described in a Forest Service report titled Responding to the Market Demand for Tongass Timber (Morse, 2000). These procedures, which have become known as the "Morse methodology," are based on the premise that:

> Forest product markets are Volatile, especially in the short run.
>
> Timber purchasers in Southeast Alaska have few alternative suppliers of timber if they cannot obtain it from the Tongass National Forest. Oversupplying this market has relatively few adverse economic effects; undersupplying it can have much greater negative economic consequences.
>
> It takes years to prepare National Forest timber for sale, including completion of environmental impact statements.
>
> It is difficult to estimate demand for timber from the Tongass, even a year or two in advance.
>
> Industry must be able to respond to rapidly changing market conditions in order to remain competitive.

Accordingly, the Morse methodology establishes a system that considers factors such as mill capacity and utilization of that capacity, and seeks to build and maintain sufficient volume of timber under contract (i.e., timber purchased but not yet harvested) to allow the industry to react promptly to market fluctuations. Industry actions such as annual harvest levels are monitored and timber program targets are developed by estimating the amount of timber needed to replace volume harvested from year to year. The methodology is adaptive, because if harvest level drop below expectations and other factors remain constant, future timber offerings would also be reduced to levels needed to maintain the target level of volume under contract. Conversely, if harvest levels increase unexpectedly, future timber volume targets would also need to increase sufficiently to ensure that the inventory of volume under contract is not exhausted. By dealing with uncertainty in a flexible, science-based fashion, the Morse methodology is an example of adaptive management.

The Morse methodology originally used the projected harvest from the final 1997 Brooks and Haynes report. These procedures were updated (Alexander, 2008) to use the annual projected harvest figures from Brackley et al. 2006 in calculations of annual timber offer targets. No further changes to the Morse methodology were required as a result of the updated long-term demand projections contained in the Brackley et al. study.

In 2008, due to the Region 10 shipment policy, the Ketchikan veneer mill, and the success of Alaska producers in niche or specially markets, Brackley et al. 2008 determined that demand for National Forest timber in Alaska was on a trajectory most similar to scenario 2 (expanded lumber production). In 2011, due to the sharp downturn in wood products markets, the 'Limited Lumber' scenario was used. However, due to the export policy and good overseas markets, this projection is back to being based on the 'Expanded Lumber, Scenario 2.

For FY 2014, the goal for volume of timber to be offered is 142 MMBF. This number is not intended to represent actual timber purchases in any given year. Rather, it reflects the estimated volume of timber the Forest Service needs to offer to replace the volume expected to be harvested and help build a 2 to 3 year supply of timber under contract, which allows the industry to respond to market fluctuations. The actual volume of timber offered in any given year, however, reflects a combination of factors, such as final budget appropriations; completing the NEPA process; the practice of offering smaller sales for smaller operators rather than all the volume from a NEPA decision; the statutory requirement that timber sales offered in the Alaska Region appraise positive; and volume affected by litigation. Due to these factors, the amount of timber that is offered and sold may be less than the expected timber purchases as predicted in the annual demand calculations. The document displaying the annual demand calculation and a summary of the factors used in these calculations are in the project record and on the Alaska Region public website (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5349461.pdf).

The planned annual timber volume offer could include a combination of new, previously offered, and reconfigured timber sales. Both green timber and salvage sales will be components of this program. Offerings will consist of those targeted for Small Business qualified firms, as well as a portion of the volume being made available for the open market.

For planning and scheduling purposes, the Tongass uses a 5-year timber sale plan, which is consistent with Forest Service Manual 2430. This 5-year plan is based on completed and ongoing environmental analyses and contains information to purchasers and other interested parties, and provides a plan that can be adjusted in response to changing market conditions. This plan is also located on the Alaska Region timber management public website after it is approved by the Forest Supervisor (see the reference section at the end of this appendix for the internet address).

Both the “annual market demand” and the “planning cycle market demand” projections are important for timber program planning purposes. They provide guidance to the Forest Service to request budgets, to make decisions about workforce and facilities, and to indicate the need to begin new environmental analysis for future program offerings. They also provide a basis for expectations regarding future harvest, and are an important source of information for establishing the schedule of probable future offerings. More information on timber demand on the Tongass National Forest is presented in Appendix G of the Forest Plan Amendment Final EIS (USDA Forest Service 2008c).

What Steps Must Be Completed to Prepare a Timber Volume Contract for Offer?

The Tongass National Forest’s timber program is complex. A number of projects are underway at any given point in time, each of which may be in a different stage of planning and preparation. A system of checkpoints, or “gates”, helps the Forest Service track the accomplishments of each stage of a project from inception to contract termination.

Gate 1 – Initial Planning of Timber Harvest Project

A Timber Harvest Project Plan, often referred to as a Position Statement, is a brief analysis of the project area with the intent of determining the feasibility of a potential timber sale. After the Position Statement is developed, the Forest Service decides whether the project area merits continued investment of time and funds for completion.

Gate 2 – Project Analysis, and Decision

This step is commonly referred to as the “NEPA” phase and includes field work, public scoping, analysis, draft disclosure of the effects of the project on the environment, public comment, final analysis and disclosure, decision, and potentially administrative appeals and litigation. Gate 2 activities must be completed before a contract is awarded. Legislation, policy changes, and appeals and litigation have recently extended completion of some projects, often doubling the desired time frame.

Gate 3 – Preparation of a Timber Harvest Contract

During this step, the information and direction included in the decision document from Gate 2 is used to layout units and design roads on the ground. Additional site-specific information is collected at this time. In order to maintain an orderly flow of timber volume, Gate 3 activities need to be complete before a contract is offered for bid.

Gate 4 – Advertise a Contract

The costs and value associated with the timber volume designed in Gate 3 are appraised and packaged in a contract. The contract is a legally binding document that tells a prospective contractor how the timber must be harvested to conform to the project decision document. This step occurs during the final year of the project development and culminates with the advertisement of the project for sale.

Gate 5 – Bid Opening

Gate 5 is completed with the opening of bids for the project. If a bid is submitted, contractual provisions govern when the award of the contract takes place, the contract length and operation season, and how timber removal is to occur.

Gate 6 – Award a Contract

Gate 6 is the formal designation of a contract between a bidder and the Forest Service.

How Does the Forest Service Maintain an Orderly and Predictable Timber Program?

Pools of Timber (Pipeline Volume)

As discussed earlier, the Forest Service tracks the accomplishment of the different steps of development of each timber harvest contract with the Gate System (Forest Service Handbook 2409.18). From a timber program standpoint, it is also necessary to track and manage multiple projects as they move through the Gate System. Because of the timeframes needed to accomplish a given timber harvest project and the complexities inherent in that project and program development, it is necessary to track various timber program volumes from Gate 1 through Gate 6.

The goal of the Tongass National Forest timber program is to provide an even flow of timber offerings on a sustained-yield basis to seek to meet market demand. In recent years, this has been difficult to accomplish due to a combination of uncertainties such as delays related to appeals and litigation; changing economic factors, such as rapid market fluctuations; and industry-related factors, such as changes in timber industry processing capabilities. To achieve an even flow of timber volume offerings, ‘pools’ of volume in various stages of the Gate System are maintained so volume offered can be balanced against current year demand and market cycle projections.

Today, upward trends in demand are resolved by moving out-year timber projects forward, which may leave later years not capable of meeting the needs of the industry. In other instances, a number of new projects are started based on today’s market but will not be available for a number of years. By the time the added projects are ready for offer, the market and demand for this volume may have changed. Three pools of timber volume are tracked to achieve an even flow of timber harvest offerings.

The objective of the timber pools concept is to maintain sufficient volume in preparation and under contract to be able to respond to yearly fluctuations in a timely manner. Table 116 displays the current estimated volume in each pool, as well as the goal which the Tongass has established for the volume to be maintained in each pool, based on historic patterns. Appeals and litigation can cause timber harvest projects to be reevaluated, which can cause delays in making projects available to move through the pools, thereby not fully meeting the goals for volumes in each pool.

Pool 1 - Timber Volume under Analysis (Gate 1 and Gate 2)

Volume in Gate 1, the initial planning step, represents a large amount of volume, but represents a relatively low investment in each project. This relatively low investment level offers the timber program manager a higher degree of flexibility and thus, does not greatly influence the flow of volume through the pipeline. A signed Project Plan (FSH 2409.18, Chapter 20) is the completion of this gate. Areas being considered at this time are Alder Creek, Sitkoh-False Island, Neck Lake, Portage Bay, Kuiu Island, Twelvemile Arm, Shrimp Bay, Polk Inlet, Thomas Bay, Frosty Bay, and Zarembo Island. The amount of the volume identified during this stage is subject to change during the Gate 2 analysis.

Gate 2, timber volume under environmental analysis as directed by the National Environmental Policy Act (NEPA), includes projects being analyzed and undergoing public comment through the NEPA process. This pool includes any project that has started the scoping process through those projects ready to have a decision issued. In addition, tracking how much volume is involved in appeals or litigation may be necessary to determine possible effects on the flow of potential timber projects. A signed NEPA decision (FSH 2409.18, Chapter 30) is the completion of this gate unless the project is subsequently appealed and/or litigated. Volume affected by appeals and litigation is tracked as a subset of this pool (Table 117). Project areas under analysis at this time, in addition to this project, are Navy, Mitkof Island, Wrangell Island, and Kosciusko Island.

Based on historic patterns, the Tongass has established a goal for the pipeline volume to be maintained in each of the timber pools. The goal for Pool 1 is to be maintained at approximately 4.5 times the amount of the projected harvest to account for projects at various stages of analysis. That goal reflects a number of factors which can lead to a decrease in volume available, such as a decision in Gate 1 to drop further analysis in a particular planning area (called the “no go” decision), a falldown in estimated volume between Gate 1 and Gate 2, and volume not available for harvest due to appeals or litigation.

Pool 2 - Timber Volume Available for Offer (Gates 3, 4, and 5)

Timber volume available for offer includes projects for which environmental analysis has been completed, and have had any administrative appeals and litigation resolved. Enough volume in this pool is needed to be maintained to be able to schedule future offerings of the size and configuration that best meets market needs in an orderly manner. Although projects may meet the above criteria, contracts may not be offered if the volume appraises deficit or if changed circumstances would affect the ability to offer them. Whether an offering appraises deficit may change over time depending on the market and other factors. Also, some projects are either designed for small sales, or otherwise slated for small sales, as part of the decision or as part of an informal appeal resolution.

The amount of volume to be offered as small sales is based on a determination of the need of mills in the vicinity of the project area. Also taken into consideration is the amount of volume under contract.

As a matter of policy and sound business practice, the Forest Service announces probable future offerings through the Periodic Timber Sale Announcement. Delays at Gate 2 have affected preparation (Gate 3) and have made scheduling of offers uncertain. At Gate 4, contracts have been fully prepared and appraised, and are available to managers to advertise for bid. This allows potential purchasers an opportunity to do their own evaluations of these offerings to determine whether to bid, and if so, at what level.

Timber in this pool can include a combination of new offers, previously offered unsold contracts, and remaining volume from cancelled contracts. The goal is to maintain Pool 2 at approximately 1.3 times the amount of the projected harvest to allow flexibility in offering contracts.

Pool 3 - Timber Volume under Contract (Gate 6)

Timber volume under contract contains the volume that has been sold and a contract awarded to a purchaser, but which have not yet been fully harvested. Contract length is based on the amount of timber in the contract, the current timber demand, and the accessibility of the area for mobilization. The longer the contract period, the more flexibility the operator has to remove the timber based on market fluctuations. Timber contracts typically initially give the purchaser 3 years to harvest and remove the timber purchased; however, they can be extended under certain circumstances, such as inoperable periods of weather, injunctions, and other contractual delays.

The Tongass attempts to maintain roughly 3 years of remaining volume under contract to the industry as a whole. This volume of timber is the industry’s dependable timber supply, which allows adaptability for business decisions. This practice is not limited to the Alaska Region, but is particularly pertinent to Alaska because of the nature of the land base. The relative absence of roads, the island geography, the steep terrain, and the consequent isolation of much of the timber land means that timber purchasers need longer-than-average lead times to plan operations, stage equipment, set up camps, and construct roads prior to beginning harvest.

A combination of projected harvest and projected demand is used to estimate the volume needed to maintain an even-flow timber program. As purchasers harvest timber, they deplete the volume under contract. Timber harvest contracts are continuously planned and offered by the Forest Service to allow the timber industry the opportunity to replace this volume and build or maintain their working inventory to be able to efficiently plan their operations. Although there will be variation for practical reasons from year to year, in the long-run over both the high points and low points of the market cycle, the volume harvested will equal the timber volume sold, excluding cancelled contracts.

The goal for Pool 3, volume under contract, is to maintain timber volume at approximately three times the amount of annual projected harvest. This allows the purchasers to have a continuous supply of timber volume available for harvest so they can plan their operations and be flexible to allow for weather conditions and market fluctuations.

Table 116. Accomplishments in gate system and timber pools (MMBF)

Pipeline Pool Volume	FY 2014 Goal	June 2014
Pool 1 Volume Under Analysis (Gate 2)	639[1/]	131 to 295[2]
Pool 2 Volume Available for Offer (Gate 3, Gate 4 and Gate 5)	185[3/]	166[4/]
Pool 3 Volume Under Contract (Gate 6)	429[5/]	60[6/]

1/ The goal for volume under analysis is approximately 4.5 times the projected harvest for the current year (based on 142 mmbf for the 2014 timber demand).

2/ Volume under analysis includes all timber volume in projects with a completed project plan (Gate 1) through completion of the environmental analysis (Gate 2). This figure includes about 52 to 55 mmbf of young-growth timber. A range is shown to display the range of volume for the alternatives for the on-going projects.

3/ The goal for volume available for offer is to have at least 1.3 times the projected harvest for the current year (143 mmbf) in projects that have approved NEPA and completion of timber contract preparation.

4/ This only includes the volume that is available to offer which needs to have gone through the NEPA process and appraises positive. This figure does include volume involved with on-going litigation – see Table 117. It does not include that volume which, through a decision by the Responsible Official, is slated only for small sales since this amount will be offered through multiple contracts is based on the needs of the Tongass-wide smaller mills.

5/ The goal for volume under contract is for purchasers to have three times the volume under contract as projected for harvest for the current year (142 mmbf).

6/ Estimated volume under contract from USDA Forest Service Alaska Region public website available for harvest as of June 2014, not including settlement contracts and those contracts which are in the process of being terminated.

How Appeals and Litigation Affect the Tongass Timber Program

Timber harvest projects require site-specific environmental analysis that usually is documented in an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). The public is notified of the analysis and is provided the opportunity to comment on proposals. The Saddle Lakes project will go through the new, pre-decisional objections process (36 CFR 218), which became effective March 27, 2013; instead of the appeals process (36 CFR 215). As before, when a decision completes the applicable administrative review processes, the project can still be litigated. Although litigation does not always preclude offering timber volume, the Forest Service and potential purchasers are often reluctant to enter into a contract where the outcome is uncertain. Since litigation can be a lengthy process, litigation can also affect the Forest's ability to provide a reliable timber supply. With an unfavorable decision, the court may vacate the project's decision requiring more environmental analysis to occur.

Table 117. Timber Volume involved in appeals, objections and/or litigation[1/]

Timber Volume with decision reversed on appeals[2/]	13.1 MMBF
Timber Volume involved with current litigation	109.5 MMBF

1/ As of 7/30/2014.

2/ Decision overturned during internal review. Does not include timber volume currently under objection review.

How Does The Forest Service Decide Where Timber Harvest Projects Should Be Located?

The process for determining the suitability of the land for timber harvest is found in the 2008 Forest Plan, Appendix A.

Land Suitability for Timber Harvest

A primary consideration for selecting lands for timber harvest is the suitability of the land for timber production. Many acres on the Tongass National Forest are not forested. Of the forested lands, some of this land has been withdrawn by Congress for further consideration for resource management. On the Tongass National Forest, these lands include Wilderness and National Monuments. Other forested lands are not physically suitable for timber production due to non-forest vegetation, poor soils or steep slopes as determined by NFMA. These non-productive forested lands and non-forested lands provide other uses such as wildlife habitat for some species and various recreation uses. Figure 21 depicts the percentages of these categories of lands within the Tongass National Forest.

The Forest Plan identified the suitable land base for timber production, as discussed in Appendix A of the Forest Plan. Lands designated for possible timber harvest are in the development land use designations (LUDs), primarily in the Timber Production, Modified Landscape, and Scenic Viewshed LUDs. Timber harvest may be limited on some lands identified as part of the suitable land base because of Forest Plan Standards and Guidelines, such as stream and estuary buffers, and other laws and regulations.

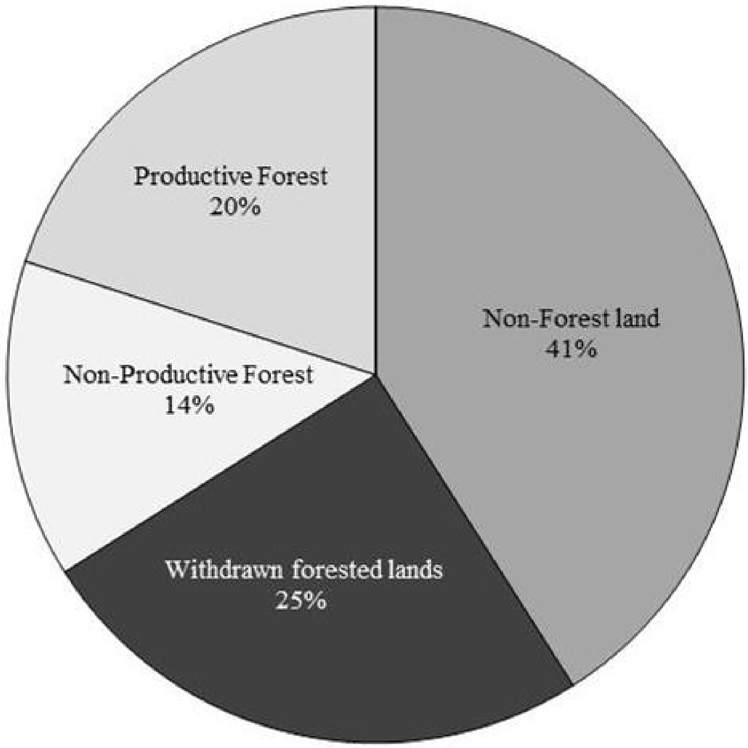

Figure 21. Tongass National Forest suitability analysis

Non-Forest land – Land that has never supported forests, e.g. muskeg, rock and ice.

Withdrawn Forested Lands – Lands designated by Congress, the Secretary of Agriculture, or Chief for purposes that preclude timber harvest, e.g. Wilderness Areas.

Non-productive Forest – Forest land not capable of producing commercial wood on a sustained yield basis.

Productive Forest – Forest land that meets all the criteria for timber production suitability over the planning horizon.

District-level Planning

The Forest Supervisor for the Tongass National Forest is responsible for the overall management of the Forest’s timber program. Included within these responsibilities is making the determination on the amount of timber volume to be made available to industry. Whether or not sufficient funding is appropriated to attain the program is the responsibility of the Congress and the President.

District Rangers develop a multi-year plan of potential timber harvest projects. The goal of the plan is to attain the targeted offer level for the current year, based on the estimated annual market demand, and to develop a timber program for several years of the planning cycle. The offer level for the current year is based, to the extent possible, on the forecasted annual market demand. Actual demand may fluctuate from year to year due to short-term market fluctuations. Actual offer levels vary year to year depending on several factors, including volume in Gates 2 through 3, and current market conditions.

District personnel work on various timber harvest projects at different stages simultaneously, resulting in continual movement of these projects through the timber program pipeline. The District Ranger is responsible for identifying and recommending to the Forest Supervisor the project areas for the 5-year schedule of integrated resource activities. This schedule factors in the time to complete preliminary analysis, resource inventories, environmental documentation, field layout preparations and permit acquisition, appraisal of timber resource values, advertisement of contract characteristics for potential bidders, bid opening, and physical award of the contract. Once all of the Rangers' recommendations are made and compiled into a consolidated schedule, the Forest Supervisor is responsible for the review and approval of the final timber harvest plan and prioritization of projects as necessary.

Considerations the District Ranger takes into account for each project include:

> If the project area contains a sufficient number of suitable timber production acres allocated to development land use designations. Consideration includes if the timber volume being considered for harvest can be achieved while meeting Forest Plan goals, objectives, and Standards and Guidelines.
>
> Other resource uses and potential future uses of the area and of adjacent areas and of non-National Forest System lands.
>
> Areas where the investment necessary for project infrastructure (roads, bridges, etc.) is achievable with the estimated value of timber volume in the project area. Where infrastructure already exists, such as the Saddle Lakes project area, the contract would allow any maintenance and upgrade of the facilities necessary for removal of timber volume.
>
> Areas where investments for the project coincide with long-term management based on Forest Plan direction.

The implementation of the timber projects depends in part on the final budget appropriation to the agency. In the event insufficient budget is allocated, or resolution of pending litigation or other factors delay projects, timber harvest projects are selected and implemented on a priority basis. Generally, the higher-priority projects are those where investments have been made such as roads, camps or log transfer facilities have already been established or where land management status is not under dispute. The distribution of projects across the Tongass is also taken into account to distribute the effects and to provide timber volume in proximity to timber processing facilities. Timber harvest projects scheduled for the current year that are not implemented, or the remaining volume of projects only partially implemented, are shifted to future years in the plan. The multi-year plan becomes very dynamic in nature due to the number of influences on each district.

Conclusion

There is a long legislative recognition that timber harvest is one of the appropriate activities on national forests, starting with the founding legislation for national forests in 1897. The Organic Administration Act provides that national forests may be established "to improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of the citizens of the United States."

Congress' policy for national forests, as stated in the Multiple-Use Sustained Yield Act of 1960, is "the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." Accordingly, Congress has authorized the Secretary of

Agriculture to sell trees and forest products from the national forests "at no less than appraised value." The National Forest Management Act directs that forest plans shall "provide for multiple use and sustained yield, and in particular, include coordination of outdoor recreation, range, timber, watershed, wildlife, fish and wilderness." ANILCA, as amended by the Tongass Timber Reform Act, provided for timber harvest from the Tongass as well as other uses such as subsistence. Effects on subsistence resources from timber harvest Tongass-wide are projected to have few differences based on the sequence in which areas are harvested. Because of the multiple use mandate and other requirements of the laws, these effects to subsistence are necessary, consistent with sound management of public lands.

In addition to nationwide statutes, Section 101 of the Tongass Timber Reform Act directs the Forest Service to seek to meet market demand for timber from the Tongass, subject to certain qualifications. It is the goal of the Tongass National Forest to provide an even-flow of timber on a sustained-yield basis and in an economically efficient manner. The amount of timber offered each year is based on the objective of offering enough volume to seek to meet the projected annual demand. That annual demand projection starts with installed mill capacity, and then looks to industry rate of capacity utilization under different market scenarios, the volume under contract, and a number of other factors, including anticipated harvest and the range of expected timber purchases.

As described by Morse (April 2000), in terms of short-term economic consequences, oversupplying the market is less damaging than undersupplying it. If more timber is offered than purchased in a given year, the unsold volume is still available for re-offer in future years. Conversely, a short fall in the supply of timber can be financially devastating to the industry.

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Appendix B – Interrelated Projects

Interrelated projects are defined for the Saddle Lakes DEIS as activities that could potentially interact with the alternatives in a manner that could result in cumulative impacts. These activities were identified by the Saddle Lakes IDT and have been considered in the cumulative effects sections of each resource in Chapter 3. The geographic area for the cumulative impacts analysis is determined by each resource.

Interrelated projects have been grouped as past, present, and reasonably foreseeable future actions and they are listed and described below to insure that full consideration has been given by each resource. Table 120 identifies the potential resource interactions among the interrelated projects and various resources. Not all of these activities interact with every resource because the cumulative effects analysis area varies by resource. It is important to note that the potential resource interactions among the interrelated projects shown in Table 120 may not necessarily contribute to cumulative impacts. Rather, Table 120 was developed by the Saddle Lakes IDT to identify the interrelated projects that have the potential to interact with the resource.

Past Activities

Timber Harvest within or adjacent to project area (1959 to 2014)

Approximately 8,952 acres have had timber harvest in or adjacent to the Saddle Lakes project area as a result of Forest Service, State of Alaska, and Alaska Native Corporation timber sales (Table 118).

Table 118. Past harvest within the Saddle Lakes project area

Agency	Acres of Harvest by Timeframe						Total Acres
	1959-1969	1970-1979	1980-1989	1990-1999	2000-2009	2010-2014	
Forest Service (NFS lands)	1,140	543	0	2,313	419	36	4,451
State of Alaska (Alaska Mental Health Trust Authority)[1/]	0	0	0	0	3,726	0	3,726
Cape Fox Native Corporation	0	184	0	477	86	28	775
Total	1,140	727	0	2,790	4,231	64	8,952

Sources: USDA Forest Service, GIS;

1/ Clark 2012, State of Alaska, personal communication

Past Forest Service Timber Harvest in the Saddle Lakes Project Area

(NEPA decision document and acres from the selected alternative)

- Timber Management Plan Record of Approval (10/16/58) – 148 acres
- Ketchikan Pulp Company Timber Sale 1974-1979 Operating Period EIS (1974) – 110 acres
- Shelter Cove EIS (1991) – 2,246 acres
- Upper Carroll EIS (1996) – 54 acres
- Sea Level EIS (1999) – 491 acres
- Salty EA (2000) – 165 acres
- Mop Point/91 Knot EA (2001) – 20 acres

Beaver Falls Hydroelectric Project (FERC P-1922)

The Beaver Falls hydropower plant is owned and operated by the Ketchikan Public Utilities (KPU). This project consists of two dams with reservoirs and two powerhouses. Upper and Lower Silvis Lakes are formed behind concrete-faced, rock filled dams which have a separate spillway weir and channel. Tunnels and penstocks connect Upper Silvis Lake to the powerhouse located on Lower Silvis Lake, and from Lower Silvis Lake to the Beaver Falls powerhouse located on the west side of George Inlet at tidewater. The total capacity is 5,000 kW.

Swan Lake Hydroelectric Project (FERC P-2911)

The Swan-Lake Hydroelectric Project is located northeast of the Saddle Lakes project area. It consists of a concrete arch dam that is 174 feet high and 430 feet long. The Swan Lake Reservoir, with a surface area of 1,500 acres at normal maximum elevation, includes a power tunnel that is 2,200 feet long and 11 feet in diameter, leading from an intake structure at the north abutment upstream of the dam to the powerhouse. An indoor-type remotely controlled concrete powerhouse, containing two generating units with a total rated capacity of 22,000 kW is located at Carroll Inlet immediately north of the mouth of Falls Creek. It also includes a13.8/115-kV substation, and access facilities comprised of port facilities 1,000 feet north of the powerhouse. A staging area adjacent to the port facilities has access roads from the port facilities to the powerhouse and dam. A 115 kV transmission line extends from the powerhouse substation 30.5 miles to the existing S.W. Bailey Substation (see description below).

Swan Lake Powerline

The transmission line extends from the S.W. Bailey Substation in Ketchikan to the switchyard at the powerhouse. The 115-kV transmission line is about 30.5 miles in length. The line follows the route of the existing 34.5-kV line north from the S.W. Bailey Substation to Ward Cove. From there the line extends east along the north side of Connell Lake, then turns to follow the White River Valley to the upper end of George Inlet. The powerline extends along the north side of George Inlet (Salt Chuck) heading east to the South Saddle Lake area, near Carroll Inlet, where it turns to the north and follows the western edge of Carroll Inlet to a location opposite the powerhouse. The line then crosses the inlet via an overhead span to the Swan Lake dam, terminating at the switchyard adjacent to the powerhouse. Swan Lake dam, associated facilities (on state land) and transmission lines were placed into service between 1981 and 1985. The powerline, originally authorized under a special use permit in 1984, is currently issued to Southeast Alaska Power Agency (SEAPA).

Swan-Tyee Powerline

Located outside the project area, the Swan-Tyee Intertie is a 57 mile long, 138-kV transmission line interconnects the electric system of Ketchikan to the Tyee Lake hydroelectric project in Wrangell, Alaska. The Forest Service issued a special use permit to Ketchikan Public Utilities (KPU) in September 2001 for its construction. Clearing of the corridor began in 2003 with line construction in 2004. The powerline was completed in 2009 when the line was energized. The powerline is currently authorized under a special use permit to the SEAPA. (September 2001 Decision)

Timber Stand Improvement 5-Year Plan (2002-2007)

This project involved pre-commercial thinning (PCT) for timber stand improvement and pruning for riparian and wildlife habitat values on about 5,000 acres of overstocked young-growth forest on Revillagigedo Island. (February 2002 Decision)

Timber Stand Improvement 5-Year Plan (2008-2013)

This plan included pre-commercial thinning on about 3,800 acres of overstocked young growth forest (lands suitable for timber harvest and old-growth stands) to enhance timber and wildlife habitat values. (November 2007 Decision).

Ketchikan-Misty Fiords Ranger District Access and Travel Management Plan

The Ketchikan-Misty Fiords Ranger District (KMRD) Access and Travel Management (ATM) plan supports the goals and objectives of travel management and road maintenance. The ATM identifies the minimal road system required for forest management of public motorized use. (July 2008 Decision)

Ketchikan-Misty Fiords Ranger District Outfitter/Guide Management Plan

The Ketchikan-Misty Fiords Ranger District (KMRD) Outfitter/Guide Management Plan determines recreation use levels for outfitters and guides, and allocates approximately 50,671 service days annually for outfitter and guide use on KMRD (January 2012 Decision). The highest guided use annually (2005-2009) was 2 service days within the project area.

Timber Stand Improvement (2012)

This project included pre-commercial thinning on about 700 acres of overstocked young-growth forest (lands suitable for timber harvest and old-growth stands) to enhance timber and wildlife and fish habitat values. Thinning was authorized to begin in 2012 in the vicinity of the Fire Cove Log Transfer Facility. (June 2012 Decision).

Non-NFS Tours and Recreation

There are several non-NFS permitted tours and recreation activities accessed from the Ketchikan road system. These activities include, but are not limited to jeep tours, canoeing on Harriett Hunt Lake, and paintball (on a paintball field along the Revilla Road). There are also commercial boat-based tours that use both George and Carroll Inlets.

Present Activities

Tongass National Forest Timber Sales (Under Contract)

The Buckdance Madder Reoffer Timber Sale is the only open timber sale in the Saddle Lakes project area. All timber harvest was completed in 2011, and the only uncompleted activities on that sale are contractual road closures. Table 120 shows remaining volume under contract for the Tongass National Forest in FY2014.

Southeast Alaska Timber Sales

The State of Alaska five-year schedule of timber sales (FYSTS) identifies areas where the Division of Forestry (DOF) is analyzing potential timber sale planning in southern Southeast Alaska (State of Alaska Department of Natural Resources, 2014). Timber volume and harvest information in that document does not include harvest volumes proposed by the Alaska Mental Health Trust Authority or the University of Alaska. The FYSTS is not developed as a decision document for particular timber sales, and no public data is available to determine the quantity of timber currently under contract. However, in that document the DOF proposed a planning harvest volume of about 19 MMBF in 2012, and 27 MMBF in 2013.

No public data is available regarding timber volume currently under contract on forest lands managed by Alaska Native corporations.

Timber Stand Improvement 5-Year Plan (2013-2018)

This plan includes pre-commercial thinning on about 9,060 acres to improve timber production, enhance wildlife habitat, and restore riparian ecosystems on the KMRD landbase. These activities would take place in previously harvested stands on Revillagigedo and Hassler Islands, Southeast Alaska over the next 5-years, and thin approximately 500 to 600 acres annually beginning in 2013. (March 2013 Decision)

Whitman Lake Hydroelectric Project (FERC P-11841)

The Forest Service issued a special use authorization to Ketchikan Public Utilities for the construction, operation, and maintenance of the hydroelectric project. The project consists of a 4.6 MW hydro-storage facility on an existing dam on Whitman Lake, in the watersheds of Whitman and Achilles Creeks, about 4 miles east of Ketchikan. Construction of this project is currently underway and expected to be completed in 2014. (June 2011 Decision)

NFS Outfitter Guide Permits

The January 2012 Decision Notice on the Ketchikan-Misty Fiords Ranger District (KMRD) Outfitter and Guide Management Plan authorized up to 1,420 service days per year to be issued to outfitter and guides in the South Revilla Natural Accessible Use Area, which includes the Shelter Cove road system. This Use Area also includes the Shoal Cove and Thorne Arm (Elf Point) road systems. One outfitter-guide has a permit for using the Saddle Lakes project area, and used 3 service days in 2012.

Non-NFS Tours and Recreation

There are several non-NFS permitted tours and recreation activities accessed from the Ketchikan road system. These activities include, but are not limited to jeep tours, canoeing on Harriett Hunt Lake, and paintball (on paintball field along Revilla Road). There are also commercial boat-based tours that use both George and Carroll Inlets.

Reasonably Foreseeable Future Activities

Tongass National Forest Five Year Timber Sale Schedule and Contract Plan

The Tongass National Forest Five Year Timber Sale Schedule and Contract Plan (Tongass NF, unpublished data, 2014) proposes an annual average timber sale volume of about 127 MMBF (gross) for the upcoming 5-fiscal-year-period (fiscal years 2014 through 2018). This includes estimated gross volumes of both young growth and old growth timber. The table below shows the Tongass National Forest Five Year Timber Sale Schedule and Contract Plan.

Table 119. Summary of Tongass National Forest five year timber sale schedule and contract plan

Fiscal Year	Young Growth Gross Volume (MMBF)	Old Growth Gross Volume (MMBF)	Total Gross Volume (MMBF)
2014	3	149	152
2015	0	113	113
2016	25	96	121
2017	20	138	158
2018	22	69	91
Annual Average			127

Source: Tongass National Forest Five Year Timber Sale Schedule and Contract Plan, 2014. Unpublished data on file with Tongass National Forest Supervisor's Office

Timber Stand Improvement 5-Year Plan (2013-2018)

This plan includes pre-commercial thinning on about 9,060 acres to improve timber production, enhance wildlife habitat, and restore riparian ecosystems on the KMRD landbase. These activities will take place in previously harvested stands on Revillagigedo and Hassler Islands, Southeast Alaska over the next 5-years, and will thin approximately 500 to 600 acres annually beginning in 2013. (March 2013 Decision)

Spit Point Wildlife Habitat Restoration Project

The Spit Point Wildlife Habitat Restoration project proposes the thinning of 21 acres in Stand 75305-110, and 50 acres in Stand 75306-72. These stands of young-growth timber are approximately 13 miles east of Ketchikan, Alaska adjacent to Carroll Inlet. This project was authorized in 2010, but has been on-hold due to lack of funding and operational technology (barge-based suspended cable operation). (February 2010 Decision)

Southeast Alaska Timber Sales (Planned)

The July 11, 2013 State of Alaska Department of Natural Resources Division of Forestry (DOF) draft five-year schedule timber sales (CY 2013-2017) identified areas where the DOF is analyzing potential timber sale planning in southern Southeast Alaska. The Southern Southeast Area encompasses lands from Tracy Arm/Frederick Sound south to Dixon Entrance and Portland Inlet.

The Leask Cove sale is planned for 2017. Development of this Timber Sale is dependent on the Department of Transportation constructing a connection road between the Leask Lake area and the Shelter Cove area, funding was provided for the construction of this road through a statewide road bond initiative in 2012. Proposed sale area consist of ten clearcut areas totaling 88 acres containing an estimated 3,300 MBF (3.3 MMBF) of timber. The construction of an additional 1.8 miles of spur road will be required access these units.

No public data is available regarding timber volume planned on forest lands managed by Alaska Native corporations.

Ketchikan to Shelter Cove Road

The Alaska Department of Transportation and Public Facilities (DOT&PF) is in the design and analysis phase of the entire Ketchikan to Shelter Cove Road; funding has been secured for its construction. This project would connect the currently isolated Shelter Cove road system to the community of Ketchikan via the Revilla Road, White River road, and the Leask Lake road systems. The road will be 23.6 miles long, require 6.0 miles of new road construction, and would use 17.6 miles of existing logging roads.

The State of Alaska began initial scoping for the Ketchikan to Shelter Cove Road project (State Project 68405) in November of 2006. In the spring of 2007, the DOT&PF began a reconnaissance study and public meetings were held in September 2011 and March 2012 to discuss highlights of the Draft Reconnaissance Report. After receiving and analyzing agency and public comments, DOT&PF recommended Alternative II (“Low-Low” Alternative). More information about the Ketchikan to Shelter Cove Road can be found on the DOT&PF website (see DOT&PF Southeast Region website). Construction on the six miles of new road is scheduled to occur in 2015.

The Ketchikan to Shelter Cove Road is listed as the Harriet Hunt - Shelter Cove Connection Road in Appendix F of the 2008 Forest Plan (USDA 2008b, p. F-23) under “Routes not constructed nor NEPA cleared: Planned or Opportunities.”

Alaska Mental Health Trust Authority Land Exchange

Alaska Mental Health Trust Authority (AMHTA) has proposed a land exchange with the Forest Service which includes an 8,170 acre parcel within the Saddle Lakes project area. Future AMHTA plans for this parcel, if approved, are not known at this time. However, revenue-generating uses of AMHT land includes land-leasing and sales; real estate investment and development; commercial timber sales; mineral exploration and production; coal, oil and gas exploration and development; and sand, gravel and rock sales (AMHTA Trust Overview brochure – April 2013). The AMHTA’s Trust Land Office (TLO) stated in their November 2013 Forest Resource Management Plan that “As of May 2013, TLO and USFS are working jointly toward the signing of an Agreement to Initiate (ATI) the proposed land exchange… TLO will be better positioned to fulfill its mandate of maximizing Trust timber assets after the exchange is complete. If successful, The Trust will own forest resources in areas more suitable for timber harvest, mitigating the known significant public opposition to monetizing its current assets” (Trust Land Office 2013, Forest Resource Management Plan, p. 2).

Mahoney Lake Hydroelectric Project (FERC P-11393)

The 9.6 MW Mahoney Lake hydroelectric project is capable of accommodating the Ketchikan / SEAPA region's growing power-load demands. The Project consists of a lake tap diversion, reservoir (Upper Mahoney Lake), pipeline, upper and lower tunnels, powerhouse, combination of underground and overhead transmission lines, and an access road. The Project is connected to the Ketchikan road system via Cape Fox Corporation's White River road system. The Project is located approximately 5 miles from existing transmission lines (both the Beaver Falls, and the Swan-Tyee Intertie lines). FERC granted a stay on the license which expires in October 2015.

Swan Lake Hydroelectric Project License Amendment

The SEAPA is in the process of amending their FERC license. The non-capacity amendment would increase the storage capacity at the Swan Lake Hydroelectric Project (FERC P-2911) by increasing the dam’s height and establishing a new maximum operating pool. The increase in dam height would flood a total of 140 acres including approximately 26 acres of NFS land and increase the lake surface area to 1,513 acres. The existing access road, camp, and staging areas would be utilized during the expansion.

NFS Outfitter Guide Permits

Up to 1,420 service days per year are authorized to be issued to outfitter and guides in the South Revilla Natural Accessible Use Area, which includes the Shelter Cove road system. This Use Area also includes the Shoal Cove and Thorne Arm (Elf Point) road systems.

Non-NFS Tours and Recreation

There are several non-NFS permitted tours and recreation activities accessed from the Ketchikan road system. These activities include, but are not limited to jeep tours, canoeing on Harriett Hunt Lake, and paintball (on paintball field along Revilla Road). There are also commercial boat-based tours that use both George and Carroll Inlets.

Marble Creek Commercial Hydroponic Greenhouse Farm

The Marble Creek Commercial Hydroponic Greenhouse Farm site is located on private land, about 17 miles northeast of Ketchikan and surrounded by National Forest System (NFS) lands. The owner has acquired all permits for the construction of a privately owned and operated hydroelectric plant, with power generated from a series of natural waterfalls that fall 150 feet down the mountainside. This business plans to deliver organic vegetables to markets and grocery stores across Southeast Alaska, reducing the fuel needed to get these products to consumers.

OceansAlaska Shellfish Nursery

OceansAlaska (OA) plans to meet the shellfish industry’s need for a consistent and sufficient supply of shellfish seed by building and operating a land-based shellfish research and production facility on OA property at mile 8.9 South Tongass Highway. OceansAlaska currently operates a small floating shellfish hatchery built as a “proof-of-concept” hatchery and as a research facility. The current facility is not large enough to be self-sustaining or to meet the needs of the shellfish industry. When fully operational, the new facility is projected to have an annual production capacity of 50 million oyster seed and 3 million geoduck seed.

State Aquatic Permits

There are four, ten acre aquatic farm permit/leases for suspended aquaculture sites available for the public in Carroll Inlet south of Shelter Cove LTF. Should these leases be issued, attention/care may be needed when barging or rafting logs past this area.

Table 120 lists potential resource interactions among the Interrelated Projects.

Table 120. Potential resource interactions among the interrelated projects

Interrelated Projects[1/]	Issue 1 Timber Economics	Issue 2 Timber Availability	Issue 3 Wildlife & Subsistence	Issue 4 Recreation & Scenery	Air Quality & Climate Change	Aquatics	Environmental Justice	Heritage	Invasive Plants	Lands and Minerals	Plants	Roadless	Silviculture	Socioeconomics	Soils/Wetlands	Transportation
Past Actions																
Timber Harvest acres within or adjacent to project area (1959-2012)		X	X	X	X	X		X	X		X	X	X	X	X	X
Timber Harvest and Exports volume for Southeast Alaska, 1997-2011														X		
Beaver Falls Hydroelectric Project			X											X		
Swan Lake Hydroelectric Project			X									X		X		
Swan Lake Powerline		X	X	X				X	X	X		X		X		
Swan-Tyee Powerline			X						X			X		X		
Timber Stand Improvement (2002-2007)			X	X	X	X							X	X	X	
Timber Stand Improvement (2008-2013)	X		X	X	X	X							X	X	X	
Ketchikan-Misty Fiords Ranger District Access and Travel Management Implementation	X	X	X	X	X	X			X				X	X		X
NFS Outfitter Guide Permits			X	X		X		X	X					X		
Non-NFS Tours and Recreation			X	X		X		X	X					X		
Present Actions																
Tongass National Forest Timber Sales (Under Contract)	X	X	X	X	X	X	X	X	X		X		X	X		X
Southeast Alaska Timber Sales (Under Contract	X	X			X		X						X	X		
Timber Stand Improvement (2013-2018)			X	X	X	X	X						X	X	X	
Whitman Lake Hydroelectric Project			X						X					X		

Interrelated Projects[1/]	Issue 1 Timber Economics	Issue 2 Timber Availability	Issue 3 Wildlife & Subsistence	Issue 4 Recreation & Scenery	Air Quality & Climate Change	Aquatics	Environmental Justice	Heritage	Invasive Plants	Lands and Minerals	Plants	Roadless	Silviculture	Socioeconomics	Soils/Wetlands	Transportation
NFS Outfitter Guide Permits			X	X				X	X					X		
Non-NFS Tours and Recreation			X	X			X	X	X					X		
Reasonably Foreseeable Future Actions																
Tongass National Forest Five Year Timber Sale Schedule and Contract Plan	X	X	X	X	X	X		X	X		X	X	X	X	X	
Timber Stand Improvement (2013-2018)			X	X	X	X	X						X	X	X	
Spit Point Wildlife Habitat Restoration Project			X	X	X	X	X							X	X	
Southeast Alaska Timber Sales (Planned)		X	X		X		X		X					X	X	
Ketchikan to Shelter Cove Road	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
Alaska Mental Health Trust Authority Land Exchange	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mahoney Lake Hydroelectric Project			X		X				X		X			X		
Swan Lake Hydroelectric Project License Amendment			X		X									X		
NFS Outfitter Guide Permits			X	X		X	X	X	X					X	X	
Non-NFS Tours and Recreation			X	X	X		X	X	X					X		
Marble Creek Commercial Hydroponic Greenhouse Farm														X		
OceansAlaska Shellfish Nursery														X		
State Aquatic Permits						X	X			X				X		

1/ Interrelated projects are defined for the Saddle Lakes DEIS as activities that could interact with the Proposed Action in a manner that could result in cumulative impacts.

Appendix C - Forest Plan Standards and Guidelines, Best Management Practices (BMPs), and Mitigation and Monitoring

Applicable LUD-specific Standards and Guidelines

Each Land Use Designation (LUD) includes a management prescription that gives general direction on what may occur within the area allocated to the corresponding LUD, the standards for accomplishing each activity, and the guidelines on how to go about accomplishing the standards. Specific management direction (Standards and Guidelines) for each LUD in the Saddle Lakes project area were reviewed by the IDT and have been grouped by resource or category, following the order established for the Forest-wide Standards and Guidelines (Table 121). Within the components of the Tongass National Forest Land and Resource Management Plan (Forest Plan) management direction, the management prescription Standards and Guidelines for each LUD take precedence over the Forest-wide Standards and Guidelines applied to that same designation, should any conflicts occur (USDA 2008b, p. 1-3).

Refer to Chapter 3 of the Forest Plan (USDA 2008b) for a description of these LUD-Specific Standards and Guidelines.

Table 121. Land use designation (LUD) Standards and Guidelines for the Saddle Lakes Timber Sale

Category	Section	Subsection
Old Growth Habitat LUD		
Fish	Fish Habitat Planning: FISH2	ALL
Forest Health	Forest Health: HEALTH1	A.
Heritage	Heritage Resource Activities: HSS1	Inventory/Evaluation (A. 1-3)
Lands	Special Use Administration (Non-Recreation): LAND2	B.
Recreation And Tourism	Recreation Use Administration: REC3	Recreation Management and Operations A. and B.
Scenery	Scenery Operations: SCENE1	A. and B.
Timber	Timber Resource Planning: TIM4	A., C. and D.
Transportation	Transportation Operations: TRAN	A. and B.
Wildlife	Wildlife Habitat Planning: WILD1	A. and B.(2 and 3)
Modified Landscape LUD		
Forest Health	Forest Health Management: HEALTH1	ALL
Heritage	Heritage Resource Activities: HSS1	Inventory A. and B.
Lands	Special Use Administration (Non-Recreation): LAND2	A.
	Landline Location and Maintenance: LAND4	ALL
Recreation and Tourism	Recreation Use Administration: REC3	Recreation Settings A. (1-3) and B.
Scenery	Scenery Operations: SCENE1	ALL
Soil and Water	Watershed Resource Planning: SW3	A and C.

Category	Section	Subsection
Timber	Timber Resource Planning: TIM4	ALL
	Timber Sale Preparation: TIM5	ALL
	Timber Stand Improvement: TIM10	ALL
Transportation	Transportation Operations: TRAN	ALL
Wildlife	Wildlife Habitat Planning: WILD1	ALL
Timber Production LUD		
Forest Health	Forest Health Management: HEALTH1	ALL
Heritage	Heritage Resource Activities: HSS1	Inventory ALL
Lands	Special Use Administration (Non-Recreation): LAND2	ALL
	Landline Location and Maintenance: LAND4	ALL
Recreation and Tourism	Recreation Use Administration: REC3	Recreation Settings A. (1-3)
Scenery	Scenery Operations: SCENE1	ALL
Soils and Water	Watershed Resource Planning: SW3	A. and C.
Timber	Timber Resource Planning: TIM4	ALL
	Timber Sale Preparation: TIM5	ALL
	Timber Resource Coordination: TIM7	ALL
Transportation	Transportation Operations: TRAN	A. (1-3)
Wildlife	Wildlife Habitat Planning: WILD1	ALL

Source: USDA 2008b, Chapter 3

Applicable Forest-wide Standards and Guidelines

Forest-wide Standards and Guidelines are measures of expectations that apply to all, or most, areas of the Forest. Each management prescription in Chapter 3 of the Forest Plan includes a list of those that apply to that LUD. Table 122 shows the Forest-wide Standards and Guidelines that apply to the Saddle Lakes Timber Sale.

Refer to Chapter 4 of the Tongass National Forest Land and Resource Management Plan (USDA 2008b) for a description of the Forest-wide Standards and Guidelines.

Table 122. Forest-wide Standards and Guidelines for the Saddle Lakes Timber Sale

Category	Section	Subsection	Old-Growth Habitat LUD	Modified Landscape LUD	Timber Production LUD
Air	Air Resource Inventory: AIR1	I. Baseline Quality and Values (A.)	X	X	X
	Air Resource Planning: AIR2	I. Objective (ALL)	X	X	X
		II. Planning for the Maintenance of Air Quality (ALL)	X	X	X

Category	Section	Subsection	Old-Growth Habitat LUD	Modified Landscape LUD	Timber Production LUD
Beach and Estuary Fringe	Beach and Estuary Description: BEACH1	I. Objectives and Identification (ALL)	X	X	X
	Beach and Estuary Management: BEACH2	II. Management (A. 1, 6, 8, and 9)	X	X	X
Fish	Fish Habitat Inventory and Monitoring: FISH1	Fish Habitat Inventory (ALL)	X	X	X
	Fish Habitat Planning: FISH2	I. Fish Habitat and Channel Processes (ALL)	X	X	X
		II. Channel Classification and Process Groups	X	X	X
		III. Fish Stream Classification (ALL)	X	X	X
		IV. Objectives/Guidelines for Management Affecting Fish Habitat (ALL)	X	X	X
		V. Management Indicators (ALL)	X	X	X
		VI. Management Activities (ALL)	X	X	X
		VII. Coordination (A. 2, B. and C.)	X	X	X
		VIII. Projects (A. - D.)	X	X	X
	Fish Habitat Restoration and Improvement: FISH3	I. Planning (A. – C.)	X	X	X
Forest Health	Forest Health Management: HEALTH1	I. Forest Health Management (A. 1 and 2; B. and C.)	X	X	X
Heritage Resources and Sacred Sites	Heritage Resource Activities: HSS1	I. Management (ALL)	X	X	X
		II. Project Clearance/Inventory (ALL)	X	X	X
		III. Project Implementation (ALL)	X	X	X
		IV. Mitigation (ALL)	X	X	X
		V. Enhancement	X	X	X
		VI. Site Inspection (ALL)	X	X	X
	Sacred Sites Protection Activities: HSS2	I. Management (ALL)	X	X	X
		II. Project Planning (ALL)	X	X	X
		III. Project Implementation (ALL)	X	X	X
		IV. Mitigation (ALL)	X	X	X
		V. Enhancement (ALL)	X	X	X
		VI. Monitoring (ALL)	X	X	X
Invasive Species	Invasive Species Prevention: INV1	I. Invasive Species Inventory (ALL)	X	X	X
		II. Project Planning (ALL)	X	X	X

Category	Section	Subsection	Old-Growth Habitat LUD	Modified Landscape LUD	Timber Production LUD
Lands	Lands Preparation: LAND1	I. Land Status (ALL)	X	X	X
		II. Coordinating with Others (A. and C.)	X	X	X
	Special Use Administration (non-Recreation): LAND2	I. Special Use Authorizations A. (1 – 5)	X	X	X
	Lands Activity Maintenance and Landline Location: LAND4	I. Establishing Forest Boundaries (ALL)	X	X	X
	Rights-of-Way (ROW): LAND5	I. Rights-of-Way Acquired (A. and B. 1 and 3)	X	X	X
Plants	Threatened, Endangered, Sensitive, and Rare Plants: PLA1	II. Sensitive Plants (A. and B.)	X	X	X
		III. Rare Plants (ALL)	X	X	X
	Invasive Plants: PLA2	I. Invasive Plants (ALL)	X	X	X
	Plant Surveys and Vegetation Mapping: PLA3	I. Plant Surveys and Vegetation Mapping (A. – E.)	X	X	X
Recreation and Tourism	Recreation Resource Inventory: REC1	I. Recreation Resource Opportunities (A. 1 and 2)	X	X	X
	Recreation Resource Planning: REC2	II. Integrated Resource Planning (A. and B.)	X	X	X
	Recreation Use Administration: REC3	III. Recreation Settings (ALL)	X	X	X
		VII. Recreation Use (A.)	X	X	X
Riparian	Riparian area: RIP1	I. Definition (ALL)	X	X	X
		II. Objectives (ALL)	X	X	X
	Riparian Planning: RIP2	I. Project Planning (A., C.-E.)	X	X	X
		II. General Standards and Guidelines by Activity (D. 1. a-c; E. 1-6, 8 and 9; F.; and G.)	X	X	X
Rural Community Assistance	Activities: RUR	I. Resource Management Decisions Affecting Communities (ALL)	X	X	X
Scenery	Scenery Operations: SCENE1	I. Scenery Management (ALL)	X	X	X
	Scenery Preparation: SCENE2	I. Scenery Integrity Objectives: Application (ALL)	X	X	X
		II. Scenic Integrity Objectives: Specific Guidelines (All)	X	X	X

Category	Section	Subsection	Old-Growth Habitat LUD	Modified Landscape LUD	Timber Production LUD
		III. Scenic Integrity Objectives - Silvicultural Prescriptions Other Than Clearcutting (B.)		X	X
	Scenery Administration: SCENE3	I. Mitigation, Enhancement, and Monitoring (A.)			
Soil and Water	Water Inventory: SW2	I. Inventory and Evaluation (A. and B., 2)	X	X	X
	Watershed Resources Planning: SW3	I. Land Use Activities (A., B., D., and F.)	X	X	X
		II. Watershed Analysis and Cumulative Watershed Effects (B.)	X	X	X
	Watershed Restoration: SW4	I. Soil and Water Quality Protection and Restoration (A. 1, 3 and 5)	X	X	X
Subsistence	Subsistence: SUB	I. Subsistence (A. – D., I. – K.)	X	X	X
Timber	Silvicultural Examination and Prescription: TIM3	I. Stage II Intensive Inventory (ALL)		X	X
	Timber Project Planning: TIM4	I. Information Gathering and Maintenance (ALL)		X	X
	Timber Sale Preparation: TIM5	I. Regeneration Methods (ALL)		X	X
		II. Even-Aged Systems (ALL)		X	X
		III. Size of Clearcuts/Even-Aged Openings (ALL)		X	X
		V. Uneven-Aged Systems (ALL)		X	X
		VIII. Utilization Standards (ALL)		X	X
		IX. Competitive Bidding and Small Business (ALL)		X	X
		X. Windthrow (ALL)		X	X
	Commercial Sale Administration: TIM6	I. Contract Administration (ALL)		X	X
	Other Forest Products: TIM7	I. Personal Use Program (ALL)	X	X	X
		III. Administrative Use of Timber (ALL)	X	X	X
	Reforestation: TIM9	I. Site Preparation, Planting, Stocking (ALL)		X	X
Transportation	Transportation System Inventory: TRAN1	I. Inventory Updating and Maintenance (ALL)	X	X	X
	Road and Bridge	I. Road Management (A.,	X	X	X

Category	Section	Subsection	Old-Growth Habitat LUD	Modified Landscape LUD	Timber Production LUD
	Administration: TRAN2	B., D. and E.)			
		II. Permitting (B.)	X	X	X
	Transportation Improvement Planning: TRAN3	I. Planning (ALL)	X	X	X
	Road and Bridge Preconstruction: TRAN4	I. Road Standards (ALL)	X	X	X
		II. Location and Design (ALL)	X	X	X
		III. Wetlands, Flood Plains, Estuaries, and Tidal Meadows (A. 1 and 2)	X	X	X
		IV. Quarry and Borrow Sites (ALL)	X	X	X
		V. Log Transfer Facilities Siting, Construction, Operation, and Monitoring (B. and C.)	X	X	X
	Road and Bridge Construction/Reconstruction: TRAN5	I. Construction (ALL)	X	X	X
		II. Reconstruction (ALL)	X	X	X
	Road Maintenance: TRAN6	I. Maintenance Levels, Conditions, and Inspections (ALL)	X	X	X
	Road Decommissioning: TRAN7	I. Planning (ALL)	X	X	X
		II. Design (ALL)	X	X	X
		III. Review (ALL)	X	X	X
Wetlands	Wetlands: WET	I. Objectives (ALL)	X	X	X
		II. Inventory and Evaluation (ALL)	X	X	X
		III. Land Use Activities (A., B., E. – G.)	X	X	X
Wildlife	Wildlife Habitat Planning; WILD 1	I. Coordination/ Cooperation with Other Agencies, Institutions, and Partners (ALL)	X	X	X
		II. General Habitat Planning/Coordination (A-C, E and H)	X	X	X
		V. Reserve Tree/Cavity-Nesting Habitat (ALL)	X	X	X
		VI. Landscape Connectivity (ALL)	X	X	X
		VII. Sitka Black-tailed Deer (ALL)	X	X	X
		VIII. Bald Eagle Habitat (ALL)	X	X	X

Category	Section	Subsection	Old-Growth Habitat LUD	Modified Landscape LUD	Timber Production LUD
		IX. Bear Habitat Management (A. 2, 3, 5 and 6)	X	X	X
		X. Marine Mammal Habitats (A. 1 and 2)	X	X	X
		XI Seabird Rookeries (A. 2)	X	X	X
		XII. Waterfowl and Shorebird Habitats (A. 2, 3, 5 and 6; and B.)	X	X	X
		XIII. Heron and Raptor Nest Protection (ALL)	X	X	X
		XIV. Alexander Archipelago Wolf (ALL)	X	X	X
		XV. Mountain Goat (ALL)	X	X	X
		XVI. Marbled Murrelet (B.)	X	X	X
		XVIII. American Marten (ALL)	X	X	X
		XIX. Endemic Terrestrial Mammals (A. 1-3)	X	X	X
	Threatened, Endangered, and Sensitive Wildlife Species: WILD4	I. Threatened or Endangered Species (A. and B.)	X	X	X
		II. Sensitive Species (A.)	X	X	X

Source: USDA 2008b, Chapter 4

Applicable Site-Specific Best Management Practices (BMPs)

The purpose of BMPs is to directly or indirectly protect water quality and abate or mitigate adverse water quality impacts while meeting other resource goals and objectives. Soil and water resources are most efficiently protected from nonpoint sources of pollution by implementation of the iterative BMP process, and the site-specific application of BMPs. The BMPs presented in FSH 2509.22 (R-10 AMENDMENT 2509.22-2006-2) were compiled from federal law, Forest Service Manual and Handbooks, contract and permit provisions, policy statements, planning documents, Regional guides, applicable state laws and regulations, and other pertinent sources. The Forest Plan (USDA 2008b) has incorporated these BMPs into the Standards and Guidelines.

In 2012, the USDA Forest Service published the National BMPs for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide that provides information for implementing the National Core BMP portion of the Forest Service National BMP Program. The National Core BMPs were compiled from Forest Service manuals, handbooks, contract and permit provisions, and policy statements, as well as state or other organizations' BMP documents. The National Core BMPs are not intended to supersede or replace existing R10 BMPs. Rather; the National Core BMPs provide a foundation for water quality protection on NFS lands and facilitate national BMP monitoring.

Forest Service regional guidance (R-10 AMENDMENT 2509.22-2006-2), incorporated into the Standards and Guidelines in the Forest Plan, provides the criteria for site-specific BMP prescriptions. Table 125 includes the objectives of the BMPs that would be implemented for the Saddle Lakes Timber Sale, and a crosswalk with the applicable National Core BMPs. The unit and road cards located in the Project Record and on the Tongass Planning website (see Tongass planning website) provide details on how these BMPs would be applied.

For more detailed information and descriptions, see FSH 2509.22 (R-10 AMENDMENT 2509.22-2006-2) and the National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide.

Table 123. Best Management Practices for the Saddle Lakes Timber Sale

R10 BMP	National Core BMP	Objective
WATERSHED MANAGEMENT		
12.5 –Wetland Identification, Evaluation, and Protection	Plan-3 Aquatic Management Zone Planning AqEco-4 Stream Channels & Shorelines	To identify wetland functions and value, and provide appropriate protection measures designed to avoid adverse hydrologic impacts.
12.6 –Riparian Area Designation and Protection	Plan-2 Project Planning and Analysis Plan-3 Aquatic Management Zone Planning AqEco-4 Stream Channels & Shorelines Road-7 Stream Crossings Veg-3 Aquatic Management Zones	To identify riparian areas and their associated management objectives.
12.6a – Buffer Design and Layout	Plan-3 Aquatic Management Zone Planning Veg-3 Aquatic Management Zones	To design streamside buffers to meet objectives defined during the implementation of BMP 12.6.
12.8 – Oil Pollution Prevention and Servicing/Refueling Operations	AqEco-2 Operations in Aquatic Ecosystems Fac-6 Hazardous Materials Road-10 Equipment Refueling & Servicing	To prevent contamination of surface and subsurface soil and water resources from spills of petroleum products.
12.9 – Oil and Hazardous Substances Pollution Contingency Planning	Fac-6 Hazardous Materials Fac-10. Facility Site Reclamation Road-10 Equipment Refueling & Servicing	To prevent the contamination of waters from accidental spills of oil and hazardous substances (including pesticides) at sites where a Spill Prevention Control and Countermeasure (SPCC) plan or hazardous substances contingency plan is required.
12.15 – Management of Sanitary Facilities and Sanitary Guidelines for Temporary Camps and Primitive Developments	Fac-4 Sanitation Systems	To comply with regulations for the disposal of sewage at administrative sites, facilities under special-use permit, temporary camps, and primitive developments of all types.
12.16 – Control of Solid Waste Disposal	Fac-5 Solid Waste Management Veg-3 Aquatic Management Zones	To protect surface and subsurface soil and water resources from harmful nutrients, bacteria, and chemicals through proper disposal of solid waste and use of alternative construction materials.
12.17 – Revegetation of Disturbed Areas	AqEco-4 Stream Channels & Shorelines Fac-2 Facility Construction and Stormwater Control Fac-10. Facility Site Reclamation Road-6 Road Storage and Decommissioning	To provide ground cover to minimize soil erosion.

R10 BMP	National Core BMP	Objective
	Veg-2 Erosion Prevention & Control Veg-4 Ground-based Skidding & Yarding Operations	
TIMBER MANAGEMENT		
13.1 - Timber Sale Planning	Veg-6 Landings	To incorporate soil and water resource considerations into timber sale planning.
13.2 – Timber Harvest Unit Design	Veg-1 Vegetation Management Planning	To incorporate site-specific soil and water resource considerations into integrated timber harvest unit design criteria.
13.3 – Designating Water Quality Protection Needs on Sale Area/Unit Release Maps	Veg-1 Vegetation Management Planning Veg-3 Aquatic Management Zones	To delineate the location of protection areas and ensure their recognition, proper consideration, and protection on the ground.
13.4 – Timber Sale Operating Schedule	Veg-1 Vegetation Management Planning	To ensure that erosion control and timing responsibilities are incorporated into the Operating Schedule.
13.5 – Identification and Avoidance of Unstable Areas	Veg-1 Vegetation Management Planning Veg-2 Erosion Prevention & Control Veg-5 Cable & Aerial Yarding Operations	To avoid triggering mass movements and resultant erosion and sedimentation by excluding unstable areas from timber harvest.
13.9 – Determining Guidelines for Yarding Operations	Veg-2 Erosion Prevention & Control Veg-4 Ground-based Skidding & Yarding Operations Veg-5 Cable & Aerial Yarding Operations Veg-7 Winter Logging	To select appropriate yarding systems and guidelines for protecting soil and water resources.
13.10 – Log Landing Location and Design	Veg-6. Landings	To design and construct landings to minimize soil erosion and water quality degradation.
13.11 – Scheduling and Enforcement of Erosion Control Measures During Timber Sale Operations	Veg-2 Erosion Prevention & Control	To ensure that the Purchaser's operations are conducted according to the Timber Sale Contract with respect to soil and water resource protection.
13.14 – Completion of Erosion Control for Unit Acceptance and Sale Closure	Veg-2 Erosion Prevention & Control Veg-3 Aquatic Management Zones	To assure that the required erosion control work is completed before unit acceptance.
13.16 – Stream Channel Protection (Implementation and Enforcement)	AqEco-2 Operations in Aquatic Ecosystems Veg-3 Aquatic Management Zones	To provide site-specific stream protection prescriptions consistent with objectives identified under BMPs 12.6 and 12.6a. Objective may include: Objectives may include the following: • Maintain the natural flow regime. • Provide for unobstructed passage of storm flows. • Maintain integrity of the riparian buffer to filter sediment and

R10 BMP	National Core BMP	Objective
		other pollutants. • Restore the natural course of any stream that has been diverted as soon as practicable. • Maintain natural channel integrity to protect aquatic habitat and other beneficial uses. • Prevent adverse changes to the natural stream temperature regime.
13.18 – Modification of the Timber Sale Contract	Veg-1 Vegetation Management Planning	To seek an Environmental Modification of the Timber Sale Contract if new circumstances or conditions indicate that the timber sale will cause irreparable damage to soil, water, or watershed values.
TRANSPORTATION AND OTHER FACILITIES MANAGEMENT		
14.1 – Transportation Planning	Road-1. Travel Management Planning and Analysis	To assure soil and water resources are considered in transportation planning activities.
14.2 – Location of Transportation Facilities	Road-2 Road Location & Design Road-4 Road Operations & Maintenance Road-11 Road Storm-Damage Surveys	To ensure soil and water resources protection measures are considered when locating roads.
14.3 – Design of Transportation Facilities	Road-2 Road Location & Design Road-3 Road Construction & Reconstruction	To incorporate site-specific soil and water resource protection measures into the design of roads.
14.5 – Road and Trail Erosion Control Plan	AqEco-2 Operations in Aquatic Ecosystems Fac-2 Facility Construction and Stormwater Control Road-2 Road Location & Design Road-3 Road Construction & Reconstruction	To develop Erosion Control plans for road projects to minimize or mitigate erosion, sedimentation, and resulting water quality degradation prior to the initiation of construction and maintenance activities. To ensure compliance through effective contract administration and timely implementation of erosion control measures.
14.6 – Timing Restrictions for Construction Activities	AqEco-2 Operations in Aquatic Ecosystems Road-2 Road Location & Design Road-3 Road Construction & Reconstruction	To minimize erosion potential by restricting the operating schedule and conducting operations during lower risk periods.
14.7 – Measures to Minimize Mass Failures	Fac-2 Facility Construction and Stormwater Control Road-3 Road Construction & Reconstruction	To minimize the chance and extent of road-related mass failures, including landslides and embankment slumps.

R10 BMP	National Core BMP	Objective
14.8 – Measures to Minimize Surface Erosion	Fac-2 Facility Construction and Stormwater Control Road-3 Road Construction & Reconstruction Road-6 Road Storage and Decommissioning	To minimize the erosion from cut slopes, fill slopes, and the road surface and consequently reduce the risk of sediment production.
14.9 – Drainage Control to Minimize Erosion and Sedimentation	Fac-2 Facility Construction and Stormwater Control Road-3 Road Construction & Reconstruction Road-6 Road Storage and Decommissioning	To minimize the erosive effects of concentrated water flows from transportation facilities and the resulting degradation of water quality through proper design, and construction of drainage control systems.
14.10 – Pioneer Road Construction	Road-3 Road Construction & Reconstruction Road-7 Stream Crossings	To minimize sediment production associated with the pioneer road construction.
14.11 – Timely Erosion Control for Incomplete Projects	AqEco-2 Operations in Aquatic Ecosystems Road-3 Road Construction & Reconstruction Road-7 Stream Crossings	To minimize erosion of and sedimentation from disturbed ground on incomplete projects by completing erosion control work prior to seasonal or extended shutdowns.
14.12 – Control of Excavation and Sidecast Material	Road-3 Road Construction & Reconstruction Road-7 Stream Crossings	To minimize sedimentation from unconsolidated excavated and sidecast material caused by road construction, reconstruction, or maintenance activities.
14.14 – Control of In-Channel Operations	AqEco-2 Operations in Aquatic Ecosystems Road-7 Stream Crossings	To minimize stream channel disturbances and related sediment production.
14.15 – Diversion of Flows Around Construction Sites	AqEco-2 Operations in Aquatic Ecosystems Road-7 Stream Crossings	To identify and implement diversion and de-watering requirements at construction sites to protect water quality and downstream uses.
14.17 – Bridge and Culvert Design and Installation	AqEco-2 Operations in Aquatic Ecosystems Road-7 Stream Crossings	To minimize adverse impacts on water quality, stream courses, and fisheries resources from the installation of bridges, culverts, or other stream crossings.
14.18 – Development and Rehabilitation of Gravel Sources and Quarries	AqEco-3 Ponds & Wetlands Fac-2 Facility Construction and	To minimize sediment from borrow pits, gravel sources, and quarries, and to limit channel disturbance from gravel sources permitted for

R10 BMP	National Core BMP	Objective
	Stormwater Control	development within floodplains.
14.19 – Disposal of Construction Slash and Stumps	Fac-5 Solid Waste Management Road-3 Road Construction & Reconstruction	To ensure that debris generated during construction is prevented from obstructing channels or encroaching on streams.
14.20 – Road Maintenance	Road-6 Road Storage and Decommissioning	To maintain all roads in a manner which provides for soil and water resource protection by minimizing rutting, road prism failures, side casting, and blockage of drainage facilities.
14.23 – Snow Removal Operations	Chem-1 Chemical Use Planning Road-8 Snow Removal & Storage	To minimize impacts of snow removal operations on road surfaces and embankments and to reduce the risk of sediment production.
14.26 – Daily LTF Cleanup	Fac-2 Facility Construction and Stormwater Control Fac-5 Solid Waste Management Road-9 Parking & Staging Areas	To assure daily cleanup of bark, debris, or other solid materials being introduced into marine waters when accumulations are present. To dispose of the materials in an acceptable manner, to prevent water quality degradation.
14.27 – Log Storage/Sort Yard Erosion Control	Fac-2 Facility Construction and Stormwater Control Road-9 Parking & Staging Areas	To avoid generation of fine particles, and control the overland flow of particles carrying hazardous materials into waterways.
FISH AND WILDLIFE HABITAT MANAGEMENT		
18.3 - In-Channel Excavation or Disturbance During Fish and Wildlife Habitat Improvement Projects	AqEco-2 Operations in Aquatic Ecosystems	To minimize stream channel disturbances and related sediment production from fish and wildlife habitat improvement projects through identification of, and compliance with, project specifications.

Sources:

USDA 2006, FSH 2509.22 – Soil and Water Conservation Handbook Chapter 10 – Water Quality Management for National Forest System Lands in Alaska (R-10 AMENDMENT 2509.22-2006-2)

USDA 2012, FS-990a - National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide

Mitigation Monitoring, and Design Features

Heritage

Monitoring

Log rafting activities would be monitored periodically by Forest Service Archaeologists and sale administrator throughout the duration of the proposed project to ensure protection of the fish trap and petroglyph sites. Log rafting and/or storage should only be allowed at approved locations and positioned away from the fish trap and petroglyph sites.

Monitoring proposed activities to ensure they do not affect cultural resources or historic properties through soil disturbance, rutting, compaction, and erosion. Monitoring would also address issues of additional use of the area that may increase the potential for deliberate looting or inadvertent disturbance of fragile sites in or near the project area.

Invasive Species

Mitigation

1. Require contractors to access rock material that is free of any high priority invasive plants (see Appendix A in Invasive Plant Risk Assessment for list of species) from existing quarries prior to constructing new roads. All rock/fill sources would be inspected by certified personnel.
    a. If any rock sources become contaminated with high-priority species and certification cannot be attained without treatment or avoidance methods, consider the use of weed infested rock for re-constructing existing roads only.
    b. Rock material free from high-priority species would be required on all new road constructions and new landings.
2. Monitor the newly constructed roads, the active quarries, and the project area for at least 3 years after the project for new invasive plant introductions.
3. Eradicate or control any newly introduced high priority invasive plant species not currently in the project area after the project completion, and prior to closing temporary roads as part of the District 5-year program of work for invasive species management. Prioritize controlling any new populations relative to other populations of high priority species needing treatment on the District. This recommendation could change if the road from Ketchikan is completed, as eradication may be impossible for some species once the road is connected.
4. Require washing of any off-road equipment and road brushers brought to the LTF from other locations prior to arrival at the Saddle Lakes project area.

Wildlife

Mitigation

Black Bears

Three active black bear dens were found within units during field reconnaissance of the project area. As a protection measure, unit boundaries should be adjusted to avoid these known bear dens. The suggested buffer width is 500 feet.

Transportation

Design Features

Rock Quarries

Rock Quarries

There is a need for rock sources during the construction of the new NFS and temporary roads, road reconditioning, and general maintenance of the existing NFS roads in this project. Borrow pits and quarries would be needed for road construction. It is preferred that the rock source is close to the site of road construction or maintenance, usually within two miles.

Where feasible, existing quarries would be used to support new road construction and road maintenance; however, new rock quarries may be developed. Quarry sites would be developed within 500 feet of a road. It is preferred that the rock source is close to the site of road construction or maintenance, usually within two miles. More details regarding rock quarries can be found in the Draft Transportation Report for the Saddle Lakes Timber Sale. All newly developed borrow quarries would be reviewed and cleared by resource specialists prior to their development.

Bridges

All existing bridges used for this project would be reviewed and brought to standard prior to haul. New bridge construction may be required on new road construction. These bridges would be designed and built to a standard that would allow them to support log truck traffic.

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