# Chapter 3
# Environment and Effects

## Introduction

This chapter provides information concerning the existing environment of the Iyouktug project area, and potential environmental consequences of the proposed action and alternatives to it. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. Each resource potentially affected by the proposed action or alternatives is described by its current condition and uses.

Following each resource description is a discussion of the potential environmental effects to the resource associated with the implementation of each alternative. All significant or potentially significant effects, including direct, indirect and cumulative effects, are disclosed. Effects are quantified where possible, and qualitative discussions are also included. The means by which potential adverse effects will be reduced or mitigated are described (see also the unit and road cards in Appendices B and C of the DEIS and Appendix C of the FEIS).

The discussions of resources and potential effects take advantage of existing information included in the Forest Plan Final EIS, other project EISs, project-specific resource reports and related information, and other sources as indicated. Where applicable, such information is briefly summarized and referenced to minimize duplication. The project record for the Iyouktug project includes all project-specific information, including resource reports, and other results of field investigations. The record also contains information resulting from public involvement efforts. The project record is located at the Sitka Ranger District Office in Sitka, Alaska, and is available for review Monday through Friday, from 8 am to 4:30 pm, except holidays.

# 3 Environment and Effects

## Ecological and Administrative Land Divisions

The land area of the Tongass National Forest has been divided in several different ways to describe the different resources and allow analysis of how they may be affected by Forest Plan and project-level decisions. These divisions vary by resource since the relationship of each resource to geographic conditions and zones also varies. The allocation of Forest Plan land use designations (LUDs) (discussed in Chapter 1) is one such division. Other divisions important for the present effects analysis are described briefly here.

### Project Area

The project area is identified by the Interdisciplinary Team (IDT) to define the boundary of the area in which the project will occur. For the Iyouktug Timber Sales project, the area includes Value Comparison Units (VCUs) 2080, 2090, and 2100. For analysis purposes the project area boundaries are the same as the VCU boundaries. VCU 2110 was not included in the project area because no activities are proposed in VCU 2110 and it is entirely old-growth habitat.

### Value Comparison Units (VCUs)

These are distinct geographic areas, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow major watershed divides. Chapter 1 includes a map showing the VCU's location (Figure 1-2).

### Wildlife Analysis Areas (WAAs)

These are land divisions that correspond to the "Minor Harvest Areas" used by the Alaska Department of Fish and Game to report community harvests of selected wildlife species. Approximately 190 apply to the Tongass National Forest. The project area includes (a portion of) WAA 3551. Information estimated by WAA is used in the wildlife and subsistence analyses.

### Watershed

Watershed refers to the area that contributes water to a drainage or stream, or to that portion of a landscape 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. Five watersheds were analyzed in the Iyouktug project area (Figure 3-7).

### Inventoried Roadless Area

Inventoried Roadless Areas are undeveloped areas typically exceeding 5,000 acres that met the minimum criteria for wilderness consideration under the Wilderness Act and that were inventoried during the Forest Service's Roadless Area Review and Evaluation (RARE II) process, subsequent assessments, or forest planning. The Iyouktug project falls partly within three Inventoried Roadless Areas: Whitestone, Point Augusta, and Freshwater Bay (Figure 3-3).

### Ecological Subsection

This refers to a mapping delineation devised as part of a national hierarchical framework designed to group ecosystems into logical associations. The

Iyouktug project area is mapped as "Freshwater Bay Carbonates" in this system (Nowacki et al. 2001). The Iyouktug project analysis did not use these polygons as separate analysis areas; however, the publication was a useful source of background information.

### Biogeographic Province

This designation refers to 21 ecological subdivisions of Southeast Alaska that are 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. Historical events (such as glaciers and uplifting) are important to the nature of the province and to the barriers that distinguish each province. Iyouktug is part of the East Chichagof Island biogeographic province. Effects of management at this scale are analyzed as part of the Forest Plan.

## Analyzing Effects

Environmental consequences are the effects of implementing an alternative on the physical, biological, social and economic environment. The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) include a number of specific categories to use for the analysis of environmental consequences. Several are applicable to the analysis of the proposed project and alternatives, and form the basis of much of the analysis that follows.

### Direct, Indirect and Cumulative Effects

Direct environmental effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity. Cumulative effects result from incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

### Reasonably Foreseeable Future Actions

An analysis of cumulative effects must also include “reasonably foreseeable future actions” (40 CFR 1508.7). This can include National Forest System timber sales and other management activities as well as land management activities of other landowners on nearby lands. We tend to view reasonably foreseeable future actions as those that are currently planned or scheduled to occur. For the purpose of this analysis, reasonably foreseeable future actions are considered to be those that will occur within the next 5 to10 years. See Appendix D of the FEIS for a listing and description of activities that have occurred, are occurring, and are reasonably foreseeable to occur in the project area.

## Unavoidable Adverse Effects

Implementation of any alternative, including the No-action Alternative, would cause some adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. Many adverse effects can be reduced, mitigated or avoided by limiting the extent or duration of effects. The interdisciplinary procedure used to identify specific harvest units and roads was designed to eliminate or lessen significant adverse consequences. The application of Forest Plan Standards and Guidelines, Best Management Practices, project-specific mitigation measures, and monitoring are all intended to further limit the extent, severity, and duration of potential effects. Such measures are discussed throughout this chapter. Regardless of the use of these measures, some adverse effects will occur. The purpose of this chapter is to fully disclose these effects.

## Short-term Use and Long-term Productivity

Short-term uses, and their effects, are those that occur annually or within the first few years of project implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services long after the project has been implemented. Under the Multiple-Use Sustained-Yield Act, and the National Forest Management Act, all renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be reestablished and grown again if the long-term productivity of the land is maintained. This long-term productivity is maintained through the application of the resource protection measures described in Chapter 2, in particular those applying to the soil and water resources, and described in more detail in the unit and road cards, Appendices B and C of the DEIS and Appendix C of the FEIS. These protection measures are also discussed throughout this chapter, in particular for soils, water quality, biodiversity and economics.

## Irreversible and Irretrievable Commitments

Irreversible commitments describe a loss of future options. Irreversible applies primarily to the effects of use of nonrenewable resources such as minerals or cultural resources, or to those factors, such as soil productivity that are renewable only over long periods of time. Once these resources are gone, they cannot be replaced.

Irretrievable commitments apply to the loss of production, harvest or use of natural resources. For example, some or all of the timber production from an area is lost irretrievably while an area is serving as a winter sports site. The production lost is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume timber production.

Where they occur related to the Iyouktug project, irreversible or irretrievable commitments are identified; those commitments are summarized here: Rock

irreversible commitment that is used for road construction/reconstruction is an irretrievable commitment of that resource. Detrimental soil disturbance from temporary roads are an irreversible commitment of soil resources. Roads built on wetlands are an irreversible and irretrievable commitment of wetlands. Loss of timber productivity in areas proposed for new specified road construction is considered an irretrievable commitment. Timber harvest is an irretrievable commitment of POG forest in development LUDs scheduled for 100-year timber harvest rotation under the current Forest Plan. Harvested stands would alternate between stand initiation and stem exclusion phase. The 15 to 20 years that it takes for the helicopter units to fully regenerate is an irretrievable recreation resource lost to that generation. The same is true for the 40 to 50 years for clearcut or shovel unit except it would be for two generations instead of one. For the other resources, there will be no irretrievable or irreversible commitments of resources as the result of any alternatives.

The use of these terms is found in 40 CFR 1502.16. The definitions above are found in the Forest Service handbook (FSH 1909.15, 05). The disclosure of effects that follows is organized by direct, indirect, and cumulative effects.

### Available Information

Much of the Tongass National Forest resource data resides in an electronic database formatted for a geographic information system (GIS). The Forest uses GIS software to assist in the analyses of these data. GIS data is available in tabular (numerical) format, and as plots displaying data in map format. For this FEIS, all the maps, and most of the numerical analyses, are based on GIS resource data supported by field inventories.

There is incomplete knowledge about many of the relationships and conditions of wildlife, fish, forests, climate, jobs and communities. The ecology, inventory and management of a large forest area is a complex and developing science. The biology of wildlife species prompts questions about population dynamics and habitat relationships. 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

Several resources and uses of the project area are likely to remain unaffected by the proposed action or alternatives. Resources or uses for which no measurable effects were identified are discussed briefly here.

### Air Quality

All of the action alternatives will have limited, short-term effects on ambient air quality. Such effects, in the form of vehicle emissions and dust, are likely to be indistinguishable from other local sources of airborne particulates, including other motor vehicle emissions, dust from road construction and motor

vehicle traffic, residential and commercial heating sources, marine traffic, and emissions from burning at sawmills. The action alternatives could result in short-term supplies of raw wood products to local mills. It is the responsibility of the mill owner or sort yard operator to ensure that mill emissions are within legal limits.

### Land Status

Under the Alaska Statehood Act of 1959, the State of Alaska is entitled to a certain amount of Federal land. The State was also allowed to identify for selection more acreage than would ultimately be conveyed to State ownership. There are no State-selected lands within the project area. Other legislation granted Alaska Native corporations similar selection rights. While there are no Alaska Native land selections in the project area, some lands are encumbered as discussed in Chapter 1 of this FEIS under Non-National Forest System Lands

### Plans of Other Agencies and Landowners

The CEQ regulation implementing NEPA require a determination of possible conflicts between the proposed action and the objectives of Federal, State, and local land use plans, policies, and controls for the area. The major land use regulations of concern are Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA), the Coastal Zone Management Act (CZMA), and the State of Alaska's Forest Practices Act. See the "Findings and Disclosures" section of Chapter 2 for discussion of compliance with these laws. State compliance is also discussed at the end of Chapter 1. ANILCA Section 810 requirements pertain to subsistence; these are also discussed in the Subsistence section of this chapter.

Land ownerships in the project area include 265 acres that are not National Forest System lands (see Figure 1-2). About 100 acres of this land have been harvested through clearcuts. Sealaska Corporation has purchased the timber rights on the area from Huna Totem Corporation. At this time, Sealaska plans to harvest some of the uncut Huna Totem corporation land within the project area in 2 or 3 years.

## Environment and Effects of the Significant Issues

The Council on Environmental Quality (CEQ) issues guidance to Federal agencies to determine the significant issues concerning any proposal, and to eliminate those issues that are not significant, or that are outside the scope of this document. With the help of the public and other agencies, we identified the three issues to be examined in detail for the proposed project. In the following sections, we describe the environmental effects of each of our alternatives as they relate to these three issues. Other resources for which effects may occur are also discussed in this chapter; these resources are organized in alphabetical order.

# Habitat Connectivity and Old Growth

Issue 1

### *Issue 1: Proposed harvest and associated road construction would reduce habitat connectivity for Sitka black-tailed deer by removing additional low elevation forest and travel corridors connecting low and high elevation habitat*

Previous timber harvest in the Iyouktug area has removed several areas of low-elevation productive old growth forest. Deer use old growth forest corridors to move between low elevation winter habitat and high elevation summer habitat; these corridors have been affected by previous harvest. Proposed harvest and associated road construction would reduce habitat connectivity for Sitka black-tailed deer by removing additional low elevation forest and travel corridors connecting low and high elevation habitat.

**Measurements:**

- Percent reduction in productive old growth forest (POG) below 800 feet elevation in the Wildlife Analysis Area (WAA)
- Acres of POG remaining in the WAA
- Degree of influence on deer habitat connectivity

There are two main types of connectivity considered in the Forest Plan: landscape connectivity and elevational migration connectivity. The objective of the landscape connectivity is to maintain corridors of old growth forest among Old Growth Habitat Reserves (OGRs) and other natural setting Land Use Designations (LUDs) at the landscape scale (USDA Forest Service 1997b). Beach and estuary buffers are important corridors that maintain this connectivity because shoreline is a prominent feature across the Forest and is of high value to many species. The Forest Plan standards and guidelines protect a 1000-foot beach fringe (USDA Forest Service 1997b) and various width riparian zones depending on stream class aid in maintaining this connectivity.

The objective of the second type of connectivity is to provide elevational corridors of old growth forest habitat between high and low elevation habitats; this is particularly important for deer. Higher elevations (over 1,500 feet) are typically used by deer during the summer months where alpine and subalpine plants are especially nutritious (Hanley 1984). Schoen and Kirchhoff (1985) found that roughly three-fourths of the deer in their study made distinct migrations between low elevation winter range and high elevation summer range. Mid-elevation habitat is also used during mild winters. Elevational migration corridors are primarily used by deer, but receive some use by bear. Other species show less elevational movement, but may utilize the corridors as old growth habitat.

For this analysis, connectivity was defined by the effects to productive old growth forest (POG) especially in low-elevation passes, beach fringe and stream habitats that provide natural connections important for migrating and dispersing deer. POG forest generally provides important cover and forage habitat for wildlife as a result of the dense canopy, which reduces snow accumulations in the understory during the winter but is open enough to provide understory vegetation during the spring, summer, and fall. POG is defined as having a timber volume of greater than 8,000 board feet per acre and is defined as volume strata low, medium, and high in the GIS database (USDA Forest Service 1997b). Volume strata uses timber volume, soil, and slope information to define POG. High volume POG (HPOG) is defined as high volume strata in the GIS database (USDA Forest Service 1997b).

Connectivity along riparian areas and between habitats at different elevations has been reduced by past clearcutting. In some areas, especially outside of OGRs, past harvest has created contiguous stands of second growth with only narrow strips of POG (corridors) remaining. In areas where past harvest has compromised connectivity, additional connectivity should be examined during project planning and should be of a sufficient width to minimize edge effects and provide interior habitat conditions (USDA Forest Service 1997b). A minimum corridor width of 1,000 feet of POG forest should be retained to facilitate movement and dispersal between OGRs (USDA Forest Service 1998).

Field surveys completed between 2002 and 2006 identified corridors throughout the project area. Over 287 miles and 965 hours of wildlife surveys were complete (refer to project record for survey data). Established corridors, trails that appeared to receive traditional use by deer, were observed along the North Fork of Iyouktug Creek (proposed National Forest System [NFS] Road 8534311), in the lower portion of Suntaheen Creek (south of NFS Road 85331), in the west portion of Iyouktug Creek (north west of NFS Road 85351) and between past harvest units in proposed Units 818 and 919.

This issue was analyzed for all of the lands in Wildlife Analysis Area (WAA) 3551. WAA 3551 includes the VCUs in the project area (2080, 2090, and 2100) plus VCUs 2110 and 2120 (Figure 3-1). The WAA was used as the analysis area to be able to compare to ADFG data, to adequately assess species with larger home ranges, to assess species at the landscape level, and to address cumulative effects.

### Old Growth Reserves

The Forest Plan contains a comprehensive conservation strategy using a system of OGRs designed to provide old growth habitats in combination with other non-development LUDs to maintain viable populations of native and desired non-native fish and wildlife species and subspecies that may be associated with

Figure 3-1: Iyouktug Timber Sale Area Old Growth Reserves and Connectivity

Color 11x17 map

# 3 Environment and Effects

Back of Figure 3-1

old growth forests (USDA Forest Service 1997b). This strategy, in addition to the implementation of Forest Plan standards and guidelines, was developed to maintain species viability.

The Forest Plan designated small Old-growth Habitat LUDs in VCUs 2080, 2090 and 2100. All of VCU 2110, 89 percent of VCU 2120 and 39 percent of VCU 2100 are designed as large Old-growth Habitat LUD (Figure 3-1); this continues into VCUs 2130, 2140 and 2150. There are no other non-development LUDs in this WAA therefore the Old-growth Habitat LUDs are referred to as OGRs. All ownerships in the WAA, including the 265 acres of Huna Totem Corporation lands and 119 acres of private lands, were included in the analysis unless otherwise specified. In accordance with Forest Plan standards and guidelines, some of the analysis was completed at the VCU level. The large OGR was not evaluated during this process because the location of this OGR received a more rigorous review than the small OGRs during the forest planning process (USDA Forest Service 1997b). Therefore it was assumed for this analysis that the large OGR achieved reserve strategy objectives.

Table 3CO-1: Acres of National Forest System lands, old-growth habitat land use designation (OG LUD) and productive old-growth forest (POG) in OG LUDs for value comparison units (VCU) in Wildlife Analysis Area (WAA) 3551.

| | | 1997 Forest Plan | | | Alternatives 2-5 | | |
|---|---|---|---|---|---|---|---|
| **VCU** | **National Forest Land Acres** | **Size Class** | **OGR Acres** | **OGR POG Acres** | **Size Class** | **OGR Acres** | **OGR POG Acres** |
| **2080** | 6432 | Small | 667 | 449 | Small | 1271 | 808 |
| **2090** | 13,150 | Small | 1052 | 771 | Small | 2165 | 1,424 |
| **2100[1]** | 20,804 | Small and Large | 8,020 | 4,610 | Large | 7598 | 4,466 |
| **2110[1]** | 4660 | Large | 4,660 | 3,477 | Large | 4660 | 3,477 |
| **2120[1]** | 13,213 | Large | 11,883 | 5,748 | Large | 11,883 | 5,748 |
| **Total** | 58,259 | | 26,282 | 15,055 | | 27,577 | 15,923 |

[1]The large OGR also occurs in VCUs 2130, 2140 and 2150 that are outside of WAA 3551.
Source: JT Stangl, GIS LUD, VCU and Volstrat Layer

Although there is no Forest Plan requirement to ensure connectivity between small OGRs (USDA Forest Service 1997b), overall landscape connectivity was considered early in this project design. The location of OGRs, distribution of POG forest, and beach, estuary, riparian and other buffers were reviewed to assess habitat connectivity between OGRs and elevationally different habitats (Figure 3-1).

## Affected Environment for Connectivity

Based on the acres of National Forest System (NFS) lands in WAA 3551, the Forest Plan requires that 1,029 acres of VCU 2080 be designated as small OGR and that 515 acres of this be POG forest. For VCU 2090, 2,104 acres should be designated as small OGR and 1,052 acres should be POG forest. Assuming that OGRs overlapped into adjacent VCUs within the same watershed (VCUs 2090 and 2100), the small OGRs designated in the Forest Plan were 53 acres short for VCU 2080 and 421 acres short for VCU 2090.

### Productive Old Growth Habitat

Although many wildlife species on the Tongass are associated with more than one habitat type, most inhabit old growth forests or prey on species that inhabit old growth forests. Old growth is characterized by a patchy, multi-layered canopy; trees that represent many age classes; large trees that dominate the overstory, standing dead (snags) or decadent trees; and higher accumulations of down woody material. For this analysis, old growth forests are defined as POG forest. The combination of a dense canopy with scattered small openings that is characteristic of POG forests allows forage to grow under the openings, while the large limbs within the canopy provide thermal insulation and intercept enough snowfall to allow access to forage during the winter.

Approximately 54 percent of the total WAA acres are classified as POG forest (Table 3CO-2 and Figure 3-2). Ninety-four percent of the existing POG occurs below 1500 feet in elevation (Table 3CO-3). Sixty-four percent of the existing POG occurs below 800 feet. An estimated 30 percent of the POG is classified as HPOG. Fifty-four percent of the existing HPOG occurs below 800 feet.

POG forest in WAA 3551 has been reduced by 12 percent as a result of past harvest. Timber harvest occurred on 4,329 acre of NFS lands from 1985 to 2005 and on 100 acres of NNF lands in 1985. All of the past harvest occurred at elevations below 1500 feet. Approximately 84 percent (3,730 acres) of the past harvest occurred below 800 feet in elevation. It is assumed that prior to the 1985 harvest, approximately 62 percent of the WAA was POG forest. This assumes that all habitats were POG before harvest.

Table 3CO-2: Acres of productive old growth (POG) by volume strata. This includes 111 acres of POG on Non-national Forest lands in VCU 2080 and 48 acres in VCU 2120.

| | Volume Strata Acres | | | |
|---|---|---|---|---|
| | **Low** | **Medium** | **High** | **Total** |
| **WAA 3551** | 7,586 | 14,772 | 9,409 | 31,768 |

Source: JT Stangl, GIS VCU and Volstrat Layer

Figure 3-2: Iyouktug Timber Sale Area Productive Old Growth

Color 11x17 map

Back of Fig 3-2

Table 3CO-3: Acres of productive old growth (POG) by elevation range. This includes 111 acres of POG on Non-national Forest lands in VCU 2080 and 48 acres in VCU 2120.

| | Acres POG per Elevation Range (feet) | | | | |
|---|---|---|---|---|---|
| | **0-800** | **801-1000** | **1001-1500** | **>1500** | **Total** |
| **WAA 3551** | 20,334 | 3,624 | 5778 | 2,032 | 31,768 |

Source: Ginny Lutz, GIS, Elevation and Volstrat Layers

### Coarse Canopy

POG forest includes coarse canopy forests. Coarse canopy forests generally include fewer but larger trees in a multiple-layer canopy and abundant understory forage species. They provide high levels of snow interception and are therefore especially important to maintaining wildlife connectivity during the winter. The current method for estimating coarse canopy forest is to use volume class 6 and 7 (USDA Forest Service 2005b) from the existing vegetation GIS database. Volume class 6 is defined as having a timber volume of 30,001 to 50,000 board feet per acre and volume class 7 is 50,001 and greater (USDA Forest Service 1997b).

Seven percent of the POG in the WAA and project area is coarse canopy forest (Figure 3-2). Of this, 47 acres are on Non-National Forest lands. Eighty percent of the coarse canopy forest in the WAA occurs below 800 feet in elevation. OGRs, beach buffers and riparian management areas protect 66 percent of the existing coarse canopy from harvest. The remainder is located in development LUD and could be subject to timber harvest depending on other suitability factors such as goshawk nest buffers and slopes greater than 72%. There is no record of how much coarse canopy forest occurred before large-scale harvest.

## Environmental Consequences on Connectivity

The Iyouktug project area is located in the East Chichagof biogeographic province. Specific measures have been identified to maintain connectivity and therefore population viability within this province (USDA Forest Service 1998). The effects of the proposed action on connectivity were addressed early on and factored into the initial planning process in unit selection and design and in alternative development. Measures taken to maintain connectivity for this project include a proposal to modify the two small OGRs to provide for landscape connectivity and the implementation of specific standards and guidelines to maintain habitat structure outside of OGRs (Table 3CO-1 and Figure 3-1). This OGR proposal was developed by an interagency group of biologists from the Forest Service, ADFG, USFWS and DNR in December of 2005 (Stangl 2007) and was proposed in the 2007 Tongass Land and Resource Management Plan Amendment (USDA Forest Service 2007a). Where

elevational connectivity was considered a factor, some units were dropped from consideration or designed to eliminate or reduce effects.

### Level of Impact

General criteria were developed to assess the intensity of the effects. Mitigation measures that may be employed to offset or minimize potential adverse impacts were defined where applicable. Levels of impact definitions are as follows.

**Negligible:** Connectivity would not be affected or the change would be so small that it would not be of any measurable or perceptible consequences. Negligible, as defined here, includes no effect.

**Minor:** Connectivity would be affected but the change would be small. Impacts would be detectable, but they would not be expected to have any long-term effects on deer or their habitats, or the natural processes sustaining them. Sufficient habitat would remain functional to maintain connectivity.

**Moderate:** Connectivity would be noticeably affected. The effect could have some long-term consequence to the deer or their habitat but sufficient habitat would remain functional to maintain connectivity.

**Major:** Connectivity would be noticeably affected with a long-term, vital consequence to individual deer, population, or habitat. Impacts on deer , their habitats, or the natural processes sustaining them will be detectable. Population numbers, population structure, genetic variability, and other demographic factors for species might have large, short-term declines with long-term population numbers significantly depressed.

### Effects Analysis

Clearcut harvest will have the greatest impact on POG forest. Clearcutting generally differs from natural disturbances in that it represents a large-scale change rather than dispersed, small, partial blow-down patches. It also differs in that nearly all trees are felled and removed, whereas in natural disturbances many trees remain standing or partially standing. Clearcuts result in even-age stands and have more of an impact on forest stand structure than single tree selection which maintains or creates uneven-aged stands. After clearcut harvest, rapid establishment and regeneration of conifers, shrubs and herbaceous plants are expected. Over time, clearcutting generally results in the rapid development of conifers and a decline in understory plant abundance as a result of stem exclusion.

Because clearcut harvest will have the greatest impact on POG forest, it will also have the greatest impact to connectivity. Clearcut harvest results in up to 100 percent removal of all trees in the unit. Although 10-20 percent of the trees will be retained in high value marten habitat, this is not enough to maintain connectivity.

Single tree selection will maintain more wildlife habitat and connectivity than clearcut harvest. Stand structural diversity and plant diversity and abundance are much greater in single tree selection stands than in young-growth stands

developing after clearcut harvest (Deal 2001; Deal and Tappeiner 2002). Although shovel harvest will remove trees from a large area, at least 50 percent of the basal area will be retained. The 40 percent helicopter harvest will retain up to 60 percent of the basal area and remove trees in small groups or as single trees. The objectives of these two prescriptions are to maintain existing tree composition and structural diversity. Regeneration will result in a mosaic of multiple age classes that maintain structure features.

POG forest will be maintained where single tree harvest of up to 25 percent is proposed because a diverse and abundant plant understory comparable to plant communities typically found in old growth stands will be maintained (Deal 2007; Deal and Tappeiner 2002; Deal 2001, p. 2074). However, the effects to coarse canopy forest consider all harvest systems because the removal of large trees could change the volume class of the stand. **

Between the DEIS and FEIS, approximately 68 to 390 acres of proposed harvest (depending on the alternative) were changed from 50 or 40 percent partial harvest to 25 percent partial harvest. The following analysis did not apply these changes. Therefore, these analyses may overestimate effects.

## Direct and Indirect Effects on Connectivity

Direct and indirect effects were assessed for WAA 3551.

### Alternative 1 (No Action)

Alternative 1 would have negligible direct and indirect effects to connectivity because POG and coarse canopy forest would not be reduced. Although past harvest has reduced connectivity, corridors would not be further reduced.

### Effects Common to All the Action Alternatives

These alternatives would incorporate the modifications to the OGRs recommended by the interagency team to improve landscape connectivity. Harvest activities will not occur within the OGR. In addition, all Forest Plan standards and guidelines that are integral parts of the conservation strategy (e.g., riparian management areas, beach fringe protection, landscape connectivity, and the goshawk and marten guidelines) would be fully incorporated into the alternatives.

### Alternatives 2 and 4

Alternatives 2 and 4 would have a moderate direct and indirect effect to connectivity because POG and coarse canopy forest would be reduced in low elevation riparian (outside of Riparian Management Area – RMA – buffers) and elevational corridors. Reduction of POG forest and corridors will reduce forage availability and will likely impact seasonal deer migration from low elevation winter ranges to high elevation summer ranges. Effects are considered moderate because activities are expected to reduce the number of deer but sufficient habitat would remain functional to maintain the species.

Alternative 2 would have the greatest reduction of POG forest (10 percent) and result in a 6 percent reduction of POG below 800 feet in elevation (Tables 3CO-4 and 3CO-5) from the current condition. Coarse canopy forest would be

reduced by 9 percent (Table 3CO-6). Most of the coarse canopy forest (156 acres) lies within units proposed for helicopter single tree selection of up to 25 percent of the basal area. These habitats may be reduced slightly more than displayed as a result of proposed new and temporary road construction (17.2 miles for Alternative 2 and 8.8 miles for Alternative 4). Most of the proposed road construction is located within proposed units or crosses non-productive ground to reach proposed units.

Harvest of POG forest in the North Fork of Iyouktug Creek (proposed NFS Road 8534311) and in the Iyouktug Creek drainage (north of NFS Road 8534), would have the greatest impact to low elevation/riparian connectivity. The harvest of Units 818 and 819 would have the greatest impact to elevational connectivity. Because shovel and 40 percent helicopter harvest will maintain up to 60 percent of the stand structure, connectivity may be maintained in portions of these units. Connectivity is expected to be maintained in units proposed for 25 percent helicopter single tree selection harvest.

Alternative 4 would have less of an effect on connectivity than Alternative 2 because fewer acres of POG would be harvested. This action would result in a 5 percent reduction in POG and 4 percent reduction of POG below 800 feet in elevation (Tables 3CO-4 and 3CO-5) from the current condition. Coarse canopy would be reduced by 9 percent (Table 3CO-6). Most of the coarse canopy forest (167 acres) lies within units proposed for helicopter single tree selection of up to 25 percent of the basal area. Units are not proposed for harvest in the upper reaches of the North Fork of Iyouktug Creek. Although this alternative proposes to harvest less POG than Alternative 3, the POG is located in areas that reduce elevational connectivity and connectivity from Iyouktug Creek (north of NFS Road 8534) to the OGR.

Open road access would increase as a result of these alternatives (4.2 miles for Alternative 2 and 1.4 miles for Alternative 4). This will increase vehicle use and access to deer hunters and may increase the number of deer harvested.

Table 3CO-4: Percent reduction of productive old growth (POG) compared to the 2007 and 1984 condition for all lands in WAA 3551. Excludes 25 percent helicopter harvest.

| | Year | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1984 | | | | | 2007 | | | |
| VCU | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| **2080**[1] | 5.6 | 18.7 | 17.3 | 14.7 | 12.6 | 11.5 | 10.0 | 7.1 | 4.8 |
| **2090** | 18.4 | 30.2 | 28.3 | 25.6 | 19.7 | 14.5 | 12.1 | 8.8 | 1.6 |
| **2100** | 9.7 | 22.9 | 18.4 | 15.7 | 14.0 | 14.7 | 9.6 | 6.6 | 4.8 |
| **2110** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **2120** | 17.7 | 17.7 | 17.7 | 17.7 | 17.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| **WAA Total** | **12.0** | **20.8** | **18.6** | **16.7** | **14.6** | **9.8** | **7.2** | **5.1** | **2.7** |

Source: JT Stangl 2007 GIS Unit_pog
[1]Includes 100 acres of harvest on Non National Forest Lands

Table 3CO-5: Percent reduction in productive old growth (POG) from the 2007 condition by elevation range by alternative for all lands in WAA 3551. [1]Excludes 25 percent helicopter harvest.

| Alt | 0-800 ft. | 801-1000 ft. | 1001-1500 ft. | >1500 ft. | Total POG Acres |
|---|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 0 | 31,768 |
| **2** | 6.1 | 16.0 | 18.5 | 10.5 | 28,657 |
| **3** | 3.8 | 12.1 | 15.8 | 8.8 | 29,467 |
| **4** | 4.2 | 8.5 | 7.6 | 1. 7 | 30,144 |
| **5** | 2.7 | 4.5 | 2.2 | 0.0 | 30,928 |

Source: Ginny Lutz, GIS, Elevation and Volstrat Layers
[1]VCUs 2080, 2110, and 2120 have no reduction in coarse canopy

Table 3CO-6: Percent reduction in coarse canopy forest (volume class 6 and 7) on all lands compared to 2007 acres. [1] Includes 25 percent helicopter harvest.

| | | Alternative | | | | |
|---|---|---|---|---|---|---|
| | Acres in 2007[2] | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| **WAA 3551** | 2157.2 | 0 | 9.0 | 8.9 | 8.5 | 0.5 |

Source: JT Stangl 2007 GIS waa_covers/eveg_vcu
[1] VCUs 2080, 2110, and 2120 have no reduction in coarse canopy
[2]Includes 100 acres of harvest on Non National Forest Lands

### Alternative 3

Alternative 3 would have a moderate direct and indirect effect to connectivity because POG forest would be reduced in riparian and elevational corridors. Reduction of POG forest and corridors will reduce forage availability and will likely impact seasonal deer migration from low elevation winter ranges to high

elevation summer ranges. Effects are considered moderate because activities are expected to reduce the number of deer but sufficient habitat would remain functional to maintain the species.

Although harvest of POG would reduce available habitat and connectivity, this alternative was designed to be economic while maintaining more connectivity than in Alternatives 2, 4 and 5. Alternative 3 would reduce POG by 7 percent and result in a 4 percent reduction of POG below 800 feet in elevation (Table 3CO-4 and 3CO-5) from the current condition. Coarse canopy would be reduced by 9 percent (Table 3CO-6). Most of the coarse canopy forest (155 acres) lies within units proposed for helicopter single tree selection of up to 25 percent of the basal area. These habitats may be reduced slightly more than displayed as a result of proposed new and temporary road construction (6.3 miles).

The amount, location, and type of modification to POG forest can all affect connectivity. Where connectivity was considered a factor, some units were dropped from Alternative 3 to eliminate or reduce effects. Connectivity will be reduced in the North Fork of Iyouktug Creek (proposed NFS Road 853431). Unit 104 and portions of Units 108 and 1171 were deferred to maintain low elevation riparian connectivity from Iyouktug Creek to the OGR. The dropping of Unit 189 (dropped to maintain connectivity and quality deer habitat) in combination with Units, 192, 197, 202, and 203 (dropped for economics) will also aid in maintaining this connectivity. Unit 819 was dropped to maintain elevational connectivity in an area where established trails were observed. Although Unit 818 is still proposed for harvest, this unit will only remove 50 percent of the basal area and should maintain a travel corridor (although likely less than 1000 feet wide). Established trails were also observed in Unit 919. It was assumed that elevational connectivity would be maintained in this unit because the helicopter single tree selection harvest would maintain cover and therefore connectivity.

All new roads (excluding 0.4 mile accessing rock pits) in Alternative 3 would be closed after completion of the sale to allow deer to use roads as corridors without the influence of vehicles and to exclude vehicle access to hunters. This action aids to mitigate the harvest effects to deer populations from the reduction in habitat connectivity, habitat capability, and deer winter range (refer to the Sitka Black-tailed deer section).

### Alternative 5

Alternative 5 would have moderate direct and indirect effects to connectivity because POG forest would be reduced in riparian and elevational corridors. Reduction of POG forest and corridors will reduce forage availability and will likely impact seasonal deer migration from low elevation winter ranges to high elevation summer ranges.

This alternative proposes to harvest the least amount of POG (3 percent) and would result in a 3 percent reduction of POG below 800 feet in elevation

(Tables 3CO-4 and 3CO-5) from the current condition. Coarse canopy would be reduced by less than 1 percent (Table 3CO-6). These habitats may be reduced slightly more than displayed as a result of proposed new and temporary road construction (6.8 miles), current small timber sale projects (approximately 107 acres) and personal wood use not included in Table 3CO-3. Most of the proposed road construction is located within proposed units or crosses non-productive ground to reach proposed units. The location of the POG proposed for clearcut would reduce elevational connectivity and connectivity from the North Fork of Iyouktug Creek to the OGR.

Open road access would increase as a result of this alternative (2.8 miles). This will increase vehicle use and access to deer hunters and may increase the number of deer harvested.

## Cumulative Effects

Cumulative effects were assessed for the WAA. Under all alternatives, habitat for old growth dependent species will gradually return to historic conditions in OGRs and other areas considered unsuitable for logging under the current Forest Plan, such as beach buffers and very high hazard soils. Units harvested in the past will continue to age naturally, gradually approaching old growth condition over the next 100 to 150 years. Trees will start to diversify in species, height, and size and the stands will become more complex in structure with larger snags and downed logs developing. Wind will eventually create small blowdown openings where increased light conditions can help forage species (herbs and shrubs) start to grow. As new trees grow in these openings the structural diversity will increase even more and the age class distribution will improve.

### Alternative 1 (No Action)

Alternative 1 would have negligible cumulative effects to connectivity because POG and coarse canopy forest would be reduced as a result of current small timber sales (approximately 107 acres) and personal wood use and windthrow. Currently planned and proposed thinning of approximately 2,700 acres is designed to maintain understory vegetation and a more open overstory in second growth stands. Ongoing road closure/storage activities will cumulatively reduce open road miles to 34.9 for Alternative 1 in the project area after implementation of the 2002 Access Travel Management (USDA Forest Service 2002b) decision, reducing hunter access. The interagency recommended modifications to the OGRs would not be implemented in this alternative. Therefore the two small OGRs do not meet Forest Plan acre criteria and there would be no improvement to landscape connectivity. However, the Forest Plan Amendment DEIS (USDA 2007) proposes to implement the recommended modifications in some of the alternatives.

### Effects Common to Alternatives 2, 3, 4, and 5

All action alternatives would incorporate the modifications to the OGRs recommended by the interagency review to improve landscape connectivity. The OGR proposal was considered biologically preferred because the location of the OGRs meets acre criteria and maintains landscape connectivity, low elevation productive old growth habitat, deer winter habitat, quality bear foraging habitat

(along Suntaheen Creek) and goshawk foraging habitat. Because Iyouktug was identified as an area where corridors may not be fully functional due to past harvest activities, private lands, location of OGRs or other factors (USDA Forest Service 1998), habitat connectivity was carefully assessed. The small OGRs exceed minimum acre criteria (by 303 acres) to maintain a 3,000-foot corridor to connect the OGRs in VCU 2080 and 2090. In addition to adding acres to the small OGRs, the size classification of a portion of the OGR maintained in VCU 2100 was changed from small to large to maintain connectivity and the boundaries were modified to follow recognizable features. See Stangl (2007) in the project record for more information.

Although the Forest Plan conservation strategy maintains the population viability of deer, the cumulative reduction of elevational connectivity in association with a cumulative reduction in deer habitat capability as a result of past, proposed and future harvest activities and the severe 2006-2007 winter will likely result in a further decline in the deer population (refer to the Sitka black-tailed deer section). This in turn would affect deer habitat and impact the availability of deer for subsistence use (refer to the Subsistence section).

### Alternatives 2 and 4

Alternatives 2 and 4 would have a moderate cumulative effect to connectivity in the WAA. Alternative 4 would have less of an effect on connectivity than Alternative 2 because fewer acres of POG would be harvested in the WAA. These habitats may be reduced more than displayed as a result of current small timber sale projects (approximately 107 acres) and personal wood use and windthrow.

Ongoing road closure/storage activities will cumulatively reduce the open road miles to 33.5 and 36.2 for Alternatives 2 and 4, respectively, in the project area after implementation of the 2002 Access Travel Management (USDA Forest Service 2002b) decision. This is a decrease from existing conditions; thus hunter access will cumulatively decrease from the current condition.

### Alternative 3

Alternative 3 would also have a moderate cumulative effect to connectivity in the WAA because POG forest would be reduced in riparian and elevational corridors. These habitats may be reduced more than displayed as a result of current small timber sale projects (approximately 107 acres) and personal wood use and windthrow. Most of the proposed road construction is located within proposed units or crosses non-productive ground to reach proposed units.

Ongoing road closure/storage activities will cumulatively reduce the open road miles to 32.4 miles for Alternative 3 in the project area after implementation of the 2002 Access Travel Management (USDA Forest Service 2002b) decision, cumulatively reducing hunter access.

### Alternative 5

Alternative 5 would also have a moderate cumulative effect to connectivity in the WAA because POG forest would be reduced in riparian and elevational

corridors. These habitats may be reduced more than displayed as a result of proposed new and temporary road construction (6.8 miles), current small timber sale projects (approximately 107 acres) and personal wood use and windthrow. Most of the proposed road construction is located within proposed units or crosses non-productive ground to reach proposed units. The location of the POG proposed for clearcut would reduce elevational connectivity and connectivity from the North Fork of Iyouktug Creek to the OGR.

Ongoing road closure/storage activities will cumulatively reduce the open road miles to 34.8 for Alternative 5 in the project area after implementation of the 2002 Access Travel Management (USDA Forest Service 2002b) decision, reducing hunter access.

# Roadless Area Resources

**Issue 2**

### *Issue 2: Timber harvest and road construction may affect the roadless character of Iyouktug's three inventoried roadless areas*

Harvesting trees and building and maintaining a road system for current and future harvest may affect the roadless character of the three inventoried roadless areas in the Iyouktug project area: Whitestone, Point Augusta, and Freshwater Bay. Additionally, several comments expressed the desire to avoid roads and avoid harvest in Tongass inventoried roadless areas because of the potential to affect wildlife and fish and their habitat as well as to affect ecological, cultural, and geological values in inventoried roadless areas.

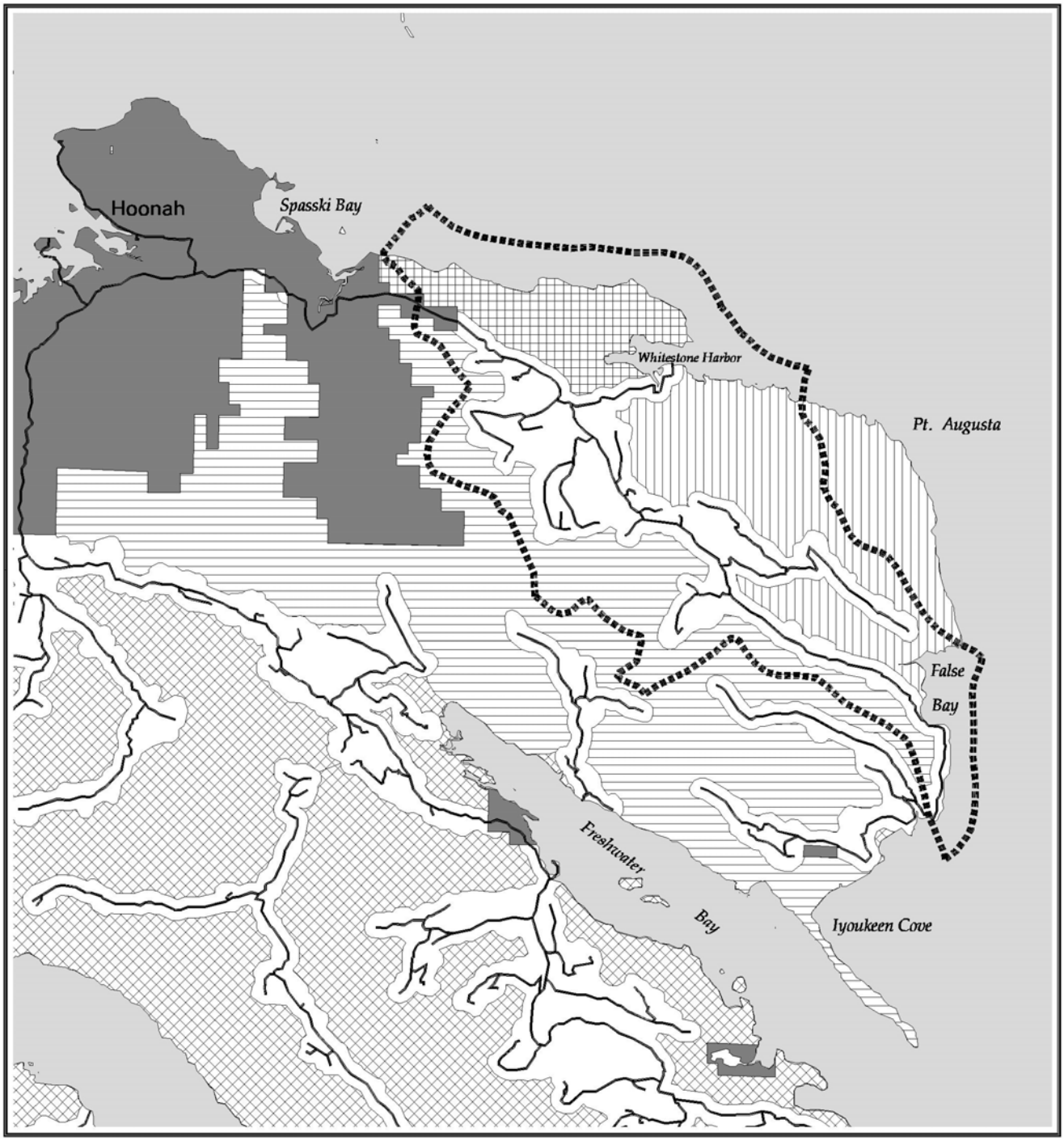
**Measurements:**

- Acres of timber harvest and miles of road construction in Whitestone, Freshwater Bay, and Point Augusta Inventoried Roadless Areas
- Acres of inventoried roadless area retaining roadless characteristics in the project area
- Degree of influence on high value fish and wildlife habitat in each inventoried roadless area
- Degree of influence on ecological, cultural, and geological special values in each inventoried roadless area

Inventoried roadless areas (IRAs) are contiguous blocks of land over 5,000 acres in size in essentially pristine condition that meet the minimum criteria for potential inclusion in the National Wilderness Preservation system using the Wilderness Attribute Rating System. Although these areas are not currently under consideration for wilderness designation, they contain wilderness values that may include pristine watersheds, diversity of native plant and animal communities, habitat for threatened, endangered or sensitive species, primitive and remote recreational opportunities, scenic viewsheds, cultural properties and sacred sites, unique wetland complexes, geologic formations, or highly valued subsistence opportunities. These characteristics are considered in detail in other resource reports (see Wildlife and Subsistence, Watershed and Fish, Soil, Geology and Karst, Heritage, Scenery, and Recreation reports) -- this section in the EIS specifically considers the relative value of each IRA in the project area in terms of these characteristics.

Three inventoried roadless areas are in the Iyouktug Project Area (VCUs 2080, 2090, and 2010) (Figure 1). These include the Point Augusta IRA (15,629 acres, 10,969 of which are in the project area), the Whitestone IRA (5,747 acres, of which 5,516 are in the project area), and the Freshwater Bay IRA (47,070 acres, of which 9,106 are in the project area). The most current roadless inventory does not show any unroaded areas in the project area.

Figure 3 - 3
Inventoried Roadless Areas in or near the Iyouktug Project Area



## Affected Environment for Roadless

### Roadless Characteristics

The Roadless Area Conservation FEIS (USDA 2000) lists several key resource characteristics of inventoried roadless areas. These include clean air, water, soil, drinking water supplies, habitat diversity for plants and wildlife, habitat for threatened, endangered, and sensitive species, cultural sites, scenic integrity, primitive recreation, opportunities for solitude and challenge, reference landscapes for study in their natural condition, and other special values such as unusual geologic formations or rare wetlands. Those characteristics that apply to the project area are summarized below:

### Air

Air quality in Southeast Alaska is generally very good. Dust and automobile exhaust are the primary pollutants along the road system in the Iyouktug project area, and cruise ship emissions may affect areas along the coast, including the coastal segments of the Whitestone and Point Augusta IRAs. These pollution sources are unquantified and generally only present in the summer. The nearest air quality monitoring stations are located on Admiralty Island.

### Fresh Drinking Water

The main beneficial use of water in the project area is to provide habitat for aquatic organisms and clean water for plants and animals. There are no municipal drinking water sources or navigable channels within the Iyouktug Project Area. Stream channels, wetlands, and karst systems conveying water in IRAs are unaffected by human activity except where stream channels cross roaded areas before entering roadless areas, or where the upper reaches of the watershed are developed.

### Soil

Carbonate landforms in the Iyouktug project area support valuable and rare soil and wetland types. Thirty-three acres of valuable fens occur along the main Iyouktug Creek channel in the Point Augusta IRA. The lower Iyouktug Creek Valley is underlain by carbonate-derived glacial sediments that contribute to the development of these fens. This wetland type contains the greatest variety of plants of all Southeast Alaska wetland types (Brock et al. 1999). In addition, 5 acres of rare tall sedge fens are mapped near the Iyouktug Creek floodplain in this IRA.

### Karst and Proposed Geologic Special Interest Areas

Karst systems developed in carbonate bedrock present unique hydrologic, geologic, and biologic values in Southeast Alaska. Karst is a type of landscape formed by dissolution of (usually carbonate) rocks, and characterized by caves, sinkholes, and extensive underground drainage. About 5,489 acres of karst have been identified, 59% of which is in the Freshwater Bay IRA. The Sonyakay Ridge karst system is proposed as a Geological Special Interest Area in the Draft Forest Plan Amendment due to these alpine karst features. An estimated 1,102 acres of previously unmapped karst was identified in the Point

Augusta IRA during project reconnaissance. This is not included in the proposed Geologic Special Interest Area.

## Diversity of Fish and Wildlife Habitat

**Fish Habitat**

High-value fish habitat occurs in estuaries and lower gradient streams throughout the project area, although most fish habitat is within roaded areas. High value habitat in IRAs includes the Iyouktug Creek Estuary and outlet, main channel of Iyouktug Creek, and North Fork Iyouktug Creek, Whitestone Head Creek and Whitestone Head estuary. VCU 207, "Spasski Creek", listed as a primary sport fish producer (Johnson and Weiss 2007), partially lies in the Whitestone IRA. However, none of the IRA in the Iyouktug Project Area drains into Spasski Creek proper, thus actions in the project area will not influence Spasski Creek.

**Wildlife Habitat**

Important wildlife species in the project area include brown bear, Sitka black-tailed deer, American marten, Queen Charlotte goshawk (listed as a sensitive species), and bald eagle. Bear, deer, and marten are harvested by the community of Hoonah for subsistence and profit. Several of these species are dependent on undisturbed or old-growth characteristics found in IRAs and areas. Wildlife habitat is defined for this analysis as high value deer (HSI 0.42 –1.0) or marten winter habitat (HSI 0.9-1.0), potential bear foraging habitat (generally within 500 feet of class one streams) or goshawk and bald eagle nest sites within the IRAs.

Eagles: Bald eagles nest along the coast in old growth trees. Of the 96 eagle nests mapped along the coast of the analysis area, 46 are within the Point Augusta IRA, 32 are within the Whitestone IRA, and 18 are in roaded areas.

Goshawks: Although there are two goshawk nest sites in the project area, goshawk nests are not located within the IRAs.

Deer: Evidence of concentrated deer use was found in each IRA. The Freshwater IRA includes mostly higher elevation summer habitat. The Point Augusta and Whitestone IRAs includes low elevation habitat that maintains connectivity for deer and more high value deer winter habitat.

Bear: High bear use areas were found in each of the three IRAs. The estuary and low-elevation segments of Iyouktug Creek and major tributaries are late-summer brown bear habitat, and high-use bear areas were identified along Iyouktug, Suntaheen, and Whitestone Head Creek.

Marten: The Freshwater IRA includes mostly higher elevation summer habitat. Nearly half of the high-value marten winter habitat in the project area is located in the Point Augusta IRA.

## Plant Habitat

**Rare Plants:** Two listed rare plants were found in the project area. *Galium kamtschaticum* and *Listera convallarioides* are often found in the same

habitats: wet Lady fern/Skunk Cabbage/Forb communities. Twenty-five of 57 sightings were in Point Augusta and Freshwater Bay IRAs.

**Plant Diversity and Invasive Species:** Highly diverse and unique plant habitats are found in the rich sedge and floodplain fens described under the "soils" section above. Undesirable non-native plants such as reed canary grass are found near roads and other developments and are likely absent from IRAs in the project area.

## Heritage Resources

The Tlingit occupied this region when European explorers arrived. The project area includes both traditional Hoonah and Angoon territories. Villages and sites for seasonal hunting, fishing, and gathering were located throughout the general area. Further information can be found in the Heritage Resource Report.

*Point Augusta:* There are no catalogued historic or cultural sites in this IRA.

*Freshwater Bay*: A charcoal deposit of unknown age near Coyote Beach/False Bay is under investigation and is currently catalogued as a historic site.

*Whitestone:* This roadless area contains 10 catalogued cultural sites near Whitestone Harbor. These include prehistoric petroglyphs, fish traps, seasonal campsites, and evidence of Russian trading from the 1800s. A historic "steam donkey" used for logging is on the beach. All of these sites are within the beach buffer and would not be affected by this timber sale.

## Recreation

Inventoried Roadless Areas are considered important for the opportunity for solitude and serenity, self-reliance, adventure, challenging experiences, and primitive recreation (USDA Forest Service 2000). Due to the small size or narrowness of the IRAs, all three rated moderate or low for solitude and self-reliance opportunities. However, opportunities for primitive recreation are high due to easy access. The Forest Service has plans to build the Whitestone Harbor cabin, 0.75 miles east of the boat ramp in the Point Augusta IRA (Nieland 2004). Both the Whitestone and Point Augusta IRAs have easy boat access.

## Scenery

IRAs provide large areas of natural, unmodified scenery. Forest Plan Visual Priority Travel Routes and Use Areas viewing the IRAs include the waterways of Icy Strait and Chatham Strait, the anchorage in Whitestone Harbor, the saltwater use area in False Bay, and NFS Roads 8530 and 8530-4. The majority of viewers are recreational users of the roads and the uplands at False Bay, visitors traveling the Alaska Marine Highway and cruise ships, and commercial fishing vessels. As tourism increases, scenery resources along cruise ship and ferry routes become increasingly valuable.

Unique characteristics for the Admiralty-Chichagof visual character type include intricate island-reef-promontory complexes around Whitestone Harbor

and along the north shore of the Whitestone IRA, and blocky often angular profiles and sharply defined crests frequently penetrated by deep glacial troughs along Sonyakay Ridge in the Freshwater Bay IRA. These areas present a highly diverse landscape to viewers.

The remainder of the landscape appears mostly natural, and is classified as having moderate to low landscape diversity (USDA Forest Service 2003).

### Reference Landscapes for Study

IRAs are undisturbed landscapes in which natural processes may be observed to better understand effects on similar managed areas. All three IRAs, and the entire Iyouktug project area, are in the Freshwater Bay Carbonates Ecological subsection. The characteristic landforms of this subsection are ridges formed from carbonate rock with karst development. Sonyakay Ridge within the Freshwater Bay IRA is the only example of this landform within the project area.

### Wilderness Attribute Rating

All three IRAs were given low to moderate Wilderness Attribute Ratings (USDA Forest Service 2003). This is due to the small size of Whitestone and Point Augusta IRAs, and the narrowness of the Freshwater Bay IRA.

Summary ratings are 19 points out of 28 for the Point Augusta and Whitestone IRAs, and 17 points for the Freshwater Bay IRA. Point Augusta and Whitestone IRAs rank 70$^{th}$ and Freshwater ranks 93$^{rd}$ out of all 108 IRAs in the Tongass (USDA Forest Service 2003).

## Environmental Consequences for Roadless

**Definition of degree of influence for high value fish and wildlife habitat specific to IRAs**

*Negligible:* Wildlife habitat will not be affected or the alternative will affect an individual but the change will be so small that it will not be of any measurable or perceptible consequence to the individual or its population. No new stream crossings are constructed that have the potential to affect fish habitat within the IRA. Effects, if they occur, are indirect and unmeasurable. Negligible, as defined here, includes no effect.

*Minor:* Wildlife habitat in the IRA will be affected but the change will be small. Impacts will be detectable, but they will not be expected to have any long-term effects on species or their habitats, or the natural processes sustaining them. Some new stream crossings may be constructed that have low potential to affect fish habitat within the IRA. A low risk road crossing may be well upstream of fish habitat in the IRA, or a bridge over an incised channel. Temporary crossings tend to be lower risk than those on roads that will remain open due to the need for continued maintenance.

*Moderate:* Wildlife habitat in the IRA will be noticeably affected. The effect could have some long-term consequence to the individual or habitat but sufficient habitat will remain functional to maintain viability of the species.

New stream crossings are constructed that have moderate potential to affect fish habitat within the IRA. Moderate risk crossings include bridges over unincised fish streams that require significant bank work within the Riparian Management Area, and crossings of larger v-notches or unstable soils.

*High:* Wildlife habitat in the IRA will be noticeably affected with a long-term, vital consequence to the individual, population, or habitat. Loss of habitat may affect the viability of the species. New stream crossings are constructed that have high potential to affect fish habitat within the IRA. High risk crossings may include roads built across or immediately above or below alluvial fan channels, crossings on high hazard soils immediately above fish habitat, or reconstruction of a crossing that has had chronic maintenance problems due to an unstable channel.

**Definition of degree of influence for ecological, cultural, and geological special values**

*Negligible:* Harvest and road building activities do not encroach upon or influence special values including rare wetland types, unique geological features, recreation opportunities, unique scenery, or cultural sites within the IRA. Effects, if they occur, are indirect and unmeasurable. Negligible, as defined here, includes no effect.

*Minor:* Harvest and road building activities encroach upon or influence a small fraction of special values including rare wetland types, unique geological features, unique scenery, recreation opportunities, or cultural sites within the IRA. Example: Timber harvest or roads adjacent to IRAs would have a low degree of influence on opportunities for primitive recreation and solitude

*Moderate:* Harvest and road building activities encroach upon or influence special values including rare wetland types, unique geological features, recreation opportunities, or cultural sites within the IRA. Examples include:

- Activities within an IRA but along the margin will moderately reduce opportunities for primitive recreation and solitude
- Ground-based harvest within moderate vulnerability karst draining Sonyakay Ridge may moderately affect the Sonyakay Ridge karst system

*Major:* Harvest and road building activities encroach upon or influence several special values including rare wetland types, unique geological features, recreation opportunities, or cultural sites within the IRA. Examples of a high degree of influence include the following:

- A road built through the middle of an IRA would greatly reduce opportunities for solitude and challenge
- A road built through a rare wetland

- Activities would change the character of a recreation place or unique scenic values
- Increased access to cultural sites without mitigation.

### IRA Area Affected By Harvest and Roads

Under all alternatives, all IRAs would still have unaffected areas over 5,000 acres and qualify for wilderness consideration. Alternatives 2, 3, and 5 propose harvest and/or roads in the Point Augusta and Freshwater Bay IRAs. The Whitestone IRA does not have harvest or roads proposed within it in any alternative. The Forest Plan SEIS (USDA 2003) inventory delineated areas within 1,200 feet of roads and 600 feet around associated harvest units as developed. For the SEIS inventory, helicopter-logged units that were not adjacent to a road or associated cable unit were included as part of the inventoried roadless areas

While the Iyouktug analysis recognizes that some proposed helicopter-logged units meet these criteria, the Iyouktug analysis conservatively assumes that all helicopter units will influence roadless characteristics, although effects to wildlife and other resources would be less than clearcut units since 60-75% of the stand will remain. Temporary roads and NFS roads were given the same zone of influence (1,200 feet) as in the SEIS. These roads are similarly treated in this analysis although temporary and closed system roads may have a lower degree of influence on wildlife, watershed and recreation resources after the timber harvest is complete.

In the Iyouktug analysis direct effects to IRAs is measured by acres of IRA harvested or miles of road built in IRAs; indirect effects are measured by acres that would be treated as developed in Iyouktug because of new roads and/or harvest (Table 3RO-1). Table 3RO-2 assumes that direct and indirect effects would have the same effect on the roadless characteristics of the roadless area.

### Alternative 1

No changes to the existing condition would occur as a result of selecting this alternative.

### Alternative 2

This alternative has the most acres of harvest and miles of road proposed in IRAs (Table 3RO-1).

*Point Augusta*: All proposed harvest is on the south and southwest sides of the IRA, thus the large undisturbed area facing Icy Strait would not be affected. The finger of the IRA extending up the Iyouktug Creek valley would be narrowed.

*Freshwater Bay*: About 77% of harvest acres proposed in Alternative 2 in Freshwater Bay IRA are single tree selection helicopter harvest, and the remainder are cable and shovel harvest. Proposed Road 853092 and associated

units would isolate a 114-acre portion of the IRA, which would not retain roadless characteristics.

Table 3RO-1: Acres of Harvest and Miles of Road Proposed in Inventoried Roadless Areas and Acres of Indirect Effects

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Whitestone Inventoried Roadless Area** | | | | | |
| Acres of timber harvest proposed in inventoried roadless areas | 0 | 0 | 0 | 0 | 0 |
| Miles of new road construction proposed in inventoried roadless areas (including temporary road) | 0 | 0 | 0 | 0 | 0 |
| Acres indirectly affected | 0 | 7 | 7 | 7 | 7 |
| **Point Augusta Inventoried Roadless Area** | | | | | |
| Acres of timber harvest proposed in inventoried roadless areas | 0 | 1,019 | 729 | 0 | 189 |
| Miles of new road construction proposed in inventoried roadless areas (including temporary road) | 0 | 5.8 | 2.0 | 0 | 1.9 |
| Acres indirectly affected | 0 | 1,770 | 1,205 | 743 | 526 |
| **Freshwater Bay Inventoried Roadless Area** | | | | | |
| Acres of timber harvest proposed in inventoried roadless areas | 0 | 852 | 687 | 0 | 40 |
| Miles of new road construction proposed in inventoried roadless areas (including temporary road) | 0 | 2.3 | 0.2 | 0 | 0.2 |
| Acres indirectly affected | 0 | 1,565 | 1,383 | 629 | 141 |

### Alternative 3

Alternative 3 is similar to Alternative 2 (Table 3RO-1), except that the proposal was designed to maintain more low elevation habitat for deer connectivity and roads would be closed after the sale. About 95% of harvest acres in Point Augusta IRA and 78% in Freshwater Bay IRA would be single tree selection helicopter harvest.

### Alternative 4

Alternative 4 proposes no harvest or roads in any of the project area IRAs, thus there would be no direct effects to the IRAs (Table 3RO-1). Harvest would indirectly affect 5% of the Point Augusta and 1% of the Freshwater Bay total IRAs. Alternative 4 would indirectly affect 5% of the IRA within the Iyouktug project area.

### Alternative 5

Alternative 5 would have the least indirect effects to IRAs due to fewer harvest units and roads along IRA margins (Table 3RO-1).

Table 3RO-2: Acres* and Percentage of IRAs Areas Retaining Roadless Characteristics in the Project Area.

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Point Augusta** | 10,969 (100%) | 8,167 (74%) | 9,034 (82%) | 10,225 (93%) | 10,254 (93%) |
| **Whitestone** | 5,516 (100%) | 5,509 (99%) | 5,509 (99%) | 5,509 (99%) | 5,509 (99%) |
| **Freshwater Bay** | 9,106 (100%) | 6,705 (74%) | 7,052 (77%) | 8,477 (93%) | 8,925 (98%) |

*These are the acres for the project area and not the entire IRA; these acres include direct and indirect effects of all units and all proposed roads.

## Influence on Wildlife and Fish

Table 3RO-3: Degree of Influence on High Value Wildlife and Fish Habitat

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Point Augusta** | Negligible | Moderate | Minor to Moderate | Negligible to Minor | Minor to Moderate |
| **Whitestone** | Negligible | Negligible to Minor | Negligible to Minor | Negligible to Minor | Negligible to Minor |
| **Freshwater Bay** | Negligible | Minor | Minor | Negligible | Negligible |

## Direct and Indirect Effects on High Value Fish and Wildlife Habitat

### Alternative 1

Alternative 1 has negligible effects to wildlife or fish habitat within IRAs.

**Effects Common to All Action Alternatives**: All alternatives have a negligible effect on wildlife habitat in the Whitestone IRA because harvest is not proposed in this IRA. Action alternatives will have a negligible or minor effect to wildlife habitat in the Freshwater IRA because most of the IRA is high elevation habitat (above 800 feet) and harvest is predominately helicopter single tree removal. Harvest of 25 percent or less will maintain old growth forest characteristics (Deal and Tappeiner 2000; Deal 2001; Deal 2007) and therefore maintain habitat for eagles, deer, marten and bear. The 40 percent helicopter harvest will retain up to 60 percent of the basal area and remove trees in small groups or as single trees. Because the objective of this prescription is to maintain existing tree composition and structural diversity and regeneration will result in a mosaic of multiple age classes that maintain structure features, wildlife habitat will be maintained. Reductions in high value marten habitat (HSI of 0.9-1.0) are less than 1 acre out of 1,060 total acres in roadless habitat, thus are negligible in all alternatives. Clearcut harvest will not occur around bear dens or in high use forging areas. No harvest or roads are proposed within a mile of any eagle nests, thus there will be no effects to eagles.

### Alternative 2

Alternative 2 harvests the most acres in IRAs and has the greatest potential to affect fish and wildlife habitat. There is a moderate risk to fish habitat due to stream crossings in fish habitat and on unstable soils in the Point Augusta IRA. There is a minor risk to fish habitat in other IRAs. There would be a moderate effect to wildlife habitat in the Point Augusta IRA because low elevation old growth and high value deer winter habitat would be reduced.

### Alternative 3

This alternative has a minor degree of influence on fish habitat in all IRAs. All stream crossings proposed have a low risk to fish habitat in IRAs. There would be a moderate effect to wildlife habitat in the Point Augusta IRA because low elevation old growth and high value deer winter habitat would be reduced. However, this alternative was designed to maintain more low elevation wildlife habitat and does not clearcut harvest as many acres in IRAs as Alternative 2.

### Alternative 4

There would be a minor risk to fish habitat due to proposed stream crossings upstream of all IRAs, and a negligible effect on wildlife because no harvest is proposed in IRAs.

### Alternative 5

Several stream crossings would be constructed that have a low risk of affecting fish habitat. This alternative proposes the least harvest over all. Alternative 5 would have a moderate effect to wildlife habitat because it clearcut harvests the same amount of low elevation old growth habitat and high value deer winter habitat as Alternative 3.

## Influence on Special Roadless Values

Several special roadless values will not be affected in any alternatives because roads and timber harvest units completely avoid them. These include calcareous fens, a rare, productive wetland type, all cultural sites in Whitestone and Freshwater Bay, traditional subsistence areas in Point Augusta, and unique scenery along the coast in the Whitestone IRA. In all alternatives, there would be a short-term decrease in opportunities for solitude and serenity in the IRAs due to noise from timber harvest operations. The most significant rare plant populations have been excluded from harvest units; therefore there is a minor risk of affecting these in all action alternatives. The remaining special values include karst and unique scenery in Freshwater Bay IRA, and recreation in all IRAs. Because no harvest is proposed in the Whitestone IRA in any alternatives, the degree of influence is minor.

## Direct and Indirect Effects on Special Roadless Values

### Alternative 1

Summary degree of influence for all IRAs is negligible under Alternative 1.

### Alternative 2

*Point Augusta:* 73 acres of moderate vulnerability karst would be harvested, 3 by cable and 70 by helicopter. This would have a minor effect on karst. There would be a decrease in solitude and serenity due to development in the IRA and

increased access along over 2 miles of new system roads. More development would be apparent along the southern boundary of the unit as seen from the road system, and the finger of the IRA extending up Iyouktug Creek would be narrower and appear developed due to new system and temporary roads and ground-based harvest units. Scenery would not be affected from the cruise ship routes along Icy Straits or from the recreation areas near False Bay and Whitestone Harbor. Overall, this alternative would have a moderate degree of influence on recreation, scenery, and ecological special values in the IRA.

*Freshwater Bay*: One area near the divide between Iyouktug and Suntaheen Creeks would appear more developed due to new system and temporary roads, and clearcuts. Two small clearcuts would be visible along the IRA margin in the northwestern part of the project area from NFS Road 8530. One cable clearcut unit is proposed in the unique visual scenery area along Sonyakay Ridge. This is shaped irregularly with several large stream buffers in it and will likely blend in with brush slopes below the ridge. About 110 acres of moderate vulnerability karst below Sonyakay Ridge are proposed for harvest in this IRA. This would have a minor effect on karst. There would be a moderate reduction in opportunities for solitude and serenity near the new road system due to increased access and traffic, and a reduction in the size of the undeveloped area. Degree of influence on the portion of the IRA that includes Sonyakay Ridge within the project area is moderate; however the degree of influence on the IRA as a whole is minor due to topographic separation of other parts of the IRA.

### Alternative 3

*Point Augusta*: Seventy acres of moderate vulnerability karst would be harvested by helicopter. This would have a minor effect on karst. There would be a moderate decrease in solitude and serenity due to development along IRA margins, however this would be less of an impact than Alternative 2 because fewer roads would be built and the new roads would be closed after the sale. More development would be apparent along the southern boundary of the unit as seen from the road system, and the finger of the IRA extending up Iyouktug Creek would be slightly narrower and appear developed due to ground-based harvest units. Scenery would not be affected from the cruise ship routes along Icy Straits. Scenery from the recreation areas near False Bay and Whitestone Harbor would not be affected. Overall, this alternative would have a moderate degree of influence on special values in the IRA.

*Freshwater Bay*: Most harvest proposed is 25-40% removal by helicopter, and harvested units would appear natural from the road system. One area near the divide between Iyouktug and Suntaheen Creeks would appear more developed due to one new temporary road and one small clearcut. A small clearcut would be visible along the IRA margin in the northwestern part of the project area. 104 acres of moderate vulnerability karst would be harvested, all by helicopter. This alternative would have a low degree of influence on the Sonyakay Ridge karst system. There would be a moderate degree of influence on solitude and

serenity due to new roads and harvest units further narrowing the tracts of undeveloped areas. However, since there are fewer units and roads and all roads would be closed this influence would be less than under Alternative 2.

### Alternative 4

*Point Augusta and Freshwater Bay*: There will be a minor degree of influence on recreation, solitude, and serenity due to development along IRA boundaries. No special values would be affected.

### Alternative 5

*Point Augusta:* Four clearcuts and access roads would cause the IRA to appear more developed from the 8530 road. The IRA would still appear natural from developed recreation sites and Icy Straits. There would be a moderate decrease in opportunities for solitude and serenity due to increased access along the new road and harvest within the IRA. Summary degree of influence is moderate.

*Freshwater Bay:* Portions of two clearcuts with access roads would cause the IRA to appear more developed from the 8530 road near the divide between Iyouktug and Suntaheen Creeks and in the northwest part of the IRA. No harvest would occur in visually unique areas. There would be a slight decrease in opportunities for solitude and serenity due to the smaller size of the undeveloped area and increased road access; however this effect would be isolated due to the rugged topography. No harvest would occur on karst. Summary degree of influence is minor.

## Cumulative Effects

The cumulative effects area includes the project area and the three IRAs. Small timber sales are along the existing road system and do not encroach on the IRAs (Appendix D of the FEIS). A planned hike-in cabin in the Point Augusta IRA near the Whitestone Harbor would increase recreation opportunities but decrease opportunities for solitude, serenity, and challenge in that part of the IRA. The proposed Geologic Special Interest Area in the Freshwater Bay IRA would protect 9,862 acres of karst lands, including the Sonyakay Ridge karst system from development. Cumulative effects beyond these direct and indirect effects are not anticipated.

# Timber Economics

**Issue 3**

***Issue 3: Proposed helicopter yarding and road-building may reduce the economic viability of timber sales***

If proposed timber harvest is not designed to be economically viable across fluctuating market conditions, there is a concern that the forest products industry in Southeast Alaska and in the local area may not remain viable. The amount of timber available for sale from national forests and a stable supply affects local employment and revenues. Small operators need local, economical timber to stay in business and loss of those operators would negatively impact the local economy. Proposed helicopter yarding and road-building may reduce the economic viability of timber sales.

**Measurements:**

- Total volume in million board feet (MMBF)
- Logging costs per thousand board feet (MBF)
- Indicated bid - dollars per MBF
- Employment in number of total job years
- Direct income based on projected employment

The following discussion and analysis of timber economics is based on a variety of sources including the NEPA Economic Analysis Tool Residual Value (NEAT_R) version 2.13.

The effects analysis area used is the Iyouktug project area encompassing VCUs 2080, 2090, and 2100.

Timber harvest economics is an issue involving the ability of Southeast Alaska's timber purchasers to make a profit and stay in business, and the ability to maintain the economic health of communities in the region. Timber purchasers and affected communities are concerned about the quantity, quality, reliability, and profitability of the timber offered for sale from the Tongass National Forest.

## Affected Environment for Timber Supply and Economics

**Employment**

### Employment in Southeast Alaska

About 74,000 people live in towns, communities, and villages located on islands and coastal lands of Southeast Alaska. The Southeast Alaska region accounts for about 12 percent of the State's population and 6 percent of the land base. Federal lands comprise about 95 percent of Southeast Alaska, 80 percent within the Tongass National Forest. Southeast Alaska communities, which are

within or adjacent to the Tongass National Forest, are largely dependent on the forest to provide natural resources for employment. This includes commercial fishing, timber harvest and processing, tourism, and mining. The forest is also needed for recreation and subsistence use.

### Employment in the Project Area

Sealaska Timber Corporation employs between four and ten local residents mainly through contracts with Johnson Logging and Southeast Stevedoring. Huna Totem Corporation owns and Sealaska Corporation operates a sort yard and marine access facility (MAF) at Long Island, 1.5 miles southwest of Hoonah (Alaska DCCED 2005). Icy Straits Lumber and Milling, Inc. and D&L Woodworks, both located in Hoonah, are among the companies with interests in local timber

D&L Woodworks operates a Woodmizer band mill and mobile dimension mill that has an estimated mill capacity of 1.75 MMBF (Parrent 2007); they currently produce approximately 100 MBF per year and employ 2 people. Icy Straits Lumber reported that they could harvest and mill up to 5 MMBF per year with 20 employees (Tyler, Pers. com. 2007). In 2006 Icy Straits Lumber milled 700 MBF. The estimated mill capacity for Icy Straits Lumber is 22.5 MMBF per year (Parrent 2007 and FEIS, Chapter 4, Glossary for estimated mill capacity).

### Forest Products Employment

The forest products industry has been an important part of the economy of Southeast Alaska since the 1950s. Based on forest products employment data for the period 2000 through 2006, total timber industry employment in Southeast Alaska has dropped from 994 jobs in 2000 to 421 jobs in 2006. Mill employment has also declined (Table 3TE-1).

Table 3TE-1 Forest Products Industry Employment in Southeast Alaska, 2000 through 2006.

| Year[1] | Tongass Logging[2] | Tongass Sawmill | Pulp Mill | Tongass- Related Employment[3] | Other sawmill | Other Logging | Total Industry Employment[4] |
|---|---|---|---|---|---|---|---|
| **2000** | 340 | 280 | 2 | 623 | - | 371 | 994 |
| **2001** | 109 | 300[5] | 2 | 409 | - | 391 | 800 |
| **2002** | 63 | 110 | - | 173 | 40 | 299 | 512 |
| **2003** | 108 | 91 | - | 199 | 64 | 298 | 561 |
| **2004** | 82 | 95 | - | 177 | 53 | 220 | 450 |
| **2005** | 88 | 96 | - | 184 | 52 | 263 | 499 |
| **2006** | 81 | 77 | - | 158 | 46 | 217 | 421 |

Source: Timber Supply and Demand: 2001 to 2005. Alaska National Interest Lands Conservation Act Section 706(a) Report to Congress. US Forest Service Alaska Region Report 21. . In review. 2006 data on file with Alaska Region Economist, Regional Office. [1] 2000 reported in calendar years. 1

[1]Reported in calendar years.

[2] Tongass National Forest logging estimated based on the ratio of Tongass timber harvest to total timber harvest in Southeast Alaska.

[3] Through 2001, assumes all sawmill and pulp mill employment is dependent upon Tongass National Forest timber supply. From 2002 to 2004, this assumption no longer held. Data from Kilborn and others (2004) and from subsequent mill studies show that Federal timber supplied 73 percent of the wood sawn in Southeast Alaska mills in 2002, 59 percent in 2003, 64 percent in 2004 and 65 percent in 2005, and 62 percent in 2006. Tongass National Forest sawmill employment from 2002 through 2005 is estimated based on sawmill employment numbers and the ratio of sources of wood (Federal versus the total) reported by Kilborn and others (2004) and in subsequent mill studies by Juneau Economic Development.

[4] Numbers may not add up to the totals shown due to rounding.

[5] Beginning in 2001, employment estimates are being published under a new classification system. The Standard Industrial Classification (SIC) system has been replaced by the North American Industrial (NAI) Classification system. "Sawmill" in this table is reported by the Alaska Department of Labor as "wood manufacturing" which in the NAI system includes sawmills, wood preservation, veneer, plywood, engineered wood, and other wood products. In southeast Alaska, this category is assumed to represent only sawmill employment. Beginning in 2001, sawmill employment figures are adjusted based on regional mill studies, which take into account self employed mill owners.

### Past and ongoing Timber Harvest in the Project Area and Northeast Chichagof Island

Considerable timber harvest has occurred in VCUs 2080, 2090, and 2100 on Northeast Chichagof Island and on private Native Corporation lands to the west of the Iyouktug project area. Past timber management activities in the Iyouktug area began in the 1940s using of hand-logging and A-frames from the beach. Large-scale clearcut logging under the Alaska Pulp Company long-term contract began in 1987 and continued through 1991 resulting in approximately 3,000 acres of clearcut harvest on National Forest System lands and about 100 acres on private land within the project area. Logging of small sales began in the 1990s and is ongoing today (see Appendix D of this FEIS).

## Timber Sale Economics

### Timber Supply and Market Demand

A description of timber supply and demand on the Tongass National Forest and the rationale for considering timber harvest in the Iyouktug project area at this time is explained in Chapter 1 and Appendix A of this document. More information can also be found in the 1997 Forest Plan Final EIS, Part 1 (pp. 3-248 to 3-307), and the Forest Plan Supplemental EIS (2003a). The latest

timber demand was done for the analysis for the 2008 Forest Plan Amendment FEIS (USDA Forest Service 2007a and 2008).

### Timber Sale Economics

There are many factors that can increase the cost of timber sale offerings, and may carry significant economic risk for potential purchasers. Road construction, helicopter yarding, silvicultural prescriptions other than clearcutting, and other factors may increase costs. Those increased costs will then affect the timber value for the alternatives. The value of the timber for sale must be sufficient to cover this cost and offer a potential for profit to purchasers.

### Road Access and Marine Access Facility

The Iyouktug project will use the existing road system and the existing Long Island MAF. Approximately 50 miles of National Forest System Road exist in the project area. All the alternatives will require additional road segments to access timber or shorten helicopter yarding distances. Tables 2-1 in Chapter 2 and 3TR-1 (in Chapter 3 under Transportation) show the amount of existing and proposed roads by alternative within the project area. More information about roads and the MAF is found in the Transportation section of this chapter.

### Silvicultural Prescriptions

Generally, the less complex a silvicultural prescription is the more cost efficient it is. Even-aged management using the clearcut prescription usually results in less cost associated with logging because it is more efficient.

All the alternatives include a mix of even-aged clearcut and uneven-aged single tree selection silvicultural prescriptions. See the Silviculture and Vegetation section of this chapter for more information.

The single tree selection prescription is used to limit harvest to certain diameters in order to improve harvest economics and address resource concerns related to Forest Plan standards and guidelines. In areas that are inaccessible or uneconomical for roaded access this prescription is best suited for helicopter logging.

## Environmental Consequences for Timber Supply and Economics

**Effects on Timber Economics**

### Logging Systems and Costs

The action alternatives include the use of ground-based cable and shovel yarding systems and helicopter yarding. Table 3TE-2 displays the acres by yarding system for each alternative.

Cable yarding systems are best suited for steep slopes and are most efficient using the clearcut harvest method. The average cost of cable yarding for all alternatives in this analysis is $223 per MBF.

Shovel yarding is the least costly yarding method used in this analysis relative to the average pond log value of harvested trees. Shovel yarding is best suited for slopes less than 30 percent. Normal yarding distance is less than 400-500 feet. Depending on slope and ground conditions, longer distances are possible. Shovel yarding does provide some flexibility in the selection of trees to be harvested. This makes shovel yarding more suitable for partial harvest prescriptions. The average cost of shovel yarding for all alternatives in this analysis is $205 per MBF.

Helicopter yarding is the most expensive yarding method. Yarding distance, turn time (the time it takes the helicopter to make a round trip from landing to the unit and return), and the value of timber yarded influence the economic viability of helicopter yarding. Helicopter yarding is used where roads are not constructed to access the timber harvest units and works well for partial harvest prescriptions. The average cost of helicopter yarding for all alternatives in this analysis is $340 per MBF.

Table 3TE-2: Yarding System and Harvest Method (Acres)

| Yarding system -- harvest method | Alternative | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| **Cable - Clearcut** | 0 | 1,253 | 574 | 636 | 646 |
| **Shovel - Single tree Selection** | 0 | 315 | 202 | 262 | 237 |
| **Helicopter - Single Tree Selection** | 0 | 2,617 | 2,556 | 1,686 | 0 |

Source: Tongass GIS 2007

The Iyouktug alternatives were evaluated using NEAT_R Version 2.13 based on an appraisal point of Hoonah. The results are displayed in Table 3TE-3. The costs and values used reflect data updated for the 2nd Quarter of 2006 and incorporate the limited interstate shipping policy (Bschor 2007, Regional Forester 2400 memo, March 14, 2007). This policy authorizes the shipment to the lower 48 States of unprocessed Sitka spruce and western hemlock sawlogs that are: a) smaller than 15 inches in diameter at the small end of a 40-foot log, or b) grade 3 or grade 4 logs of any diameter. Shipments will be limited on each sale to a maximum of 50 percent of total sawlog contract volume harvested of all species; including cedar, unless the Regional Forester expressly grants an exception in advance based on case-specific unusual circumstances.

Logging costs evaluated in the NEAT_R financial analysis included only truck hauling of logs to Hoonah. Transporting logs to a mill located somewhere other than Hoonah would require additional expense. Barging or rafting costs were not included in the financial analysis and would be an additional cost for export of yellow-cedar, interstate shipping, or transporting logs to a mill located somewhere other than Hoonah. On average, barging and rafting costs were estimated to be approximately $135/MBF and $46/MBF respectively (Housley 2007). For smaller volumes (1-2 MMBF) rafting costs are considered to be roughly the same as barging. Rafting is considerably less expensive than

barging when transporting larger volumes (e.g.10 MMBF) since barging this same volume would require five to ten trips versus one trip with a log raft (Tyler 2007, Pers. Com).

Table 3TE-3: Timber Financial Efficiency Analysis

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Sitka Spruce (MBF)** | 0 | 29,399 | 23,263 | 18,104 | 6,495 |
| **Hemlock (MBF)** | 0 | 18,514 | 11,320 | 9,902 | 7,051 |
| **Alaska Yellow-Cedar (MBF)** | 0 | 2,340 | 1,770 | 1,373 | 518 |
| **Western red cedar (MBF)** | 0 | 0 | 0 | 0 | 0 |
| **Total Net Sawlog MBF[1]** | 0 | 50,253 | 36,353 | 29,379 | 14,063 |
| | | | | | |
| **Logging Cost per MBF** | 0 | $377 | $385 | $380 | $333 |
| **Road Cost per MBF** | 0 | $67 | $40 | $65 | $92 |
| | | | | | |
| **Indicated Value ($millions)[2]** | 0 | $(8.9) | $(5.5) | $(5.1) | $(2.5) |
| **Indicated Bid Value/MBF[2, 3]** | 0 | $(177.75) | $(151.28) | $(175.07) | $(176.79) |

Source: NEAT_R Version 2.13 (December 19, 2007 output)

[1] Numbers may not add up to the totals shown due to rounding.

[2] ( ) indicates negative value; no sales would be offered at this time if they appraise deficit.

[3] NEAT_R Version 2.13 incorporating the limited interstate shipping policy

The harvest volumes, indicated value, costs and net stumpage values used in this document are current estimates; they are useful for comparing the relative differences among alternatives and are not meant to reflect absolute values. Merchantable timber within units and any road right-of-way located on National Forest System lands will be cruised to determine the quantity, quality and value of timber for the contract under which that volume of timber is offered. The final sale appraisal will include current quarter selling values, current cost information and a normal profit and risk allowance to determine the minimum advertised stumpage value at the time of offering. Under current Congressional direction (Public Law 110-161, House Report 110-497) no timber sale in the Alaska Region shall be advertised if the indicated rate is deficit. Sales with volumes under 250 MBF do not require an appraisal and can be advertised using established standard rates.

The difference in indicated bid rates among the action alternatives can be attributed to multiple factors, including:

- Differences in species composition, volume per acre harvested, and timber quality
- Difference in harvest prescriptions
- Proportion of cable, shovel and helicopter yarding systems
- Amount of road construction and reconstruction
- Differences in haul distances

### Timber Volume Calculations

Total unit net volumes by alternative were calculated using NEAT_R Version 2.13 and average per acre volume for the high, medium and low volume strata. Volume strata averages are based on 2002 and 2006 stand exam data. Volumes for the alternatives are displayed in million board feet (MMBF) in Table 3TE-4.

Table 3TE-4: Estimated Volume (MMBF)

| Estimated Volume | Alternative | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| **Sawlog** | 0 | 50.3 | 36.4 | 29.4 | 14.1 |
| **Utility** | 0 | 7.8 | 5.3 | 4.5 | 2.5 |
| **Total** | 0 | 58.1 | 41.7 | 33.9* | 16.6* |

*Numbers do not match those in Chapter 2 due to rounding

### Timber Financial Efficiency Analysis

One method to compare the effects of the different alternatives is through a financial efficiency analysis, which is a comparison of those costs and benefits that can be quantified in terms of actual dollars spent or received within the project area. This type of analysis does not account for non-market benefits, opportunity costs, individual values, or other values, benefits, and costs that are not easily quantifiable. This is not to imply that such values are not significant or important, but to recognize that non-market values are difficult to represent by appropriate dollar figures. Therefore, financial efficiency should not be viewed as a complete answer but as one tool decision makers can use to gain information about resources, alternatives, and trade-offs between costs and benefits. Although individual harvest units may or may not be economical to harvest by themselves, the management of less productive land, or land containing a high percentage of defective timber, will help to increase future timber yields. The harvest of units with higher value can help compensate for less economical harvest units.

### Forest Service Costs

Financial efficiency analysis compares estimated Forest Service direct expenditures with estimated financial revenues. Average financial costs used in the Alaska Region's budget allocation process are subtracted from indicated values to estimate net present value. The Forest Service costs used in the analysis are: $41/MBF for environmental analysis and documentation (NEPA), $23/MBF for sale preparation, $9/MBF for sale administration and $28/MBF for engineering support.

Environmental analysis and documentation costs include field inventory, data analysis, public involvement, and preparation of documents that satisfy the requirements of the National Environmental Policy Act.

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. Normally, costs are associated with office documentation, timber sale accounting, and site visits to the sale area, which is generally adjacent to a new or existing road system. 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.

Although the environmental analysis cost is based on timber volume, costs fluctuate with the amount of area to be examined and the accessibility of that area. Sale preparation costs increase significantly when implementing partial harvest units, as compared to clearcut harvest units. Accessibility to the units is another major cost factor. All of these factors could cause the cost estimates in Table 3TE-5 to be higher or lower than regional averages. These cost estimates are useful to compare relative differences among alternatives

Table 3T-5. Estimated Forest Service Financial Costs and Revenues

| Forest Service Costs[1] in $million | Alternative | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| **Analysis and Documentation[2]** | $2.1 | $2.1 | $2.1 | $2.1 | $2.1 |
| **Sale Preparation** | $0 | $1.2 | $0.9 | $0.7 | $.3 |
| **Sale Administration** | $0 | $0.5 | $0.3 | $0.3 | $0.1 |
| **Engineering Support** | $0 | $3.7 | $2.7 | $2.1 | $1.0 |
| **Total Project Costs** | $2.1 | $7.5 | $6.0 | $5.2 | $3.5 |
| **Indicated Bid value[3]** | $0 | $(8.9) | $(5.5) | $(5.1) | $(2.5) |
| **Net Present Value[4]** | $ | $(16.4) | $(11.5) | $(10.3) | $(6.0) |

Source: NEAT-R version 2.13 ,

1 Based on Alaska Region's average budget allocation for cost centers
2 Analysis and documentation costs are based on the proposed action (Alternative B).
3 ( ) indicates negative value.
4 Indicated bid value minus total project costs, ( ) indicates negative value.

**Opportunities to Improve Economics**
The costs used in the NEAT_R model incorporate the same current costs used in the Alaska Region's appraisal program. Those costs reflect actual cost data collected from timber sale purchasers in Southeast Alaska, as well as production studies. At times, certain situations and sales may have higher or lower costs than the regional averages, based on site specific circumstances.

For example, in the Iyoutug project area, local estimates for logging costs may be lower for felling and bucking, shovel yarding, and hauling, while cable yarding costs are estimated to be higher. Some of the reasons why local costs may be lower include: a nearby town (Hoonah) with an experienced and available workforce, a well developed marine access facility (MAF), and an existing road system.

Utility volume could be left in the woods under the optional removal contract clause. NEAT_R also amortizes all costs of road construction over the timber volume removed. Additionally, in some years, public works funds are available to pay for all, or a portion of, road construction or reconstruction costs in a timber sale for roads that will be used in the long-term administration of the national forest.

The mix of species harvested may also enhance the economic potential of the Iyouktug project area and may in turn affect the timber supply to the forest products industry. The amount of timber volume will have an effect on employment as shown in Table 3TE-6, which displays estimated direct employment that will result from logging and milling the volume in the timber sale.

**Opportunities for Small Sales**
The timber volume in any of the action alternatives could be administratively separated into several smaller sales. To meet the purpose and need of this project, a large portion of the volume in all of the action alternatives would be offered as small sales.

### Projected Employment and Income

The action alternatives would have direct and indirect impacts to the economies of the local communities.

Direct employment and income likely to result from timber harvest is estimated by converting board feet to jobs and income. The coefficients used in this calculation and more detailed information can be found in the Timber Economics Resource Report located in the project record. Table 3TE-5 displays estimated direct logging and sawmilling-related employment and income. Alternative 1 would not generate timber-related jobs since no timber would be sold.

Table 3TE-6: Estimated Project Employment and Income in Alaska

| Employment[1] | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Logging[2]** | 0 | 116 | 84 | 68 | 32 |
| **Sawmills[3]** | 0 | 83-166 | 60-120 | 49-97 | 23-47 |
| **Total Jobs** | 0 | 199-282 | 144-204 | 116-165 | 56-79 |
| **Direct Income (in millions)** | 0 | $7.7 - 10.6 | $5.6 - 7.7 | $4.5 - 6.2 | $2.2 - 3.0 |

Source: NEAT_R Version 2.13
[1]Number of Job years
[2] Annualized jobs per MMBF based on net sawlog volume sold.
[3] Sawmill jobs range based on 50 percent of net volume shipped to markets outside Alaska to all sawlogs processed in Alaska

The number of sawmill jobs and related income is provided as a range in Table 3TE-6 to reflect the variety of options the timber purchaser has under the limited interstate shipping policy. The purchaser may elect to process all the sawlogs locally or to ship up to 50 percent of the total sawlog volume to markets outside Alaska.

The upper end of this range assumes all of the timber sold, including Alaska yellow-cedar is processed in Southeast Alaska. The lower end of this range assumes that the maximum of 50 percent of total sawlog volume is shipped to markets outside Alaska. The number of jobs and related income will likely fall somewhere between the high and low end of this calculated range, based upon factors such as current timber markets and mill configuration.

**Payments to States**

Currently in FY 2008, in states with national forests, 25 percent of returns to the US Treasury from revenue producing Forest Service activities, such as timber sales, are returned to each state for distribution back to counties (or in Alaska, boroughs) having acreage within a national forest. Those payments are called the "25 percent fund" payments and are dedicated by law for schools and roads. Under the 25 percent approach, funding to the state will increase or decrease as revenue generated on the national forest increases or decreases.

From FY 2001 through 2007 under the *Secure Rural Schools and Community Self Determination Act of 2000* affected Alaska boroughs and communities chose to receive a payment amount based on the average of the highest three payments made to the state during the 14-year period between 1986 and 1999. As a result, the State of Alaska received payments of approximately $9 million per year during the 2001 through 2007 time period.

**Other Employment Opportunities**

Effects on other employment opportunities, such as those for tourism and commercial fishing are not included in the financial efficiency analysis. Because of the regional nature of these occupations, this analysis is done at the Forest planning level and was most recently included in the analysis for the

2008 Forest Plan Amendment FEIS. Information on the effects on tourism and commercial outfitters and guides is found in the recreation section in this chapter. Effects on the commercial fish species was done through the Essential Fish Habitat Assessment as required by the Magnuson Stevens Fisheries Conservation Act (see Watershed and Fisheries, this chapter).

## Direct and Indirect Effects on Timber Economics

### Alternative 1

No timber income would be created from this project. Timber needed to meet the estimated demand would have to be harvested from other areas on the Tongass National Forest.

### Alternative 2

This alternative would offer up to 58.1 MMBF of timber for harvest offered through various small sales, and one or more large sales over a 10-year period. This is the alternative that has the highest volume of timber

Estimated logging and transportation costs would be $377 per MBF with road costs estimated to be $67 per MBF. The indicated bid is -$177.75 per MBF. Between 199 and 282 direct annualized jobs would be supported in Alaska, providing an estimated $ 7.7 to 10.6 million in direct income.

### Alternative 3

This alternative would offer up to 41.7 MMBF of timber for harvest. . This alternative includes some of the more economic ground-based units found in Alternative 5 and proposes most of the helicopter-yarded timber volume in Alternative 2.

Estimated logging and transportation costs would be $385 per MBF with road costs estimated to be $40 per MBF. The indicated bid is -$151.28 per MBF. Between 144 and 204 direct annualized jobs would be supported in Alaska, providing an estimated and $5.6 to 7.7 million in direct income.

### Alternative 4

This alternative would offer 33.8 MMBF of timber for harvest. Alternative 4 was developed in response to public concerns about the impacts of harvest and road building on roadless area characteristics.

Estimated logging and transportation costs would be $380 per MBF with road costs estimated to be $65 per MBF. The indicated bid is -$175.07 per MBF. Between 116 and 165 direct annualized jobs would be supported in Alaska, providing an estimated $4.5 to 6.2 million in direct income.

### Alternative 5

This alternative would offer 16.5 MMBF of timber for harvest using shovel yarding and cable-logging systems. Alternative 5 was developed to maximize the economic return of timber harvest in the Iyouktug project area by maximizing the amount of ground-based yarding and accessing the most productive sites with the least amount of new road construction. This alternative is based on Alternative 2 with modification for economics. Alternative 5 was developed in response to public concerns about the economic

viability of timber sales, but also partially addresses concerns about effects on roadless area characteristics.

Estimated logging and transportation costs would be $333 per MBF with road costs estimated to be $92 per MBF. The indicated bid is -$176.79 per MBF. Between 56 and 79 direct annualized jobs would be supported in Alaska, providing an estimated $2.2 to 3.0 million in direct income.

At the time this alternative was developed, only units that could be logged with ground-based systems were chosen since they are the most economical systems to operate. While this is still true, helicopter costs have decreased slightly and cable logging costs have increased. Recently the operation costs for ground-based systems have increased. Cable systems have increased about $50 to $60/mbf. Shovel costs have increased slightly about $20/mbf. Helicopter logging costs have decreased about $30 to $50/mbf.

Because of this shift, Alternative 5 which was designed to maximize the economic return of timber harvest in the Iyouktug project area now has the second lowest indicated bid ($176.79) per MBF relative to the other action alternatives. Alternative 2 has the lowest indicated bid value at ($177.75). Currently, the alternatives only vary within $27/mbf. Alternative 3 has the highest indicated bid of ($151.28) per MBF.

### Cumulative Effects on Timber Economics

Economic effects are analyzed in the 1997 Forest Plan FEIS, 2003 Forest Plan SEIS, and most recently in the analysis for the 2008 Forest Plan Amendment FEIS. Alternatives 2 through 5 would contribute to the timber–related economy of Southeast Alaska. Alternative 1 would not and timber from other areas on the Tongass would have to be used to provide a supply. Appendix A of this Iyouktug FEIS includes information about how the Tongass timber program is structured.

# Other Resources Considered

The following resource analyses are organized in alphabetical order.

# Botany

The Forest Service Manual (FSM 2670) establishes guidance designed to ensure that Forest Service actions (1) do not contribute to the loss of viability of any native or desired non-native species or cause a trend toward federal listing for any species; (2) comply with the requirements of the Endangered Species Act; and (3) provide a process and standard which ensures that TES species receive full consideration in the decision making process.

This section provides a summary of the botanical work done to analyze the potential effects of this project on sensitive and rare plant species and invasive species.

## Affected Environment for Sensitive Plants

### Existing Condition of Sensitive Plants

Botanical surveys were conducted in all of the major plant communities present in the project area. Two hundred and twenty-six vascular plant species were identified from these surveys. Detailed information about common forest and wetland types in the project area can be found in the Silviculture and Vegetation, and Wetland Resource Reports. No threatened or endangered plants are known or suspected to occur in Southeast Alaska, therefore federally listed plants will not be evaluated.

#### Sensitive Plants

Nineteen plant species have been designated as sensitive by the Regional Forester for the Alaska Region. Four of those species are known from Chichagof Island and 4 more are suspected of occurring there. One sensitive species, *Botrychium tunux,* was found on areas of subalpine limestone outcrops that are within the project area boundary but will not be affected by the project because these areas were well outside proposed units or roads and the habitat they occurred on is not present in other proposed areas of the timber sale.

#### Region 10 Sensitive Plant List Updates

The Sensitive Species list is currently under revision. Three of the species known or suspected to occur on the Hoonah Ranger District are less of a concern due to the following reasons: *Arnica lessingii* ssp. *norberii* is no longer recognized as a subspecies and is now grouped with the common *Arnica lessingii*; it is not necessary to further analyze this plant. *Hymenophyllum wrightii* has been found to be abundant in low elevation coastal areas in the

southern Tongass and as far north as southern Chichagof Island; beach buffers will protect primary habitat for this species. *Poa laxiflora* has been found throughout the Tongass, typically on upper beach meadows or estuaries, which are largely protected. Because these species are still on the current list and are suspected in the project area they are still considered in the Biological Evaluation for Sensitive Plants (in the project record).

### Sensitive Plants Known or Suspected in the Project Area:

*Botrychium tunux* is known from 2 distinct habitats. It is found on beach meadows in theYakutat area and has recently been found at mid-to-high elevation on limestone bedrock on the Craig, Sitka and Hoonah Ranger Districts. Typical habitat for this species does not include the forested or forested wetland habitats in the Iyouktug sale area (Stensvold pers. com. 2007).

*Carex lenticularis* var. *dolia* is found in wetland areas in the subalpine and alpine. Recent taxonomic treatments have C. enanderi subsumed by *C. lenticularis* var. *dolia*; therefore, the species is more abundant than considered under previous taxonomy.

*Hymenophyllum wrightii* -No longer a viability concern – see previous section.

*Isoetes* x *truncata* Habitat for *Isoetes* includes shallow water, either in ponds or along lake shores. This species has never been found in the Tongass National Forest and its habitat is protected by Riparian Forest Plan Standards and Guidelines through Riparian Management Area buffers.

*Poa laxiflora* - No longer a viability concern – see previous section.

*Romanzoffia unalaschcensis* This species is known from a few widespread areas in Region 10. It is often associated with streamside/riverbank habitats and rock outcrops, often near the ocean. Primary habitat is protected by beach buffers and Riparian Forest Plan Standards and Guidelines through Riparian Management Area buffers.

## Environmental Consequences on Sensitive Plant Species

### Direct and Indirect Effects on Sensitive Plant Species

Aspects of this project that may affect sensitive plants or their habitat are listed by alternative.

#### Alternative 1
No direct or indirect effects.

#### Alternatives 2, 3, 4 and 5
Primary habitat for the four sensitive species being evaluated is not likely to occur in the proposed units; therefore the risk of effects is minimal. However, if plants were present, plants may be destroyed and habitat lost in road corridors due to trampling by workers, machinery, and deposition of road

materials. Plants may be destroyed in timber harvest units due to trampling by workers, trees falling on the plants, trees dragged over the plants during removal, or slash deposited on the plants. Plants may also be destroyed from operation of shovel yarding equipment, habitat alteration from soil compaction.

Indirect affects on these species in other locations as a result of timber harvest and road construction are essentially undocumented at this time. However, changes in the habitat condition may have some indirect effects, such as soil moisture changes, light regime changes and increased susceptibility to disturbances (human and natural). Some of these possible changes include increased groundwater hydrology due to decreased levels of evapotranspiration after harvest; alterations due to possible sedimentation caused by landslides or windthrow as a result of timber harvest or roading activities; increased competition from native or non-native species that may establish as a result of road building activities and other disturbance; impacts caused by changes in the light regime as a result of canopy removal; and increased disturbance caused by humans who may access these areas for recreation or subsistence use.

One invasive plant species, reed canary grass, currently in the Iyouktug project has impacted some sensitive species habitat, especially streambanks and wetlands, but no known populations of sensitive plants. Most weed species are not expected to spread much beyond the road prism. Proposed mitigation measures are expected to reduce the spread of invasive species due to project activities.

If plants were present, Alternative 2 would have the greatest effect, followed in decreasing order by Alternatives 4, 3, and 5.

## Cumulative Effects on Sensitive Plant Species

### Alternatives 1, 2, 3, 4 and 5

Since there would be no direct or indirect effects in Alternative 1, there would be no cumulative effects in Alternative 1. For Alternatives 2, 3, 4, and 5, the following cumulative effects may impact sensitive species or their habitat. Road and trail construction, gravel extraction, timber harvest, mining, off road vehicle use, recreation; higher elevation - timber harvest, utility corridors, communication sites, hunting camps. Sensitive plants could also be cumulatively affected through concentrated recreational or guided use on or adjacent to beaches or through off road vehicle use in the area.

Primary habitat for the four sensitive species being evaluated is not likely to occur in the project area, therefore the risk of effects is minimal and the determinations reflect this fact.

Table 3BO-1: Determinations for Sensitive Plant Species by Alternative.

| Species | Known or Suspected | Alternative 1 | Alternatives 2-5 |
|---|---|---|---|
| *Botrychium tunux* | Known | No Impacts | MIIH* |
| *Carex lenticularis var. dolia* | Suspected | No Impacts | MIIH |
| *Hymenophyllum wrightii* | Suspected | No Impacts | MIIH |
| *Isoetes x truncata* | Suspected | No Impacts | MIIH |
| *Poa laxiflora* | Suspected | No Impacts | MIIH |
| *Romanzoffia unalaschcensis* | Suspected | No Impacts | MIIH |

*MIIH = may impact individuals or habitat but not likely to cause a trend to Federal listing or loss of viability.

## Affected Environment for Rare Plants

### Existing Condition for Rare Plants

Four rare plants were considered in the Resource Report for Botany. Rare plant species considered for this project include any plant listed on the Alaska Natural Heritage Program (AKNHP) Vascular Plant Tracking List that were found during botanical surveys in the project area. This project may have substantial localized effects on some of the known populations of two rare plant species and their habitat. However, these species were found to be fairly common in the project area and are known from other locations on Chichagof Island. Thirty-three populations of *Galium kamtschaticum* and 53 populations of *Listera convallarioides* were found in the project area. This number of sightings makes their rarity on Chichagof Island questionable.

#### Rare Plants

*Botrychium virginianum* and *Glyceria striata* were evaluated in the Resource Report and are not likely to be affected by this project.

*Galium kamtschaticum* and *Listera convallarioides* were found frequently in the project area and will be affected by the proposed action alternatives. *Galium kamtschaticum* is a perennial herb in the bedstraw family. Primary habitat includes moist coniferous forests, lady fern and forb communities, wet meadows, swamps, stream banks and talus slopes (Douglas et al. 1999). On Chichagof Island, *Galium kamtschaticum*, has also been found in the Game Creek, Pavlov, Rust Lake, and Sitkoh Bay watersheds and in the coastal forest near Todd. *Listera convallarioides* is a perennial orchid typically found in wetter sites, including forested edges, openings with lady fern and skunk cabbage, lady fern and forb communities and fens. *Listera convallarioides* has been found in the Game Creek, Kook Creek, Rust Lake, and Sitkoh Bay watersheds and in the coastal forest near Todd. Both species have stable populations in these areas, which span Chichagof Island.

**Rare Plant Habitat**

*Galium kamtschaticum* and *Listera convallarioides* are often found in the same habitats: wet lady fern/skunk cabbage/forb communities. This community type is common from low to subalpine elevations in the Iyouktug planning area and much of the Tongass National Forest. Both species have been found from low elevation at 200 feet to relatively high elevation of 2,100 feet for G. *kamtschaticum* and 1,500 feet for L. c*onvallarioides*. *Galium kamtschaticum* is also found in better-drained settings, such as avalanche slopes, brushfields or broken mountain slopes near the subalpine zone. The largest populations of both species found in the Iyouktug project area occurred in large open lady fern/forb meadows at elevations between 1,100 and 2,100 feet. In some cases these habitats are well above harvest areas. More commonly these higher elevation habitats would fall in or around proposed helicopter logging units.

## Environmental Consequences for Rare Plants

### Effects on Rare Plants

The assessment of risks to populations of rare plants takes into account size, density, vigor, habitat requirements, location of the population, and consequence of adverse effect on the species as a whole within its range and within the National Forest.

All of the known rare plant species and most suspected sensitive or rare plant species in the project area occur in more open habitats, including beach meadows, subalpine, open forest, forest edge, meadows and wetlands or other habitats associated with streams or water. In large part these areas are avoided or protected in timber sale planning.

### Direct and Indirect Effects on Rare Plants

#### Alternative 1 (No Action)

Alternative 1 is the “no action” alternative and has no direct or indirect impact on rare plant populations or their habitat although it does not preclude future timber harvest or other management activities. Invasive plant species currently in the Iyouktug project area are unlikely to affect known rare plant populations. Habitat for the known rare plant species is typically unfavorable to weed species because of shade, high organic component to the soil or poorly drained soils and lack of disturbance. Most weed species are not expected to spread much beyond the road prism.

#### Alternatives 2, 3, 4, and 5

The direct and indirect effects described under “Sensitive Plants” are the same for rare plants and their habitat. However some known rare plants and their habitat would be affected. Higher elevation habitats, and rare plants found at higher elevations, will be less impacted by proposed road construction or proposed harvest because these areas are mainly proposed for helicopter yarding. The harvest prescription for helicoptor units is less likely to impact

these habitats than the prescriptions on shovel or cable-yarded units. Recommended mitigation measures in the unit cards in Appendix B of the DEIS would protect some of the largest populations and habitat in the project area.

***Galium kamtschaticum* (Boreal bedstraw):**

**Alternatives 2, 3, 4, and 5:** The consequences of adverse impacts to this rare plant due to project activities are low because many large populations in the project area and across Chichagof Island will not be impacted. The likelihood of adverse effects is low. The overall risk to this species is minimal because it occurs in many open-forested and non-forested niches, often where management activities are not likely to occur.

***Listera convallarioides* (Broad-lipped twayblade):**

**Alternative 2:** The consequences of adverse impacts to this rare plant due to project activities are moderate. The likelihood of adverse effects is low. The overall risk to this plant in the Iyouktug project area is low because at least 53 populations are known in the area, often in habitats that will be avoided by harvest activities Road construction will eliminate habitat and possibly small populations of this species. However, this species has been found near existing roads in several places, indicating that the indirect effects of road construction do not necessarily eliminate populations close to roads.

**Alternatives 3, 4, and 5:** The consequences of adverse impacts to this rare plant due to project activities are low. The likelihood of adverse effect is low. The overall risk to this plant in the Iyouktug proposal is low because over 50 populations were found across the project area, often in habitats that will be avoided by harvest activities and foreseeable future activities.

Table 3BO-2 displays the percentage of known rare plant populations potentially affected by the project; this includes known populations in or adjacent to harvest units and road corridors. Surveys have only been conducted in or adjacent to units. Therefore, many more undiscovered populations are likely to occur outside of the affected areas, based on the botanists experience in finding populations of these species. The effects to rare plants are considered low to moderate because large known populations of rare plants are not likely to be impacted and because many undiscovered populations will not be impacted.

Table 3BO-2: Percentage of observed rare plant populations potentially impacted by timber harvest and/or road construction within the project area, by alternative.

| Species | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| *Galium kamtschaticum* | 0% | 42% | 27% | 27% | 30% |
| *Listera convallarioides* | 0% | 51% | 30% | 34% | 34% |

### Cumulative Effects on Rare Plants

Cumulative effects on rare plants and rare plant habitat are the same as those listed for sensitive species. Because much of the primary habitat for the known or suspected rare plants is not in productive timber stands there are no foreseeable cumulative effects that could pose a serious threat to the rare plant species. The status of these plants on Chichagof Island is secure in the foreseeable future.

## Invasive Plants

### Existing Condition of Invasive Plants

An "invasive plant species" is a plant, including its seeds, spores or other biological material that is not native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112; USDA Forest Service 2004a; USDA Forest Service 2005). Invasive plant surveys were conducted in the project area in 2006, primarily on the roads and rock quarries. A limited number of surveys were also conducted on the entire Hoonah Forest Service road system and in the city of Hoonah. A comprehensive invasive plant survey was done in 2007, covering the main road system, rock quarries and large disturbed areas, and the city of Hoonah.

On October 19, 2007, the Tongass National Forest implemented a supplement to the Forest Service Manual concerning invasive plant species (Supplement No.: R10 TNF – 2000-2007-1). This document clarifies the responsibilities of the Forest Service in managing for invasive plant species on the Tongass National Forest. The release of this document occurred after the DEIS for the Iyouktug Timber Sale was published. In response to this direction, an invasive plant risk assessment for the Iyouktug project was completed and included in the project record with the Botany resource report. This risk assessment clarifies the management concerns, objectives and mitigation measures proposed to address invasive species for the Iyouktug project.

**Priority Invasive Plant Species**

Five invasive plant species found on the Hoonah road system are ranked moderately to highly invasive, according to the Alaska Natural Heritage Invasive Plant Ranking System (2007, Alaska Natural Heritage Foundation Weed Ranking Project). *Hypochaeris radicata* and *Myhrris odorata* are not yet

ranked; *Hypochaeris* is recognized to be moderately invasive in southeastern Alaska.

Table 3BO-3: Invasive Plants on the Hoonah Road System

| Species | Common Name | Status |
|---|---|---|
| *Hypochaeris radicata* | Hairy cat's ear | Not known in project area. One small population near Hoonah which is currently being controlled. |
| *Leucanthemum vulgare* | Oxeye daisy | Scattered populations on road and a large population at Freshwater Bay; a few small populations in project area |
| *Myhrris odorata* | Anise | Not known in project area. One small population west of the project area on the road. |
| *Phalaris arundinaceae* | Reed canary grass | Widely distributed on road system including the project area |
| *Ranunculus repens* | Creeping buttercup | Scattered small populations on the Hoonah road system, including the project area |
| *Sonchus arvensis* | Perennial sowthistle | Not known in project area. Rapidly spreading, large population in city of Hoonah, encroaching on beaches, beach meadows and disturbed areas |
| *Tanacetum vulgare* | Common tansy- | Not known in project area. Large population at Freshwater Bay and scattered populations on FS road system |

## Direct and Indirect Effects for Invasive Plants

### Alternative 1

Alternative 1 would have no direct or indirect effects on invasive plants. Invasive plants are typically found in disturbed areas and spread by human caused disturbance.

### Alternatives 2, 3, 4, and 5

The activities occurring in Alternatives 2, 3, 4, and 5 may increase the spread of existing weed species and increase the likelihood of new weed introductions. However, the design elements prescribed for the Iyouktug project should limit the introduction and spread of invasive species.

## Cumulative Effects for Invasive Plants

### Alternative 1

Alternative 1 would have a positive cumulative effect on weed species by not causing new disturbance or additional road construction in the project area for weed species to occupy or spread. Hand or mechanical treatment of weeds, ongoing on the Hoonah Ranger District (see Appendix D of this FEIS and USDA Forest Service 2007d), would help to limit the spread of invasive weeds related to past, ongoing, and future projects.

### Alternatives 2, 3, 4, and 5

Disturbances caused by road building and timber harvest favor the spread of invasive plants. It is likely that some invasive plants will be spread or spread naturally into newly disturbed areas. Currently most weed species are limited

to the road corridor and rock quarries, although reed canary grass is also present in some wetland areas, floodplains and second growth forest. It is possible that more highly invasive plants could be introduced and spread into natural habitats. Monitoring during and after the project and suggested weed control measures may help mitigate this possibility. Hand or mechanical treatment of weeds, ongoing on the Hoonah Ranger District (see Appendix D of this FEIS), would help to limit the spread of invasive weeds related to past, ongoing, and future projects.

# Geology and Karst

The following discussion and analyses are based on and summarized from the Karst Resource and Cave Resource Report for the Iyouktug Project Area.

## Affected Environment for Karst

### Geology

The Iyouktug project area is located in the Freshwater Bay Carbonates ecosubsection (Nowacki et al. 2001, page 134). A mix of calcareous and non-calcareous sedimentary rocks with a scattering of volcanic and intrusive igneous rocks characterizes this ecosubsection. Continental glaciation and alpine glaciers have shaped the topography of Chichagof Island and the project area. Karst features form on the calcareous portion of the landscape not covered by glacial till.

The project area is primarily underlain by the Silurian aged Point Augusta Formation of the Alexander Terrane. This Formation is characterized by graywacke and calcareous wackes. Sonyakay Ridge along the southwestern boundary of the project area, several of the ridge tops northwest of the Sonyakay Ridge and the ridge to the east of Iyouktug Creek are Kennel Creek limestone and dolomite. Freshwater Bay upper Devonian volcanic rocks are along the central western portions of the project area. The western most ridge tops along the project boundary are underlain by the Mississippian limestone of the Iyoukeen Formation.

#### Proposed Geologic Special Interest Areas

Under the Tongass Land Management Plan Amendment process currently ongoing several Geologic Special Interest Areas are proposed adjacent to and within the project area. These are areas of intense karst development; their unique geomorphological characteristics, the intensity of karst features found there, and potential for significant caves and their associated resources warrants recognition of these areas. About 1,925 acres of geologic special area are proposed in the planning area.

### Karst Resources

Karst is a comprehensive term that applies to the unique topography, surface and subsurface drainage systems, and landforms that develop by the action of water on soluble rock; in the case of Southeast Alaska, limestone and marble. The dissolution of the rock results in the development of internal drainage, producing sinking streams, closed depressions, and other landforms such as sinkholes, collapse channels and caves.

Karst resources are well developed within the carbonates of the Iyouktug project area. Karst drainage systems have developed into the Kennel Creek Limestone and the limestone of the Iyoukeen Formation within the project area wherever they occur. Within the project area there is approximately 5,492 acres of carbonate bedrock into which karst systems have developed. Karst feature in

these higher elevation areas (1,200 feet and above) reach densities of hundreds of features per square mile.

### Karst Vulnerability (Figure 3-4)

**Low Vulnerability Karstlands, or land underlain by carbonate geology (73 acres):** These are the carbonate areas most modified by glaciation. They generally have a deep (>40" deep) covering of glacial till and little or no epikarst, which are karst features at the surface. Only one small area of low vulnerability karst was identified within the project area that consisted of a limestone breccia outcrop along the 85312 road (see Figure 3-4).

**Moderate Vulnerability Karstlands (2,773 acres):** These are carbonate areas that have a mosaic of shallow organic and mineral soils with differing amounts of glacial till. The epikarst is moderate- to well-developed and is sometimes visible at the surface. These tend to be at mid-elevations, on knobs, ridges, and on the dip-slope of the bedding planes of the limestone when near the surface. These lands posed little or no threat to organic, sediment, and debris introduction into the karst hydrologic systems beneath. Partial suspension is required on these lands to minimize soil disturbance. Many of these areas are on the steep slopes of the valley walls. These occur within the project area between 300 and 1,200 feet elevation.

**High Vulnerability Karstlands (2,642 acres):** These are all collapsed karst features, caves, losing streams and resurgences. The highest vulnerability features (those which could produce and transport the greatest amount of sediment if disturbed) are the till lined sinks and cave entrances which accept a surface stream, whether intermittent or not. Also considered high vulnerability are karstlands in which the epikarst was well or extremely well-developed and the soils were predominately very shallow organic and mineral soils. Some of these karst features contain glacial till or are till lined. These karstlands could move organics, sediments, and debris down into the karst hydrologic systems beneath. These occur in the project area at elevations above 1,200 feet. Discrete springs, flowing from bedrock, not from beneath carbonate talus, are considered high vulnerability to protect and maintain the environment surrounding the springs and the water quality. This type of spring has only been located in the project area in the high alpine and along the shoreline south and south west of False Bay within the 1,000-foot beach buffer.

### Existing condition for Karst

Any surface management activity on a karst landscape is likely to affect the components of that landscape to some extent. Surface landforms and surface water hydrology would most obviously be affected; however, the direct link between surface water and subsurface drainage implies that karst hydrologic systems and cave ecosystems could also be affected.

Water enters the karst systems by either “discrete” or “diffuse” recharge. Discrete recharge is from losing or sinking streams and diffuse recharge is through forest floor and the epikarst. Threats to the karst systems, caves, and

associated resources from timber harvest and road building include changes in hydrology, infiltration rates, sediment production, debris transport, pollutants, and introductions or organics which can lead to oxygen depletion. Clearcutting the forest on karst lands increases annual diffuse recharge, for example.

### Past Harvest

Some karstlands were harvested as part of the 1986-1992 operating period of the 50-year contracts (Table 3GK-1). Since the high vulnerability karst is all high elevation, it was avoided in the past timber sales. Some roads from this operating period crossed low and moderate vulnerability karst lands (Table 3GK-2).

Table 3GK-1: Acres of Karst in Past Harvest

| Vulnerability | Acres of Karst | Acres of Karst Harvested | % of Karst in Project Area that has been Harvested |
|---|---|---|---|
| **Low** | 73 | 30 | 41% |
| **Moderate** | 2,773 | 182 | 6% |
| **High** | 2,642 | 0 | 0% |
| **Total** | 5,488 | 212 | 4% |

Source: Karst vulnerability map and managed stand layer

Approximately 20 acres of past harvest were not included in this analysis because information about this harvest was not received until late in the analysis process. This harvest occurred on NFS lands, in VCU 2100, in proposed unit 139 (proposed in the unit pool) that lies adjacent to Forest Road 8530. This harvest removed only 50 percent of the basal area. The addition of this harvest would not change the effects analysis or level of thresholds for effects.

Table 3GK-2: Existing Road on Karst

| Vulnerability | NFS Road | | Decomissioned Temporary Road | | Unauthorized Road* | |
|---|---|---|---|---|---|---|
| | miles | acres | miles | acres | miles | acres |
| **Low** | 0.6 | 3.2 | 0.0 | 0.0 | 0 | 0 |
| **Moderate** | 0.9 | 4.4 | 0.2 | 0.9 | 0.03 | 0.1 |
| **High** | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | 1.5 | 7.6 | 0.2 | .9 | 0.03 | 0.1 |

Source: Karst vulnerability coverage, road coverage, road assumed to be 42' wide
* Existing unauthorized roads are small sections of road accessing rock pits.

Figure 3-4: Iyouktug Timber Sale Area Karst Vulnerability

Color 11x17 map

Back of figure 3-4

# Environmental Consequences on Karst

## Effects on Karst

Karst lands impose land management challenges not encountered in non-karst areas because the three-dimensional aspect of karst lands functions differently than other landforms. Some parts of the landscape are more vulnerable than others to the effects of surface activities and groundwater contamination.

The Forest geologist mapped the carbonate outcrops and significant karst features within the Iyouktug project area based on the US Geologic maps of the area. The results of this survey are in the Iyouktug project record. Based on these inventories, areas of high vulnerability karst were identified and removed from consideration for timber harvest. The karst resource assessment determined that the remaining moderate and low vulnerability areas would be suitable for timber harvest given the proposed silvicultural prescriptions and suspension requirements.

### Harvest on Karst

No low vulnerability karst is proposed for harvest. All high vulnerability karst lands were removed from proposed harvest units. Only moderate vulnerability karst remains in any proposed units (Table 3GK-3). Nearly all the proposed harvest on karst is helicopter harvest and partial harvest prescriptions. Specific requirements are outlined in the unit cards (Appendix B of the DEIS).

### Roads on Karst

No new road is proposed on or near any low, moderate or high vulnerability karstlands.

## Direct and Indirect Effects on Karst

### Alternative 1 (No Action)

Alternative 1 proposes no harvest on any karst lands.

### Effects common to Alternatives 2, 3, 4, and 5

There will be about 0.4 mile of unauthorized road reclassified as NFS road. These are small sections of existing road accessing rock pits. About 0.1 acre exists on moderate vulnerability karst. While identified as “construction”, there is no reconstruction or construction associated with this activity, thus no additional effects on karst.

### Alternative 2 (Proposed Action)

Alternative 2 proposes harvest on 325 acres of moderate vulnerability karst lands, the highest of any alternative. The effect is expected to be minor by protecting soil and water quality in these areas and specifying suspension requirements in the unit cards (Appendix B of the DEIS).

### Alternative 3

Alternative 3 proposes harvest on 316 acres of moderate vulnerability karst lands. The effect is expected to be minor by protecting soil and water quality in these areas and specifying suspension requirements in the unit cards.

### Alternative 4

Alternative 4 proposes harvest on 142 acres of moderate vulnerability karst lands. The effect is expected to be minor by protecting soil and water quality in these areas and specifying suspension requirements in the unit cards.

### Alternative 5

Alternative 5 proposes no harvest on any karst lands, the lowest of any action alternative.

## Cumulative Effects on Karst

Three ongoing small sales are in the Iyouktug project area (Lowridge, Divide and Boomerang). None of these are on karst. The only future activity proposed on karst is the False Bay Recreation development. This is proposed on moderate vulnerability karstlands. There may be up to two acres of recreation development on these lands (Table 3GK-3).

No past, present or future activities have or will occur on high vulnerability karst. No present or future activities will occur on low vulnerability karst (Table 3GK-3).

Table 3GK-3: Cumulative Activities on Karst

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Low Vulnerability** | | | | | |
| **Past Harvest (ac)** | 30 | 30 | 30 | 30 | 30 |
| **Existing Road (ac)** | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 |
| **Cumulative % of low vulnerability karst affected** | 45% | 45% | 45% | 45% | 45% |
| **Moderate Vulnerability** | | | | | |
| **Past Harvest (ac)** | 182 | 182 | 182 | 182 | 182 |
| **Proposed Iyouktug Harvest (ac)** | 0 | 325 | 316 | 142 | 0 |
| **Existing Road (ac)** | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| **Future False Bay development (ac)** | 2 | 2 | 2 | 2 | 2 |
| **Cumulative % of moderate vulnerability karst affected** | 7% | 19% | 18% | 12% | 7% |
| **Total Karstlands (ac)** | 222.7 | 547.7 | 538.7 | 364.7 | 222.7 |
| **% total karst resource affected** | 4% | 10% | 10% | 7% | 4% |

Source: Karst vulnerability coverage, managed stands coverage, roads coverage, proposed unit pool coverage

# Heritage

The National Historic Preservation Act (NHPA) sets forth government policy and procedures regarding "historic properties" -- that is, districts, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places. Section 106 of NHPA requires that federal agencies consider the effects of their actions on such properties, following regulations issued by the Advisory Council on Historic Preservation (36 CFR 800).

## Affected Environment for Heritage Resources

### Existing Conditions for Heritage Resources

Heritage resources include archaeological sites, historic sites, and traditional use areas. The Forest Plan provides Standards and Guidelines for the management of these resources.

Archaeological investigations indicate that people have lived in Southeast Alaska for at least 10,000 years. The Tlingit occupied this region when European explorers arrived. Site location, artifact types, faunal assemblages, oral tradition, and historic records all show that human occupation and subsistence revolved around marine resources. Although people during all periods relied heavily on maritime resources there have been significant changes in how these resources were used.

To fulfill Section 106 obligations, Forest Service archaeologists researched past heritage resource investigations and conducted new archaeological survey in and around the Iyouktug Project Area. Some previously recorded sites were also monitored. Previous and current survey plans were based in part on an archaeological site probability model developed over the past several decades. This model is defined in a Programmatic Agreement between the State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation (ACHP) and the USDA Forest Service, Alaska Region (USDA Forest Service and State of Alaska 2002a). The second amended Programmatic Agreement expired on July 29, 2007. The Forest Service, Alaska SHPO and ACHP agreed to extend the Agreement’s terms until September 30, 2008, to allow for sufficient time to consult with Indian tribes and incorporate improvements in procedures in consideration of the previous work under the Programmatic Agreement (USDA Forest Service 2007f). The Iyouktug Heritage Resource survey methodology is described in the Heritage Specialist Report in the Iyouktug Project Record. Consultation with the federally-recognized tribal governments that claim a cultural affiliation with the project area was done in order to acquire and share information about traditional knowledge and past use of the area. The Iyouktug Project Area lies within the traditional territory of the Angoon and Hoonah Tlingit.

Archaeologists intensively surveyed areas considered to have a high probability of containing heritage resources. Archeological investigations identified 14 heritage resource sites in the project area. Of these 14 heritage resource sites, only three have been determined eligible for the National Register of Historic Places (Table 3HE-1). The oldest of the three is site 49-JUN-0695, a fish weir. It has been dated 2790+/-60 BP (Before Present), falling under the Middle Phase of the Prehistoric period.

Table 3HE-1: Historic Properties in the Project Area.

| USGS QUAD | AHRS[1] | Site Type[2] | Eligibility[3] | Effect* |
|---|---|---|---|---|
| **Juneau A-4** | 49 JUN 088 | Petroglyph | Yes | NHPA |
| | 49 JUN 695 | Fish Weir | Yes | NHPA |
| **Sitka D-3** | 49 SIT 503 | Midden | Yes | NHPA |

[1] Alaska Heritage Resource Survey number
[2] Site type given rather than name to avoid disclosing location.
[3] Eligibility for National Register of Historic Places
*No Historic Properties Affected

Other heritage resources in the project area include historic cabins, mining claims, and logging camps that date to the early to mid twentieth century.

The Area of Potential Effects for this project includes the location(s) where ground disturbance may occur, including the total number of cutting units and proposed new road construction listed in the proposed action and all alternatives (Figures 2-2A through 2-6B). The Area of Potential Effects also includes surrounding areas where indirect effects may alter the character or use of sites eligible to the National Register of Historic Places.

### Tribal Consultation

Consultation with the federally-recognized tribal governments that claim a cultural affiliation with the project area was completed in order to acquire and share information about traditional knowledge and past use of the area and to help identify any areas of special concern regarding effects on heritage resources.

Investigations indicate that the much of the project area is within the traditional Angoon territory. The project area is also in the traditional Hoonah territory. The northern section of the project area was specifically used by the Chookaneidi clan as hunting and trapping territory. There is general agreement that Hoonah territory did not extend past Point Augusta, while other Natives used Freshwater Bay with permission of the tribe that owned the area.

Hoonah Ranger District conducted tribal consultation with the Hoonah Indian Association and offered tribal consultation to the Angoon Community Association, Kootznoowoo Inc., and Huna Totem Corporation (see Chapter 1, Consultation with Tribal Governments).

Tribes and Tribal Corporations were asked if there are any concerns regarding the location of any of the proposed logging units in relation to heritage resources. Hoonah Indian Association identified an area of concern prior to the development of the Proposed Action. This area was dropped from the alternatives. To date, the tribes and corporations have not identified any concerns for heritage resources within the Area of Potential Effects.

## Environmental Consequences on Heritage Resources

### Effects on Heritage Resources

The no action alternative as well as Alternatives 2, 3, 4, and 5 and their potential to affect identified heritage resources were considered. All of the known heritage resources either lie within the intertidal zone or within the 1000-foot buffer established in the Forest Plan Beach and Estuary Fringe Standards and Guidelines (Forest Plan, page 4-4). All identified heritage resources have been avoided, which is consistent with the National Environmental Policy Act and the National Historic Preservation Act.

### Direct and Indirect Effects on Heritage Resources

There would be no direct effects from any alternative to any of the known heritage resources. Direct effects would be mitigated by complete avoidance of the high sensitivity zone. Indirect effects may occur through increased activities near sites with implementation of any of the action alternatives, although these effects, if any, are expected to be negligible because no new roads, harvest units, or log transfer facilities would be near identified heritage resources in any alternative.

### Cumulative Effects on Heritage Resources

Current use of the project area centers on timber harvest, hunting, and recreation. Logging occurs inland while most of the recreation activities take place along the beach and along the existing road system. Monitoring activities indicate that these activities have had little known effects on historic properties. This trend will likely continue unless new use trends develop.

Given that there are no direct or indirect effects, there would be no cumulative effects to heritage resources when adding this activity to any past, present, or any reasonable foreseeable future activities.

No known heritage sites are within proposed harvest units or road corridors. Based on previous investigations and lack of sites, no further heritage resource investigations are recommended. We have made a determination of No Historic Properties Affected under provisions of the National Historic Preservation Act Section 106 review process. No direct, indirect or cumulative effects to heritage resources are anticipated as a result of this project.

If heritage resources or items protected by the Native American Graves Protection and Repatriation Act are discovered during implementation, work would cease in the immediate vicinity. The sale administrator would be

contacted, who will contact the appropriate archaeologist. Hoonah Ranger District in consultation with the appropriate Native organization and the State Historic Preservation Office will determine a course of action (36 CFR 800.13).

**National Historic Preservation Act Compliance**
A detailed Heritage Resource report was prepared and will be submitted with the 2007 Annual Report to the Alaska SHPO as per the R10 Programmatic Agreement with the Alaska State Historic Preservation Office and the advisory Council on Historic Preservation. Since we have complied with terms of the Programmatic Agreement and have made a determination of No Historic Properties Affected we may proceed with this proposed project without a consensus determination from the Alaska SHPO. That, combined with the absence of issues raised by Indian tribes and interested parties, effectively completes the Section 106 review process under the NHPA.

## Environmental Justice

In 1994, President Clinton signed Presidential Executive Order (EO) 12898. It directed every Federal agency to make environmental justice part of its mission by identifying and addressing the effects of all programs, policies, and activities on "minority and low-income populations." EO 12898 applies to Blacks, Hispanics, Asians, Native Hawaiian or other Pacific Islanders, American Indians, Alaska Natives, and low-income populations. Fundamental environmental justice principles include:

- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects on minority and low-income populations.
- Ensure the full and fair participation by all potentially affected communities in the decision-making process.

The Council on Environmental Quality (CEQ) issued guidance on analyzing effects on environmental justice under NEPA in December 1997. This guidance clarified that such analysis should recognize the interrelationships between cultural, social, occupational, historical, and economic factors that may amplify the environmental impacts. For example, subsistence in Alaska Native communities is not only important economically, it is also important for reasons of tradition and culture. Consequently, effects to subsistence resources can also affect the social and cultural lives of residents. The CEQ guidance also clarified that identifying 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 1007, page 10).

Executive Order 12898 directs Federal agencies to conduct effective public participation with low-income and minority communities. The public participation process involved public scoping through notification in local papers, agency public websites, written letters to individuals, agencies, governments, and notices in the Federal Register. The impact of this project is

expected to be similar among local populations; minority populations, or low-income populations should not be disproportionately impacted under any alternative. Nearby Alaska Native and American Indian populations have been considered within the analysis of the proposed alternatives. The Hoonah Indian Association and the Angoon Community Association were informed throughout project planning. Members were encouraged to comment at any point in the process to ensure their concerns would be addressed. Two public meetings were also held in Hoonah to assist people in understanding the proposal, alternatives, and how issues were addressed. These meetings also gave the public opportunities to highlight other issues or concerns they had. A Heritage Resource Report was prepared with input and review from the Native Community. With the avoidance of heritage resource sites and the consideration of traditional values and uses, Native populations should not be disproportionately impacted under any alternative.

# Management Indicator Species (MIS) and Other Wildlife Species

Management indicator species (MIS) are those wildlife species whose responses to land management activities are thought to reflect the likely responses of other species with similar habitat requirements. Thirteen MIS have been identified for the Tongass National Forest (NF) (USDA Forest Service 1997a). Of the 13 MIS, the wolf and black bear do not occur on Chichagof Island and therefore would not be further assessed (MacDonald and Cook 1999, p. 53 and 57). Mountain goats were transplanted to Chichagof Island in 1954. However, the introduction was not successful (MacDonald and Cook 1999, p. 79). Although there was a confirmed sighting of a mountain goat in the 1970's, there is not an established population of goats on Chichagof Island (Mooney 2007, pers. com.) therefore this species would not be further assessed. Three MIS species with special management concerns (American marten, brown bear, and Sitka black-tailed deer) are discussed in more detail. MIS species are associated with spruce and hemlock forests of Southeast Alaska that represent 98 percent of the productive old growth forests of the Tongass NF.

### Level of Impact

General criteria were developed to assess the intensity of the effects. Mitigation measures that may be employed to offset or minimize potential adverse impacts were defined where applicable. Levels of impact definitions for MIS, threatened and endangered and other wildlife species are as follows.

**Negligible:** No species would be affected or the alternative would affect an individual but the change would be so small that it would not be of any measurable or perceptible consequence to the protected individual or its population. Negligible effect would equate with a "no effect" determination for threatened and endangered species and the "no impact" determination for sensitive species.

**Minor:** An individual or its critical habitat (if identified) would be affected but the change would be small. Impacts would be detectable, but they would not be expected to have any long-term effects on species or their habitats, or the natural processes sustaining them. Occasional responses to disturbance by some individuals could be expected, but without interference to reproduction, or other factors affecting population levels. Sufficient habitat would remain functional to maintain the species. Minor effect would equate with a "not likely to adversely effect" determination for threatened and endangered species and the "may impact individuals but not likely to cause a trend to federal listing or a loss of viability" determination for sensitive species.

**Moderate:** An individual or its critical habitat would be noticeably affected. The effect could have some long-term consequence to the individual or habitat. Breeding animals of concern are present; animals are present during particularly vulnerable life-stages, such as migration or juvenile states; or

interference with activities necessary for survival can be expected on an occasional basis. Frequent response to disturbance by some individuals could be expected, with some negative impacts to feeding, reproduction, or other factors affecting short-term population levels. Sufficient habitat would remain functional to maintain the species. Moderate effect can equate with a “not likely to adversely effect" or “may effect” determination for threatened and endangered species and the "may impact individuals but not likely to cause a trend to federal listing or a loss of viability" determination for sensitive species.

**Major:** An individual or population, or its critical habitat, will be noticeably affected with a long-term, vital consequence to the individual, population, or habitat. Impacts on species, their habitats, or the natural processes sustaining them will be detectable. Population numbers, population structure, genetic variability, and other demographic factors for species might have large, short-term declines with long-term population numbers significantly depressed. Frequent responses to disturbance by some individuals will be expected, with negative impacts to feeding, reproduction, or other factors resulting in a long-term decrease in population levels. Major effect will equate with a "may effect" determination for threatened and endangered species and the "likely to result in a trend to federal listing or a loss of viability" determination for sensitive species.

## Affected Environment for American Marten

### Existing Condition for American Marten

Marten historically occurred on the mainland of Southeast Alaska and on some islands. However, this species was transplanted to Chichagof Island between 1930 and 1950. Marten are dependent on high-quality winter habitat that includes low-elevation, high-volume POG forest especially in coastal and riparian areas. These habitats intercept snow, provide cover and denning sites, and provide habitat for prey species. Marten are generalist predators and will vary their diet seasonally. On Chichagof Island, marten were recorded to utilize winter-killed deer carcasses during the spring; squirrels, birds and berries during the summer; and salmon carcasses and small rodents during the fall (Flynn et al. 2004; Ben-David et al. 1997).

For this analysis, two primary activities were identified that can affect marten and their habitat: clearcut timber harvest (especially of POG habitat) and increases in open motorized access. Clearcut harvest reduces canopy cover, the amount of coarse woody debris, and the availability of denning and resting sites and may potentially reduce habitat for prey species. An increase in road access can increase trapping pressure on marten. Marten are easily trapped and can be over-harvested, especially where trapping pressure is heavy and not effectively controlled. East Chichagof Island is classified in the Forest Plan as a high-risk biogeographic province for marten habitat (USDA Forest Service 1997a). In these areas, timber harvest units that contain high-value marten habitat (defined as stands below 1500 feet elevation in high volume POG timber strata) must

meet specific standards and guidelines. Less than 33 percent (6-18 percent) of the POG forest in the VCUs has been harvested.

**Habitat Capability**
An interagency model (Suring et al. 1992) was developed and updated during the 1997 Forest Plan analysis to compare the effects of action alternatives on the existing condition of marten habitat to the condition of marten habitat as it existed prior to 1954 or when large-scale harvests were initiated. The model calculates HSI based on timber volume strata, elevation, and typical snowfall for all lands within WAA 3551. This model does not consider road access or road densities. HSI values range from 0.0 in areas that have no winter habitat value to 1.0 in optimal habitat. The existing marten habitat capability is 90 percent of the probable capability in 1984 (when large scale harvest was initiated) for the WAA 3551. The reduction in habitat capability is due to large-scale logging and road building which converted high-value marten habitat into young growth stands.

**High Value Marten Habitat**
High value marten habitat is defined as HPOG below 1500 feet in elevation. This equates to a marten HSI of 0.9 to 1.0. There are 8595 acres of high value marten habitat existing in WAA 3551 (Figure 3-5). This is 68 percent of the habitat that assumed to be present in 1984. The reduction is due to large-scale logging and road building which converted high value marten habitat into young growth stands.

**Trapping and Road Density**
The ADFG currently permits unlimited trapping of marten in the GMU 4 from December 1 to February 15. Trapping efforts fluctuate year-to-year depending on fur prices, fuel prices, winter weather conditions, the current economy and marten populations. Between 1991 and 2002, an average of 165 martens per year were trapped on Chichagof Island (Flynn et al. 2004, p. 18). ADFG sealing records for the X35 harvest area in GMU 4 recorded an average of 182 marten harvested per between 1984 and 2005 (ADFG 2007, pers. com).

Suring et al. (1992, p. 14) assumed that habitat suitability for marten began to decline when road densities reached 0.20 miles per square mile (mi/mi$^2$) and decreased sharply when road densities reach 0.60 mi/mi$^2$. It is also assumed that trapping pressure may be higher along roads that lead to major communities. Although closed roads still facilitate access (e.g., off-highway vehicle, pedestrian), open roads receive the highest and most consistent use and therefore are likely to have the greatest effect on marten. The current total road density (including roads closed to vehicle access) on all lands in the WAA is 0.83 mi/mi$^2$ and the open road density is 0.56 mi/mi$^2$.

The harvest level of marten resulting from the high road densities and the placement of the roads adjacent to low elevation riparian habitat in the Iyouktug project area could impact marten populations. However, the harvest data indicates that marten populations are stable or increasing on Chichagof

Island and that there is not a mortality concern (Mooney 2007, pers. com., ADFG 2004, Flynn et al. 2004). Sex and age ratio data suggest that marten populations on Northeast Chichagof Island are stable. The observed sex ratio of greater than 60 percent males ADFG 2007; Whitman 2004, p. 7; Fadden and Parsley 2005, p. 1), the high incidence of young of the year animals in the harvest and the high total young to adult female ratio suggest good recruitment and moderate trapping pressure from 2003 to 2005 (Whitman 2004). The percentage of males harvested and the age ratio exceeded the recommended levels for the 2005-2006 trapping season. These data may not have been representative of the entire season. If data continue to show a declining trend, then restrictions in access or season length may need to be considered.

## Environmental Consequences for American Marten

The marten model was developed as a tool to assess the effects of action alternatives compared to past, present, and future habitat suitability and capability within the WAA. The model was run to assess the effects of action alternatives on the existing condition (2007) of marten habitat, the condition of marten habitat as it existed prior to large-scale harvest (1984), and 25 years after proposed harvest would begin (2036). The year 2036 is used to represent the future condition to assess the effects of past and proposed harvest that have reached the stem exclusion stage, on marten habitat capability. No thresholds for effects have been defined.

The model overestimates the reduction of habitat capability because it assumes that all proposed timber harvest is accomplished using traditional clearcut silvicultural systems. Clearcut harvest will have the greatest impact on POG forest, and therefore marten habitat, compared to shovel and helicopter harvest systems because the removal of more than half of the basal area can result in significantly different plant community structure compared to unharvested areas (Deal and Tappeiner 2002). Reference the Habitat Connectivity issue for additional information.

Stand structural diversity and plant diversity and abundance are much greater in single tree selection stands than in young-growth stands developing after clearcut harvest (Deal and Tappeiner 2002; Deal 2001). Low-impact harvest prescriptions such as individual tree selection where only 25 percent of the basal area is removed were not classified as harvested for this model analysis because this harvest method was assumed to maintain POG forest and a diversity of plant communities in the understory and cover in the overstory (Deal 2007; Deal and Tappeiner 2002; Deal 2001). Between the DEIS and FEIS, approximately 68 to 390 acres of proposed harvest (depending on the alternative) were changed from 40 or 50 percent partial harvest to 25 percent partial harvest. The following analysis did not apply these changes. Therefore,

these analyses may overestimate effects. Refer to the Habitat Connectivity issue for additional information.

The model was also run to assess the effects of cable and shovel harvest. Although the removal of trees in the 40 percent single tree helicopter prescriptions could create small gaps in the canopy, over 50 percent of the available habitat and existing tree composition and structural diversity will be maintained.

## Direct and Indirect Effects on American Marten

### Alternative 1 (No Action)

Alternative 1 would have negligible direct, indirect or cumulative effect to marten because there would be no change to habitat in the area.

### Alternatives 2, 3, 4 and 5

Alternatives 2, 3, 4 and 5 would have moderate direct and indirect effects to marten. Effects to marten would result from disturbances that adversely affect individuals or their young, a reduction in habitat capability and high value habitat, and an increase in road densities that may result in an increase in trapping. Effects are considered moderate because activities will likely result in a decline in the marten population but sufficient habitat will remain functional to maintain the species.

All action alternatives result in the reduction of marten habitat capability (Table 3MI-1). The reduction ranges from 1.5 to 6 percent of the current capability depending on the alternative and harvest system assessed. When assessing cable, shovel and 40 percent helicopter, the alternatives with the greatest amount of harvest would result in the greatest reduction of habitat capability. Therefore, Alternative 2 would have the greatest reduction and Alternative 5 would have the least reduction in habitat capability. However, if all helicopter harvest were excluded, Alternative 2 would have the greatest reduction and there is little difference (0.01-0.02) in habitat capability between the other Alternatives.

Table 3MI-1: Percent reduction in marten habitat capability from the 2007 (existing) and 2036 (future) condition compared to the 1984 (pre harvest) condition for WAA 3551 by harvest system.

| | | Percent Reduction in Capability | | | | |
|---|---|---|---|---|---|---|
| **Harvest System[1]** | **Year** | **Alt 1** | **Alt 2** | **Alt 3** | **Alt 4** | **Alt 5** |
| **Cable, Shovel & 40 percent Helicopter** | 2007 | 0 | 6.0 | 4.5 | 3.2 | 1.7 |
| | 1984[2] to 2007 | 10.5 | 15.8 | 14.4 | 13.3 | 11.9 |
| | 1984 to 2036 | 11.8 | 18.0 | 16.5 | 15.1 | 13.5 |
| **Cable & Shovel** | 2007 | 0 | 2.8 | 1.5 | 1.6 | 1.7 |
| | 1984 to 2007 | 10.5 | 13.0 | 11.8 | 11.8 | 11.9 |
| | 1984 to 2036 | 11.8 | 14.8 | 13.3 | 13.4 | 13.5 |

Source: Lutz 2007

[1] The model assumes that all harvest is clearcut.

[2] 1984 represents the year when large scale timber harvest was initiated in the WAA.

Figure 3-5 Iyouktug Timber Sale Area Marten Habitat Suitability Index

Color 11x17 map

Back of Fig. 3-5

When assessing cable, shovel and 40 percent helicopter harvest, Alternative 2 would have the greatest reduction of high value marten habitat followed by Alternatives 3, 4 and then 5 (Table 3MI-2). However, if all helicopter harvest was excluded, Alternative 2 would have a greatest reduction followed by Alternatives 5, 3, and then 4. The Forest Plan standards and guidelines require that trees be retained in high value marten habitat within proposed harvest units (USDA Forest Service 1997b).

Table 3MI-2: Percent reduction in high value marten habitat for WAA 3551. High value marten habitat was defined as a habitat suitability index of 0.9 to 1.0 in the marten capability model.

| Harvest System | | Percent Reduction in Habitat | | | |
|---|---|---|---|---|---|
| | | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| Cable, Shovel & 40 % Helicopter | Acres remaining after harvest | 7815 | 7923 | 8155 | 8337 |
| | % Reduction from 2007[1] | 9.08 | 7.82 | 5.13 | 3.00 |
| | % Reduction from 1984[2] | 38.10 | 37.25 | 35.42 | 33.97 |
| Cable & Shovel | Acres remaining after harvest | 8297 | 8373 | 8467 | 8337 |
| | % Reduction from 2007[2] | 3.47 | 2.58 | 1.50 | 3.00 |
| | % Reduction from 1984[3] | 34.29 | 33.68 | 32.95 | 33.97 |

Source: Lutz 2007
[1] Based on 8595 acres.
[2] 1984 represents the year when large scale timber harvest was initiated in the WAA. Based on 12,626 acres.

Excluding helicopter harvest of up to 25 percent, less than 33 percent of the 1984 POG forest on National Forest System Lands (NFS) lands would be harvested in each of the VCUs in the WAA (Table 3MI-3). If helicopter harvest of up to 25 percent is included, the percent harvest of 1984 POG ranges from 12.97 to 34.47 between VCUs and alternatives. However, single tree selection of up to 25 percent of the stand is not expected to reduce POG forest.

Table 3MI-3: Percent reduction in the 1984 level of productive old growth (POG) on National Forest System lands for VCUs in the project area (PA) and WAA 3551. Excludes 25 percent helicopter harvest. Assumes that all past harvest acres would have been classified as productive old growth (POG).

| VCU | Acres of POG 1984[1] | Percent Reduction POG | | | | |
|---|---|---|---|---|---|---|
| | | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| **2080** | 3604 | 5.72 | 16.73 | 15.14 | 12.45 | 10.27 |
| **2090** | 8205 | 18.39 | 30.45 | 28.30 | 25.59 | 19.72 |
| **2100** | 13,108 | 9.68 | 23.01 | 18.37 | 15.66 | 13.97 |
| **2110** | 3477 | 0 | 0 | 0 | 0 | 0 |
| **2120** | 7546 | 17.78 | 17.78 | 17.78 | 17.78 | 17.78 |
| **WAA Total** | **36,043** | **12.02** | **20.68** | **18.40** | **16.52** | **14.35** |

Source: Ginny Lutz 2006
[1] 1984 represents the year when large scale timber harvest was initiated in the WAA.

All action alternatives will result in an increase in open road density in WAA 3551 during project activities (Table 3MI-4). This assumes that all roads will be open at the same time. Alternative 2 will have the greatest increase in roads densities during the project activities followed by Alternatives 4, 3, and 5. After project activities, Alternative 2 will have the greatest increase in roads densities followed by Alternatives 5, 4 and 3. Alternative 3 would have the least impact because all newly constructed, reconstructed and temporary roads would be closed to vehicle access. Increases in open road densities may result in increased trapping of marten.

Table 3MI-4: Miles per square mile of open road densities based on the 91.63 square miles of NFS and NNF lands in WAA 3551.

| VCU | Open Road Density Miles Per Square Mile | | | | |
|---|---|---|---|---|---|
| | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| **During Project Activities[1]** | 0.57 | 0.83 | 0.70 | 0.74 | 0.66 |
| **After Project Completion[2]** | 0.57 | 0.61 | 0.57 | 0.58 | 0.59 |
| **Cumulative[3]** | 0.55 | 0.56 | 0.52 | 0.53 | 0.55 |

Source: JT Stangl 2007

1 Includes existing, temporary, newly constructed and reconstructed roads.

2 Excludes decommissioned temporary, or closed newly constructed and reconstructed roads.

3 Reflects the implementation of the 2002 Access and Travel Management decision (USDA Forest Service 2002b).

## Cumulative Effects on Marten

**Effects Common to all Action Alternatives**

Because less than 33 percent of the original POG forest has been or would be harvested in each of the VCUs in the project area, standards and guidelines include retaining: 1) 10-20 percent of the original stand structure; 2) an average of at least four large trees (20-30 inch DBH or greater) per acre for future snag recruitment; 3) an average of at least three large decadent trees per acre; and 4) an average of at least three pieces of down material (logs 20-30 inches or greater in diameter and 10 feet long) per acre. Retained trees should be somewhat evenly distributed throughout the harvest unit if possible and should have a reasonable assurance of wind firmness (USDA Forest Service 1997b). Trees may be clumped and maintained along the unit or setting boundaries for operational purposes (USDA Forest Service 2005b).

POG forest may be reduced and open road densities may increase slightly as a result of current small timber sale (approximately 107 acres), personal use wood harvest, associated temporary road construction and as windthrow occurs. Currently planned and proposed thinning of approximately 2,700 acres is designed to maintain understory vegetation and a more open overstory in second growth stands. Second growth stands will continue to be scheduled for thinning as they reach the appropriate age.

Marten numbers may fluctuate in response to food availability. Northeast Chichagof Island experienced substantial winter-related deer mortality during

the winter of 2006-2007 (USDI 2007c). This resulted in a short term increase in the availability of deer carcasses as a food source for marten. However, in the long term, the availability of deer and therefore deer carcasses may decrease. These winter conditions may also decrease the availability of prey species such as voles. If future winters are mild, prey species are likely to rebound.

**Alternative 1 (No Action)**
Alternative 1 would have negligible cumulative effects to marten because there would be minimal changes to habitat in the area. There would be a 0.02 miles per square mile reduction in existing open road density as a result of cumulative activities.

**Alternatives 2, 3, 4 and 5**
Alternatives 2, 3, 4 and 5 would have moderate cumulative effect to marten. Effects to marten would result from a reduction in habitat capability and high value habitat. The reduction in habitat capability ranges from 11.8 to 15.8 percent of the 1984 capability depending on the alternative and harvest system assessed. The reduction in 2036 ranges from 13.3 to 18 percent of the 1984 capability depending on the alternative and harvest system assessed. All road densities would decrease cumulatively by 0.01 to 0.05 miles per square mile as a result of the completion of proposed activities and road closures proposed in association with the 2002 ATM EA decision (USDA Forest Service 2002b). Although habitat losses decrease habitat capability, Forest Plan standards and guidelines will maintain habitat in the beach fringe and riparian management areas. Over the next 150 years, harvested areas will develop into POG forest and marten habitat will become available. The shift to a more complex structure will be gradual; it may take more time for harvested openings to become optimal marten habitat again.

## Affected Environment

### Existing Conditions for Bald Eagle, Vancouver Canada Geese and River Otter

The bald eagle, Vancouver Canada goose and river otter are associated with coastal and fresh water aquatic environments. Bald eagles nest in habitat that is primarily old growth trees along the coast and within riparian areas. Based on the 1999 GIS bald eagle nest data, there are an estimated 66 bald eagle nest sites in the project area located within 1000 feet of the shoreline. Unlike other subspecies of Canada geese, the Vancouver Canada goose uses forested habitats for nesting and relies primarily on forest understory plant species for food. Old growth forests have the highest habitat value for river otters, providing canopy cover, large-diameter trees and snags, and burrow and den sites.

River otters were not observed during surveys but habitat is present along riparian areas. Although bald eagles were observed, nests were not identified in units proposed for harvest. Vancouver Canada geese were observed on ponds and roads in the project area.

## Environmental Consequences

### Direct, Indirect, and Cumulative Effects on Bald Eagle, Vancouver Canada Geese and River Otter

All of the alternatives would have negligible direct, indirect or cumulative effect to bald eagles, Vancouver Canada geese and river otters in WAA 3551.

Habitat for these species occurs primarily along the shoreline that is protected from harvest by Old-growth Habitat and Scenic Viewshed LUD designations and Forest Plan standards and guidelines to maintain beach and estuary habitats. Activities do not occur within 1 mile of the shoreline. Riparian management buffers will aid in maintaining inland goose and otter habitat. Forest Plan standards and guidelines to protect bald eagle nesting habitat will be implemented if active nest are located adjacent to proposed activities.

## Affected Environment for Brown Bear

### Existing Condition for Brown Bear

Brown bears are important both for hunting and to the recreation and tourism industry of Southeast Alaska. The islands of Southeast Alaska are home to one of the highest concentrations of brown bears in the world (ADFG 2000). Whitman (2003, pers. com) estimated that there are 1.7 bears per square mile on Chichagof Island. ADFG (2005, pp. 22-23) estimated that there were 1550 brown bears on Chichagof and adjacent islands and those populations were stable or slightly increasing.

Although brown bears use a diversity of habitats, from sea level to the alpine, brown bears on Chichagof Island, primarily use estuary and closed forested riparian habitats (Schoen and Beier 1990, p. 18; Flynn et al. 2007, pp.18-19). This forested habitat is associated with salmon spawning streams and provides security and resting habitat for brown bears (Titus et al. 1999, p. 152). The late-summer/fall season has been identified as the most critical or limiting period for brown bears because brown bears concentrate in riparian areas with spawning salmon. These are often the same areas of highest human use and most intense resource development activities (Schoen et al. 1992, p. I-4).

In compliance with Forest Plan (USDA Forest Service 1997b; USDA Forest Service 1998) direction, ADFG was consulted twice (Mooney 2007, pers. com; USDA Forest Service 2005a) and stream surveys were completed in potential bear foraging habitat (defined as the area within 500 feet of class I streams classified as moderate gradient/mixed control and flood plain process groups that support spawning salmon) to assess important brown bear foraging use in the project area. For this analysis, areas that displayed concentrated bear foraging use, as compared to other areas surveyed in the project area, were considered important. Brown bears and sign were frequently observed in the Iyouktug project area and concentrated bear foraging sign was observed along a portion of Suntaheen Creek southeast of Whitestone Harbor and NFS Road 85304. This area was included in the proposed OGR to maintain bear foraging

habitat. Bear foraging use was also observed along a portion of Iyouktug Creek south of NFS Road 8534. Six den sites, ranging from 700 to 1,200 feet in elevation, were also identified.

## Environmental Consequences for Brown Bear

### Direct and Indirect Effects on Brown Bear

Direct effects to brown bears can result from disturbances that adversely affect individuals or their young. Increases in human activity may result in displacement of bears and bear/human conflicts (USDA Forest Service 1997a).

Motorized access can increase the opportunity for human-induced mortality of bears through legal hunting, defense of life or property and illegal mortality (ADFG 2000, p. 20). Northeast Chichagof Island is closed to the use of any motorized land vehicle for brown bear hunting. Open roads, which receive the highest and most consistent use, are likely to have the greatest effect on brown bears, although closed roads still facilitate access (e.g., off-highway vehicle, pedestrian). Closed roads are generally densely overgrown with alder and are not accessible or used by any type of motorized vehcile.

Of the 76.20 miles of road on all lands in WAA 3551, approximately 51.78 miles are classified as open roads. Less than 1 mile of these roads is on private lands. Forest Road (NFS Road) 8530 leads to and from the community of Hoonah.

The distribution and movement pattern of brown bears can be indirectly affected by the reduction in POG forest that provides foraging habitat (e.g. skunk cabbage, berries). Effects also result from the reduction in the quality and quantity of riparian habitats, both in terms of the maintaining adequate vegetative cover to support anadromous fish production (i.e., regulate stream temperature) and providing visual obscurity of bears from humans and other bears.

#### Alternative 1 (No Action)

Alternative 1 would have negligible direct effect to brown bears because there would be no increase in open roads or in human activities and no change to habitat in the area.

#### Alternatives 2, 3, 4 and 5

Alternatives 2, 3, 4 and 5 would have moderate direct and indirect effects to brown bears because brown bears may be displaced from dens, increases in road access and human activities in the WAA may result in an increase in hunter and other mortalities, and POG forest outside of the riparian stream buffers will be reduced. Effects are considered moderate because populations are stable and sufficient habitat will remain functional to maintain the species.

Alternatives with the greatest amount of higher elevation harvest in POG forest would result in an increased likelihood for disturbance to brown bear dens and denning habitat. Therefore, Alternatives 2 would have more of an effect

followed by Alternatives 3, Alternative 4 and then Alternative 5. Alternatives 2, 3 and 4 would maintain denning habitat by implementing a 200-foot no harvest buffer around documented and newly identified den sites (Flynn 2007, pers. com.). Den sites do not occur in the units proposed for harvest in Alternative 5. All of the documented den sites occur in helicopter harvest units proposed for less than 40 percent single tree selection. Therefore cover adjacent to the den sites will be maintained.

All alternatives propose to increase the miles of open roads during project activities. Alternative 2 will have the greatest increase in miles of open roads during the project activities followed by Alternatives 4, 3, and 5 (Table 3MI-5). After project activities are completed, Alternative 2 will have the greatest increase in miles of open roads followed by Alternatives 5, 4 and 3 (Table 3MI-5). Alternative 3 would have the least impact because all newly constructed, reconstructed and temporary roads would be closed to vehicle access. Although increases in open roads may result in an increase in bear/human interactions and therefore the potential for bear mortalities, Chichagof Island supports high-density populations of brown bears despite already having experienced a high level of timber harvest with roads having been built in nearly every watershed, many of which are closely associated with major fish streams (ADFG 2000).

Table 3MI-5: Change in miles of open road from the existing condition (51.38 miles) on all lands in WAA 3551 during and after project completion and after completion of cumulative activities by alternative.

| Miles Open Road | Change in Miles of Open Road | | | |
|---|---|---|---|---|
| | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| **During Project**[1] | +24.1 | +12.6 | +15.8 | +8.2 |
| **Project Completion**[2] | +3.8 | 0 | +1.0 | +2.4 |
| **After Cumulative Activities**[3] | - 0.4 | -4.2 | -3.2 | -1.8 |

[1] Includes existing, temporary, newly constructed and reconstructed roads. Existing roads includes 0.4 mile of road leading to gravel pits that are considered non system but are currently open roads.
[2] Excludes decommissioned or closed temporary, newly constructed and reconstructed roads. Excludes temporary roads for current and other proposed projects.
[3] Reflects the implementation of the 2002 Access and Travel Management decision (USDA Forest Service 2002b).

All action alternatives propose to harvest within potential bear foraging areas. Alternative 2 proposes to harvest 122 acres within 500 feet of potential foraging streams, Alternative 4 proposes 79 acres, Alternative 3 proposes 76 acres and Alternative 5 proposes 65 acres. This excludes the minimum 100-foot buffer that the riparian management area standards and guidelines require along class one streams. Most of these areas occur at the end of streams or tributaries that do not contain concentrations or even a large number of salmon and therefore are not likely to receive concentrated forging use by brown bear. Alternatives 2, 4 and 5 propose to harvest 21 acres of habitat identified as containing a concentrated area of bear use outside the Iyouktug Creek riparian buffer in Unit 108 and south of NFS Road 8534. This portion of the unit was proposed for shovel harvest of individual tree selection of up to 50 percent of

the basal area. However, due to windthrow risk, it was changed to up to 25 percent harvest. Although harvest will be concentrated along the road, this harvest method will have a minor reduction in brown bear foraging cover adjacent to the riparian buffer along Iyouktug Creek.

The highest concentrations of bear foraging use were observed along Suntaheen Creek southeast of NFS Road 85304. This area was intentionally included in the proposed OGR for all action alternatives.

**Cumulative Effects on Brown Bear**

### Effects of All Alternatives

POG forest may be reduced and open road densities may increase slightly as a result of current small timber sale (approximately 107 acres), personal use wood harvest, associated temporary road construction, and as windthrow occurs.

Currently planned and proposed thinning of approximately 2,700 acres is designed to maintain understory vegetation and a more open overstory in second growth stands.

### Alternative 1 (No Action)

Alternative 1 would have negligible cumulative effects to brown bear because there would be minimal changes to habitat in the area. There would be a 1.3 mile reduction in existing open roads as a result of cumulative activities.

### Alternatives 2, 3, 4 and 5

Alternatives 2, 3, 4 and 5 would have moderate cumulative effect to brown bear because of the reduction in POG forest. Open road miles would decrease by 0.4 (Alternative 2) to 4.2 (Alternatives 3, 4 and 5) miles as a result of cumulative activities.

A rapid establishment of shrubs and herbaceous plants are expected after clearcut and shovel harvest reduce POG forest. This flush of vegetation will provide summer forage for brown bears. Once the stand reaches the stem exclusion stage, stands are not likely to provide foraging habitat.

## Affected Environment

**Cavity Dependent MIS**

Many MIS including brown creeper, Hairy woodpecker, red-breasted sapsucker (referred to as sapsucker) and red squirrels nest or den in tree cavities in Southeast Alaska. Several of these species depend exclusively on cavities in the large-diameter snags characteristic of old growth stands. Timber management activities tend to reduce dead and dying trees in older stands.

The brown creeper, Hairy woodpecker, and sapsucker rely on old growth forest habitat for nesting and foraging. The brown creeper is associated with high-volume stands that include large-diameter, old trees that provide abundant prey. The Hairy woodpecker and sapsucker are primary cavity excavators that use snags and partially dead trees for nesting and foraging. The availability of

suitable habitat for roosting and foraging is an important constraint on the habitat suitability for these species. Spruce trees and mature old growth forest have the highest values for red squirrel habitat because of the cone-producing qualities and cavities in trees and snags. Habitat for all of these species is best represented by snag and stand structure management that uses volume classes as an indicator of coarse canopy forest and stands associated with highly productive sites (e.g., alluvial fans).

These species would all be affected by the reduction in POG forest. Brown creeper and Hairy woodpecker would be most affected by harvest activities that reduce the number of large diameter trees and snags for nesting and large trees for foraging. All harvest methods, including helicopter harvest, would reduce the number of large trees (coarse canopy). Based on the removal of large trees and snags, clearcut harvest would result in the greatest overall habitat reduction coarse canopy and 25 percent helicopter harvest would have the least reduction. Single tree selection harvest (shovel and helicopter) may maintain open habitat preferred by sapsuckers.

## Environmental Consequences

### Direct and Indirect Effects on Cavity Dependent MIS

#### Alternative 1 (No Action)

Alternative 1 would have negligible direct, indirect or cumulative effect to brown creeper, Hairy woodpecker, sapsucker and red squirrel because there would be no change to POG or coarse canopy habitat in the project area.

#### Alternatives 2, 3, 4 and 5

Alternatives 2, 3, 4 and 5 would have moderate direct and indirect effects because brown creeper, Hairy woodpecker, sapsuckers and red squirrels may be displaced and nesting and foraging habitat would be reduced. Effects are considered moderate because sufficient habitat will remain functional to maintain the species.

Alternative 2 would have the greatest effect to these species because it has the most acres of clearcut harvest (Table 3MI-6) and harvests the most acres of POG and coarse canopy forest (refer to the Habitat Connectivity section). Although Alternative 3 includes more total harvest than Alternatives 4 and 5, it has fewer clearcut acres. Alternative 4 includes more harvest than Alternative 5 but they have similar acres of clearcut harvest. Alternative 5 would have the least effect of the action alternatives due to the least numbers of acres harvested. Although helicopter harvest will reduce the number of large trees and snags in the units, red squirrel habitat should remain suitable. Live standing trees and snags would be maintained in units where high value marten habitat occurs (high volume strata below 1,500 feet in elevation). Snag habitat does not appear to be a limiting factor in the project area and is maintained in OGR, non-development LUDs, and riparian, beach, and estuary buffers and by implementing marten standards and guidelines for snag retention.

Table 3MI-6: Acres of productive old growth (POG) harvest and percent of existing POG forest[1] by harvest system for each alternative.

| Harvest System | Alt 2 | | Alt 3 | | Alt 4 | | Alt 5 | |
|---|---|---|---|---|---|---|---|---|
| | Acres | % | Acres | % | Acres | % | Acres | % |
| **Clearcut** | 1,217 | 3.8 | 562 | 1.8 | 623 | 2.0 | 632 | 2.0 |
| **Shovel** | 284 | 0.9 | 183 | 0.6 | 231 | 0.7 | 208 | 0.7 |
| **40% Helicopter** | 1,610 | 5.1 | 1,555 | 4.9 | 769 | 2.4 | 0 | 0 |
| **25% Helicopter** | 850 | 2.7 | 850 | 2.7 | 856 | 2.7 | 0 | 0 |
| **Total** | **3,962** | **12.0** | **3,151** | **10.0** | **2,480** | **7.8** | **840** | **2.6** |

Source: JT Stangl 2007 GIS pog_for_alts_harvest_system.xls
[1]Percentage based on 31,768 total acres of productive old growth on all lands in WAA 3551.

### Cumulative Effects on Cavity Dependent MIS

#### Effects of All Alternatives

POG forest may be reduced slightly as a result of current small timber sale (approximately 107 acres), personal use wood harvest, and as windthrow occurs.

Currently planned and proposed thinning of approximately 2,700 acres is designed to maintain understory vegetation and a more open overstory in second growth stands.

#### Alternative 1 (No Action)

Alternative 1 would have negligible cumulative effects to cavity dependent species because there would be minimal changes to habitat in the area.

#### Alternatives 2, 3, 4 and 5

Alternatives 2, 3, 4 and 5 would have moderate cumulative effect to cavity dependent species because the reduction in POG forest.

## Affected Environment for Deer

### Existing Condition for Sitka Black-tailed Deer

The Sitka black-tailed deer is an important game and subsistence species in Southeast Alaska. Although deer will utilize a wide range of habitat from shoreline to alpine, deer are seasonally associated with old-growth forests. Research conducted in Southeast Alaska indicates that low elevation, high volume POG habitats are particularly important to deer, especially during severe winters (Schoen et al. 1985; Yeo and Peek 1992). These mature old-growth stands intercept snow, provide thermal cover, and support the largest biomass of herb and shrub forage for deer (Alaback 1982; Schoen et al. 1984). Following clearcut harvest, deer populations are impacted by the combination of increased snow accumulation that reduces forage availability and the conversion of winter habitat to second-growth stands. Closed-canopy young-growth (generally 25 to 30 years old) and older stands, if left untreated, provide little to no forage in any season due to the lack of light penetration to the forest floor.

Northeast Chichagof Island received record snowfall during the winter of 2006-2007 that resulted in a substantial winter-related deer mortality. Because Northeast Chichagof Island is a popular hunting area, ADFG was concerned that additional doe harvest would jeopardize the future productivity and recovery of this deer population (USDI 2007, p. 3). Therefore, on November 6, 2007, ADFG issued an emergency order to close the doe hunting season for Northeast Chichagof Island until June 30, 2008 unless superseded by a subsequent emergency order (ADFG 2007). The Federal season was subsequently closed for doe hunting on Northeast Chichagof Island starting November 27, 2007 (USDA Forest Service 2007b) and for all of Game Management Unit (GMU) 4 starting January 1, 2008 (USDA Forest Service 2007c).

### Habitat Capability

An interagency model (Suring et al. 1992) developed to evaluate potential winter habitat capability was updated during the 1997 Forest Plan revision. The most updated model was used to assess the effects of action alternatives compared to past, present, and future habitat suitability and capability of the WAA. The model calculates habitat suitability indices (HSIs) based on timber volume strata, aspect, elevation, and typical snowfall. HSI values range from 0.0 in areas that have no winter habitat value to 1.3 in optimal habitat. Low-elevation, high-volume old-growth stands with southern aspects and in low snowfall areas are assumed to provide the best quality deer winter habitat. Areas above 1500 feet in elevation are assumed to have no value as deer winter habitat. HSI values were used to calculate and compare habitat capability and to estimate changes in habitat capability that result from timber harvest. An HSI of 1.0 represents a habitat capability of 100 deer per square mile; this is the multiplier used to convert HSI values into habitat capability numbers. Habitat capability is the theoretical number of deer that particular habitat types can be expected to support. It does not reflect actual known deer numbers but is used only for comparing potential impacts of action alternatives. The model estimates habitat capability based on the condition of previously harvested stands and stands proposed for harvest (e.g., stand initiation or stem exclusion) compared to the habitat capability that existed prior to large-scale timber harvest. All past harvest prescriptions were counted as clearcut by the model.

The winter HSI model is most appropriate for analysis over large planning areas such as the entire Tongass National Forest or at the scale of a WAA or number of WAAs, where data are coarse, and has limitations when applied at the watershed or project planning level. This geographic level is large enough to allow the model to work as designed but small enough to recognize substantial changes to high value deer habitat because of the large area that deer utilize as their home range.

Based on the deer model outputs, the current estimated deer habitat capability for all lands in WAA 3551 is 83 percent of the 1984 condition (when large scale harvest was initiated). This is the same as depicted in the Forest Plan

(USDA Forest Service 1997b) for the habitat capability in 1995. Deer habitat capability has been reduced by 17 percent since 1984 as a result of timber harvest and road building that converted high value habitat into young growth stands.

### High Value and Prime Deer Winter Habitat

Deer winter habitat is further defined by high value and prime habitat. High value habitat is defined by grouping HSI values above zero into four categories (quartiles) of winter range quality (Table 3MI-7 and Figure 3-6); the highest quartile range (0.42 to 1.0 HSI) representing high value deer winter habitat.

Although the deer model aids in comparing the differences between alternatives, other predictors of habitat were also used in this analysis. Prime habitat is defined as HPOG (high volume strata) on south and west facing aspects below 800 feet in elevation. These are the most important stands for deer during periods of snow and decreases in this habitat have the greatest affect on the ability of deer to survive the winter. This, in turn, affects the number of deer available to hunters, especially after a severe winter.

There are 7,216 acres of high value deer winter habitat existing in WAA 3551. This is 69 percent of the habitat that assumed to be present in 1984 (10,515 acres, Table 3MI-7). High value habitat has been reduced as a result of timber harvest and road building that converted high value habitat into young growth stands.

Table 3MI-7: Habitat Suitability Index (HSI) for WAA 3551 based on habitat conditions in 1984.

| HSI Value Range | Acres in 1984 | Acres in 2007 | Percent Change |
|---|---|---|---|
| **0.01-0.12** | 7,254 | 8,904 | 23 |
| **0.13-0.22** | 10,706 | 12,319 | 15 |
| **0.23-0.41** | 12,686 | 12,723 | 2 |
| **0.42-1.00[1]** | 10,515 | 7,216 | -31 |

Source: JT Stangl 2007

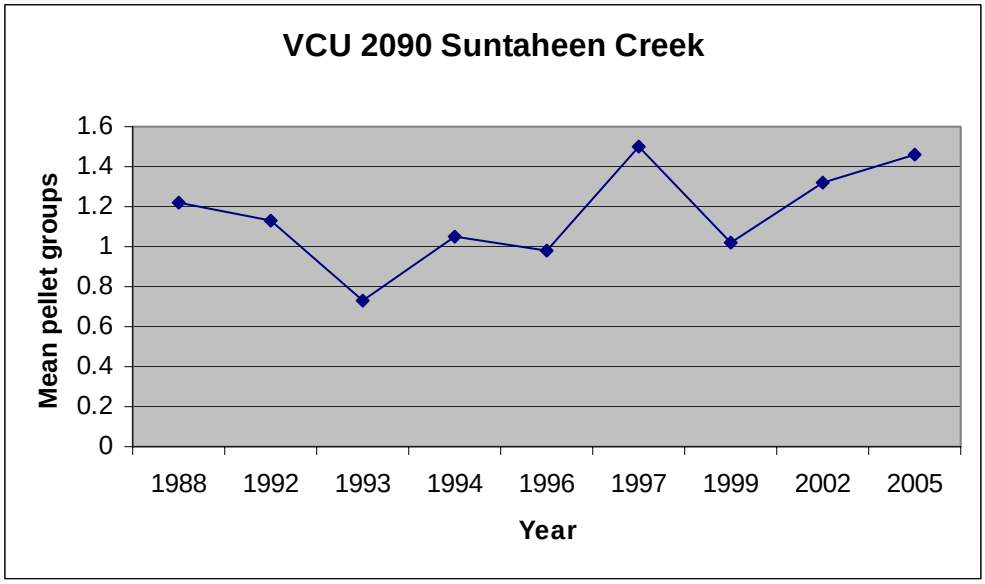
[1] Although the highest HSI value in the model is 1.3, the highest HSI value in WAA 3551 is 1.00.

There was an estimated 3,212 acres of prime deer winter habitat in the WAA previous to large-scale harvest (1984) (Table 3MI-8). Because the majority of past harvest occurred below 800 feet in elevation, 53 percent (1,703 acres) of this habitat remains in 2007.

Quick-Cruise plots were also completed to assess the quality of deer winter habitat. Of the 460 plots completed in the project area, the average plot score was 64 with 100 representing the highest quality winter habitat. Six of the highest score plots (80-99) were within the proposed OGR.

Results of deer pellet surveys suggest that deer numbers in WAA 3551 have remained at moderate to high levels with an average 1.46 pellet-groups per plot in VCU 2090 (Converse 2006, Appendix 1) (Chart 3MI-1).

Chart 3MI-1: Mean deer pellet group trend for VCU 2090. Data from Converse 2006.




### Deer Summer Habitat

Wildlife surveys were conducted to evaluate deer habitat and locate high use areas. Survey crews identified high use areas for deer based on observations of deer browse, trails, beds and scats.

## Environmental Consequences for Deer

All of the data described above were considered when assessing the effects of the alternatives to deer and deer habitat. In addition, research papers were consulted and incorporated, personal communications were held with ADFG and FWS personnel, ADFG data was studied and incorporated, and public comments and local knowledge were considered.

The model was run to assess the effects of action alternatives on the existing condition (2007) of deer habitat, the condition of deer habitat as it existed prior to large-scale harvest (1984), and 25 years after proposed harvest is expected to begin (2036). The year 2036 is used to represent the future condition to assess the effects of past and proposed harvest, where harvested stands have reached the stem exclusion stage, on deer habitat capability. No thresholds for effects have been defined in the Forest Plan or by the research.

Figure 3-6: Iyouktug Timber Sale Area Deer Habitat Suitability Index

Color 11x17 map

Back of Fig. 3-6

The model overestimates the reduction of habitat capability because it assumes that all proposed timber harvest is accomplished using traditional clearcut silvicultural systems. Clearcut harvest will have the greatest impact on POG forest, and therefore deer habitat, compared to shovel and helicopter harvest systems because the removal of more than half of the basal area can result in significantly different plant community structure compared to unharvested areas (Deal and Tappeiner 2002). Although a flush of vegetation provides summer forage for deer, it is not likely available during the winter due to snow accumulation. Overtime, as the rapid development of conifers reaches the stem exclusion stage, understory plant abundance will decline. Thinning of these stands will increase forage availability in the short term. Reference the Habitat Connectivity and Old Growth issue for further information.

Low-impact harvest prescriptions such as individual tree selection where only 25 percent of the basal area is removed by helicopter were not classified as harvested for this model analysis because this harvest method was assumed to maintain POG forest, a diversity of plant communities in the understory, and cover in the overstory (Deal 2007; Deal and Tappeiner 2002; Deal 2001). This level of harvest is not expected to change the volume strata estimate of the stand. It will also maintain a diverse and abundant plant understory comparable to plant communities typically found in old growth stands (Deal 2007; Deal and Tappeiner 2002; Deal 2001, p. 2074). Between the DEIS and FEIS, approximately 68 to 390 acres of proposed harvest (depending on the alternative) were changed from 40 or 50 percent partial harvest to 25 percent partial harvest. The following analysis did not apply these changes. Therefore, these analyses may overestimate effects.

The model was also run to assess the effects of cable and shovel harvest excluding the 40 percent single tree helicopter harvest. Although the removal of trees would create small gaps in the canopy, over 50 percent of the available habitat and existing tree composition and structural diversity will be maintained.

## Direct and Indirect Effects on Sitka Black-tailed Deer

### Alternative 1 (No Action)

Alternative 1 would have no direct and indirect effects to deer because there would be no change to habitat in the area. The habitat capability in 2007 is 83 percent of the assumed capability in 1984 (Table 3MI-12). This reduction in habitat is due to large-scale logging and road building that converted high value deer habitat into young growth stands. Past harvest units are still less that 26 years old (2-22 years old) and have likely not reached the stem exclusion stage.

### Alternatives 2, 3, 4 and 5

Alternatives 2, 3, 4 and 5 would have moderate direct and indirect effects to deer. Effects to deer would result from disturbances that adversely affect individuals or their young and a reduction in habitat capability, high value and prime winter habitat, high use summer habitat and connectivity (refer to the Habitat Connectivity and Old Growth section). Effects are considered

moderate because activities will likely result in a decline in the deer population but sufficient habitat will remain functional to maintain the species.

Action alternatives result in the reduction of deer habitat capability from 1.2 to 4.4 percent of the current capability depending on the alternative and harvest methods assessed (Table 3MI-8). When assessing cable, shovel and 40 percent helicopter harvest, Alternative 2 would have the greatest reduction and Alternative 5 would have the least reduction in habitat capability. However, if all helicopter harvest were excluded, Alternative 2 would have the greatest reduction and there is little difference (0.01-0.02) in habitat capability between the other Alternatives. Although not reflected in the habitat capability results, Alternative 3 was designed to clearcut fewer acres and to maintain more connectivity and low elevation habitat for deer.

Table 3MI-8: Percent reduction in deer habitat capability from the 2007 (existing) and 2036 (future) condition compared to the 1984 (pre harvest) condition for WAA 3551 by harvest system.

| Harvest System[1] | Year | Reduction in Habitat Capability | | | | |
|---|---|---|---|---|---|---|
| | | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| **Cable, Shovel & 40 percent Helicopter** | **2007** | 0 | 4.4 | 3.2 | 2.6 | 1.4 |
| | **1984[2] to 2007** | 17.0 | 20.3 | 19.3 | 18.8 | 17.8 |
| | **1984 to 2036** | 20.8 | 26.2 | 24.7 | 24.1 | 22.6 |
| **Cable & Shovel** | **2007** | 0 | 2.2 | 1.2 | 1.2 | 1.4 |
| | **1984 to 2007** | 17.0 | 18.5 | 17.7 | 17.7 | 17.8 |
| | **1984 to 2036** | 20.8 | 23.7 | 22.4 | 22.6 | 22.6 |

Source: Lutz 2007
[1] The model assumes that all harvest is clearcut.
[2] 1984 represents the year when large-scale timber harvest was initiated in the WAA.

High value deer winter habitat would be reduced from the current condition in all action alternatives (Table 3MI-9). With or without the 40 percent helicopter harvest, Alternative 2 would have the greatest reduction in high value deer winter habitat followed by Alternative 4, then Alternative 3 and finally Alternative 5.

Table 3MI-9: Percent reduction in high value deer habitat from the 2007 and 1984 (pre harvest) levels for WAA 3551 by harvest system.

| Harvest System[1] | Year | Reduction in High Value Habitat | | | | |
|---|---|---|---|---|---|---|
| | | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| **Cable, Shovel & 40 percent Helicopter** | **2007[2]** | 0 | 4.9 | 3.1 | 3.8 | 1.6 |
| | **1984[3] to 2007** | 31.0 | 34.8 | 33.5 | 34.0 | 32.5 |
| **Cable & Shovel** | **2007** | 0 | 2.2 | 0.4 | 1.9 | 1.6 |
| | **1984 to 2007** | 31.0 | 33.2 | 32.2 | 32.7 | 32.5 |

Source: Lutz 2007
[1] The model assumes that all harvest is clearcut.
[2] Based on 7216 acres.
[3] 1984 represents the year when large scale timber harvest was initiated in the WAA. Based on 10,515 acres.

Prime deer winter habitat would be reduced from the current condition in all alternatives (Table 3MI-10). When assessing cable, shovel and 40 percent helicopter, Alternative 2 would have a greatest reduction followed by Alternative 4, Alternative 3 and Alternative 5. However, if all helicopter harvest were excluded, there is very little difference between the alternatives.

Table 3MI-10: Percent reduction in prime deer habitat from the 2007 and 1984 (pre-harvest) levels for WAA 3551 by harvest system.

| Harvest System[1] | Year | Reduction in Prime Habitat | | | | |
|---|---|---|---|---|---|---|
| | | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| Cable, Shovel & 40 percent Helicopter | 2007[2] | 0 | 3.1 | 1.2 | 1.9 | 0.9 |
| | 1984[3] to 2007 | 47.0 | 48.6 | 47.6 | 48.0 | 47.5 |
| Cable & Shovel | 2007 | 0 | 1.5 | 0.8 | 0.7 | 0.9 |
| | 1984 to 2007 | 47.0 | 47.8 | 47.4 | 47.4 | 47.5 |

Source: Lutz 2007
[1] The model assumes that all harvest is clearcut.
[2] Based on 1703 acres.
[3] 1984 represents the year when large scale timber harvest was initiated in the WAA. Based on 3212 acres.

All of the action alternatives would reduce high use summer habitat identified during field surveys. Summer habitat was often associated with muskegs or alpine habitat in units that are proposed for single tree selection harvest. Because single tree selection harvest leaves more trees dispersed throughout the unit, summer habitat may be maintained in these units. Alternatives 2, 4 and 5 would have the greatest impact because clearcut harvest of Units 189 and 819 and shovel harvest of Unit 818 would reduce high use summer deer habitat and travel corridors.

## Cumulative Effects on Sitka Black-tailed Deer

### Effects of All Alternatives

Deer experienced substantial winter-related mortality as a result of the severe winter in 2006-2007. Although deer populations in Alaska are dynamic and fluctuate considerably with the severity of the winters, periodic severe winters may result in a major decline in a population. Future severity of winters is unpredictable. However, if future winters are mild, deer numbers are likely to rebound.

Low elevation POG forest would be reduced as a result of current small timber sales (approximately 107 acres) and personal wood use. Habitat capability will be reduced further as windthrow occur and past second growth stands, and proposed and future harvest units reach the stem exclusion stage. Currently planned and proposed thinning of approximately 2,700 acres is designed to maintain understory vegetation and a more open overstory in second growth stands. Second growth stands will continue to be scheduled for thinning as they reach the appropriate age.

### Alternative 1 (No Action)

Alternative 1 would have negligible cumulative effects to deer because there would be minimal changes to habitat in the area.

### Alternatives 2, 3, 4 and 5

Alternatives 2, 3, 4 and 5 would have moderate cumulative effect to deer. Although the Forest Plan conservation strategy maintains for the population viability of deer, the cumulative reduction of elevational connectivity (refer to the Habitat Connectivity and Old Growth section) in association with a cumulative reduction in deer habitat capability as a result of past, proposed and future harvest activities and the severe 2006-2007 winter will likely result in a further decline in the deer population.

## Affected Environment for Migratory Birds

### Migratory Birds

Neotropical migratory birds (referred to as migratory birds) are far ranging species that require a diversity of habitat for foraging, breeding, and wintering. Over 100 species of birds migrate from the lower forty-eight states, Central and South America, to nesting, breeding, and rearing grounds in Alaska. Most of the birds fly to the interior or northern Alaska and only pass through Southeast Alaska on their way to the breeding grounds. There are small numbers of migratory bird species, however, that breed in the project area.

The Migratory Bird Treaty Act of 1918 (amended in 1936 and 1972) prohibits the taking of migratory birds, unless authorized by the Secretary of Interior. The law provides the primary mechanism to regulate waterfowl hunting seasons and bag limits, but includes other species. Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) provides for the conservation of 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.

### Existing Conditions for Migratory Birds

Of the 40 migratory birds potentially found on the Tongass National Forest, 14 use hemlock/spruce/cedar forest as primary habitat for known or probable breeding. Another eight species use spruce/hemlock/cedar forest as secondary habitat (Tongass National Forest MBTA list). The other species use habitats that are not found the project area or that will not be affected by project activities. Most of the breeding species (11 of 14) are considered common or abundant.

# Environmental Consequences for Migratory Birds

Most of the migratory bird species will be affected by a reduction in POG habitat. As with other species, clearcut harvest would create the greatest impacts to habitat. Migratory birds would be most susceptible to impacts from harvest activities occurring in suitable nesting habitat during the nesting/fledging period; which generally begins in mid-April and ends about mid-July when young birds have fledged. The magnitude of the effects will vary depending on the amount of harvest proposed and the season in which disturbance would occur.

## Direct and Indirect Effects on Migratory Birds

### Alternative 1 (No Action)

Alternative 1 would have negligible direct, indirect or cumulative effect to migratory birds because there would be no change to habitat in the area.

### Alternatives 2, 3, 4 and 5

Alternatives 2, 3, 4 and 5 would have moderate direct and indirect effects because migratory birds may be displaced and nesting and foraging habitat would be reduced for some species. Effects are considered moderate because sufficient habitat will remain functional to maintain species.

Alternative 2 would have the greatest effect to migratory birds because it harvests the most acres of POG and coarse canopy forest (refer to the Connectivity section) and has the most acres of clearcut harvest (Tables 3MI-6 and 2-1, Chapter 2). Although Alternative 3 includes more total harvest than Alternatives 4 and 5, it has fewer clearcut acres. Alternative 4 includes more harvest than Alternative 5 but they have similar acres of clearcut harvest. Alternative 5 would have the least effect of the action alternatives due to the least numbers of acres harvested. Live standing trees and snags would be maintained in units where high value marten habitat occurs.

## Cumulative Effects on Migratory Birds

### Effects Common to All Alternatives

POG forest may be reduced slightly as a result of current small timber sales (approximately 107 acres), personal use wood harvest, and as windthrow occurs.

Currently planned and proposed thinning of approximately 2,700 acres is designed to maintain understory vegetation and a more open overstory in second growth stands.

**Alternative 1 (No Action)**

Alternative 1 would have negligible cumulative effects to migratory birds because there would be minimal changes to habitat in the area.

**Alternatives 2, 3, 4 and 5**

Alternatives 2, 3, 4 and 5 would have moderate cumulative effect to migratory birds because of an additional reduction in POG forest.

## Affected Environment for Endemic Mammals

Endemic mammals are those species that are restricted to a particular locality, or that may occur on only one or a very few islands. The Forest Plan removed all islands less than 1,000 acres in size from the timber base to specifically address restricted range endemic mammals that may occur on one or a few isolated island (USDA Forest Service 1997a). Removing these islands reduced risks to habitat loss or alteration from timber harvest. The extended beach fringe and riparian corridors were expected to provide functional habitat for species with relatively small home ranges.

To date, 21 endemic mammalian taxa have been identified in Southeast Alaska (Smith 2005). Mammal surveys on the Tongass have resulted in the documentation of new distributions, new species, and distinct populations that suggest a high level of endemism on the Tongass (Hanley et al. 2005).

### Existing Condition for Endemic Terrestrial Mammals

Numerous small mammal surveys have been conducted on Chichagof Island (Flynn et al. 2004, MacDonald and Cook 1999, Ben-David et al. 1997. Additional surveys were not conducted specifically for this project because the Forest Plan does not require them. Smith (2005) identified *Peromyscus keeni sitkensis* (Keen's mouse) as the only endemic mammal to occur on Chichagof Island. Therefore, the endemic small mammals analysis will focus on project effects on the Keen's mouse.

Keen's mouse is widely distributed throughout Southeast Alaska and has several subspecies. *Peromyscus keeni sitkensis* occurs on Chichagof, Baranof, Coronation, Duke, and Warren Islands (Cook et al. 2001). Flynn et al. (2004) caught Keen's mice on Chichagof Island and noted that they were significantly larger than those they caught in other areas of Southeast Alaska. Young-growth with open canopies, downed wood and other elements of coarse woody debris was correlated with higher mouse densities (Smith et al. 2005).

## Environmental Consequences for Endemic Mammals

### Direct and Indirect Effects on Endemic Terrestrial Mammals

Cable and shovel yarding activities and road building would be most likely to result in direct mortality of Keen's mice and affect nest sites and other habitat structures. Clearcuts would reduce habitat capability for about the first 10 years (Smith et al. 2005). Approximately 10 to 30 years after harvest, the habitat would be optimum until the canopy closed and dead wood and shrubs declined. Habitat value would then decline again unless stands were thinned. Single tree selection harvest prescriptions are assumed to cause little change to Keen's mouse habitat because the canopy cover and amount of down wood would remain similar to pre-harvest conditions.

### Alternative 1 (No Action)

Alternative 1 would have negligible direct and indirect effect to Keen's mice because there would be no change to habitat in the area.

### Alternatives 2, 3, 4 and 5

Alternatives 2, 3, 4 and 5 would have minor direct and indirect effects because Keen's mice may be displaced and nesting and foraging habitat will be reduced. Effects are considered minor because sufficient habitat will remain functional to maintain species.

Alternative 2 would have the greatest effect to these species because it has the most acres of clearcut harvest (Table 3MI-6) and miles of road construction. Even though there could be a long period during stem exclusion when habitat capability is reduced, these habitats will still sustain some mice. Alternatives 3 and 4 are intermediate with similar overall effects. Although Alternative 4 has fewer total harvested acres, is includes more clearcut and shovel acres, and more roads than Alternative 3. Alternative 5 would have the least effects of the action alternatives due to the fewest acres harvested and miles of roads built.

## Cumulative Effects on Terrestrial Endemic Mammals

### Effects Common to All Alternatives

POG forest may be reduced and open road densities may increase slightly as a result of current small timber sale (approximately 107 acres), personal use wood harvest, associated temporary road construction and as windthrow occurs.. Currently planned and proposed thinning of approximately 2,700 acres is designed to maintain understory vegetation and a more open overstory in second growth stands.

### Alternative 1 (No Action)

Alternative 1 would have negligible cumulative effects to terrestrial endemic mammals because there would be minimal changes to habitat in the area.

### Alternatives 2, 3, 4 and 5

Alternatives 2, 3, 4 and 5 would have moderate cumulative effect to migratory birds because of an additional reduction in POG forest.

# Recreation

Recreation and tourism account for 51% of the direct resource dependent employment to communities in Southeast Alaska (USDA Forest Service 2003). While much of the recreation income occurs in communities through retail sales, there is a growing interest and effort to have people "get into the woods" to experience more of the natural environment. The effort to accommodate use through our outfitters and guides is tempered by consideration of existing public uses from affected communities, subsistence, and other quality of life issues. The analysis of the effects of this timber sale will be accomplished by analyzing 1) the gains and losses of acreage in the Forest's inventoried recreation opportunities system due to disturbances or regeneration of old harvest and roaded areas, 2) through the effects of harvest action on other recreation agencies (State of Alaska) and businesses (Huna Totem Corporation) within or near the sale area, as well as 3) the effects to the Forest Service recreation program and facilities

## Affected Environment for Recreation Opportunity Spectrum (ROS)

### Existing Condition for ROS

The ROS system is used two separate ways in resource planning. First, through the Forest Plan's Goals, Objectives and Desired Conditions (Forest Plan 1997), the ROS classes define the recreation setting, or the opportunities for recreation use for the LUD. Second, the existing ROS inventory (1993) portrays what the recreation opportunities are available on the forest now.

The management objective for recreation in the Timber Production LUD is to provide a variety of recreation and tourism opportunities consistent with timber sustainability and harvesting. The Timber Production desired condition for the recreation resource is to provide opportunities from the Recreation Opportunity Spectrum (ROS) from Semi-Primitive to Roaded Modified

The Scenic Viewshed objective is to provide a spectrum of recreation and tourism opportunities consistent with the capabilities of this LUD. The ROS categories of Semi-Primitive to Roaded Modified are acceptable within this LUD.

In an Old-growth Habitat LUD, the standard and guidelines for ROS is to generally provide a Semi-Primitive Motorized experience. More developed ROS settings may be present due to authorized activities, existing use patterns and activities in adjacent LUDs (Forest Plan 1997).

As discussed in the first paragraph of this section, the existing ROS inventory (1983) portrays what recreation opportunities are available on the forest now. If the area shown in the ROS inventory is more developed than defined in the

Forest Plan direction then that portion of the LUD is currently inconsistent with the Forest Plan (1997).

The current opportunities in the existing Old-growth Habitat LUD do not meet the semi-primitive ROS on 2,432 acres in VCUs 2090 and 2010. Past harvest and roading that occurred prior to 1997 extended the Roaded Modified zone of influence into the Old-growth Habitat LUD. More developed ROS settings are allowed in Old-growth LUDs if they are caused by authorized activities adjacent to them, which is the case in both of these VCUs. As the second growth matures in these harvested areas, they will provide a semi-primitive recreation opportunity, changing the Old-growth Habitat zones of influences from roaded modified to semi-primitive areas.

All of the project area meets the Forest Plan ROS direction for recreation opportunities.

## Environmental Consequences on ROS

### Direct and Indirect Effects on ROS

#### Alternative 1

There would be no change in LUD or ROS in this alternative.

#### Alternatives 2, 3, 4, and 5

These alternatives will change the existing Scenic Viewshed (651acres) and Timber Production (38 acres) LUD acreage to the Old-growth Habitat LUD in VCU 2090 to maintain connectivity and habitat for fish and wildlife. With this change to the LUD an even larger portion of this LUD will not meet the definition for semi-primitive ROS because an existing Whitestone Harbor road will now be incorporated into the Old-growth Habitat LUD. The road will remain open for passenger car use and will continue to provide a roaded recreation experience (USDA Forest Service 2002b, Hoonah Ranger District Access and Travel Management Plan). Again, more developed ROS settings are allowed in Old-growth Habitat LUDs where an existing use pattern already occurs. This road has consistently been used for roaded recreation opportunities.

In VCU 2100, proposed harvest and roads caused the Roaded Modified zone of influence related to the Timber Production LUD to stretch further into the adjacent Old-growth Habitat LUD. More developed ROS settings are allowed in Old-growth LUDs if they are caused by authorized activities adjacent to them, which is the case in this VCU. As the second growth matures in the proposed harvested areas, they will provide a semi-primitive recreation opportunity, changing the Old-growth Habitat zones of influences from roaded modified to semi-primitive areas.

This table compares the change from a Semi-Primitive experience to a Roaded Modified experience caused by the increase in the Roaded Modified zones of influence in VCU 2090 and 2100.

Table 3RE-1: Changes in Recreation Experience (ROS) in acres in the Old-growth Habitat LUD

| ROS/LUD acres | Alt. 1[1] | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Semi-Primitive Non-Motorized** | 5,207 | 4,290 | 4,478 | 4,746 | 4,668 |
| **Semi-Primitive Motorized** | 1,712 | 1,715 | 1,715 | 1,715 | 1,715 |
| **Roaded Modified** | 2844 | 3,758 | 3,570 | 3,302 | 3,380 |
| **Total** | 9,763 | 9,763 | 9,763 | 9,763 | 9,763 |

Source: GIS

[1] Alternative 1 ROS numbers includes Timber Production (38 acres) and Scenic Viewshed (651 acres) ROS acreages that became part of the Old Growth Habitat in all other alternatives..

The direct and indirect effects on the Recreation Opportunity Spectrum Existing Inventory acreage in all action alternatives are a loss of acreage in the Semi-Primitive recreation opportunities (Table 3RE-2). This means that the ability of the Forest Service to provide a Semi-primitive recreation opportunity within the project area would decline. In all cases, this effect would be a long-term effect to the existing Semi-Primitive opportunity until regeneration of the harvest units allows normal forest hiking access through the unit. In the case of a clearcut unit and shovel (50% basal area removal), the amount of time to regain this Semi-Primitive experience would be an average of 40 to 50 years. In the helicopter units with 60% or 75% of the basal area remaining, it would average 15 to 20 years for conversion of the recreation opportunities from developed to undeveloped.

Table 3RE-2: Alternative Comparison of the Changes to the ROS Inventory

| ROS Inventory Acres | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Semi-Primitive Non-Motorized** | 0% | -7% | -6% | 0% | -1% |
| **Semi-Primitive Motorized** | 0% | -1% | 0% | -1% | -1% |
| **Roaded Modified** | 0% | +8% | +6% | +1% | +2% |
| **Private Land** | 0% | 0% | 0% | 0% | 0% |

Source: 2007 ROS GIS Database

In the immediate future, the proposed activities, though allowed by the Forest Plan, would not meet the Forest plan Desired Condition for ROS in the Old-growth Habitat LUDs. But as second growth matures in the adjacent LUDs, a semi-primitive recreation opportunity will become available. All other areas within the project area are consistent with the Forest Plan ROS and LUD direction.

### Cumulative Effects on ROS

A comparison of the harvested acreage that would take 40 to 50 years to revert to Semi-Primitive recreation opportunity (clearcut and shovel units) will be considered in this section. As second growth matures, harvested areas provide semi-primitive recreation opportunity through improved ease of accessibility of

the units. The main roads will remain open for passenger car use and will provide a Roaded Natural experience as timber matures (USDA Forest Service 2002, Hoonah Ranger District Access and Travel Management Plan). This effect on the recreation resource would be moderate because the effects would exist until the units and the roads within the proposed sale area provide more undeveloped recreation opportunities than does the designation Roaded Modified.

It takes less time for the helicopter units to recover (15 to 20 years) and they have less visual impacts (60 to 75% of the basal area remains), so no analysis will be discussed for helicopter units. Only half of the shovel unit acreage was included here, since about 50% of these units would be disturbed.

### Alternative 1 (No Action)

The sale area was heavily harvested in the late 1980s, which makes the existing units about 20 years old. Though these units have improved for accessibility, they are still difficult to traverse for recreation activities and when standing in them, the units look as if the area has been disturbed. With another 30 years of vegetation growth, these units will convert to a Semi-Primitive recreation experience. In VCU 2080, there is 212 acres that were disturbed, VCU 2090 a total of 1,508 acres and in VCU 2100, there is 1,266 acres for a total of 2,986 acres.

### Alternative 2 (Proposed Action)

This alternative would have the highest amount of harvest (1,411 acres) by shovel and clearcutting harvest methods. The recovery period for reverting areas from Roaded Modified to Semi-Primitive recreation opportunities and experiences would be the same in all alternatives, 40 to 50 years. When adding the past disturbance acreage with the proposed disturbance, there would be 3,411 disturbed acres in total within the project area. This alternative would have the greatest impact across the sale area because it has the largest acreage involved in disturbance.

### Alternative 3

This alternative would have the least amount of harvest (675 acres) by shovel and clearcutting harvest methods, so the recovery period for all alternatives would be 40 to 50 years. When adding the past disturbance acreage with the proposed disturbance, there would be 3,675 disturbed acres in total within the project area. This alternative would have the least impact across the sale area because it has the least amount of acreage involved.

### Alternatives 4 and 5

Alternatives 4 and 5 would have harvest of 767 acres and 765 acres, respectively. When adding the past disturbance acreage with the proposed disturbance, there would be about 3,767 disturbed acres in total within the project area. These alternatives would have the second highest impact across the sale area because they have the largest acreage involved in disturbance caused by shovel and clearcutting harvest methods.

# Affected Environment for Recreation Planning

### Existing Condition for Recreation Planning

On Forest Service land and within the sale area, Whitestone Harbor, as well as the Lower Suntaheen Creek Trail, can be accessed from secondary NFS Road 85304.

Lower Suntaheen Creek Trailhead is located two miles east of junction of 8530 and 85304. This trail is .5 miles in length and traverses through the forest and above the stream flowing into the Whitestone estuary.

Whitestone Harbor has an identified anchorage and allows boaters easy access to three large bodies of saltwater, Icy Straits, Lynn Canal and Chatham Strait. NFS Road 85304 ends at the scenic Whitestone Harbor and is a popular destination point for recreationists traveling the road system. This area receives constant use during the spring, summer and fall.

Whitestone Harbor was proposed for a Log Transfer Facility (LTF) during the 1986-1990 operating period of the Alaska Pulp Corporation Long Term Timber Sale Contract but was never completely constructed or used for harvesting timber. Vegetation was cleared from the area and filled with pit-run rock to support heavy equipment use and a log sort yard. The disturbed site has overgrown with Sitka alder, but still provides open space to park campers, motor homes and trailers for overnight use. NFS Road 85304 ends at this parking area and people are able to launch skiffs during high tides.

The Whitestone LTF site was never developed with the intent of providing opportunities for recreational use, but roaded access to saltwater 12 air miles from Hoonah, the scenic vistas, the ability to launch a skiff and the open space for day use and camping attracts considerable use. This area carries great promise for enhanced recreational use, including development of Forest Service rental cabins, a developed parking area, boat launch and restroom facilities. The Forest Service has plans to build a cabin at the Whitestone Harbor, 0.75 miles west of the boat ramp. Construction of an access trail and the cabin is slated for the summer of 2008 according to the Hoonah Recreation Master Plan (Nieland 2004).

Another small interpretive trail system, the Suntaheen Fish Pass Trail, is located 0.5 miles south of the junction of 8530 and 85304 on 8530. This trail is 0.25 miles long and features a number of stream enhancement techniques for fish habitat with interpretation signs.

At the far southeast corner of the sale area is False Bay, a semi-protected bay, which the people of Hoonah use for picnicking and viewing scenery (Chatham Strait). At this time, there is pullout for parking vehicles off the road, with two Forest Service picnic sites. Plans for the area include picnic shelters, accessible restroom facilities, and a short trail system.

Icy Strait Point Corporation has a bus tourism operation from the community of Hoonah to Spasski Creek trailhead, which is located on Huna Totem

Corporation lands (Cerveny 2007). They run an average of two buses a day, four days a week from May through September. The trail has been developed for wildlife viewing. This site is located 3.5 miles northwest of the project area.

## Environmental Consequences for Recreation Planning

### Direct and Indirect Effects on Recreation Planning

#### Alternative 1

Alternative 1 would have no effect on Recreation Planning. Alternative 1 would have no effect on other agencies.

#### Alternatives 2, 3, 4, and 5

The effects on the use of NFS Road 8530 will be the loss of Semi-Primitive recreation opportunities, visuals concerns, noise concerns, and a slowing of recreation traffic through the sale area caused by harvest operations close to road and logging truck traffic as well as helicopter yarding. These effects will be sporadic because of movement of the harvesting throughout the area but long term from the stand point that sale will be ongoing for 10 years. In all action alternatives, noise from the harvesting may disrupt recreation users' 'experience after leaving their vehicles to walk or boat within or near the sale area. The intensity of noise will be felt at different levels and durations depending on where the harvesting operation is happening and is an acceptable effect in Timber Production LUDs but not Old-growth Habitat LUDs.

Once recreation users exit on to Whitestone Harbor and Lower Suntaheen Creek Trail road (85304), which is located four miles into the sale area, there is just one visual effect along this travel way (see Visual Resource Report) but there are no proposed harvest units directly along this road in any of the action alternatives. Unit 911, a proposed clearcut unit in Alternative 2 and 4, will be visible for the first mile when driving to Whitestone and Lower Suntaheen but will not be noticeable driving back to Hoonah.

There will be no effects on existing recreation activities in Lower Suntaheen Creek Trail and Whitestone Harbor area because of this sale. A direct effect to the Whitestone area in all action alternatives is that the area is being proposed to change its governing LUD from Scenic Viewshed to Old-growth Habitat. This means that recreation opportunities in the area will be managed to provide a Semi-Primitive experience into the future instead of spectrum of recreation experiences from Roaded Modified to Semi-Primitive.

The effects this sale will have on the Suntaheen Fish Pass Trail and the False Bay area will be the same as on the NFS Road 8530 described in the first paragraph of this section.

Icy Strait Point Corporation bus tour operations will only be affected by this sale when sharing National Forest System (NFS) Road 8530 coming to and

from Hoonah and Spasski Creek trailhead with logging trucks carrying harvested wood to Long Island in Hoonah. It is not anticipated that the slowing of the tour bus traffic will affect the tour negatively; negative impact to economics are not expected.

### Cumulative Effects on Recreation Planning

#### Alternative 1

Because there are no direct or indirect effects, there are no cumulative effects on planning.

#### Alternatives 2, 3, 4, and 5

The long-term loss of Semi-Primitive recreation opportunities is discussed in Cumulative Effects section of the Recreation Opportunity Spectrum section. Visual cumulative effects are discussed in the Iyouktug Timber Sale Visual Resource Report.

Cumulative effects of disruptive noise (saws, heavy equipment, helicopters) to the recreation users is long term from the standpoint of 10 years but once the harvesting has been completed in all alternatives the area will regain its normal noise level which is mostly vehicle traffic on the road and small plane overflights between Hoonah and Juneau.

The cumulative effects on slow moving traffic will also only last until harvest has been completed (about 10 years) or until the harvesting is no longer taking place on the main road system. Suntaheen Fish Pass Trail and False Bay area are the same as on the main NFS Road 8530.

The only cumulative effect to the Whitestone Harbor and Lower Suntaheen Creek Trail road (85304) is that Unit 911 will regenerate within the next 50 years in Alternatives 2 and 4 and will no longer be seen when driving to Whitestone Harbor.

The only cumulative effect would be that timber harvest is expected to occur over a 10-year period and sharing the road between buses and logging trucks might become more difficult. If the tour operator expanded their business to include more buses or trips per week, it would create more traffic on NFS Road 8530.

## Affected Environment for Recreation Use and Tourism Trends

### Affected Environment for Recreation Use and Tourism Trends

Recreational users of the Iyouktug project area are primarily from the community of Hoonah and most of the recreation activities start from the main road system (8530) traversing this area. Even though the area is easily identifiable as having been harvested, the past harvest units' brushy texture reflects some of the natural landscapes that help to smooth the eyes transition between the disturbed (harvested) and undisturbed areas creating a feel of less development in the area.

Recreation activities include driving for pleasure (passenger vehicles, ATV, and motorbikes), big game hunting, viewing scenery and wildlife, dispersed camping, gathering forest products (berries), stream fishing, hiking and cross-country skiing. Saltwater activities include fishing, pleasure boating (power boats accessing from large saltwater channels, skiffs and kayaks), viewing scenery and wildlife, and beachcombing. The residents of Hoonah use the road system constantly during the spring and summer months and heavily during the fall subsistence deer-hunting season.

Tourism development has steadily increased in the community of Hoonah over the past five years, especially since re-furbishing and opening Icy Point Cannery. Recreation use of the area has continued to grow. This cannery site was originally opened for large cruise ship passengers to enjoy but has become inclusive of any recreation user that would like to tour the facility. Most people who visit the cannery do not venture into the project area (Cerveny 2007). The existing tours (2006-2007) do not focus on the project area but use the road system through the project area to access False Bay (east of the project area) and Wukuklook drainage (southeast of the project area) for viewing scenery and hiking. In 2006, permittees reported 50 clients. Historically, there have been an average of two guides permitted into this area since 2004 (consistently, one of the guide companies has changed each year), one guide reported 13 clients in 2004, and two guides reported 55 clients in 2005. Historically there has not been a strong trend of increased use of the project area by clients. There were four outfitting and guide recreation permittees allowed within this area in 2007. No client numbers are available for 2007 at this time.

## Environmental Consequences for Recreation Uses and Trends

### Direct and Indirect Effects on Recreation Use and Tourism Trends

#### Alternative 1

Alternative 1 would have no effect on current recreation uses.

#### Alternatives 2, 3, 4, and 5

The environmental consequences of this proposed timber harvest on the recreation use in the area are moderate because the existing use has developed around the old timber harvest and roading that was completed in the 1980s (Cerveny 2007). Alternative 2 would have the most impact on the existing recreation use because it has the highest timber volume to be harvested and will take the longest amount of time to recover its existing recreation use. Alternative 3 has the next highest proposed volume, then Alternative 4 and 5. As the amount of timber volume declines in the alternatives, the ability of the area to recover its existing recreation use increases at a faster rate because the harvesting will be completed in less time than the higher volume alternatives.

Use of many existing recreation activities (driving for pleasure (passenger vehicles, ATV, and motorbikes)) will be disrupted throughout the project area

during the harvesting (approximately 10 years). Big game hunting will be disrupted during harvesting (noise, traffic) and the harvest units will not be available for this activity immediately after the sale because of slash (average of five years to deteriorate) or in the long term once the second growth shades out the forbs (approximately 20 years). There will be a 10-year period where this activity will be viable between the deterioration of the slash and the second growth taking over the harvest units.

Viewing scenery would be disrupted during and after the harvesting until the harvested areas have greened up, approximately three years. Wildlife viewing would be disrupted by the noise during the harvesting but would resume once the operations had been completed (10 years). This noise would also disrupt dispersed camping, which mostly takes place at Whitestone Harbor. This activity would also recover with the completion of the harvesting.

Gathering forest products (berries) would be disrupted during the harvest operations especially if an area that is traditionally used is being harvested. Once the sale has been completed, this recreation activity would once again be available if it is not within a harvest unit. If the forest product were within a harvest unit, the recovery of this recreation activity would be three to five years depending on its regeneration properties. The lack of stream fishing would depend on the location of the stream to a harvest unit. This effect would be short term from the standpoint that the activity would be available to the user once the unit has been harvested.

Hiking and cross-country skiing would not be available to the user in the short term if the user were close to the harvesting operation. This effect would be considered short term because once the harvesting was completed, the area would be useable again. If the area that the hiker wants to access is within a harvest unit then the effect would continue after the sale had been completed and the unit re-vegetated to allow access into it or through it (20 years).

The effects of this sale could be detrimental to development of Hoonah tourism because some tourists are not interested in seeing forests that are harvested or have been harvested commercial (Cerveny 2007). Effects from harvest operations would only last for 10 years, where the visual effects on an area that has been harvested can be noticeable for 20 to 30 years. Again, the more volume that is removed, the longer the visual effect could last. Alternative 2 would have the most impact, then 3, 4, and 5 would follow.

There are four outfitting and guide recreation permits allowed within this area. The trend shows this type of use is growing on the Hoonah Ranger District. There could be effects on these guides economically because of the disturbance of the natural forest during harvesting and the period of recovery for harvested units after (Cerveny 2007). Alternative 2 would have the highest impacts because it has the highest amount of volume being removed, followed by Alternatives 3, 4 and 5.

## Cumulative Effects on Recreation Use and Tourism Trends

### Alternative 1

Because there are no direct or indirect effects of Alternative 1, there are no cumulative effects to recreation uses.

### Alternatives 2, 3, 4, and 5

The cumulative effects of this timber sale on the recreation use and tourism trends are the cumulative visual impacts of the 1980-harvested sale, past and ongoing small timber sales and this proposed sale. Alternative 2 would have the highest impacts over time, duration and intensity because it has the highest volume proposed to harvest, followed by Alternatives 3, 4 and 5. This would likely be detrimental to the tourism trends in the area (Cerveny 2007).

Many existing recreation activities would slowly develop again in the harvested units with regeneration of the vegetation and the ability to easily hike through it (helicopter 15 to 20 years, clearcut and shovel 40-50 years). This cumulative effect would be considered a positive aspect of the sale's regeneration of the units.

The cumulative effects on the outfitting and guide business would probably be detrimental because many people may not want to pay to tour through old or new timber harvest areas.

# Scenery

## Affected Environment for Scenery

Southeast Alaska scenery generally includes mountains, glaciers, water, sky, weather, trees, animals, boats, people, and development. The Iyouktug project area lies in the southern portion of the Admiralty-Chichagof Visual Character Type (USDA Forest Service Alaska Region 1979). Past and present glaciation has created complex alpine landforms including craggy peaks and ridges, prominent escarpments, and large exposures of rock. Western hemlock-Sitka spruce forest is distributed across the project area below alpine, with muskeg complexes in areas of flat terrain.

### Visual Priority Travel Routes and Use Areas

The Forest Plan has adopted specific locations from which scenery is viewed reflecting high visitor use and a greater public concern for scenic quality. Visual Priority Travel Routes and Use Areas are used to assess scenic condition and the locations from which scenic value is to be emphasized. Locations visible from Visual Priority Travel Routes and Use Areas are described in scenery resource terms as the "seen area."

There are a number of Visual Priority Travel Routes and Use Areas related to the Iyouktug Study Area: the Alaska Marine Highway and Tours Ship Route - Hoonah to Tenakee via Icy Strait and Chatham Strait; Public Use Road - Hoonah to Whitestone Harbor and Iyoukeen Cove (Road 8502 and 8530-4); Saltwater Use Area - False Bay (Chatham Strait), Dispersed Recreation Areas – Whitestone Harbor and Suntaheen Fish Viewing Area.

The Forest Plan requires that timber harvest visible from Visual Priority Routes and Use Areas will be designed and implemented to meet the adopted Forest Plan Visual Quality Objectives (VQOs).

**Adopted Visual Quality Objectives (VQOs)**
Adopted Visual Quality Objectives are established in the Forest Plan and establish the minimum objectives that all activities must meet:

**Retention:** Changes in the landscape are not visually evident to the average forest visitor.

**Partial Retention:** Changes in the landscape may be evident to the casual observer but appear as natural occurrences when contrasted with the appearance of the surrounding landscape.

**Modification:** Changes in the landscape appear very evident but incorporate natural patterns of form, line, color, and texture when contrasted with the appearance of the surrounding landscape.

**Maximum Modification:** Changes in the landscape appear highly evident and may visually dominate the surrounding landscape, yet when viewed in the background distance these activities appear as natural occurrences.

The Seen Area or what is visible of the Iyouktug project landscape from Visual Priority Travel Route and Use Areas is classified into three distance zone categories: foreground, middleground, and background. Table 3SC-1 displays the VQOs associated with Forest Plan Land Use Designations (LUDs) for the distance zone categories. Table 3SC-2 displays the VQOs for the Iyouktug project area.

Table 3SC-1: Adopted Visual Quality Objectives by Land Use Designation in the Three Distance Zones

| LUD | Foreground | Middleground | Background |
|---|---|---|---|
| **Old-growth** | Retention | Retention | Retention |
| **Scenic Viewshed** | Retention | Partial Retention | Partial Retention |
| **Timber Production** | Modification | Maximum Modification | Maximum Modification |

Table 3SC-2: Existing Project Area Acres by Adopted Visual Quality Objective

| VQO | VQO Acres* |
|---|---|
| **Retention** | 10,531 |
| **Partial Retention** | 914 |
| **Modification** | 12,227 |
| **Maximum Modification** | 16,714 |

* Totals do not include non-National Forest land

# Environmental Consequences on Scenery

### Direct and Indirect Effects on Scenery

Several factors contribute to the degree of visual impact created by the proposed activities. These factors include: (1) the harvest prescription (clearcut or a partial harvest of various intensities) (2) the distance from which the development is observed, (3) the vegetative composition and complexity of the surrounding landscape, and (4) in the case of clearcuts, the shape and position of the harvest.

Where large blocks of timber are proposed to be harvested by helicopter, the alternatives call for a low intensity harvest prescription of up to 25% harvest of basal area in more visible areas, and up to 40% harvest in less visible area. This approach would ensure compliance with Scenery Forest Plan Standards and Guidelines.

Each of the action alternatives would result in some degree of change in the appearance of the landscape. The majority of the proposed harvest units in all alternatives would be screened from view by micro-topography and by foreground vegetation. Those units with a partial harvest prescription would

have little or no visual impact as a result of the screening provided by the remaining trees.

Impacts to scenery would remain relatively constant or decrease over time as areas of past harvest reach a more mature appearance and as new stands are harvested.

All proposed timber harvest units and other activities proposed in the alternatives would fall within the parameters of the adopted VQOs of Modification and Maximum Modification.

### Alternative 1

This alternative would create no new visual disturbance. Previously harvested acres in the project area would continue to mature and develop toward a natural-appearing landscape.

### Effects Common to Alternatives 2, 3, 4, and 5

Rock for the construction of roads would be taken from existing rockpits that are located in areas that either cannot be seen or would have very minor visibility when they are redeveloped. For this reason, the rock pits will meet the required VQO.

All roads are expected to meet required VQO without visual mitigation because of their aspect, screening from vegetation or low profile of slopes on which they are located, except Road 85344 located in Unit 124 in Alternative 2. Mitigation measures would be implemented during the design and construction of this road to ensure it meets the VQO.

### Alternative 2

All harvest units proposed in this alternative would meet the VQOs prescribed in the Forest Plan.

Harvest Units 817 and 819 would be designed to remove the timber which currently creates a “scalped” appearance for the existing clearcut below, when viewed from Whitestone Harbor (see unit cards in Appendix B of the DEIS). This will improve the view as seen from the Visual Priority Route at Whitestone Harbor from Maximum Modification to Modification.

The clearcut units would either be screened from sight by vegetation or topographic features, or would be of sufficiently small size or distance from the Visual Priority Route to meet the required VQO of Modification in the foreground or Maximum Modification in the background.

The partial harvest units (helicopter and shovel yarded) would meet the adopted VQOs due to the low intensity of harvest. The design for the shovel unit yarding corridors visible from Visual Priority Routes would be reviewed during unit layout to minimize the impact to the extent practicable. See Unit Cards in Appendix B of the DEIS.

### Alternative 3

All harvest units proposed in this alternative would meet the VQOs prescribed in the Forest Plan.

The clearcut units would either be screened from sight by vegetation or topographic features, or would be of sufficiently small size or distance from the Visual Priority Routes to meet the required VQO of Modification in the foreground or Maximum Modification in the background.

The partial harvest units (helicopter and shovel yarded) would meet the adopted VQO due to the low intensity of harvest. The design for the shovel unit yarding corridors visible from Visual Priority Routes would be reviewed during unit layout to minimize the impact to the extent practicable (Appendix B of the DEIS).

### Alternatives 4 and 5

The visual effects of Alternatives 4 and 5 would be the same as Alternative 2, without the negligible effects of helicopter units in Alternative 5. See Alternative 2 description.

## Cumulative Effects on Scenery

Cumulative effects consider the overall scenic effects expected as a result of past, present, and foreseeable future development in the project area. These effects include; timber harvest, roads, rock pits, associated construction activities, and existing effects of adjacent Non-National Forest System lands. Cumulative effects continually change over time to a greater or lesser extent, and in general will ultimately present the appearance of the desired future condition outlined in the Forest Plan. For the Timber Production Land Use Designation, this would likely lead to a visual condition where management activities appear highly evident and become a dominant feature in the landscape.

The visual effects of timber harvest are greatest immediately following harvest. Within five years, vegetation would begin to grow, transitioning a change in color from brown to light green. Green tree retention retained in the harvested areas would reduce the overall contrast of new growth with the surrounding forest. From five to twenty years after harvest, young trees become established, reaching a height of approximately 15 feet and further reducing the color contrast with adjacent forested areas; the existing harvested units in the Iyouktug project area are 15 to 20 years old. After about 50 years, the emerging forest would achieve a height of approximately 50 feet. Color contrast at this point approaches that of a mature forest and only textural differences are apparent. Edge lines forming the boundary of harvested areas also become less apparent. At about 80 years after harvest, stand vegetation achieves 75 percent of mature height. At about 100 years after harvest, the

stand would reach approximately 100 feet in height, and appearance of the past harvest would no longer be evident.

Assuming implementation of the Forest Plan through the entire rotation, all timber designated as suitable for timber production within the Iyouktug Project Area would be harvested within the next 100 years. During this period, the forest would be in a continuous state of transition toward meeting the desired future condition of the Timber Production Land Use Designation. The landscape would be characterized by regenerating harvested areas of mixed age classes from young stands to trees of maturing height, typically in 40-acre to 100-acre groups. The activities associated with timber harvest will present a highly modified landscape, which meets the direction in the Forest Plan.

# Silviculture and Vegetation

The following discussion and analysis of forest vegetation and silviculture is based on a variety of sources including existing information and data gathered during field visits including stand exams in 2002 and 2006. Additional background on forest land classification, silvicultural and logging systems, and other related topics may be found in the Forest Plan Final EIS, Chapter 3: "Timber" and in Appendix G. Applicable direction is contained in the Forest Plan, Chapter 2, Chapter 3 (Timber Production Land Use Designation), Chapter 4 (Forest-wide Standards and Guidelines), and Appendix A.

The effects analysis area used is the Iyouktug project area encompassing VCUs 2080, 2090, and 2100.

## Affected Environment for Forest Vegetation

### Forest Vegetation

The natural vegetation of the Iyouktug project area is a mosaic of coniferous forest intermixed with alpine, muskeg, riparian, and shrubland plant communities. Hemlock and Sitka spruce forests occur on well-drained sites in this area. Mixed conifer forest types occupy areas with restricted drainage. Open shrubby bogs and fens occur on the wettest sites. Transition zones exist between well-drained western hemlock/Sitka spruce sites and restricted drainage mixed conifer sites. These zones are commonly occupied with a mix of western hemlock and Alaska yellow-cedar. The current forest structure and developmental patterns in the area have been influenced by ancient volcanic activity, glaciation, and exposure to storm winds. Elevation of the project area varies from nearly sea-level to approximately 2,400 feet with higher elevation areas (over 1,500 feet) experiencing a shorter growing season and slower growth rates than lower areas.

#### Species Composition

Knowledge of species distribution including yellow-cedar across the project area is based on extensive project level stand exam inventory within the unit pool (1027 plots – 1 plot per 7.2 acres) and broader level permanent Forest Inventory and Analysis (FIA) plots conducted on a Tongass wide basis from 1990-2000 and re-measured on a 10-year cycle. The species composition of the forest in the Iyouktug project area unit pool is displayed in Table 3SV-1. These numbers are derived from unit pool stand exam data collected and displayed as a percentage of total board foot volume.

Table 3SV-1: Species Composition in the Iyouktug Project Area Unit Pool

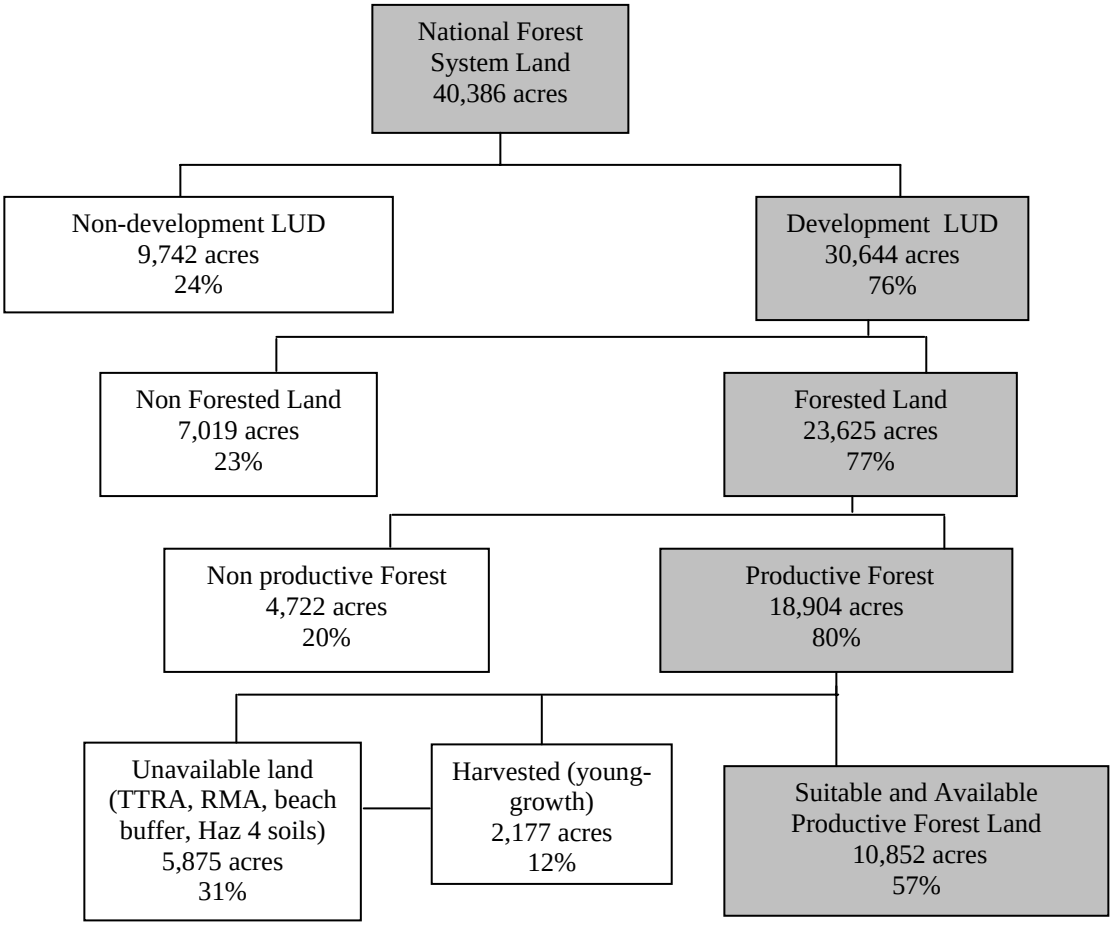
| Species | Percent Board Foot Volume |
|---|---|
| Western Hemlock | 41.0% |
| Sitka Spruce | 35.5% |
| Mountain Hemlock | 20.1% |
| Yellow-cedar | 3.4% |

In the Iyouktug project area, yellow-cedar occurs as a minor species, and is seldom found in pure stands. It is generally a slow-growing long-lived species that has difficulty competing with spruce and hemlock on more productive sites. As a result, cedar occurs more frequently on poorer sites. Under the right conditions though, yellow-cedar is capable of relatively fast growth. Alternately, on very poor sites (non-productive forest land) it can be very slow growing. Approximately 70 out of the 233 (30 percent) units sampled through stand exam inventory within the Iyouktug project area contain a cedar component.

### Forest Land Classification

National Forest System lands are defined 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 forest vegetation, land that is capable of commercial timber production and suitable/available for timber management. The process, using geographic information for land classification, is listed in Appendix A of the Forest Plan. This methodology defines the process and the order of successive classes of suitable and non-suitable lands for timber management. This is illustrated in Chart 3SV-1 for National Forest System land classifications in the Iyouktug Timber Sales project area. Refer to Chapter 4 for land classification definitions.

Chart 3SV-1: Current National Forest System Land Classification in the Iyouktug Project Area




### Volume Classification

National Forest land was classified using volume class mapping that is based on interpretation of aerial photos. The Forest Plan (Forest Plan FEIS Part I, p. 3-253 to 254) replaced volume class with volume strata (see below) for the classification of forest land. Timber volume estimates for this project are based on stand exams and are classified by volume strata

### Volume Strata

The volume strata classification system adopted by the Forest Plan incorporates volume class, soils and slope information. Table 3SV-5 displays the suitable and available acres of each volume strata for Iyouktug Timber Sale project area. Refer to Chapter 4 for volume strata definitions.

### Past Harvest

Timber harvest has occurred in VCUs 2080, 2090, and 2100 and on private corporation lands to the west. Past timber management activities in the

Iyouktug area are described in more detail in the Timber section of this chapter and Appendix D of this FEIS.

### Intermediate Treatments - Thinning

No thinning has been done in the project area. Timber harvest under the Alaska Pulp Corporation long-term sale occurred during the years 1987 to 1991. A first survey for precommercial thinning needs was conducted in 2005 from the ground and the air. About 700 acres of precommercial thinning is currently scheduled to be completed in the next three to five years. The remaining precommercial thinning will likely be desirable in five to ten years. Periodic resurvey is scheduled.

## Forest Health and Natural Disturbance

### Wind Disturbance

Wind is the predominant disturbance factor affecting stand structure and development in Southeast Alaska. Winds of force sufficient to cause considerable blowdown can occur in Southeast Alaska during any month, but the strongest winds are most likely to come during the fall and winter months (Harris 1989).

Wind influences forest stand development based on its frequency and intensity. Smaller scale wind disturbance where individual trees and/or small groups of trees are affected results in a development of stand characteristics associated with "old-growth" stands and is referred to as "gap-phase" development. This is the dominant form of wind disturbance in Southeast Alaska. However, it is believed that there is less naturally occurring old-growth forest regulated by gap-phase succession than previously thought and that catastrophic windthrow is an important process driving forest development in southeast Alaska (Kramer et al. 2001). In certain areas with pronounced exposure to storm winds, it is evident that larger scale stand replacing blowdown dominates (Nowacki et al. 1998).

Investigation and mapping of wind disturbance patterns was conducted for northeast Chichagof Island in 1993 and 1994 (Ott et al. 1999). This assessment identified the north side of Iyouktug Creek valley, located in the southeast portion of the Iyouktug project area, as a high wind risk area where large-scale stand replacing wind disturbance is prevalent (Ott et al. 1999). Forest stands in the project area outside of the high wind risk area mapped on the north side of Iyouktug valley, are also, in most cases, considered vulnerable.

### Yellow-Cedar Decline

Yellow-cedar mortality has been extensively mapped in Southeast Alaska. By dating the death of the dead trees researchers have determined that the decline began sometime in the late 19$^{th}$ century and has continued for over a hundred years (PNW Research Station, 2007). Researchers currently believe this mortality is the result of a combination of factors centered around freezing injury to roots resulting from low snow pack and poor soil drainage. Snow pack during March and April when freezing injury is likely to occur could

delay the onset of spring growth and also provide insulating protection to shallow fine roots.

Cedar decline is presently not documented in the Iyouktug project area (Hennon 2006). This is likely due to favorable growing conditions for cedar, which include a combination of higher elevation and greater spring snowpack.

### Dwarf Mistletoe and Decay Fungi

Hemlock dwarf mistletoe is present in nearly all proposed harvest units in the Iyouktug project area. Decay caused by heart-rotting and root-rotting fungi is probably the greatest single cause of disease-related timber volume loss in Alaska (Laurent 1974), and is prevalent in the Iyouktug project area.

## Environmental Consequences on Forest Vegetation

### Effects on Forest Vegetation

The effects of timber harvest on forest vegetation vary by silvicultural prescription and the number of acres harvested. The following provides a discussion of effects related to the various components forest vegetation including stand structure and species composition.

### Silvicultural Prescriptions

Even-aged and uneven-aged silvicultural prescriptions were developed for the Iyouktug project area by a certified silviculturist to meet the objectives identified by the interdisciplinary planning team using the criteria below.

- Operational feasibility (possible logging systems)
- Timber Economics
- Windthrow hazard (the presence of tree and stand attributes determining windthrow potential)
- Stand conditions (diseases and decay fungi)
- Regeneration potential
- Slope stability and retaining live root mass
- Scenery requirements

Table 3SV-2 below displays the silvicultural system and yarding method by alternative.

Table 3SV-2: Silvicultural System and Harvest Method Acres by Alternative and Yarding System

| Silvicultural System | Harvest Method | Yarding System | Alternative | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |
| **Even-aged Management** | **Clearcut** | **Cable** | 0 | 1,253 | 574 | 636 | 646 |
| | **Total** | | **0** | **1,253** | **574** | **636** | **646** |
| **Uneven-aged Management** | **Single tree selection up to 25%** | **Helicopter** | 0 | 1,225 | 1,225 | 1,059 | 0 |
| | **Single tree selection 25-40%** | **Helicopter** | 0 | 1,392 | 1,331 | 627 | 0 |
| | **Single tree selection up to 50%** | **Shovel** | 0 | 247 | 169 | 194 | 169 |
| | **Single tree selection up to 25%** | **Shovel** | 0 | 68 | 33 | 68 | 68 |
| | **Total** | | **0** | **2,931** | **2,758** | **1,947** | **234** |
| **Total** | | | **0** | **4,185** | **3,332** | **2,584** | **883** |

### Clearcut – Cable Yarding

This prescription would create even-aged stands by clearcut harvest using cable yarding as the specified harvest method. However, there are specific portions of Units 101, 114, 121, 122, 123, and 9061 that are suitable for optional shovel yarding. These areas are identified on the unit cards.

Reasonable Assurance of Windfirmness (RAW) zones would be applied to unit edges or stream buffers that are determined to be at the highest risk for wind damage after harvest. These would tend to be the edges of harvest units or stream buffers that have high exposure to southeast storm winds but may vary depending on the topography and location of the unit.

Reserve trees within even-aged management units to meet marten standard and guidelines will be clumped within RAW zones and/or adjacent to stream buffers when possible. If RAW stream buffers are not present, clumps will be located in proximity to other adjacent old growth trees near unit boundaries to provide for operational feasibility of the harvest system. These areas will be designated during unit layout.

Dispersed reserve trees will be retained inside even-aged management harvest units only where RAW zones need to be applied. When reserve trees of sufficient size and/or number to meet marten standard and guidelines cannot be clumped, reserve trees may be dispersed within RAW zones.

Natural regeneration is expected to be abundant and include the same species mix as the original stand. The approximate age at which timber stands would

be available for rotational harvest is 110 years in the high volume strata areas; 120 years in the medium strata areas; and 150 years in the low volume strata areas .

Additional silvicultural treatments that follow harvests may include tree planting and thinning to influence species composition, thinning to increase tree growth and improve wildlife habitat, and pruning to increase wood quality and improve wildlife habitat.

### Justification for Clearcutting

Even-aged clearcutting is being prescribed in the Iyouktug project area to preclude or minimize the occurrence of potentially adverse impacts from hemlock dwarf mistletoe or other insect or disease infestations, logging damage and windthrow. This project implements even-aged management in order to minimize the potential for windthrow in the residual stand while maximizing the use of cable yarding systems needed for maintaining the potential for an economic timber sale offering. Cable yarding generally has fewer impacts to soils than shovel yarding and is more economic than helicopter yarding.

### Single Tree Selection – Shovel and Helicopter Yarding

This prescription would maintain or create uneven-aged stands with multiple age (size) classes of trees while maintaining existing species composition.

In helicopter yarding areas up to 25 percent or up to 40 percent of the total standing green tree basal area would be designated for harvest. In shovel yarding areas, up to 50 percent of the total standing green tree basal area would be designated for harvest, except in two units (Units 108 and 111) where up to 25 percent of the total standing green tree basal area would be designated for harvest (to reduce windthrow risk in these two stands).

Trees designated for harvest will be marked singly and in small clumps or corridors to promote regeneration and accommodate shovel and helicopter yarding (cut-tree mark). Clumps will range from several trees up to an acre in size with occasional clumps as large as 2 acres. Emphasis for harvest will be placed on selecting Sitka spruce 24 inches DBH or greater and Alaska yellow-cedar of all sizes. Harvest of other species and diameter classes will be refined during layout based on market conditions at the time.

Trees to be retained will represent all species and most of the diameter classes currently in the stand; especially large diameter (30” +DBH) high defect trees that meet safety guidelines and nine to sixteen inch DBH spruce and yellow-cedar with high vigor and good seed producing potential. The residual stand and smaller advanced regeneration two to nine inches in diameter (spruce/yellow-cedar especially) will be protected to the extent possible.

Retention of 60 percent or more of the total stand basal area will meet marten standards and guidelines in areas of high value marten habitat. Trees of sufficient size and condition will be dispersed throughout the stand.

There are areas within each alternative with moderate-high to high wind risk. To offset the wind risk in these areas, the basal area removed will not exceed 25 percent with taller trees targeted for removal (Harris 1989). Specific requirements are specified in the individual stand prescriptions and included on the unit cards.

This prescription sets up a management regime with expected re-entries on a 50 or 75-year cutting cycle. A 50-year cutting cycle is prescribed for less than 30 percent basal area removal and a 75-year cutting cycle for 30 to 50 percent basal area removal at each entry. Additional silvicultural treatments that follow the harvests may include tree planting to influence species composition, thinning, and pruning. Natural regeneration is expected to occur within the harvested areas creating a new cohort of trees following each management entry.

## Direct and Indirect Effects on Windthrow Risk

### Alternative 1

Under the No Action alternative tree stands would remain in a predominantly old-growth condition. Small-scale, frequent disturbance events would continue in the stand until a large-scale event occurs. At some point in the future it is expected that some stands in the project area would suffer large-scale damage from a severe storm event, leading to the regeneration of the stand in what would likely be a two-aged or an even-aged condition

### Alternatives 2, 3, 4, and 5

Windthrow risk was evaluated for each unit considering prevailing wind direction, topography, evidence of windthrow within proposed units and along edges of previous harvest units, and the proximity to other wind generated stands. Wind prone areas were favored for harvest over wind protected areas. Wind prone stands tend to be even-aged and lack multi-story structure; wind protected stands will generally maintain old-growth forest characteristics because there is less chance of catastrophic windthrow. The windthrow risk is summarized by silvicultural system and alternative in Table 3SV-3 below. In units where windthrow risk has been determined to be moderate-high or high, specific measures have been prescribed to reduce or minimize windthrow risk adjacent to unit edges, within stream buffers and to reserve trees. These measures are included on the unit cards and in the detailed unit prescriptions located in the project record.

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 single tree retention prescription and 6.4 to 8.5 percent basal area loss with 75 percent retention in clumps (McClellan, 2007). Based on these results, minor (5-8%) amounts of windthrow can be expected to occur following harvest within proposed single tree selection units with moderate to high wind risk ratings.

Riparian Management Areas (RMAs) that have stream channel stability concerns and windthrow potential have been identified and will have trees

retained in RAW zones. Guidelines for applying RAW zones are included in silvicultural prescriptions and included on unit cards. The specific size and configuration of zones will be determined during unit layout.

These measures combined with additional evaluation during layout are intended and expected to minimize the effects of windthrow associated with proposed harvest under the action alternatives.

Table 3SV-3: Wind Risk Rating by Silvicultural System and Alternative

| Silvicultural System | Wind risk | Acres | | | | |
|---|---|---|---|---|---|---|
| | | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
| **Even-aged Clearcut** | **High** | 0 | 459 | 263 | 128 | 263 |
| | **Moderate-high** | 0 | 606 | 190 | 347 | 262 |
| | **Moderate** | 0 | 188 | 121 | 161 | 121 |
| | **Low-moderate** | 0 | 0 | 0 | 0 | 0 |
| | **Low** | 0 | 0 | 0 | 0 | 0 |
| | **Total** | **0** | **1253** | **574** | **636** | **646** |
| **Uneven-aged Single tree selection** | **High** | 0 | 300 | 249 | 187 | 68 |
| | **Moderate-high** | 0 | 750 | 690 | 448 | 54 |
| | **Moderate** | 0 | 583 | 535 | 633 | 54 |
| | **Low-moderate** | 0 | 22 | 22 | 22 | 22 |
| | **Low** | 0 | 1277 | 1262 | 658 | 39 |
| | **Total** | **0** | **2931** | **2758** | **1947** | **883** |

Source: 2002 and 2006 Stand exam observations and analysis from Ott et al. 1999

## Direct and Indirect Effects on Species Composition and Long-term Stand Productivity

### Post Harvest Species Composition and Intermediate Treatments

### Alternative 1

Tree growth, mortality and establishment would continue to progress at the same rate as present. Under the No Action alternative there would be no immediate or reasonably foreseeable effect on species composition including Alaska yellow-cedar. Assuming conditions within the project area remain less than favorable for cedar, yellow-cedar growth and mortality would continue to progress at the same rate as present.

### Alternatives 2, 3, 4, and 5

Proposed harvest under Alternatives 2, 3, 4 and 5 would have a negligible affect on the species composition within in the project area. Single tree selection harvest or clearcutting rarely leads to species conversion (Deal 2006). Harvest of the different species varies between even-aged and uneven-aged prescriptions.

For all alternatives, where even-aged clearcut prescriptions are applied, the overall post-harvest species composition should remain the same as the pre-harvest overstory species composition and include new seedlings, advanced regeneration, and in some cases reserve trees for RAW buffers and/or marten habitat.

The single tree selection prescriptions will emphasize the importance of what is left in addition to what is removed by retaining trees that represent all species and many of the diameter classes currently in the stand. Where uneven-aged single tree selection prescriptions are applied, more of the currently higher-value trees would be taken. Higher value, however, is a relative term, and does not necessarily equate to the largest diameter trees. The largest older trees with high amounts of defect would be left. This would include Sitka spruce and yellow-cedar. Mid-sized (16-20-inch diameter) and some larger, greater than 30-inch diameter yellow-cedar/spruce with high vigor and good seed producing potential would also be left individually and/or in clumps to assure regeneration and maintain stand structure, species diversity, and future stand productivity. Smaller diameter and sub-merchantable sized trees, 2-12 inches diameter, would mostly be left uncut. Advanced regeneration and residual trees will be protected to the extent possible during harvest. Although a greater percentage of higher value trees are designated for harvest, a relatively low number of trees are harvested. This type of harvest will maintain species composition, stand productivity and diversity, but may decrease the expected value of the next timber harvest entry. Specifics can be found in the unit prescriptions in the project planning record.

The majority of units containing cedar are proposed for single tree selection harvest using helicopter and shovel yarding methods. The stand exam data collected in the project area during the field seasons of 2002 and 2006 shows that within the entire Iyouktug unit pool, the percentage of Alaska yellow-cedar, in board foot volume, is 3.4 percent (4.5 percent cubic foot). This percentage varies from the estimates calculated from the most recent Forest-wide inventory completed between 1995 and 2000 by the Pacific Northwest Research Station, Forest Inventory and Analysis (FIA) unit. A Forest Service Region 10 report estimated net cubic volume, calculated from the FIA data, for the northern Tongass area to be seven percent for yellow-cedar (Wilson 2002, as amended). The percent of yellow cedar in the Iyouktug unit pool is less than the estimate calculated from the FIA data. However, based on field observations, additional yellow-cedar exist within the project area outside the unit pool. Consequently, it is expected that yellow-cedar likely approximates the Northern Tongass FIA estimate of seven percent within the project area as a whole. Table 3SV-4 displays the percent of yellow cedar proposed for harvest in the Iyouktug project, in net board foot volume by alternative.

Table 3SV-4: Percent Species Harvest by Alternative using Board Feet.

| Species | Percent of Species Mix (Existing) | Percent harvest by Alternative[2] | | | |
|---|---|---|---|---|---|
| | | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| **Yellow-cedar** | **3.4**[1] | 4.7 | 4.9 | 4.7 | 3.7 |
| **Spruce** | **36** | 58 | 64 | 61 | 46 |
| **Hemlock** | **61** | 37 | 31 | 34 | 50 |

Source: [1]2002 & 2006 Stand Exam Data based volume strata averages and calculated using FSVEG
[2]NEAT_ R Version 2.13 2007

Under Alternatives 2, 3, 4 and 5 the percentage of proposed yellow-cedar harvest would have little or no effect on the existence of cedar within the unit pool or project area. Based on stand exam, approximately 30 percent of the entire Iyouktug unit pool contains a yellow-cedar component. Of the unit pool, 6 percent of the units in Alternative 5 to 18 percent in Alternative 2 contain cedar.

To account for the generally slower growth rate of yellow-cedar and other species on the North Tongass, as well as a shorter growing season associated with relatively higher elevation (above 1,000 feet) stands, rotation age at which stands will be available for harvest again has been extended beyond the more typical 85-100 years. Re-entries are scheduled on a 50-year cycle under the ST25 prescription and on a 75-year cycle for the ST40 and ST50 prescriptions. Clearcut rotation ages vary from 110 to 150 years depending on site quality. Re-entry cutting cycles or rotation length can be modified if deemed necessary based on future stand exam inventories conducted prior to the next entry.

Natural regeneration is expected to be similar to the current species mix in all stands and will be monitored during post-harvest regeneration surveys after the third full growing season following the completion of logging. All of the areas proposed for timber harvest are expected to meet the requirements of the National Forest Management Act regulations (Forest Plan, page 4-101). If necessary, inter-planting of yellow cedar or spruce will be scheduled to maintain pre-harvest composition.

The most recent scientific information includes recommendations to plant yellow-cedar immediately following harvest in areas judged to be suitable for long-term yellow-cedar survival (accounting for a potentially warmer climate and less snowpack) to increase overall long-term yellow-cedar composition in light of Tongass-wide cedar decline (Hennon and D'Amore 2007; Hennon 2006). The following planting would be prescribed in the Iyouktug project area in response to these recommendations:

- Inter-plant yellow-cedar following harvest in specific units currently containing yellow-cedar (single tree selection shovel yarding Units 105, 108, 111, 178, 1773) to supplement natural regeneration and provide for post harvest yellow-cedar composition that is greater than what

currently exists. Proposed planting is expected to accelerate yellow-cedar establishment and give seedlings a competitive advantage over natural hemlock and spruce regeneration, and is prescribed for the larger openings in these units.

- Inter-plant plant yellow-cedar in clearcut Units 114, 121, 192, 194, 197, 202 in an effort to increase overall yellow cedar composition in the project area. Yellow-cedar is currently not present or is a very minor component of these units . Proposed planting is expected to establish yellow-cedar in specific units judged to have favorable site characteristics for long-term survival and growth.

Prescribed yellow-cedar planting is expected to be successful with seedling survival percentages being similar to those of past planting. Yellow-cedar third-year seedling survival percentages following planting on the Tongass from 1994 to 2001 have ranged from 67 to 92 percent with a weighed average of 84 percent.

## Direct and Indirect Effects on Forest Structure and Health

### Forest Structure and Health

### Alternative 1

In the absence of large or small-scale wind events, the no action alternative would result in no immediate changes in forest structure. Tree growth and mortality would continue to progress at the same rate as present. Insect and disease processes at work in the stand would persist at approximately current levels.

### Alternatives 2, 3, 4, and 5

The structure of the forest would be affected by timber harvest. The effects would vary by the silvicultural prescription and the number of acres harvested. Use of uneven-aged systems would maintain considerable forest with old growth characteristics but with fewer trees. The distribution of remaining trees would vary depending on the prescription. Removal of trees in small clumps or patches would result in small openings that would regenerate to second-growth forest. Removal of trees dispersed throughout the stand would result in old trees interspersed with regeneration of young trees. Forest health concerns, including the removal of trees with disease or that face imminent mortality, can be used as factors in determining which trees to harvest. Even-aged management would result in the creation of young-growth stands with or without older residual trees. The acres of harvest by volume strata, for each alternative, are shown in Table 3SV-5. Table 3SV-2 displays the acres converted to a managed condition by silvicultural system.

Table 3SV-5: Acres of Proposed Harvest by Volume Strata by Alternative.

| Volume Strata | Suitable and Available Acres in Project Area | Acres Harvested | | | |
|---|---|---|---|---|---|
| | | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
| **High** | **2,777** | 1,378 | 1,266 | 1,002 | 260 |
| **Medium** | **5,041** | 2,101 | 1,562 | 1,171 | 417 |
| **Low** | **3,035** | 706 | 505 | 411 | 207 |
| **Total** | **10,853** | 4,185 | 3,332 | 2,583 | 883 |

Source: Tongass GIS data 2007

Most of the proposed harvest units contain varying amounts and severities of dwarf hemlock mistletoe. Clearcut harvest of infected stands is an effective way of removing the disease. Units prescribed for uneven-aged management may still have mistletoe-infected trees remaining in the overstory after harvest. When hemlock is designated for harvest, the selection criteria in these prescriptions favor removing mistletoe-infected trees first. This should improve forest health in these stands, but probably not to the extent that applying a clearcut prescription would.

Alternatives 2, 3, 4, and 5 all contain a mixture of even-aged and uneven-aged management. The distribution of trees that are retained would vary between harvest units and alternatives depending on resource objectives, site conditions and logging systems.

Following regeneration, managed forests grow through several distinctive successional stages in which different components dominate the stand. All harvest alternatives will move the project area toward the desired future condition by creating a mix of stand structures and ages.

Alternative 2 converts the most acres to a managed condition and provides for the greatest mix of stand structures and ages and also provides the greatest opportunity for reducing hemlock dwarf mistletoe infection through clearcut harvest. Alternative 5 converts the fewest acres to a managed condition. Alternatives 3 and 4 convert more acres to an uneven-aged condition than even-aged condition in comparison to alternatives 2 and 5.

## Cumulative Effects on Vegetation

The analysis area for cumulative effects is the entire project area. Of those activities listed in Appendix D of this FEIS, the following are the only activities expected to have cumulative effects to forest vegetation.

Past management actions include about 3,000 acres of timber harvest over the past 30 years on NFS land plus 100 acres on private land. Of this past harvest, approximately 2900 acres or 94 percent created even-aged stands using the clearcut harvest method. Three small single tree selection sales totaling approximately 107 acres are either under contract or scheduled to be advertised

for sale in 2007 within the project area. The remainder of the private land in the project area (about 165 acres) will be harvested.

Scattered windthrow has occurred along exposed stand boundaries after past harvest. At the time of harvest no effort to buffer or stabilize exposed boundaries was made. A portion of this blown down timber has been salvaged in four separate small sales. These exposed stand boundaries have since stabilized naturally.

Table 3SV-6 displays the percentage of suitable productive forest land in the Iyouktug project area in an even-aged and uneven-aged condition under each alternative.

Table 3SV-6: Percentage of Suitable Productive Forest in Even-aged and Uneven-aged Managed Condition

| Percent Suitable Productive Forest | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Even-aged condition** | 15 | 22 | 18 | 19 | 19 |
| **Uneven-aged Condition** | 1 | 16 | 15 | 11 | 2 |

Source: Tongass GIS 2007

All previous harvest areas have been certified as regenerated, and contain trees five feet tall or greater. These areas are no longer considered openings for the purposes of scheduling or locating additional created openings (Forest Plan 4-96).

Future precommercial thinning will provide an opportunity to maintain stand growth and productivity, improve windfirmess, and promote or maintain understory vegetation growth. Post-harvest precommercial thinning operations could also be used favor yellow-cedar and spruce composition within the project area.

Precommercial thinning is proposed in about 2,000 acres of previously harvested areas within the project area over the next ten years. In addition, almost 700 acres of young growth 20-25 years old is currently planned for thinning over the next three to five years in the Iyouktug area (VCUs 2080 and 2090, USDA Forest Service 2006e). Prescriptions will be developed to manage for multiple resource values with spacing of leave trees based on site specific objectives. Prescriptions will maintain a buffer adjacent to streams and will often incorporate travel corridors for deer. In non-development LUDs, prescriptions will often include creating gaps and retaining unharvested thickets. These treatments may also be considered in development LUDS on a case by case basis. This future action when combined with any of the action alternatives represents a favorable cumulative effect relative to forest vegetation, windthrow risk, and forest structure and species composition.

The cumulative effect of past or reasonably foreseeable future free use harvest on the forest vegetation resources within the project area when combined with any of the action alternatives would be the addition of approximately 30 acres of single tree selection harvest within the project area.

# Soil

Soil is a fundamental part of a forest ecosystem; soil health and productivity influence the long-term forest productivity. The following discussion and analyses are based on and summarized from the Soil Resource Report for the Iyouktug project area.

## Affected Environment for Soil

**Affected Environment for Soil**

The Iyouktug project area is located in the Freshwater Bay Carbonates ecosubsection (Nowacki et al. 2001). This ecosubsection is characterized by a mix of calcareous and non-calcareous sedimentary rocks with a scattering of volcanic and intrusive igneous rocks. Karst features form on the calcareous portion of the landscape not covered by glacial till.

Soils in the Iyouktug project area have been strongly influenced by high precipitation and cool temperatures. Under these conditions, organic matter decomposes slowly and tends to accumulate on-site. A thick organic surface layer composed of forest litter is common on mineral soils. Deep organic soils develop where movement of water is impeded by bedrock or other restrictive layers. Podzolisation, where organic material and iron and aluminum oxides are leached from the topsoil to the subsoil, is the primary soil process forming mineral soils. Over time, this process can reduce site productivity by immobilizing important plant nutrients and forming cemented layers of iron and aluminum oxides, which slow soil drainage (Bormann et al. 1995).

The direct and indirect effects analysis area is the proposed unit and 42-foot wide road corridor. The cumulative effects analysis area is the entire Iyouktug project area.

## Environmental Consequences for Soil

**Effects of Management Activities on Soil**

### Soil Productivity

National Forest Management Act (NFMA) requires that national forests be managed under the principles of multiple use and sustained yield without permanent impairment of the land productivity, and to maintain or improve long-term soil productivity.

Region 10 Soil Quality Standards (R-10 SQS) state that a maximum of 15 percent of an area can have detrimental soil disturbance (USDA FSM 2554). If the R-10 SQS are met, then soil productivity will be maintained. Detrimental soil areas are areas of soil that have been altered to the point where soil productivity has been affected. Examples are landslides, temporary roads, bared mineral soil or eroded areas.

**Roads and Rock Pits**
Specified roads and rock pits are part of the long-term infrastructure and are not considered detrimental soil disturbance. Temporary roads are considered part of the productive landbase and are a form of detrimental soil disturbance. Roads have an average disturbed soil corridor width of 42 feet including the road prism, cut and fill banks. Soil productivity is decreased in the road corridor because the organic rich layers are either removed from the soil or buried under a rock road prism. Soil erosion can occur on exposed soil on road cuts.

**Timber Harvest**
Tongass soil quality monitoring data indicates that shovel yarding and cable yarding with a minimum of partial suspension minimizes detrimental soil disturbance and will meet the R-10 SQS (Landwehr 1997). All past harvest units were estimated to have five percent detrimental disturbance, based on achieving partial suspension (Landwehr and Nowacki 1999).

## Existing Detrimental Disturbances

Total existing detrimental disturbance for the Iyouktug project area is about 263 acres (Table 3SO-2). This is less than one percent of the project area. With other, non-detrimental, disturbances total disturbance is 1.1 percent of the project area.

### Landslides

Landslides are natural ecological processes on the Tongass but management can accelerate the rate of landsliding. Landslides are the dominant erosional process occurring on steep unmanaged lands. Most landslides occur during, or immediately after periods of heavy rainfall when soils are saturated. The most hazardous areas are steep slopes that have soils with distinct slip-planes such as compacted glacial till or bedrock parallel to the soil surface. These areas have a high likelihood of failing, especially if disturbances, blasting of rock pits, road pioneering, side casting of excavated material or logging practices that cause substantial surface disturbance, occur during periods of high rainfall.

Site characteristics determine where a landslide will occur while climatic conditions determine when a landslide will occur. Landslides most commonly occur in managed stands within five years after cutting because the strength of tree roots tends to decrease four to seven years after the tree is cut (Ziemer and Swanston, 1977). Vegetation also manages soil moisture through rainfall interception and evapotranspiration. When trees are removed, less water is taken up resulting in saturated, heavy soil prone to landslides. Under natural conditions, windthrow is another important triggering device of debris avalanches and flows in Southeast Alaska.

Landslide inventories in Southeast Alaska found that in areas of timber harvest and road construction, the frequency of landslides are about 3.5 times the frequency of landslides in unharvested areas (Swanston and Marion, 1991).

**Landslides in the Iyouktug Project Area**
Landslides in the Iyouktug project area occur in both unharvested and harvested areas. During field surveys, 18 slides were noted in harvested areas. In managed stands, landslides tended to initiate on gentler slopes (generally from 55 to 65 percent gradient) than in unmanaged areas (generally over 65 percent gradient).

Soils in the southeastern portion of the project area (North Fork of Iyouktug Watershed) are inherently more stable than elsewhere in the project area. In this area slopes up to 80 percent gradient have had timber harvest with very few landslides. The soils are generally shallow to bedrock and the bedrock is durable. In this area landslides are not common even in managed stands.

Based on Swanston and Marion's data (1991) the Iyouktug project area should experience about seven landslides totaling three acres in a period of 20 years (Swanston and Marion 1991).

**Harvest on Slopes Over 72 Percent**
Slope gradients of 72 percent or more are removed from the tentatively suitable timber base due to high risk of landslides. The Forest Supervisor or District Ranger, however, may approve limited timber harvest on slopes of 72 percent or more, on a case-by-case basis, based on the results of an on-site analysis of slope stability and an assessment of potential impacts. Soil stability investigation reports for proposed harvest units with slopes greater than 72 percent have been completed and are filed in the Iyouktug project record.

Most of the past harvest was on gentle, well-drained and productive soils. Only two percent (47 acres) of harvest occurred on slopes steeper than 72 percent. Some landslides are associated with past timber harvest, but they do not necessarily occur on slopes greater than 72 percent.

**Roads on 67 Percent Slope**
Roads or road segments on slopes greater than 67 percent are generally avoided. Areas where roads are proposed on slopes exceeding 67 percent or on unstable areas are documented in the road and unit cards.

Limited road has been built across slopes greater than 67 percent. Only 479 feet of road (0.5 acre) has been built on slopes greater than 67 percent. There is about 2,752 feet (2.7 acres) of road on slopes greater than 55 percent but less than 67 percent. These roads total about 1 percent of all existing roads in the Iyouktug project area. There are no landslides associated with these small areas.

Due to the construction of these roads on shallow soils over competent bedrock these roads do not appear to have more erosion or stability issues than the average road segment in the project area.

## Direct and Indirect Effects on Soil

**Harvest on Slopes Over 72 Percent**
Boundaries were modified on many steep slope areas due to concerns about slope stability and impacts to soil productivity following harvest.

Approximately 304 acres of landslide prone slopes were removed from harvest consideration to protect soil resources and prevent potential degradation of downslope resources. In addition, suspension requirements were prescribed for other steep slope areas.

Complete details on steep slopes in harvest units and appropriate mitigation measures are included in the individual unit cards (Appendix B of the DEIS). Approximately 174 acres of slopes greater than 72 percent gradient remain in the unit pool because they have a moderate risk of landslides and they pose little or no risk to surface water resources (Table 3SO-1). Most areas are less than three acres in size and consist of short steep slopes associated with rock outcrops. Units 903, 914, 976, 184, 185, and 125 all have more than ten acres of slopes greater than 72 percent gradient, but the steep slopes occur in small areas and are not continuous. They are included in the proposed harvest units because on-site investigations indicate they are stable and will facilitate yarding of surrounding gentler slopes.

Table 3SO-1 includes slopes up to 80 percent gradient proposed for harvest. Slopes greater than 80 percent gradient are not proposed for harvest, but occur in deferred areas in some units. The majority of the areas over 72% slope are proposed for helicopter yarding. Partial harvesting in these helicopter units would help ensure an adequate amount of live root mass remains intact to preserve slope stability. Full suspension achieved through helicopter yarding and full suspension in cable yarding would provide the necessary surface protection for soils on slopes over 72%.

Table 3SO-1: Slopes over 72 percent gradient in harvest units.

| Timber Unit | Harvest Method / Rx | Total Harvest (acres) | Slopes greater than 72% (acres) | Included in Alternative (s) |
|---|---|---|---|---|
| **903** | HE/ST40 | 99 | 16 | 2, 3 |
| **903** | HE/ST40 | 73 | 9 | 4 |
| **914** | HE/ST25 | 243 | 22 | 2, 3, 4 |
| **916** | HE/ ST40 | 107 | 3 | 2, 3 |
| **976** | HE/ ST40 | 77 | 12 | 2, 3 |
| **9041** | HE/ ST40 | 18 | 2 | 4 |
| **9061** | C/CC | 41 | 3 | 2, 4 |
| **116** | C/CC | 34 | 2 | 2, 3, 5 |
| **117** | C/CC | 25 | 0.5 | 2, 3, 5 |
| **124** | C/CC | 41 | 2 | 2 |
| **125** | HE/ST25 | 185 | 17 | 2, 3 |
| **125** | HE/ST25 | 96 | 10 | 4 |
| **149** | HE/ST25 | 46 | 3 | 2, 3 |
| **149** | HE/ST25 | 23 | 3 | 4 |
| **165** | C/CC | 12 | <1 | 2 |
| **184** | HE/ST25 | 202 | 15 | 2, 3 |
| **184** | HE/ST25 | 28 | 15 | 4 |
| **185** | HE/ST25 | 137 | 15 | 2, 3 |
| **185** | HE/ST25 | 71 | 15 | 4 |
| **203** | C/CC | 16 | <1 | 2 |
| **204** | HE/ST40 | 47 | 8 | 2, 3, 4 |
| **Totals** | | **1,621** | **174** | |

Source: Soil field notes, GIS coverages. HE=helicopter, C=cable, ST25=single tree selection up to 25% of basal area, ST40=single tree selection of up to 40% basal area, CC=clearcut

**Roads on Slopes Over 55 Percent Gradient**

Most road is proposed on slopes less than 55 percent gradient. The small portions where slopes exceed 55 percent have been reviewed by the IDT soil scientist. Specific mitigation measures are required in these areas. Refer to the unit and road cards for complete description of slopes and mitigation measures.

Alternative 2 proposes building a section of temporary road between Unit 123 and 124 that is located on slopes over 67 percent gradient. Per the forest plan a soil scientist or geotechnical engineer will provide design criteria for this road section when it is staked (see unit cards in Appendix B of the DEIS and Project-specific Mitigation in Chapter 2).

Table 3SO-2: Summary of cumulative disturbances from the Iyouktug project area

| | Existing | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Future |
|---|---|---|---|---|---|---|---|
| | Acres | | | | | | |
| **Detrimental Disturbance** | | | | | | | |
| **Temporary Road** | 45[1] | 0 | 67 | 19 | 38 | 22 | 0 |
| **Yarding Disturbances** [2] | 155 | 0 | 157 | 115 | 96 | 44 | 5 |
| **Landslides** | 63 | 3[3] | 3[3] | 3[3] | 3[3] | 3[3] | -[3] |
| **Total Detrimental** | **263** | **3** | **227** | **137** | **137** | **69** | **5** |
| **Other Disturbance** | | | | | | | |
| **System Road** | 248 | 0 | 19 | 12 | 5 | 12 | 0 |
| **Rock Pit Development** [4] | 29 | 0 | 8 | 3 | 4 | 3 | 0 |
| **Total Other** | **277** | **0** | **27** | **15** | **9** | **15** | **0** |
| | | | | | | | |
| **Total Disturbance** | **544** | **3** | **255** | **152** | **147** | **85** | **5** |

Source: GIS unitpool coverage. Only proposed units and new roads analyzed Numbers may not add to totals due to rounding.
[1]Estimate includes about 0.4 mile (2 acres) of unauthorized road reclassified as NFS road.
[2]Shovel harvest estimated at 5% disturbance, both cable and helicopter harvest is 3% based on Landwehr' and Nowacki's 1999 work. Existing harvest disturbance is acres of past harvest x 5%
[3]Alternatives 1, 4 and 5 have a predicted landslide rate of 7 landslides over 20 years while Alternatives 2 and 3 have a predicted rate of 8 landslides. All alternatives will have total landslides at about 3 acres.
[4]Assumed 1 acre of rockpit development per 2 miles of road.

### Alternative 1 (No action)

Under Alternative 1 no timber harvest or road building would take place and no soil disturbances would be caused by new management activities. Roads on the project area would continue to receive incidental use from hunters and other visitors. Landslides would continue to occur in unharvested areas and existing harvested areas. Vegetation in harvested areas would continue to grow and add stability to soils on those sites. Detrimental soil conditions remain within R-10 SQS.

### Effects common to Alternatives 2, 3, 4, and 5

There will be about 0.4 mile of unauthorized road reclassified as NFS road. These are small sections of existing road accessing rock pits. While identified as "construction", there is no reconstruction or construction associated with this activity.

### Alternative 2

Under Alternative 2 the total area of detrimental disturbance would be about 224 acres, the highest of any alternative (Table 3SO-2). All harvest units will meet R-10 SQS as proposed.

Approximately 121 acres of slopes greater than 72 percent gradient would be harvested in Alternative 2. Alternative 2 includes the highest amount of timber harvest proposed on slopes greater than 72 percent of any alternative. Less than 500 feet of road on slopes greater than 67 percent is proposed. Site specific design criteria apply to this area, see road and unit cards.

### Alternatives 3 and 4

Under Alternatives 3 and 4 the total area of detrimental soil disturbance would be about 134 acres (Table 3SO-2.). All harvest units will meet R10 SQS as proposed

Approximately 114 acres of slopes greater than 72 percent gradient would be harvested in Alternative 3. Approximately 87 acres of slopes greater than 72 percent gradient would be harvested in Alternative 4.

### Alternative 5

Under Alternative 5 the total area of detrimental soil disturbance would be about 66 acres the lowest of any alternative (Table 3SO-2). All harvest units will meet R-10 SQS as proposed.

Approximately 3 acres of slopes greater than 72 percent gradient would be harvested in Alternative 5.

## Cumulative Effects

### Alternative 1 (No action)

Detrimental soil disturbance, temporary roads and timber harvest, incurred from past management activities cover about 200 acres or less than 1 percent of the project area. Existing system roads and rock pits have disturbed about 277 acres or less than 1 percent of the project area (Table 3SO-2). Soil disturbances from landslides cover about 63 acres or less than 1 percent of the project area. Alternative 1 proposes no new timber harvest or roads. Present and future entries would add about 5 acres of detrimental soil disturbance for a total of about 271 acres. The project area meets R-10 SQS.

Landslides would continue at an estimated rate of seven landslides, totaling three acres, over a 20-year period in the project area (Swanston and Marion 1991). Vegetation in previously harvested areas would continue to grow and add root mass and stability to the soil, thus landslide frequency would likely decline over time in the harvested areas (Brardinoni et al. 2002).

### Alternative 2

In addition to the impacts described for Alternative 1, Alternative 2 would add the effects described in the direct and indirect effects. Cumulative detrimental soil conditions from all past, present and future activities would be about 495 acres (Table 3SO-2). All harvest units and the project area meet R-10 SQS as proposed.

Based on Swanston and Marion’s (1991) estimated rate, landslides would continue to average eight landslides, totaling about three acres, over a twenty year period in the project area.

### Alternatives 3, 4, and 5

Alternatives 3, 4 and 5 would have cumulative effects similar to Alternative 2 but not as extensive. Cumulative detrimental soil conditions from all past, present and future activities would be about 405 acres for Alternatives 3 and 4, and about 337 acres for Alternative 5, the lowest of any action alternative (Table 3SO-2). All harvest units and the project area meet R-10 SQS as proposed.

Based on Swanston and Marion's (1991) estimated rate, landslides would continue to average eight landslides, totaling three acres, over a twenty year period in the project area for Alternative 3, and average seven landslides, totaling three acres, over a twenty year period in the project area for Alternatives 4 and 5.

By implementing the BMPs outlined on the unit and road cards, all units will meet Forest Plan Standards and Guides and Regional standards.

# Subsistence

This analysis tiers directly to the Forest Plan Standards and Guidelines for subsistence (USDA Forest Service 1997b), the Forest Plan FEIS (USDA Forest Service 1997a), and the Forest Plan SEIS (USDA Forest Service 2003a). The FEIS and the SEIS contain in-depth discussions on the history of subsistence use and community information. Since non-Native rural residents qualify, subsistence activities are not the same as Native cultural and traditional use even though overlap occurs. Refer to the Heritage section of this document for discussion of cultural and traditional use of the Iyouktug area.

## Alaska National Interest Lands Conservation Act

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. 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, followed by specific notice and determination procedures should there be a significant possibility of a significant restriction of subsistence uses.

The Alaska Land Use Council's definition of "significantly restrict subsistence use" is one guideline used in the evaluation: "A proposed action shall be considered to significantly restrict subsistence uses, if after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources." Considerations of abundance and distribution, access, and competition (by non-rural residents) are mentioned. The U.S. District Court Decision of Record in *Kunaknana v. Watt* provided additional clarification. In part it states: "restrictions 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" (USDA Forest Service 2003a).

Under ANILCA, if it is concluded that land management activities (from a specific project or cumulatively for a geographic area) may impose a significant possibility of a significant restriction on subsistence resources or uses, additional analysis and findings are required. Such a finding requires that the Proposed Action 1) be modified to remove the significant restriction, 2) be dropped, or 3) proceed with the stipulation that formal subsistence hearings be held and subsequent findings published.

# Affected Environment for Subsistence

### Existing Condition of Subsistence Resources and Uses

The Iyouktug area falls within documented community use areas for Hoonah, Gustavus, and Angoon. These communities are classified as rural and receive subsistence priorities under ANILCA.

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. Resources most commonly used by the residents of Hoonah, Gustavus and Angoon include deer, furbearers, seals, salmon, marine fish, waterfowl and other birds, shellfish, herring roe on kelp, clams and cockles, Dungeness crab, seaweed, berries and wood (USDA Forest Service 1997a). Hoonah residents' subsistence activities in WAA 3551 are important for the economics and cultures of many families.

Residents from the Hoonah, Haines, and Juneau communities obtain approximately 75 percent of their average annual deer harvest from WAA 3551 (USDA Forest Service 1997a, Appendix H). This area is designated by the Alaska Department of Fish and Game as GMU 4. Juneau is classified as a non-rural community and residents do not have subsistence priority under ANILCA. The majority of Haines' subsistence use areas are not on the National Forest (USDA 1997a). Because the WAA is connected to Hoonah by a road system, Hoonah is the primary subsistence user for deer in the area.

Although harvest may be for subsistence purposes, the Federal Subsistence Board does not issue federal registration permits for any resource within the Iyouktug area. Subsistence users must comply with all State of Alaska licensing, permitting, and reporting requirements.

The Iyouktug Timber Sale project area (VCUs 2080, 2090 and 2100) is connected to Hoonah by a road system. Hoonah hunters travel an average of 15 miles to their most reliable deer hunting areas (USDA Forest Service 1997a). Residents from other communities must travel by water or plane to access subsistence resources in the analysis area.

# Environmental Consequences on Subsistence

### Direct, Indirect, and Cumulative Effects on Subsistence

The Forest Plan provides a comprehensive analysis of subsistence resources and potential effects, both Tongass-wide and for each rural community of Southeast Alaska. The Forest Plan determined that no significant decline in salmon, other finfish, or invertebrate habitat capability was expected from the implementation of the proposed alternative (USDA Forest Service1997a). It also concluded that, Forest-wide, under full implementation of the plan (including riparian, beach, and estuary buffers as well as the old growth conservation strategy), the only subsistence resource that may, in the future, be significantly restricted is deer (USDA Forest Service 1997a). Although the plan

recognizes that with full implementation of the Forest Plan there could be some risk to fish habitat, it was determined that deer, due to their association with old growth forest habitat, become the indicator for potential subsistence resource consequences concerning the abundance and distribution of the resources (USDA Forest Service 1997a). Therefore, there would be no effects or significant restrictions on subsistence use of plants, any aquatic resources, or wildlife species excluding deer as a result of any of the alternatives. Because deer are the indicator for subsistence effects and because there would be no effects or significant restrictions on subsistence use of these other resources (other than deer), only effects related subsistence use of deer are described below.

## Sitka Black-tailed Deer

Sitka black-tailed deer receives the highest subsistence and sport hunting use of all mammals in Southeast Alaska. A deer population at carrying capacity should be able to support a sustainable hunter harvest (demand) of approximately 10 percent of the habitat capability while also providing a reasonably high level of hunter success (USDA Forest Service 1997a). Hunter success can be expected to decline in areas where demand represents 10 to 20 percent of habitat capability. If demand exceeds 20 percent of habitat capability, harvest of deer by hunters may be directly or indirectly restricted (USDA Forest Service 1997a).

ANILCA requires the analysis of subsistence uses and resource on NFS land and of any potential effects resulting from management activities (ANILCA Sec. 810). This analysis typically focuses the impacts of the proposed project on the abundance and distribution of, access to, and competition for deer.

### Alternatives 1, 2, 3, 4, and 5

**Abundance and Distribution**

The abundance and distribution of deer is based on assessing the number and location of deer available for hunter harvest. Under all alternatives, including the no action alternative, deer habitat capability would decrease as a result of proposed harvest and/or existing second growth stands entering the stem exclusion stage. The distribution of deer would change in response to the disturbance caused by harvest activities and the reduction in POG forest and connectivity. This was addressed in Issue #1 Habitat Connectivity and Old Growth and the Sitka black-tailed deer (in the Management Indicator Species section) sections in this chapter.

**Access**

Subsistence users typically hunt in traditional areas surrounding their communities. They may access an area via a number of different transportation types and often use more than one form of transportation. Subsistence users may, for example, access an area via boat followed by motorized vehicle (and on-foot) or via motorized vehicle and on-foot, with types of access varying by location and user. Some hunters may access specific areas using more than one

form of transportation, but others may favor one form of transportation over another, for example boat over vehicle (USDA Forest Service 2006c).

Roads can affect subsistence both positively and negatively by providing access, dispersing hunting and fishing pressure, and creating the potential for increased competition. Road systems tend to bring more people into an area and they may also give subsistence hunters access to previously remote regions and provide a greater opportunity for subsistence harvest (USDA Forest Service 2006c).

The primary mode of access for harvesting deer in WAA 3551 is by boat and vehicle. Because the road system in WAA 3551 connects to the community of Hoonah, roads are extensively used to access hunting areas.

None of the alternatives would limit the use of public lands for the purposes of subsistence uses. Historical access (by foot, boat, and floatplane) would remain available under all the alternatives for present and foreseeable future activities.

The construction and reconstruction of roads will increase human access in the project area. The greatest increase in road access would occur during project implementation. Alternative 2 will have the greatest increase in miles of open roads during the project activities followed by Alternatives 4, 3, and 5 (Table 3MI-5 in Management Indicator Species and Other Species Section). After project activities, Alternative 2 will have the greatest increase in miles of open roads followed by Alternatives 5, 4 and 3. Open roads would decrease for all alternatives as a result of cumulative activities.

New road construction is likely to result in the development of new use patterns in some areas. Alternative 2 and 5 would open motorized access into the North Fork of Iyouktug Creek. Alternative 3 would open foot travel into this area. While there would be some new road access under all alternatives, most of the new roads constructed would be closed following harvest. These roads would, therefore, not be available for use by highway vehicles or high-clearance vehicles. They may, however, be available for access by other methods and would, as a result, have the potential to affect existing subsistence patterns.

**Competition**

Changes in deer abundance resulting from timber harvest and increased access to deer by both rural and non-rural hunters, combined with a potential increase in hunter demand for deer, would affect competition for deer between subsistence users.

ADFG hunter reports identified Angoon, Elfin Cove, Haines, Hoonah, Juneau, Ketchikan, Sitka, Whitestone Camp and other Alaska communities as hunting deer from WAA 3551. There were an average of 180 hunters per year (range 108-225) during the period of 1995-1996 and 1997-2003 (excludes the period between 1996 and 1997 when there is no data). Between 1995 and 2003, hunters from all of these communities harvested an estimated average of 227

deer annually from WAA 3551 (Summary of ADFG 1995-2003 Deer Hunter Survey Statistics). This is consistent with hunter harvest data used in the Forest Plan.

The deer habitat capability model was used to provide an estimate of the potential number of deer available for hunter harvest that the habitat within the WAA can support over time. This analysis assumes that 360 deer per year, which is the maximum number of deer harvested by Hoonah community residents and all other hunters for WAA 3551 from 1995 to 2003, represent the hunter demand. Twenty-eight percent (102) of this harvest is sport hunting of deer by the community of Juneau. This hunter demand represents about 18.9 of the 1984 condition (pre-harvest) and 22.6 percent of current (Alternative 1) deer habitat capability (refer to Sitka Black-tailed deer in the MIS section). Hunter demand as represented as a percentage of habitat capability is displayed in Table 3SU-1. Since wolves are not present on Chichagof Island, it was assumed that all of the deer are available to hunters.

Table 3SU-1: Estimated deer harvest by all hunters in WAA 3551 as a percent of current (Alternative 1) and projected deer habitat capability by alternative.

| | Alternative | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** |
| Hunter demand as a percentage of deer habitat capability | 22.7 | 23.7 | 23.4 | 23.3 | 23.0 |

Current deer demand is at the level (greater than 20 percent) at which not all hunters may be successful, or may have to spend more effort to harvest deer. Generally, if restrictions are necessary, they would be imposed on non subsistence hunters first. As was demonstrated in 2007, demand for deer might not be met following a severe snow winter. As a result of record snowfall during the winter of 2006-2007, the State and the Federal government closed the sport and subsistence hunt of does for a portion of the season on Northeast Chichagof Island (ADF&G 2007, USDI 2007).

## Subsistence Hearings

In compliance with ANILCA, and consistent with current Forest policy, subsistence hearings were held in affected communities after publication and dissemination of the DEIS. The Forest Service held a formal subsistence hearing in Hoonah on November 1, 2007. Two people attended the meeting, but no one provided testimony. A formal hearing was also scheduled in Angoon on October 21, 2007, but weather precluded the hearing officer from attending. However, a Forest Service representative was present at the hearing location for the entire time that the hearing was planned, and one individual did show up for the hearing. The hearing officer later called this individual and his testimony was taken and recorded by phone on November 13, 2007. Concern was expressed during the hearing that subsistence uses would be reduced. The individual stated that subsistence harvest is important to the local communities

and that this way of life should be maintained. A complete transcript of the testimony from the hearing is included in the Iyouktug Project Record.

## Subsistence Findings

The Forest Plan (USDA Forest Service 1997a) included a cumulative effects analysis of resource development on subsistence resources. Based on that analysis, the Forest Plan ROD concluded that full implementation of the Forest Plan "may result in a significant restriction to subsistence use of deer due to the potential effects of projects on the abundance and distribution of these resources, and on competition for these resources" (USDA Forest Service 1997a). It is not possible to substantially reduce timber harvest in one area and concentrate it in other areas without affecting subsistence resources and uses important to one or more rural communities (USDA Forest Service 1997a).

Consistent with Section 810 of ANILCA, the alternatives were evaluated for potential effects on subsistence uses and needs. Based on that evaluation, and the findings in the Forest Plan, it was determined that, in combination with other past, present, and reasonably foreseeable future actions, the alternatives, including the no action, would result in a significant possibility of a significant restriction on subsistence deer resources and uses.

Section 810 (a)(3) of ANILCA requires that when a use, occupancy, or disposition of public lands may result in a significant possibility of a significant restriction, a determination must be made whether (1) such a restriction is necessary, consistent with sound management principles for the utilization of public lands, (2) the proposed activity involves the minimum amount of public lands necessary to accomplish the purposes of the use, and (3) reasonable steps will be taken to minimize adverse impacts on subsistence uses and resources resulting from the actions.

Using the information described earlier in this section, the alternatives were evaluated for potential effects on subsistence uses and needs, as described above.

**Necessary and Consistent with Sound Management of Public Lands:** The alternatives proposed in this EIS have been examined to determine whether they are necessary and consistent with sound management of public lands. In this regard, the National Forest Management Act, the Alaska National Interest Lands Conservation Act, the Tongass Timber Reform Act, the Wilderness Act, the 1997 Forest Plan Revision Final EIS, as amended, the Alaska State Forest Resources and Practices Act, and the Alaska Coastal Zone Management Program have been considered.

National Forest land management plans are required by the National Forest Management Act and must provide for the multiple-use and sustained yield of renewable forest resources in accordance with the Multiple-Use Sustained Yield Act of 1960. Multiple-use is defined as "the management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meets the needs of the American people" (36 CFR 219.3). The alternatives presented herein represent different

ways of managing Tongass National Forest resources in combinations that are intended to meet the needs of the American people. The potential restrictions associated with each alternative are necessary and consistent with the sound management of public lands.

**Amount of Public Land Necessary to Accomplish the Proposed Action:** The amount of land necessary to implement each alternative is, considering sound multiple-use management of public lands, the minimum necessary to accomplish the purpose of that alternative. The entire forested portion of the Tongass is used by at least one rural community for subsistence purposes for, at a minimum, deer hunting. It is not possible to avoid all of these areas in implementing resource use activities, such as timber harvesting and road construction, under any alternative, and attempting to reduce effects in some areas can mean increasing the use of others. The current Forest-wide standards and guidelines and LUD prescriptions provide for management or limit activities in many of the areas most important for subsistence uses, such as beaches and estuaries, and areas with high fish and wildlife habitat values.

**Reasonable Steps to Minimize Adverse Impacts to Subsistence Uses and Resources:** Subsistence use is addressed specifically in a Forest-wide standard and guideline, and subsistence resources are covered by the Forest-wide standards and guidelines for wildlife, fish, riparian areas, and biological diversity, among others. Fish and wildlife habitat productivity will be maintained at the highest level possible under all alternatives, consistent with the overall multiple-use goals of the current Forest Plan, with improved protection under the Forest Plan.

# Threatened, Endangered, Petitioned, and Sensitive Wildlife and Salmonid Species

## Threatened, Endangered and Petitioned Species

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) under authority of the Endangered Species Act (ESA) of 1973, as Amended. There are no terrestrial species listed by the USFWS as threatened or endangered that are known to occur within or near the project area therefore there will be no direct, indirect or cumulative affects effects to these species.

The Queen Charlotte goshawk and the Alexander Archipelago wolf were both the subject of listing petitions under the ESA. In 1995, the USFWS concluded that listing was not warranted for either subspecies, but concerns remained for their long-term viability. In part, these USFWS decisions were based on expectations that the Forest Service would incorporate species-specific conservation strategies into the 1997 Forest Plan Revision, which was in preparation at the time of their decision.

Conservation organizations petitioned the FWS to list the Queen Charlotte goshawk subspecies of the northern goshawk (*Accipiter gentilis laingi)* as endangered in May 1994. The FWS has repeatedly determined that listing is not warranted, largely on the basis of protections provided by the conservation strategy in the 1997 Tongass Forest Plan. The most recent status update and finding was published in November 2007. The FWS found that the best available information does not support the listing of the Alaska population segment as threatened or endangered at this time. However, the FWS also concluded that Vancouver Island is a significant portion of the Queen Charlotte goshawk's range and that listing the subspecies in British Columbia is warranted (Federal Register 2007, p. 63123).

The Alexander Archipelago wolf does not occur on Chichagof Island, and therefore is not addressed in this analysis.

The Kittlitz's murrelet is a petitioned species and are actively being considered for listing. Petitioners cited dramatic reductions in population size over the past decade and declining habitat quality as reasons for the requested listing. Due to the Kittlitz's murrelet's association with glacial habitat, this species occupies areas outside of the project area. Consequently, implementing any of the alternatives would have negligible direct, indirect or cumulative affects on the Kittlitz's murrelet.

See the Management Indicator Species (MIS) and Other Wildlife Species section in this chapter for definitions of negligible, minor, and moderate effects.

## Affected Environment for Humpback Whale, Steller Sea Lion and Salmonid Species

### Existing Conditions for Humpback Whale, Steller Sea Lion and Salmonid Species

The federally listed mammal species that are likely to occur within the waters surrounding the project area include the endangered humpback whale (*Megaptera novaeangliae*), the endangered western distinct population segment (DPS) of the Steller sea lion (*Eumetopias jubata*), and the threatened eastern DPS of the Steller sea lion. Humpback whales are commonly observed in Port Frederick, Icy Strait and Chatham Strait that surround the project area. Icy Strait appears to be important feeding areas early in the season, when whales prey heavily on herring and other small, schooling fishes. Because humpbacks inhabit shallow coastal areas, they are increasingly exposed to human activity. National Forest management activities that could have an affect on whale habitats or populations generally fall into the categories of acoustic disturbance and habitat degradation (including effects to prey species) and are generally associated with the development and use of marine access facilities (MAF) (formally known as log transfer facilities) and associated camps, the movement of log rafts from MAFs to mills, and the potential development of other docks and associated facilities for mining, recreation and other forest activities (USDA Forest Service 1997a). Critical habitat has not been designated for this species in Alaskan waters.

The NMFS listed the Steller sea lion as a threatened species throughout its range in 1990 because of an abrupt population decline. The NMFS recognizes two distinct populations of Steller sea lions; the western population is west of 144 degrees west longitude and the eastern population is generally east of Cape Suckling and includes Southeast Alaska. The decline has continued for the western population in Alaska, which was declared endangered in 1997. The eastern population remains listed as threatened.

Steller sea lion habitat includes marine and terrestrial areas that they use for a variety of purposes. Adult Steller sea lions congregate at rookeries for breeding and pupping. Rookeries are generally located on relatively remote islands, often in exposed areas that are not easily accessed by humans or mammalian predictors (NMFS 1992). Life history and population information is contained in the Recovery Plan (NMFS 1992).

Critical habitat including haulout and rookery sites has been designated for this species (50 CFR 226). There are no designate rookeries or haulouts within the portion of Icy Strait and Chatham Strait the surround Northeast Chichagof Island (CFR Title 50 Part 226). The nearest documented haulout lies about 5 miles north of the project area.

Although none of the listed fish stocks (listed in the project record) originate from Alaskan streams, 14 of the 28 listed evolutionarily significant units (ESUs) for salmon and DPSs for steelhead could potentially be present in Alaskan waters during some period of their marine life stage. All of these salmonid species originate from the Columbia River system or Puget Sound. They may feed on prey resources originating from marine and estuarine waters of the Tongass National Forest, and could occasionally be present in inner waters of Southeast Alaska. Overall, listed stocks make up a small portion of total salmon and steelhead in waters off the coast of Alaska (NMFS 2003).

## Environmental Consequences for Humpback Whale, Steller Sea Lion and Salmonid Species

### Direct and Indirect Effects on Humpback Whale, Steller Sea Lion and Salmonid Species

Activities that result in mortality or displacement of individuals or immediate changes in habitat conditions directly affect humpback whales and Steller sea lions. Therefore activities associated with the marine access facility (MAF) are the only activities associated with the proposed project that could directly effect the marine environment. Although the majority of the ground-based harvest would be removed from the project area via the road system and taken to the local mill, larger sales, as well as small sales by purchasers outside of Hoonah, may result in the use of MAF to transport logs by saltwater to a processing facility. This would result in an increase in boat and barge activity and log rafting and towing at the existing permitted Long Island MAF at the former Whitestone Logging Camp near Hoonah.

Individuals of several listed salmon and steelhead ESUs may be present in Southeast Alaska including the waters that surround the Iyouktug project area (Port Frederick and Freshwater Bay). The project will not affect spawning habitat because it is unlikely that this habitat is present in or around the project area. Activities associated with the proposed project, specifically the use of the MAF, could affect foraging habitat for some of these fish species.

Indirect effects to these species include effects that occur later in time and may reduce prey species and their habitats. These include changes to stream habitat that results in changes to the marine environment and can affect prey habitat.

#### Alternative 1 (No Action)

Alternative 1 would have negligible direct, indirect or cumulative effect to humpback whales, Steller sea lions, salmonid species or their habitat because there would be no increase in marine activities or changes in the stream or marine habitats in the area as a result of this project. This alternative would have a “no effect” determination to these species.

### Alternatives 2, 3, 4 and 5

Alternatives 2, 3, 4 and 5 would have minor direct and indirect effects to humpback whales and Steller sea lions as a result of an increase in marine activities. These alternatives would have a "not likely to adversely affect" determination. Alternative 2 would have the greatest affect and Alternative 5 the least affect based on the amount of volume associated with these alternatives. Effects are considered minor because the increase in boat and barge traffic and associated noise would be localized and occur at an existing MAF that is close to the town of Hoonah and already receives considerable activity. Although the behavior, hearing, or distribution of humpback whales may change because of increases in marine activities, changes would not reduce individual survival or reproduction. The Marine Mammal Protection Act and 50 CFR 224 establish measures to protect marine mammals. These measures includes prohibiting the harassment, hunting, capturing, or killing of any marine mammal and prohibiting approaching within 100 yards of a humpback whale.

Alternatives 2, 3, 4 and 5 would have minor direct and indirect effects to salmonid species as a result of an increase in marine activities. These alternatives would have a "not likely to adversely affect" determination. The proposed actions will have, at most, an insignificant effect on the listed salmonid species because species may only occasionally occur in marine waters adjacent to the project area, spawning habitat does not likely occur in or around the project area, and the MAF and associated activities would affect a very small portion of the total foraging habitat available in Southeast Alaska and throughout these species ranges.

### Cumulative Effects on Humpback Whale, Steller Sea Lion and Salmonid Species

Cumulative effects including past, present and future timber harvest, activities associated with MAFs, fishing and marine recreation activities that affect the marine environment may reduce habitat for this species over time.

Alternatives 2, 3, 4 and 5 would result in a minor cumulative effect as a result of possible changes to the marine habitat. Effects are considered minor for these alternatives because the application of State and Federal regulations and Forest Plan standards and guidelines would maintain water quality in the streams that flow into marine environments. In addition, the construction and operation of all MAFs and similar facilities require an U.S Army Corps of Engineer, U. S. Environmental Protection Agency, and State of Alaska tidelands permits to maintain water quality.

## Sensitive Species

Sensitive species are those plant and animal species identified by the Regional Forester for which population viability is a concern on National Forest System (NFS) lands within the region. Sensitive species addressed in this analysis include the osprey (*Pandion haliaetus*), Peale's peregrine falcon (*Falco peregrinus anatum*), Queen Charlotte goshawk (*Accipiter gentilis laingi*), and

trumpeter swan (*Cygnus buccinator*). The Queen Charlotte goshawk is described in greater detail because this species has additional management concerns.

### Osprey, Peale's Peregrine Falcon and Trumpeter Swan

Habitat for osprey, trumpeter swan and Peale's peregrine falcon occurs along the shorelines and lakes in the project area. However, there are no documented osprey nest sites on Chichagof Island. The nearest Peale's peregrine falcon nest is over 40 miles west of the project area. Swans have been observed at the head of Freshwater Bay, outside of and south of the project area (Hodges 2001; Young and Mooney 1992). Because harvest activities are not proposed to occur near the shoreline and forest-wide standards and guidelines provide for the protection of beach and estuary habitats that provides suitable or potentially suitable nesting, perching, and foraging habitat, there will be no impact to these species.

## Affected Environment for Goshawk

### Queen Charlotte Goshawk

The northern goshawk inhabits forested lands throughout North America, favoring dense stands of conifer or deciduous old growth for nesting habitat. As of 2001, there were 63 confirmed goshawk nest sites found in all LUDs on the Tongass National Forest.

POG forest is an important component of goshawk habitat use patterns in Southeast Alaska and at all scales (nest tree, nest site, post-fledging areas) goshawks select POG forest types. However, non-productive forest types and second-growth stands are also used by goshawks for movement and foraging, emphasizing the importance of matrix lands in goshawk management (ADFG 2006). Although goshawks prefer to place their nests in mature to old growth forest types, when these habitats are not available they would nest in younger forest or in smaller patches of trees, and forage in young forest as well as along edges and in openings (Boyce et al. 2006). Although there is some documented use of second growth in Southeast Alaska, for the most part goshawks are associated with older forests.

Between 2002 and 2006, approximately 800 goshawk broadcast call stations or valley watches were completed. Survey routes and call stations were distributed across the project area and sampled an area representative of the project area. Survey information is on record in the Iyouktug project record. Surveys resulted in 32 observations of goshawks and located two goshawk nest sites (Hippoback and Iyouktug) and four goshawk nest trees. A nest site is defined as the area containing all nests used by a pair of goshawks; it is the portion of a pair's home range that contains all active and inactive nests. Nest sites were located in 2002 and were surveyed from 2003 to 2006. The Hippoback nest site was occupied and productive only in 2002. The Iyouktug nest site was occupied and suspected to be productive every year of survey. Five pluck posts were also located. Pluck posts are areas where goshawks or sharp shinned hawks pluck and eat their prey. It was not clear if which species used these

sites but it was assumed that these sites represented potentially foraging habitat for goshawks.

Goshawks were observed in Units 108, 1711, 173, 175, 818, 901, 904, east of 980 and north of 982. Pluck posts were located in Units 125, 130, 923 and 942 and in the OGR. Goshawk nest sites were located in Units 107 and 901.

Forest Plan standards and guidelines require the maintenance of an area of not less than 100 acres of productive old growth forest (if it exists) generally centered over the nest tree or probable nest tree. A 122-acre "nest buffer" containing 120 acres of POG forest was designated around the Hippoback nest site. A 128-acre nest buffer containing 120 acres of POG forest was designated around the Iyouktug nest site. Forest Plan standards and guidelines, including timing restrictions for timber harvest activities, will be followed.

## Environmental Consequences on Goshawk

### Direct and Indirect Effects on Goshawk

#### Alternative 1 (No Action)

Alternative 1 would have negligible direct, indirect or cumulative effect to Queen Charlotte Northern goshawk because there would be no change to habitat in the area. This alternative would have a "no impact" determination on the goshawk.

#### Alternatives 2, 3, 4 and 5

These alternatives would have a moderate direct effect on goshawks. Effects are considered moderate because goshawks may be disturbed from the Hippoback and Iyouktug nest sites as a result of harvest and associated activities but sufficient habitat will remain functional to maintain the species. These alternatives would have a moderate indirect effect on goshawks. Effects are considered moderate because of the reduction in POG habitat that provides potential nesting and foraging habitat. These alternatives would have a "may impact individuals but not likely to cause a trend to federal listing or a loss of viability" determination to the Queen Charlotte goshawk.

Harvest activities in Units 105, 1051, 1053, 108, 819 and 820 are proposed to occur adjacent to goshawk nest buffers. Alternatives 2 and 4 may result in more disturbances to the Iyouktug nest site because of helicopter activities associated with the harvest of Unit 104. Alternatives 2, 3 and 4 may result in more disturbances to the Hippoback nest site because of helicopter activities associated with the harvest of Unit 820. Activities such as road construction and harvest activities in Units 105, 1053 and 108 and helicopter operations would be restricted between March 15 and August 15 within 600 feet of active nest sites. Although not required, recommendations will be made to harvest Units 103, 1031, 104, 105, 1051, 1053, 108, 1081, 174, 175, 176, 819, and 820 after August 15 yearly.

Indirect effects result from the reduction of perching and foraging habitat and potential nesting habitat. Timber harvest resulting in the conversion of POG forest to young-growth, has contributed to a decline in goshawk habitat capability due to their association with this habitat and the association of their prey with POG forest (e.g., grouse and red squirrels).

As discussed in the connectivity issue above, alternatives with the greatest amount of harvest would result in the greatest reduction of POG and coarse canopy forest (Tables 3CO-5, 3CO-6 and 3CO-7 in the Habitat Connectivity section of this chapter). Because goshawks prefer to nest in larger diameter trees, reduction of coarse canopy forest is more likely to reduce potential nest habitat. Therefore Alternative 2 would have the greatest effect and Alternative 5 the least affect on goshawk foraging habitat and potential nesting habitat.

## Cumulative Effects on Goshawk

### Alternatives 2, 3, 4 and 5

POG forest would be reduced as a result of current small timber sales (approximately 107 acres), personal wood use and as windthrow occurs. Currently planned and proposed thinning of approximately 2,700 acres is designed to maintain a more open overstory in second growth stands.

These alternatives would have a moderate cumulative effect on goshawks. Effects are considered moderate because of the reduction in POG habitat that provides potential nesting and foraging habitat. Alternative 2 would have the greatest effect and Alternative 5 the least affect on goshawk foraging habitat and potential nesting habitat. POG and coarse canopy forest may be reduced slightly more than displayed as a result of current small timber sale projects, including a small sale proposed for harvest south and east of the Hippoback nest site (south of NFS Road 8531 and east of NFS Road 8530), personal wood use, and as windthrow occurs.

# Transportation System

Forest roads are classified as National Forest System (NFS) roads, Unauthorized Roads, and Temporary Roads by 36 Code of Federal Regulations (CFR) 212.1. The definitions of roads are found in the Glossary in Chapter 4 of this FEIS; additional defining information is shown below.

- NFS roads are generally required to provide long-term or intermittent motor vehicle access. These roads receive constant or intermittent use depending upon the timing of the timber harvest(s) and other activities. NFS roads form the primary transportation network in the project area. NFS roads were formerly called system roads in GIS.
- Temporary roads are defined as "roads necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road that is not included in a forest transportation atlas." For National Forest System timber sales, temporary roads are constructed to harvest timber on a one-time basis, and are decommissioned after harvest operations are complete. Approximately 6.6 miles of former temporary road in the Iyouktug project area have been built and decommissioned to the standard of the time. These decommissioned former temporary roads are not considered to be NFS or unauthorized road, according to today's road direction/definitions, but were part of the 7 miles of road identified as unauthorized in the Iyouktug DEIS. Unauthorized roads are defined as "roads or trails that are not a forest road or trail or a temporary road or trail and that is not included in a forest transportation atlas." Approximately 0.4 mile of currently existing open road in the Iyouktug project access rock pits but are not included in the forest transportation atlas; those roads have not been decommissioned or reclassified, and are now called unauthorized roads. Unauthorized roads can also include unplanned roads, abandoned travel ways, and off-road vehicle tracks that have not been designated and managed as a trail; in the Iyouktug project area, there are no unplanned roads, abandoned travel ways, or off-road vehicle tracks.

In the current GIS layer, roads are labeled as system or non-system. Non-system roads include former temporary roads that have been decommissioned as well as roads now called unauthorized roads. Throughout the Iyouktug EIS, the non-system roads have been identified as "Unauthorized Roads."

## Affected Environment for Roads

### Existing Condition of Roads

Roads were constructed as part of previous timber sale contracts for the purpose of timber haul and administration. The use of the road system has expanded since then to include other silvicultural activities and substantial subsistence and recreational use; however, timber management is still the

primary purpose. There are 57.2 miles of existing constructed roads in the Iyouktug Project Area. This total includes NFS roads, 0.4 miles of unauthorized roads, and 6.6 miles of former temporary roads that have been decommissioned.

The existing Forest Service road system begins at the border of Native Corporation Land and the National Forest on National Forest Service Road (NFS) Road 8530. The system is accessed by road from Hoonah, which is approximately 12 miles northwest of the project boundary. NFS Road 8530 continues through the project area and provides access to False Bay and the Wukuklook recreation area.

The roads in the Iyouktug Project Area are connected to a contiguous road system consisting of approximately 150 miles of NFS roads on the northern portion of Chichagof Island. These roads are connected to the community of Hoonah, State highways and Alaska Marine Highway. All of the NFS roads were constructed in support of timber sales and connect to a Marine Access Facility (MAF) at Long Island.

Approximately 7.2 miles of Road 8530 is outside the project area and connects the project area to 2.4 miles of Road 8502 and 1.9 miles on 8570 to the terminus at the Long Island MAF. These roads are included in this analysis because they could be used for administrative traffic to access the area and for log haul to Long Island MAF, if an action alternative is selected.

Traffic is primarily seasonal; roads are closed November thru May by snow. Most of the road use on the island is due to administrative use or recreation, with some traffic from outfitter/guides and subsistence activities.

Eleven log stringer bridges currently exist on the road system in the project area. All eleven of these bridges have been rated as structurally unable to support log truck traffic. Of these existing bridges, one is located on a road that would not be utilized as a haul route. The other ten bridges must be replaced to accommodate log trucks prior to timber haul. Even if timber sales are not offered in the Iyouktug area, these bridges would need to be replaced in the near future, 3 to 5 years, if the roads are to remain open for public use.

Maintenance of existing National Forest System (NFS) roads is an ongoing process that occurs on a periodic basis. Normally this kind of road 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, 31.12). The maintenance of NFS roads on the project area may occur before, during and after the project analysis. This work is done through separate service contracts to reduce the backlog of deferred maintenance, comply with best management practices, maintain the existing infrastructure for the proposed timber sale or any future harvest entries, and other National Forest management activities. The timing of this work may coincide with this project's analysis but is not part of the proposed action or alternatives being

considered. Any effects from the road maintenance work are included in the cumulative effects analysis for this project.

## Roads Analysis Process

Part of the analysis of the project area is to identify the minimum road system needed for safe and efficient travel and for administration, utilization, and management of National Forest System lands. The minimum system is the road system determined necessary to:

- meet resource and other management objectives adopted in the Tongass Land and Resource Management Plan,
- meet applicable statutory and regulatory requirements,
- reflect long-term funding expectations, and
- ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.

The Road Analysis Process (RAP) for the Project Area is a tiered, science-based system of analysis. The first layer is the Forest Wide RAP, which is an analysis of the Tongass National Forest (USDA Forest Service 2003b). The second layer is the Iyouktug Roads Analysis (Matter 2003), which includes the Iyouktug Timber Sale project area. Prior to the RAP process, an Access Travel Management Environmental Analysis (EA) was completed on the Hoonah Ranger District in 2001, and decision notice on that analysis completed in 2002 (USDA Forest Service 2002b). A new Access Travel Management (ATM) project is being analyzed and written for Hoonah R.D. (see Appendix D of this FEIS). The proposals in this EIS are based on, and compatible with, the past analysis, and the road management objectives from this decision will be included in the new ATM plan. Road management objectives for roads constructed, reconstructed, or with bridge replacements associated with the Iyouktug Timber Sales will be determined with the decision for this project.

The road recommendations in the project area are detailed on the Road Cards in Appendix C of the DEIS and this FEIS and those roads selected will become part of the Record of Decision. Each of the roads shown in Appendix C of the DEIS and this is considered necessary for long-term management of the forest, on either an intermittent or constant basis. About 36.2 miles of road are currently considered to be open in the project area (an additional 0.4 mile are unauthorized road that are currently open).

## Road Maintenance and Reconstruction

Road maintenance consists of periodic repairs to an existing road surface, brushing, and cleaning and repairing drainage features to keep the roads in the safe and useful condition for which they were designed. For this analysis, road reconstruction is heavier maintenance of an existing road such as culvert replacement, surface rock replacement, and subgrade repair. Road maintenance and reconstruction consists of performing the work necessary to retain the road's traffic service level. The amount and level of maintenance

and repair is dependent upon traffic management objectives and maintenance criteria.

The purpose of maintenance levels is to define the level of service provided by, and maintenance required for, a specific road or segment. Roads are often built and operated at a higher maintenance level during the timber sale than they are afterwards. The operational maintenance level is the maintenance level assigned to a road considering the immediate needs, road condition, budget constraints, and environmental concerns; in other words, it defines the level at which roads would be maintained during the timber sale. The objective maintenance level is the maintenance level assigned to the road after timber harvest. It considers future road management objectives, traffic needs, budget constraints, and environmental concerns.

The maintenance levels for the roads currently existing in the project area are as follows:

- There are 7 miles of non-system road (called "unauthorized roads" throughout the Iyouktug analysis). Approximately 6.6 miles of this non-system road are former temporary roads that are closed to motorized access, brushed in by vegetation, and have waterbars installed to prevent erosion. Some of these former temporary roads have a barrier installed to prevent access and have existing ditch relief culverts in place. These former temporary roads lie within previously harvested stands and are decommissioned to the standards in place at the time of harvest. Current contracts for decommissioning of temporary roads require the removal of all culverts; new temporary road decommissioning would be consistent with current direction. Approximately 0.4 mile of this non-system road are open roads accessing existing rock quarries; these are the only unauthorized.roads (by today's standards and definitions) in the Iyouktug project area.
- There are 14 miles of NFS road maintained at Maintenance Level 1 (assigned to intermittent service roads during the time they are closed to vehicular traffic). Emphasis is normally given to maintaining drainage facilities and runoff patterns. Drainage structures are either removed or kept open to allow cross drainage of the roadway.
- There are 9 miles of NFS road maintained at Maintenance Level 2 (assigned to roads open for use by high clearance vehicles). Passenger car traffic is not a consideration. Log haul may occur at this level.
- There are 27 miles of NFS road maintained at Maintenance Level 3. This level of maintenance allows for passenger vehicle access at a

minimal level of comfort. User comfort and convenience are not considered priorities.

An Access Travel Management EA was completed on the Hoonah Ranger District in 2001, and decision notice on that analysis completed in 2002 determined that several open roads should be closed and other roads should be kept open and maintained. Three roads designated to be closed are open at this time (NFS Roads 85307, 85309, and the furthest portion of 8534). Closure of these roads would occur as ongoing activities covered by the 2002 Access Travel Management decision (USDA Forest Service 2002b).

### Existing Logging Facilities in the Iyouktug Project Area

There are no existing logging related facilities in the project area. There are no logging camps. There are no existing Log Transfer Facilities (LTF) or MAFs in the project area.

The nearest MAF is located on Long Island, near Hoonah, and is approximately 12 miles northwest of the project area. This MAF is currently in operation under a cooperative agreement between the Forest Service, Huna Totem Corporation and Sealaska Corporation. The Forest Service has easements and rights to use this MAF. Facilities at Whitestone Harbor and False Bay will not be used because they are cost prohibitive.

There is a sort yard, located on the uplands adjacent to Long Island MAF, that the Forest Service operates jointly with Huna Totem Corporation and Sealaska Corporation under Huna Totem-Forest Service and Sealaska-Forest Service Cost Share Agreements. There is no longer an existing land camp in the Hoonah area; commercial lodging is available in Hoonah. There is a Forest Service administrative site located in Hoonah, Hoonah Ranger District Office.

Many rock quarries exist in the Iyouktug project area that could be used and expanded for any new construction or existing road maintenance as needed. Roads into rock quarries are currently not identified in the Roads Atlas and are therefore unauthorized at this time.

## Environmental Consequences for Roads

The transportation systems for the action alternatives were developed to provide necessary road access to timber units in accordance with their respective harvest methods. This section focuses on the access needs of each alternative and the effects of the alternatives on the transportation system. The discussion is grouped into categories of roads, major stream crossings, MAFs (formerly LTFs), and culminates with a comparison of alternatives.

### Roads

Table 3TR-1 summarizes existing and proposed roads for each alternative. Road Management Objectives (RMOs) are displayed by alternative in Appendix C of the DEIS and this FEIS.

Table 3TR-1: Summary of Existing, Proposed, Unauthorized, and Reconstructed Road Miles by Alternative

| | Existing Condition Miles | Alt. 2 Miles | Alt. 3 Miles | Alt. 4 Miles | Alt. 5 Miles |
|---|---|---|---|---|---|
| **Existing NFS Road Miles *** | 50.2 | 50.2 | 50.2 | 50.2 | 50.2 |
| **Existing Unauthorized Road Miles*** | 7.0 | 6.6 | 6.6 | 6.6 | 6.6 |
| **Proposed NFS Road Miles** | 0.0 | 4.2 | 2.8 | 1.4 | 2.8 |
| **Temporary Road Miles** | 0.0 | 13.4 | 3.9 | 7.8 | 4.4 |
| **Total Road Miles by Alternative** | **57.2** | **74.4** | **63.5** | **66.0** | **64.0** |
| **Existing Road Miles to be Reconstructed** | 0.0 | 6.9 | 6.3 | 7.0 | 1.4 |

Source: GIS Road Layer
Note: Not all Existing Roads are used in each alternative
*Approximately 6.6 miles of this non-system road are former temporary roads that are closed to motorized and are decommissioned to the standards in place at the time of harvest. Approximately 0.4 mile of this non-system road are open roads accessing existing rock quarries; 0.22 miles of unauthorized road is categorized as Existing/Reconstruct in GIS; this 0.22 miles of road would be temporary road in some alternatives

## Projected Road Costs

Estimated costs for the roads by alternative are shown in Table 3TR-2. 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, uneven terrain. Other factors that contribute to the high cost of constructing Southeast Alaskan roads include the higher costs of shipping and labor, the numerous drainage structures needed and more complex logistics.

All roads, both existing and proposed, would be located, designed, constructed or reconstructed, and maintained following Best Management Practices (BMPs) and other applicable laws, regulations, and specifications. Refer to the Road Management Objectives in Appendix C of the DEIS and this FEIS for more information on specific BMPs.

Table 3TR-2: Projected Road Costs by Alternative

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Total Proposed NFS Road Costs** | 0 | $799,291 | $479,432 | $207,549 | $479,432 |
| **Total Temporary Road Costs** | 0 | $2,058,406 | $572,835 | $1,183,924 | $683,020 |
| **Total Reconstructed Road Costs** | 0 | $522,785 | $414,226 | $522,391 | $135,020 |
| **Total Construction Cost per Alternative** | **0** | **$3,380,482** | **$1,466,493** | **$1,913,864** | **$1,297,472** |
| **Bridges**[1] | 4 | 17 | 10 | 13 | 5 |
| **Bridge Cost** | $240,000 | $1,020,000 | $600,000 | $780,000 | $300,000 |
| **Total Cost** | $240,000 | $4,400,482 | $2,066,493 | $2,693,864 | $1,597,472 |

Source: Sandall and Heinrichsen

[1]In all alternatives, some of these bridges would need to be replaced in the near future, 3 to 5 years, if the roads are to remain open for public use

Note: 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 increase over time due to any of the following variables: fuel, material and freight costs.

### Stream Crossings and Bridges

If a new or replacement bridge is needed, the Forest Service plans to install a bridge at each location where a road intersects with a Class I or II stream and in places where gorges or other topographic features make a bridge necessary. There are at least 18 locations in the project area that will require a bridge installation or replacement. Seventeen of these eighteen bridges are installed or replaced in Alternative 2; the additional bridge, not in Alternatives 2, 3, or 5, would be installed in Alternative 4. Table 3TR-2 shows the number of bridges required and also their associated cost for each alternative.

Bridge installation costs were derived by planning a new bridge installation at each necessary location. Bridge costs can be reduced by reusing each bridge as many times as possible. By so doing, overall bridge costs can be reduced from an average of $60,000 per crossing to below $40,000 per crossing.

## Logging Related Facilities

A Marine Access Facilities (MAF) would not be constructed in conjunction with this project. Due to Long Island sort yard's size and convenient location at the MAF, it is not expected that any other sort yard would be needed for any of the action alternatives. There is a need for rock sources during the construction of the new NFS roads and the temporary roads and also for the maintenance of the existing NFS roads within the project area. Existing rock quarries would be used and expanded for any new construction or existing road maintenance as needed. No new rock quarries are anticipated.

## Direct and Indirect Effects of Alternatives

The effects of the transportation system on other resources are discussed in the specific resource sections. This section focuses on the transportation system by alternative and discusses post-project management.

### Alternative 1 – No Action

No new road construction or reconstruction would occur. The maintenance of existing NFS roads would not change. Normal, ongoing maintenance costs would be incurred. Bridges would be replaced on open roads as needed.

### Actions/Effects Common to Alternatives 2, 3, 4, and 5

- The majority of the ground-based harvest would be removed from the project area via the road system and taken to a local mill. Larger sales, as well as small sales by purchasers outside of Hoonah, may result in the use of MAF to transport logs by saltwater to a processing facility.
- In the Iyouktug project, reconstruction of currently closed NFS roads needed for accessing timber units would consist of removing blow down trees, brushing, regrading of the existing roadbed, and clearing road ditch lines and drainage channels. Reconstruction also involves reinstalling culverts at drainage and stream crossings. Stream crossing structures would be removed after logging operations are complete and drain ditches would be added to move water off of the roadbed.
- Closed roads would be placed into storage by installing a barrier to prevent use by motorized vehicles, removing stream-crossing culverts and bridges, and restoring natural drainage patterns. These roads could be re-opened by filling in water bars and re-installing stream crossing structures as needed.
- All temporary roads would be decommissioned after timber harvest, including the removal of structures and addition of drain ditches to move water off of the roadbed. Temporary road decommissioning will be part of the timber sale contract.

### Alternative 2 – Proposed Action

This alternative proposes construction of 3.8 miles of new NFS road, reclassification/construction of 0.4 mile of existing unauthorized road to NFS road, and 13.4 miles of temporary road. All of the NFS road would remain open after the harvest for future timber harvest and silvicultural activities. Temporary roads will be decommissioned post harvest. Approximately 6.9 miles of existing road would be reconstructed and then closed after timber harvest completion, and 17 bridges would be replaced or installed. Total construction cost of all roads and bridges for this alternative would be approximately 4.4 million dollars. (See Tables 3TR-1 and 2)

### Alternative 3

This alternative proposes construction of 2.4 miles of new NFS road, reclassification/construction of 0.4 mile of existing unauthorized road to NFS road, and 3.9 miles of temporary road. All of the new NFS road would be closed and placed into storage after the harvest. Temporary roads would be decommissioned post harvest. Approximately 6.3 miles of existing road would

be reconstructed and then closed after timber harvest completion, and 10 bridges replaced or installed. The total construction cost of all roads and bridges for this alternative would be approximately 2.1 million dollars. (See Tables 3TR-1 and 2)

### Alternative 4

This alternative proposes construction of 1.0 miles of new NFS road, reclassification/construction of 0.4 mile of existing unauthorized road to NFS road, and 7.8 miles of temporary road. The new NFS road would remain open, while temporary roads would be decommissioned. Approximately 7 miles of existing road would be reconstructed and then closed after timber harvest completion, and 13 bridges replaced or installed. The total construction cost of all roads and bridges for this alternative would be approximately 2.7 million dollars. (See Tables 3TR-1 and 2)

### Alternative 5

This alternative proposes construction of 2.4 miles of new NFS road, reclassification/construction of 0.4 mile of existing unauthorized road to NFS road, and 4.4 miles of temporary road. All of the new NFS road would remain open after the harvest for future timber harvest and silvicultural activities. Approximately 1.4 miles of existing road would be reconstructed and then closed after timber harvest completion, and 5 bridges replaced or installed. The total construction cost of all roads and bridges for this alternative would be approximately 1.6 million dollars. (See Tables 3TR-1 and 2)

## Cumulative Effects of Alternatives

The list of activities for the Iyouktug project area (Appendix D of this FEIS) was referenced in determining cumulative effects. Road maintenance of existing open roads, including some bridge replacements, would be part of ongoing activities, and would occur no matter which Iyouktug alternative was chosen. Bridge replacements and/or brushing would occur on all or parts of NFS Roads 8535, 8534, 85341, 853412 as ongoing activities under all alternatives. The effects of the transportation system on other resources are considered in the specific resource sections. This section focuses on the impacts of roads as related to length, which relates to maintenance cost.

### Alternative 1

Road closures of about 1.3 miles of existing open roads (NFS Roads 85307, 85309) would occur as ongoing activities covered by the 2002 Access Travel Management decision (USDA Forest Service 2002b) under Alternative 1. Approximately 34.9 miles NFS road would remain open after ongoing road closure activities; this is the number of miles in the project area that would need ongoing maintenance. The last 3 miles of Road 8534 would not be closed after Alternative 1 was chosen since the ATM EA decision stated that the portion of the road would be closed after the next timber sale. A new ATM decision could change road management in the project area. Road maintenance of existing open roads, including some bridge replacements, would be part of ongoing activities, and would occur no matter which Iyouktug alternative was chosen

### Alternatives 2, 3, 4, and 5

About 4.2 miles of currently open road (NFS Roads 85307, 85309, and the furthest portion of 8534) would be used in some of the action alternatives; all of these roads would be closed and placed into storage after timber harvest completion as part of the Access Travel Management decision (USDA Forest Service 2002b). Ongoing road closure/storage activities will cumulatively reduce open road miles to 36.2, 32.4, 33.5, and 34.8 for Alternatives 2 through 5, respectively in the project area after implementation of the 2002 Access Travel Management (USDA Forest Service 2002b) decision. Cumulatively, there would be less road open, and thus less maintenance needed after Alternatives 3, 4, and 5 were implemented, than for Alternative 2 (the Proposed Action) or Alternative 1 (No Action).

In all action alternatives the amount of road use in the area is not expected to change substantially as a result of these closures because the roads receive very little use.

The risk of impacts by roads are minimized and mitigated by standards and guidelines which direct the road location, design, construction, maintenance and operation, as well as the implementation of BMPs.

# Watershed and Fish

The Iyouktug Project Area contains five watersheds and one frontal unit, ranging in size from 2,851 to 14,925 acres (Figure 3-7). These provide habitat for six species of fish and other aquatic and riparian species, and fresh water for consumption. Additional information on watershed components including wetlands, karst, and soils are in the Wetlands, Geology and Karst, and Soil Resource Reports in the project record.

## Affected Environment for Watershed and Fish

Water quality (temperature and sediment concentration), water yield (the amount of water entering stream channels), and channel form in the project area are affected by climate, wetlands, natural mass movements, riparian vegetation, and human activity including roads and timber harvest.

**Climate and Streamflow**

The nearest climate station is Hoonah, Alaska, 10-15 miles to the west. Average daily maximum/minimum temperatures are 34/25° F in January and 64/51° F in July. Average total annual rainfall is 60 inches, with 56 total inches of snow. Average monthly precipitation peaks in October and is lowest in April and May. Streams are not gaged in the project area, but are probably similar to Pavlof River, the nearest gaged stream 12 miles to the south. Streamflow peaks in the spring during snowmelt and in the fall during storms. Low flow is typically in July and August.

**Surface Water and Fish Habitat**

The Iyouktug Project area has over 330 miles of streams and 12 acres of ponds. Streams are differentiated by process group, channel type and by Aquatic Habitat Management Unit (AHMU) class. Process groups describe the geomorphic properties of stream channels and their general location in the landscape, while channel types further differentiate channels within process groups (Paustian et al. 1992). AHMU class, channel types and process groups are used to assign appropriate buffers (see Table B-1, Appendix B of the DEIS).

The Alaska Region AHMU stream value classification is based on subsistence, recreational, and economic fish harvest considerations. Fish streams are Class I and II, and sediment transport streams are Class III. Table 3WF-1 displays miles of stream by AHMU class. Stream classes are further defined in the glossary (Chapter 4 of this EIS).

Figure 3-7: Iyouktug Timber Sale Area Watersheds

B&W 11x17 map

Back of Fig. 3-7

Table 3WF-1: Miles of Stream by AHMU Class in each Watershed

| Watershed | Class I | Class II | Class III | Class IV | Total |
|---|---|---|---|---|---|
| **Alpha-Spasski** | 10 | 7 | 6 | 6 | 28 |
| **Whitestone Head** | 13 | 8 | 13 | 5 | 39 |
| **Gamma-Spasski** | 4 | 5 | 5 | 2 | 17 |
| **Iyouktug Creek** | 27 | 26 | 65 | 12 | 129 |
| **Suntaheen Creek** | 17 | 17 | 28 | 10 | 72 |
| **Zeta-Spasski** | 2 | 14 | 24 | 4 | 44 |
| **Grand Total** | **74** | **77** | **141** | **38** | **330** |

### Fish Species in Project Area

Resident and anadromous fish that utilize habitat within watersheds of the proposed project are included in Table 3WF-2. Detailed descriptions of fish species and habitat requirements at various life stages are detailed in Appendix WF-1 of the Watershed and Fisheries Specialist Report.

Table 3WF-2: Fish Species in the Iyouktug Project Area

| Common Name(s) | Scientific Name | Watersheds with Fish Species |
|---|---|---|
| Coho (Silver) salmon | *Oncorhynchus kisutch* | Alpha-Spasski, Iyouktug, Suntaheen, Whitestone Head |
| Pink salmon | *Oncorhynchus gorbuscha* | Alpha-Spasski, Iyouktug, Suntaheen, Whitestone Head |
| Chum salmon | *Oncorhynchus keta* | Alpha-Spasski, Iyouktug, Suntaheen, Whitestone Head |
| Steelhead trout | *Oncorhynchus mykiss* | Iyouktug, Suntaheen |
| Cutthrout trout | *Oncorhynchus clarki* | Alpha-Spasski, Iyouktug, Suntaheen, Whitestone head |
| Dolly Varden | *Salvelinus malma* | Alpha-Spasski, Iyouktug, Suntaheen, Whitestone Head |

More channels are currently accessible to anadromous fish in the Iyouktug Creek Watershed than in Suntaheen Creek making Iyouktug Creek Watershed of higher value anadromous fish habitat. Few anadromous fish have historically used Suntaheen Creek above the lower fish pass due to difficult

access. However, because excellent fish habitat remains above the partial barriers, Suntaheen Creek provides very high quality resident habitat.

### Water Quality

Temperature and sediment concentration are the primary water quality concerns in timber harvest areas. Stream temperature is affected by loss of shading when riparian forests are harvested or blow down (through windthrow), or when large areas of hillsides are clearcut, increasing soil temperatures in the upper reaches of the watershed. Decreasing the amount of shade provided by streamside trees and vegetation can increase water temperature and decrease the amount of dissolved oxygen in the water. The metabolic rates of fish and other aquatic organisms are directly related to water temperature. For fish streams, migration routes and rearing areas water temperature should not exceed 15˚C and spawning and egg and fry incubation areas should not exceed 13˚C (Department of Environmental Conservation, 2007). Evaluation of stream temperature data from both harvested and un-harvested watersheds on Prince of Wales Island showed no predictive relationship between total watershed harvest or riparian harvest and days with high stream temperatures (USDA Forest Service 2004, Walters and Prefontaine 2005). The stream temperature data correspond to the period when most harvested riparian stands had recovered shade from shrubs and alder. High stream temperatures in Southeast Alaska are likely to occur during warm, rainless weather and resulting low stream flow periods regardless of watershed harvest levels or extent of past riparian harvest. This confirms the importance of current riparian management practices of the Forest Plan. Shade provided by intact riparian forests moderates the effects of climate on stream temperature. A total of 270 acres of RMA along 13 miles of Class I, II, and III stream were harvested in the Iyouktug Project area during pre-Forest Plan logging (Table 3WF-3). The majority of the logging occurred 15-20 years ago, thus if the same relationship holds as on Prince of Wales, it is unlikely that this harvest is causing temperatures in fish streams to exceed 15° C.

Table 3WF-3: Acres of RMA Harvested in each Watershed

| Watershed | Class I | Class II | Class III | Total |
|---|---|---|---|---|
| **Alpha-Spasski** | 8 | 13 | 1 | 22 |
| **Whitestone Head** | 5 | 8 | 5 | 17 |
| **Iyouktug Creek** | 53 | 37 | 30 | 119 |
| **Suntaheen Creek** | 42 | 42 | 27 | 111 |
| **Total** | **109** | **100** | **62** | **270** |

Large woody debris (LWD) plays an important role in controlling stream channel morphology, regulating the storage and routing of sediment and particulate organic matter, and creating and maintaining fish habitat (Hicks et al. 1991). Timber harvest can change the distribution and abundance of LWD in streams with riparian harvest. Field inspection of RMA harvest along several small alluvial fan-type Iyouktug Creek tributaries indicated channel

destabilization and localized increased sedimentation. The main channels of both Iyouktug and Suntaheen Creeks have retained the majority of riparian forest.

An increase in sediment beyond natural conditions may be caused by equipment in the stream, inadequate road/stream crossings, logging or road-induced landslides, and storm runoff over disturbed areas. Fine sediment in the gravel of fish spawning streams can reduce interstitial water flow, lowering dissolved oxygen concentrations and trapping emerging fry in the gravel. Salmonid survival was found to decline in some Alaska streams when timber harvest increased the amount of fine sediment in spawning gravels. After intensive timber harvest, without the use of BMPs, salmonid survival was found to decline in some Alaska streams when timber harvest increased the amount of fine sediment in spawning gravels. The amount of sediment in gravels returned to prelogging conditions within 5 years (Hicks et al., 1991). Because Iyouktug activities would incorporate state-of-the-art BMPs in full compliance with current state and federal regulations, we do not anticipate measurable increases in sediment.

Currently, there are no water quality limited waterbodies within the project area. The "Long Island" MAF (referred to by the State as the "East Port Frederick LTF"), which is outside the project area, was Section 303(d) listed by the State of Alaska for non-attainment of the residues standard for bark and woody debris. The operator submitted a remediation plan, which DEC approved on March 14, 2005. This MAF may be used as part of this timber sale. The Forest Service and all operators or contractors using this facility as part of this timber sale will follow the approved remediation plan.

**Landslides**

Managed stands in the Project Area have a higher landslide rate than unmanaged areas, and landslides initiate on lower slopes in managed stands than in unmanaged stands (see Soils report for further information). At least one landslide since 2005 initiated in a 1989 harvest unit entered a stream channel and eventually fish habitat in the Whitestone Head Watershed.

**Road Density and Stream Crossings**

Roads have been found to contribute more sediment to streams than any other land management activity (Gucinski et al. 2001) and pose the greatest potential risk to watershed resources and fish habitat capabilities (Furniss et al. 1991). Studies in Southeast Alaska have correlated higher rates of road erosion with heavy traffic and poor quality rock surfacing (Kahklen and Hartsog 1999). Roads can also affect stream flow connectivity. There are about 57 miles of road in the project area and 243 mapped stream crossings. Iyouktug Creek, Suntaheen Creek, and Alpha-Spasski Creek watersheds have the highest road density and potential for adverse effects from roads. A field survey of roads in 2006 indicated that most road segments on gentle slopes did not have erosion

problems while roads crossing steep terrain and Class III channels in Iyouktug Creek Watershed had created several small landslides and washouts.

The guiding criteria for culvert design is to allow for natural migration by adult and juvenile fish through the culvert during various flows. The Tongass National Forest developed juvenile fish passage evaluation criteria with an interagency group of professionals. Culvert categories are: green (conditions have a high certainty of meeting adult and juvenile fish passage requirements at all stream flows), gray (conditions are such that additional analysis is required to determine juvenile fish passage ability), and red (conditions have a high certainty of not providing juvenile fish passage at all stream flows, such as mean annual flood levels). Most fish stream crossing structures on roads in the Iyouktug Timber Sale project area have been surveyed at least once to determine function, and have been categorized as green, gray or red. There are five red, five gray and 29 green known fish culverts currently in the project area boundary, according to the Tongass Road Condition Survey (RCS) database (2/12/2008) and the Iyouktug Roads Analysis Process. One of the existing red culverts is in the Iyouktug Creek watershed, one is in the Suntaheen Creek watershed, two are in the Whitestone Head Creek watershed and one is in the Alpha Spasski watershed. Two gray culverts are within the Suntaheen watershed, two are within the Iyouktug watershed and one is within the Whitestone Head watershed. In addition to these, there are an additional two red, two gray and 13 green culverts along the haul route between the project area and the Long Island MAF. A complete list of all red, gray and green culverts within the project area and along the haul route, their location and status is located in the Watershed and Fisheries Resource Report.

Table 3WF-4: Existing Roads in the Project Area.

| Watershed | National Forest System Road Miles | Unauthorized Road[1] Miles | Total Road Density (mi/mi[1]) | Stream Crossings |
|---|---|---|---|---|
| **Alpha-Spasski** | 4 | 0 | 0.8 | 25 |
| **Iyouktug Creek** | 19 | 4 | 1.0 | 107 |
| **Suntaheen Creek** | 16 | 2 | 1.3 | 76 |
| **Whitestone Head** | 7 | 1 | 0.9 | 32 |
| **Zeta-Spasski** | 4 | 0 | 0.2 | 3 |
| **Grand Total** | **50** | **7** | **0.8** | **243** |

[1] Unauthorized roads include spur roads built to harvest particular units and roads to rock pits. Most of these roads were considered temporary and have been decommissioned to the standards of the day; however, as long as the road prism remains, they are considered existing roads for this analysis and included in total road density.

### Water Yield

Studies have indicated that 20-35% of precipitation is intercepted by canopy in coastal temperate rainforests (Banner et al. 2005). Canopy removal decreases this interception, increasing the amount of water available to streams. Changes in annual water yield and peak flows following timber harvest and road building have been documented in numerous studies in the Pacific Northwest

and are commensurate with the proportion of watershed harvested (Bosch and Hewlett 1982, Harr 1986, Jones and Grant 1996, Jones 2000, Moore and Wondzell 2005). If timber harvest and road building is extensive enough (generally 20% or more canopy removal per watershed) to cause increases in water yield and peak flows during salmon spawning seasons, spawning success may be affected. Bed load movement resulting from increased peak flows can bury eggs to depths that prohibit fry emergence. Scour can remove or rework redds and crush incubating eggs or fry (Sullivan et al. 1987). Road ditches integrate with and extend the stream network thereby increasing transport efficiency to streams (Montgomery 1994, Wemple et al. 1996).

Recovery of pre-harvest streamflow conditions is reported to occur at between 10 and 30 years in the Pacific Northwest (Jones 2000). Road effects on water yield may not recover until flow paths are reclaimed during road obliteration. Forest Plan Appendix J (USDA Forest Service 1997) encourages a closer look at watersheds that have been or are proposed to be harvested over 20% of their area within 30 years. No watersheds or subwatersheds in the Iyouktug project area have yet reached this threshold (Table 3WF-5), however, almost all harvest has been within the last 30 years (the majority 16-20 years ago) and will cumulatively affect water yield along with proposed harvest.

Table 3WF-5: Existing Young-growth Stands in Iyouktug Watersheds and Percent Canopy Removal.

| Watershed | Watershed Acres | Existing Harvest Acres | Percent Harvest | Percent Canopy Removal* |
|---|---|---|---|---|
| **Alpha-Spasski** | 3,238 | 249 | 8 | 11 |
| **Whitestone Head** | 5,422 | 469 | 9 | 12 |
| **Gamma-Spasski** | 2,851 | 0 | 0 | 0 |
| **Iyouktug Creek** | 14,925 | 1,192 | 8 | 9 |
| **Suntaheen Creek** | 9,036 | 1,120 | 12 | 14 |
| **Zeta-Spasski** | 11,391 | 70 | 1 | 1 |
| **Total** | **46,863** | **3,100** | **7** | **8** |

*Canopy removal includes existing harvest and road acres.

## Environmental Consequences for Watershed and Fish

Measurable parameters associated with effects to watershed resources include existing and proposed road lengths, harvest unit acres, number of stream crossings, and percent canopy removal. The level of effects due to these conditions is estimated using the following qualitative descriptors which account for how measurable the effect would be, how widespread the effect is likely to be, how long it is likely to last, and whether it is likely to require mitigation.

**Negligible:** Water quality, water yield, or fish habitat would not be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight, local, and short-term. Negligible, as defined here, includes no effect.

**Minor:** Changes in water quality, water yield, or fish habitat would be measurable, although the changes would be small, likely short-term, or the effects would be localized to the affected channel segment. No mitigation measures beyond routine BMP implementation would be necessary to maintain water quality.

**Moderate:** Changes in water quality, water yield or fish habitat would be measurable, but would be local to the subwatershed scale. Site-specific mitigation measures associated with water quality or hydrology would be necessary and the measures would likely succeed.

The effects analysis will focus on Alpha Spasski, Iyouktug Creek, Suntaheen Creek, and Whitestone Head Creek. Direct, indirect, and cumulative effects to Zeta-Spasski and Gamma-Spasski are negligible in all alternatives because either no or extremely low levels of harvest are proposed.

### Effects on Large Woody Debris and RMA Buffers

The potential for harvest to affect large woody debris is negligible in all alternatives because stream buffers will be left along the length of all Class I, II, and III streams.

Reasonable Assurance of Windfirmness (RAW) zones in ground-based units are assigned where wind risk is estimated to be moderate-high or high based on slope aspect, exposure, and evidence of past windthrow. Tongass buffer monitoring data has shown that in buffers without RAW trees, about 5% of trees on average are blown down. It is logical to assume that fewer than 5% of RMA buffer trees will be lost due to windthrow when protected by RAW zones. Negligible direct, indirect, or cumulative effects on RMAs are anticipated due to windthrow.

## Direct and Indirect Effects on Water Yield

Water yield in the project area may be affected where over 20% of the canopy is removed from a watershed in less than 30 years. In this analysis, single tree selection harvest is normalized by percent basal area removed, so that a 100-acre unit with 50% basal area removed is treated as 50 acres of canopy removed. Percent canopy removed includes harvest and road area. Because studies have indicated that smaller watersheds are more vulnerable to increased water yield, canopy removal percentages were calculated for subwatersheds in Iyouktug, Suntaheen, and Whitestone Head Creeks. Direct and indirect effects to water yield would be negligible in all alternatives because 10% or less canopy is removed per watershed, and 15% or less is removed per subwatershed (the Watershed and Fish Specialist Report contains a breakdown of acres).

## Cumulative Effects to Water Yield

Cumulative effects to water yield may result from canopy removal on 396 acres of roads and 3,100 acres of timber harvest units in the past 30 years and about 107 acres of ongoing small sales in project area watersheds, as well as acres of road and harvest in the five alternatives

### Alternative 1

There are no direct or indirect effects to water yield under Alternative 1, thus no cumulative effects.

### Alternative 2

Cumulative effects to water yield are likely to be small, but measurable at the subwatershed scale in three subwatersheds of Suntaheen Creek and Iyouktug Creek where canopy removal is over 20% (Table 3WF-6). This is also the only alternative that results in 20% canopy removal in Suntaheen Creek Watershed. As water yield and peak flows tend to increase with canopy removal, uncontained (floodplain, alluvial fan, and palustrine) channels in these watersheds could retain sediment or overflow their banks during floods, adversely affecting fish habitat during and immediately after the storms. There could also be a beneficial effect of increasing flow during summer dry periods (Bartos, 1989). These effects will be long term but not permanent, decreasing over the next 15 years as regrowth develops the capacity to absorb runoff in existing harvest units. Changes in water yield would not likely be measurable in other watersheds or subwatersheds.

### Alternatives 3 and 4

Cumulative effects to water yield are likely to be small but measurable at the subwatershed scale in Upper Iyouktug and Middle Suntaheen subwatersheds. As with Alternative 2, effects would be most likely found in uncontained channel types and decrease over the next 15 years as second growth develops the capacity to absorb runoff in existing harvest units.

### Alternative 5

This alternative proposes the least amount of canopy removal of all alternatives. Water yield may increase measurably due to canopy removal in the Middle Suntaheen subwatershed. Effects to water yield would be negligible in all other subwatersheds.

Table 3WF-6: Cumulative percent canopy removal by subwatershed including past roads and harvest and ongoing small sales.

| Subwatershed | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Watershed Percentage Alpha Spasski Creek** | **10%** | **15%** | **15%** | **13%** | **12%** |
| **Iyouktug Estuary** | 4% | 4% | 4% | 4% | 4% |
| **Middle Iyouktug** | 10% | 18% | 14% | 15% | 13% |
| **North Fork Iyouktug** | 9% | 24% | 19% | 13% | 15% |
| **S. Fork Iyouktug** | 9% | 16% | 13% | 11% | 10% |
| **Upper Iyouktug** | 8% | 23% | 21% | 22% | 19% |
| **Watershed Percentage Iyouktug Creek** | **9%** | **19%** | **15%** | **13%** | **13%** |
| **Lower Suntaheen** | 0% | 1% | 1% | 1% | 0% |
| **Middle Suntaheen** | 18% | 28% | 26% | 27% | 20% |
| **Upper Suntaheen** | 14% | 19% | 19% | 18% | 16% |
| **Watershed Percentage Suntaheen Creek** | **14%** | **20%** | **19%** | **19%** | **15%** |
| **L. Whitestone Head Creek** | 1% | 1% | 1% | 1% | 1% |
| **N. Whitestone Head Creek** | 6% | 9% | 7% | 10% | 9% |
| **S. Whitestone Head Creek** | 11% | 16% | 13% | 16% | 12% |
| **Watershed Percentage Whitestone Head Creek** | **9%** | **13%** | **11%** | **13%** | **10%** |

Source: Includes existing and proposed road acres, existing and proposed clearcut acres, and proposed single tree selection cut acres normalized by percent removal.

## Direct and Indirect Effects on Water Quality – Sediment and on Fish

Roads and road/stream crossings are both a direct and indirect source of sediment. High road/stream crossing numbers indicate higher potential for short-term sedimentation due to construction in the stream and long-term effects due to drainage disruption by the road prisms. Road/stream crossings require stream channel disturbance during construction and decommissioning, and result in a locally altered channel and riparian area. Sediment is introduced into channels during construction, and the new road prism generally sheds sediment into channels during storms indefinitely. Properly placed and maintained crossings affect only the local channel segment, and are individually minor effects. Multiple large stream crossings in a subwatershed may increase the risk of sediment input. Fish stream crossings will be bridged to minimize channel disturbance and cost of designing a fish passage culvert.

All road/stream crossings are included in this analysis for both proposed temporary and proposed system roads. Short-term, local sedimentation is likely during the replacement of pre-existing stream crossing structures on reconstructed roads. This will change the existing condition less than new crossings because the road prism and in some cases bridge abutments already exist. Crossings on roads that will remain open indefinitely after the timber sale are more likely to have longer term water quality impacts than those that are closed immediately after the sale. All crossings proposed to remain open

after the timber sales are in the Iyouktug Creek watershed. They are shown in parentheses on Table 3WF-7. All crossing structures on system roads designated for closure and temporary roads will be removed when logging is completed. The application of BMPs during layout, implementation, and maintenance will maintain water quality to State of Alaska standards for all alternatives. The NFS road construction within all action alternatives includes reclassifying approximately 0.4 mile of existing, open, unauthorized roads accessing rock pits to NFS roads. No new crossings would be needed for these roads to rock pits.

### Alternative 1

No new crossings would be constructed, thus there would be no direct or indirect effects on water quality or fish from this alternative.

### Alternative 2

There would be four new fish stream crossings (one Class I and three Class II) constructed, two of which would remain open. Effects to fish habitat would be measurable, but restricted to the channel segment immediately adjacent to the crossing, and would occur at locations and during times that are the least likely to disturb fish. Direct effects to fish habitat due to road crossings are expected to be minor. Three red culverts (NFS Roads 85313-MP 0.080, 85307-MP 1.028 and 85302-MP 0.0513) and one gray culvert (NFS Road 85300 MP 0.097) would be removed upon completion of this timber sale, locally improving fish habitat. .

There would be 10 new Class III stream crossings, two of which will remain in place. These crossings are on steep, active stream channels, thus site-specific design and BMP implementation will be necessary to mitigate water quality risks (see Unit card for Units 123 and 124). In addition, there will be 62 new known Class IV stream crossings, 20 of which will remain in place. Alternative 2 presents a moderate risk to water quality in the North Fork Iyouktug Creek subwatershed. This risk would become minor when all but three stream crossing structures are removed after the harvest is completed. This alternative presents a minor risk to water quality in other subwatersheds.

Current sport and subsistence fishing use with the project area is relatively low and mainly limited to the lower reaches of the main stream systems near saltwater. Increased fishing pressure due to this timber sale is not anticipated to affect fish populations in the project area due to the new road locations within the watershed and the general remoteness of the area. Increased road densities and fish stream crossings within the various alternatives will allow improved access to fish streams; however these reaches are mainly located in upper watershed areas, with fish inhabiting these reaches being primarily small in size and undesirable for the majority of anglers. There is no commercial fishing within the project area, however commercially fished fish species do reside within the project area. Due to the limited and negligible effects anticipated, no adverse impact on commercial fishing is expected as a result of this project. Please see the Essential Fish Habitat Section later on in this

section for further information on freshwater and marine fish species and populations.

### Alternative 3

This alternative proposes the fewest miles of new construction. There would be a minor effect to fish habitat due to one new Class II fish stream crossing, and a minor effect to water quality due to five new Class III and 20 new known Class IV stream crossings. Two red culverts (NFS Roads 85307 MP 1.028 and 85302 MP 0.0513) and one gray culvert (NFS Road 85300 MP 0.097) would be removed upon completion of this timber sale, locally improving fish habitat. None of the new roads will remain open to the public after the sale in this alternative, decreasing the risk of continued erosion and maintaining current fishing opportunities. Existing roads to rock pits would remain open, but impacts would be limited.

### Alternative 4

This alternative proposes the fewest stream crossings. There would be three new Class II fish stream crossings constructed, none of which would remain in place. Effects to fish habitat would be measurable, but restricted to the channel segment adjacent to the crossing, thus effects to fish habitat would be minor. Effects to fishing would be similar to those described in Alternative 2. Three red culverts (NFS Roads 85313 MP 0.080, 85307 MP 1.028 and 85302 MP 0.0513) and one gray culvert (NFS Road 85300 MP 0.097) would be removed upon completion of this timber sale, locally improving fish habitat.

There would be a minor effect to water quality due to four new Class III and 15 new known Class IV stream crossings. Only two of these new Class IV stream crossings structures would remain in place.

### Alternative 5

There would be a minor effect to fish habitat due to one new Class II fish stream crossing, and a minor effect to water quality due to five new Class III and 22 new known Class IV stream crossings. Effects would be concentrated in the Iyouktug Creek watershed, and greater than Alternative 3 because 12 crossing structures would remain in place indefinitely after the sale, requiring regular maintenance. Effects to fishing would be similar to those described in Alternative 2.

Table 3WF-7: Total New Stream Crossings by Alternative in Each Watershed. Numbers in parentheses indicate crossings that will remain in place.

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Alpha Spasski Creek** | 0 | 7 | 7 | 5 | 7 |
| **Iyouktug Creek** | 0 | 60 (24) | 17 | 8 (2) | 17 (12) |
| **Suntaheen Creek** | 0 | 2 | 2 | 4 | 2 |
| **Whitestone Head Creek** | 0 | 7 | 0 | 5 | 2 |
| **Total New Stream Crossings** | **0** | **76** | **26** | **22** | **28** |

Table 3WF-8: Total Miles of New Road Construction* per Watershed. Numbers in parentheses indicate miles of road that would remain open.

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Alpha Spasski Creek** | 0 | 0.8 | 0.7 | 0.7 | 0.8 |
| **Iyouktug Creek** | 0 | 12.0 (3.8) | 4.2 | 3.5 (1.1) | 4.2 (2.4) |
| **Suntaheen Creek** | 0 | 2.2 | 1.1 | 2.8 | 1.1 |
| **Whitestone Head Creek** | 0 | 1.9 | 0.1 | 1.6 | 0.7 |
| **Total Miles of New Road** | **0** | **17.0** | **6.1** | **8.6** | **6.8** |

* Table displays construction of new road prisms

### Direct and Indirect Effects on Water Quality - Temperature

Because all Class I, II, and III streams will have no-cut buffers, and streams in single tree selection harvest units will retain shade, only Class IV streams in clearcut units are likely to suffer increased solar radiation due to harvest. The greatest proportion of stream miles harvested is 6.9 % for Alternative 2 in Iyouktug Creek. These are small streams (less than 5 feet bankfull width), so this represents significantly less than 6.9% of the water supply to Iyouktug Creek; therefore it is unlikely that any measurable temperature increase will occur because of harvest in this watershed. Over all harvested watersheds, Alternative 2 harvests 3.9% of total stream miles, about twice as many as Alternatives 5 and 3, and three times as many as Alternative 4. Temperature increases beyond fish tolerance due to harvest are not anticipated in any project watersheds.

### Cumulative Effects on Water Quality - Sediment

Existing conditions with the potential to affect water quality include roads, stream crossings, and landslides. Future actions include road closures authorized under the 2002 Access Travel Management decision, and ongoing small sales. A cumulative sediment risk assessment indicates that Middle Fork Iyouktug, South Fork Iyouktug, and Upper Suntaheen subwatersheds have the highest sediment risk due to a combination of steep slopes, depositional stream channels, and past management. Upper Suntaheen also has the most acres of mapped landslides within the forested area, and thus the highest risk from future landslides (Watershed and Fish Specialist Report).

Cumulative effects of road and stream crossings on water quality are likely in the Iyouktug and Suntaheen watersheds, especially the Middle Iyouktug

subwatershed (57 existing crossings) and Middle Suntaheen subwatershed (47 existing crossings). Alternative 2 has the greatest cumulative impacts in the Iyouktug Creek Watershed since it adds 60 stream crossings and 12 miles of road. Cumulative effects of roads and stream crossings on water quality are expected to be minor in other watersheds for all alternatives.

Existing road crossings of fish streams are generally in good condition with the exception of 5 red culverts in the project area. Three of these red culverts will be removed as part of this project under Alternatives 2 and 4 (NFS Roads 85302 MP 0.513, 85313 MP 0.080 and 85307 MP 1.028) and two will be removed under Alternative 3 (NFS Roads 85302 MP 0.513 and NFS Rd#85307 MP 1.028). The other two red pipes (NFS Roads 8530_9.38R MP 0.057 and 8534 MP 1.554) will not be fixed directly as a result of this project, however the the red pipe on the 8534 road is a priority maintenance item for the 2008 field season. One gray culvert on NFS Road 85300 (MP 0.097) will be removed under Alternatives 2, 3 and 4. The condition of fish stream crossings will improve as culvert replacements are proposed and roads are closed under the 2002 ATM. Under this ATM, two miles of road would be closed and stored in the Iyouktug Creek watershed under the ATM, as well as the removal of the red culvert in the Suntaheen watershed (NFS Road 85307 MP1.028). Although the road prism would remain on a steep slope, removal of 11 stream crossing structures, two of which have been chronically overflowing and eroding the road prism, will improve water quality. Cumulative road density in all watersheds is relatively low at less than 2 miles/mile$^2$.

Table 3WF-9: Total Cumulative Stream Crossings by Alternative within Affected Watersheds

| | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
|---|---|---|---|---|---|
| **Alpha Spasski Creek** | 25 | 32 | 32 | 30 | 32 |
| **Iyouktug Creek** | 107 | 167 | 124 | 115 | 124 |
| **Suntaheen Creek** | 76 | 78 | 78 | 80 | 78 |
| **Whitestone Head Creek** | 32 | 39 | 32 | 37 | 34 |
| **Total Stream Crossings[1]** | **243** | **319** | **269** | **265** | **271** |

Source: SRD GIS Layers; [1] Includes 3 crossings Zeta Spasski Watershed
Note: Total Cumulative stream crossings comprises all new constructed and existing stream crossing structures, including those where the crossing structure will be removed after the sales are completed.

## Cumulative Effects Comparison of Alternatives

### Alternative 1 (No Action)

Under Alternative 1, fish habitat and watershed resources would be maintained under the existing condition. About 85 acres of timber would be harvested in small sales, and roads would be decommissioned, including one red culvert removed under the Access and Travel Management Plan and one red culvert fixed during ongoing road maintenance. This alternative has the least impact on watershed resources and fish habitat.

### Effects Common to All Action Alternatives

Of the five true watersheds in the project area, Iyouktug and Suntaheen Creeks have the most fish habitat and the most past management, thus the greatest risk of cumulative effects. Effects to Alpha Spasski, Gamma Spasski, and Whitestone Head watersheds are similar between alternatives so they will be described here:

Alpha Spasski Watershed has a relatively high cumulative sediment risk due to an abundance of depositional channels below Road 8530. Most of the area below Road 8530 is undeveloped and has no proposed harvest or roads. The area above Road 8530 includes transport channels and steeper slopes. Sediment transport potential would increase slightly with all action alternatives due to increased harvest and roads, however as all roads would be decommissioned after the sale, this effect is likely to be short-term, local to road/stream crossings, and minor.

Gamma-Spasski Watershed would have at most 0.03 miles of road and 15 acres of harvest units under the action alternatives. It has a very low sediment risk index and effects to water quality, water yield, and fish habitat are expected to be negligible.

Whitestone Head Watershed has a moderately high sediment risk due to both to downstream fish habitat and upstream areas that are prone to landslides. Past harvest and road building has not been extensive in this watershed, and water yield would not increase under any of the action alternatives. Effects of Alternative 2 on water quality and fish habitat are expected to be limited to the areas adjacent to proposed stream crossings and therefore minor.

Zeta Spasski frontal watersheds will not be affected by any of the project alternatives because no harvest or roads are proposed in them.

### Alternative 2 (Proposed Action)

Alternative 2 has the greatest potential impact on watershed resources and fish habitat. Iyouktug and Suntaheen Creek Watersheds have the highest sediment risk due to extensive past and proposed harvest and road building, extensive high quality fish habitat, and unstable slopes. Water yield in several subwatersheds may increase slightly after harvest, with the potential to affect channel stability and available spawning gravels in unconfined channels in Suntaheen and Iyouktug Creek Watersheds. This increase would decline over the next 15 years as existing managed stands mature. New road construction has the potential to further concentrate water flow and deliver sediment to streams. The Iyouktug Creek Watershed is most likely to undergo local, episodic decreased water quality due to 167 cumulative stream crossings, however BMP implementation will ensure that water quality standards are met. Twenty-four new crossings would remain open after the timber sale, requiring regular maintenance. Three existing red pipes and one gray pipe would be removed upon completion of the timber sale and one red pipe would be fixed

through ongoing road maintenance. Eleven existing crossings in Iyouktug Creek would be decommissioned following the ATM. Suntaheen Creek would have a total of 78 stream crossings under Alternative 2, but no new crossings would remain open. Activities in the Iyouktug Creek watershed impact higher value fish habitat more so than in Suntaheen Creek as more channels are currently accessible to anadromous fish.. .

### Alternatives 3 and 4

Alternative 3 has less potential than Alternative 2 to affect watershed resources and fish habitat because it proposes fewer than half the number of road/stream crossings, and all of them would be removed after the sale. Alternative 3 has the fewest new road miles and stream crossings of any alternatives, and thus presents the lowest water quality risk. Two existing red pipes and one gray pipe would be removed upon completion of the timber sales and one red pipe would be fixed through ongoing road maintenance. Effects to water quality will be limited to areas adjacent to proposed stream crossings and thus minor. Cumulative canopy removal percentages are slightly lower, but similar to Alternative 2. Effects to water yield would be minor for a few Iyouktug Creek and Suntaheen Creek subwatersheds and negligible for all other watersheds.

Alternative 4 is similar to Alternative 3 in potential to affect water yield, water quality, and fish habitat, however three existing red pipes and one gray pipe would be removed upon completion of the timber sales and one red pipe would be fixed through ongoing road maintenance.

### Alternative 5

Alternative 5 proposes the least harvest of all alternatives, but slightly more road than Alternatives 3 and 4. One existing red pipe would be removed as part of the ATM and one red pipe would be fixed ongoing road maintenance Effects to water yield are expected to be negligible in all watersheds, and effects to water quality would be limited to road/stream crossings and thus minor.

### Cumulative Effects from Harvest on Adjacent Private Land

Extensive timber harvest has taken place in the Spasski Watershed, a high-value sport fishery and primary salmon producer adjacent to the project area. This harvest is on private land and has had unquantified but probable adverse effects to water quality and fish habitat due to extensive riparian harvest and landslide initiation. Because the boundary is outside project area watersheds, there is no cumulative effect to project area fish or water quality due to adjacent harvest. However, the relatively undisturbed habitat in the project area may increase in value as sport fishing pressure increases in the project area.

# Essential Fish Habitat

***The following text is quoted from the Iyouktug DEIS (September 2007) with the addition of one reference as requested by NMFS.***

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act require the Forest Service (FS) to consult with the National Marine Fisheries Service (NMFS) regarding actions that "may adversely affect" essential fish habitat (EFH) for federally managed marine and anadromous fish species. 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. The procedures are posted on the Tongass intranet site.

Federally managed fish species are those species 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: Chinook, chum, coho, pink, and sockeye salmon; Walleye pollock; Pacific cod; arrowtooth flounder; yellowfin, rock, rex, dover and flathead sole; Alaska plaice; sablefish; Pacific Ocean perch; shortraker, rougheye, northern, thronyhead, yelloweye, and dusky rockfish; sculpin; skates; squid; octopus; forage fish; and weathervane scallop. Several common fish species that are not managed under a FMP include: Dolly Varden char, cutthroat trout, steelhead, halibut, ling cod, Pacific herring, and Dungeness crab.

EFH is defined as "those waters and substrates 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 includes estuarine and marine areas from tidally submerged habitat to the 200-mile exclusive economic zone.

There are four main steps in the consultation process:

1. The FS 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.
2. An EFH Assessment is prepared by the FS as a component of the NEPA document and forwarded to the NMFS to initiate formal consultation.
3. 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.

4. The FS must provide a written response to NMFS within 30 days explaining our evaluation of the conservation recommendations. The response may include reasons for not following the recommendations.

An EFH Assessment includes, at a minimum:

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. FS conclusions regarding the effects of the action on EFH, and
4. Proposed mitigation, if applicable.

A more complete description of the consultation process is included with the June 27, 2007 letter.

**Description of the Proposed Action**
The proposed action (Alternative 2) for the Iyouktug Timber Sale would harvest 4,185 acres of FS land approximately 12 miles SE of Hoonah, AK. The other four action alternatives propose harvest ranging from 883 to 3,332 acres. Various yarding systems including cable, shovel, and helicopter are proposed. New road construction would range from 6.3 to 17.2 miles and include both temporary roads that would be decommissioned at the end of the timber sale and permanent roads that would remain open. There would be one new road crossing at a Class I stream in Alternative 2. Logs will either be barged from the Long Island Marine Access Facility (MAF – the State refers to it as the East Port Fredrick Log Transfer Facility) or placed into saltwater for rafting to mills. A complete description of the proposed action and all of the alternatives can be found in Chapters 1 and 2 of this document.

**Potential Adverse Effects on Freshwater EFH**
The Iyouktug project area has over 330 miles of stream in 5 watersheds. Of the total, 74 miles are Class I streams (see Table 3WF-1). Iyouktug, Suntaheen, and Whitestone Head creeks and tributaries are important fish bearing streams and have populations of federally managed species of pink, chum, and coho salmon. Iyouktug and Suntaheen creeks also have populations of Dolly Varden char, cutthroat trout and steelhead. Whitestone Creek also has Dolly Varden (Johnson and Weiss, 2007).

Potential adverse effects on freshwater EFH include changes in water yield, sediment, water temperature, and fish passage at road crossings. The FS has determined the proposed action may adversely affect freshwater EFH.

Previous studies have shown increases in water yield when over 20 percent of the canopy is removed in less than 30 years (Bosch and Hewlett 1982). For Iyouktug, effects on water yield are expected to be negligible for all alternatives because 10 percent or less canopy is removed per watershed and 15 percent or less is removed per subwatershed.

Sediment production from forest management has been shown to be largely the result of road construction and use. The number of new road crossings of fish streams range from three to six depending upon the alternative. Class III streams do not have fish, but are upstream of fish habitat and three to 20 new road crossings will likely generate sediment to downstream EFH.

Water temperature increases when shade producing trees are removed increasing solar radiation to stream channels. The proportion of stream miles proposed for harvest without buffers ranges from approximately 1.3 percent to 3.9 prercent for the alternatives. These are all Class IV channels, less than 5 feet wide, and generally far upstream from EFH. Temperature increases beyond fish tolerance are not anticipated in any of the watersheds.

Upstream fish passage has often been impeded or blocked by culverts installed on logging roads. Improved crossing structures and increased awareness of fish presense in small headwater streams has reduced the number of structures not meeting the fish passage standard. Depending upon the alternative, three to six new road crossings will be made on fish streams.

A more complete discussion of potential adverse effects, including cumulative effects, of the proposed action on freshwater EFH is included in the Watershed and Fish section of Chapter 3 of this document.

Potential adverse effects to freshwater EFH will be minimized because:

- Stream buffers are prescribed along all Class I, II and III streams according to Forest Plan standards and guidelines. Class I and II streams will receive a minimum no-cut buffer of 100 feet and Class III streams will receive a slope break buffer.
- In areas where extensive windthrow has occurred or is expected, buffer widths will be increased to help insure resistance to windthrow.
- Best Management Practices (BMPs) will be implemented to protect water quality and aquatic habitat for all freshwater streams. See the unit cards for specific applications of BMPs.
- Bridges will be placed at all road crossings over fish streams to minimize risks of sediment production and blockage of fish passage. All but three structures will be removed after the timber harvest.
- The temporary roads will be decommissioned following use for this timber sale and culverts will be removed.

**Potential Adverse Effects on Marine EFH**

The Iyouktug Timber Sale proposes to use the East Port Fredrick MAF owned and operated by Huna Totem Corporation. The FS has determined that use of

this MAF for placing logs into the water for barging or rafting may adversely affect EFH.

The MAF has been in use since 1983, and was listed by the State of Alaska under the Clean Water Act Section 303(d) for non-attainment of the residues standard for bark and woody debris. Dive survey information has documented an exceedance of the threshold bark accumulation. The last dive survey was conducted in 2006 and 2.9 acres of continuous bark coverage was reported. This accumulation is roughly similar to that found during 2000-2002 dive surveys. Due to the high levels of bark and the Section 303(d) listing, Huna Totem Corporation submitted a remediation plan to the State Department of Environmental Conservation on March 14, 2005. The plan was approved and contains provisions to minimize future accumulation of bark and wood waste and a goal to reduce the continuous bark coverage to less than 1.5 acres within a reasonable period of time. The Environmental Protection Agency approved removing East Port Frederick MAF from the Section 303(d) list as part of Alaska's 2004 Integrated Report. In the future, continued annual bark monitoring is required if the MAF is used (Foley 2005).

According to the queriable database (http://www.fakr.noaa.gov), NMFS has identified East Port Fredrick as EFH for arrowtooth flounder, atka mackerel, capelin, chinook salmon, pink salmon, sockeye salmon, chum salmon, coho salmon, eulachon, greenland turbot, octopus, pacific cod, pacific ocean perch, rex sole, rock sole, flathead sole, dover sole, yellowfih sole, sablefish, sand lance, sculpin, shark, shortraker and rougheye rockfish, yelloweye rockfish, skate, squid, walleye pollock, and weathervane scallop.

The potential effects of FS use of this MAF on marine EFH include diminished habitat for managed species and their prey due to additional bark accumulation that smothers subtidal habitat. Another potential adverse effect is reduced prey abundance that may occur because of lower primary production in the water column from shading by barges, log rafts and equipment floats. Primary and secondary production may also be reduced because of lower water quality caused by leachates from the bark debris.

These potential negative impacts to marine EFH will be minimized because:

- The FS will abide by all stipulations in Huna Totem's permits for operating the MAF.
- The FS actions will be in compliance with Huna Totem's approved remediation plan.

Optional loading logs onto barges will help prevent further bark accumulation on the subtidal substrate.

**Conclusions**

The FS believes that the Iyouktug Timber Sale may adversely affect EFH. However, by implementing the minimization measures summarized above, implementing other Forest Plan Standards and Guidelines and the BMPs, negative effects of the proposed actions on EFH will be avoided and minimized. Additional impacts to EFH are likely to occur only from unforeseen events such as landslides, debris blockages of culverts, and road failures. A copy of this Draft EIS will be sent to NMFS, and the FS will continue participating in the EFH consultation process.

# Wetlands

Executive Order 1190 and subsequent regulations directs the federal agencies to avoid adverse impacts associated with the destruction or modification of wetlands. The following discussion and analyses are based on and summarized from the Wetland Resource Report for the Iyouktug project area.

## Affected Environment for Wetlands

### Existing Conditions of Wetlands

The Iyouktug project area is approximately 49 percent wetland and 51 percent upland (Table 3WE-1).

#### High Value Wetland Types in the Iyouktug Project Area

**Tall Sedge Fens** — These ecologically valuable wetlands were noted during field visits. Plant species differentiate these tall sedge fens from the short sedge fens. There is typically more than 50% coverage of tall sedges like Sitka sedge. Soils are deep organic mucks derived from dead sedges. They are in landscape positions where they receive nutrient-rich groundwater. These fens are found adjacent to Suntaheen Creek and along Iyouktug Creek.

Calcareous fens are an example of a tall sedge fen community present in the Iyouktug project area. They are found at the base of Sonyakay ridge, skirting alluvial fans. More calcareous fens are found on Chichagof Island (McClellan et al. 2003). They are wetlands with unique plant communities that flourish where the water is enriched by the limestone bedrock.

**Estuarine Wetlands** – Estuaries are unique brackish environments where fresh water mixes with saltwater. Estuaries support complex and productive ecosystems for fish and wildlife habitat. The estuaries at Whitestone Harbor and Iyouktug Creek are examples of high value estuary habitat within the project area.

#### Other Wetland Types in the Iyouktug Project Area

Muskegs are bogs dominated by sphagnum moss with a wide variety of other plants adapted to very wet, acidic, organic soils. Muskegs are most commonly found in broad valley bottoms, rounded hilltops and rolling lowlands in the Iyouktug area. Alpine wetlands are a combination of bog and sedge meadows on peat deposits generally above 1500 feet in elevation. Short sedge fens are characterized by a diverse community of sedges, forbs, and stunted trees. They occur in landscape positions where they receive some runoff from adjacent slopes resulting in somewhat richer nutrient status than bogs. Forested wetlands include a number of forested plant communities with hemlock, cedar, or mixed conifer overstories, and ground cover consisting largely of skunk cabbage and deer cabbage. They are most common on broad glacial valley bottoms and on gently sloping hill slopes or benches. Some forested wetlands also produce commercial forest products (Julin and D'Amore 2003).

Table 3WE-1: Wetland Types and Acres in Iyouktug Project Area.

| Wetland Type | Acres | Percent of Project Area |
|---|---|---|
| Muskeg | 4,262 | 10% |
| Alpine Wetlands | 2,153 | 5% |
| Short Sedge Fens | 2,615 | 6% |
| Tall Sedge Fens | <20* | <<1% |
| Forested Wetlands | 10,451 | 26% |
| Estuarine Wetlands | 362 | 1% |
| Uplands | 21,160 | 52% |
| Total | 41,004 ** | 100% |

Source: GIS coverage of Chatham Area Soil Map--Wet-hab values
* Tall sedge fens exist in the project area as inclusions of other map units. They were not large enough to be a map unit in the soil cover but were noted on field visits.
**Acreage does not match project area due to estuaries and other shoreline differences.

### Existing Roads in Wetlands

There are about 22.9 miles (117 acres) of existing NFS road, 1.3 miles (7 acres) of decommissioned temporary road, and about 0.2 miles of unauthorized road in wetlands in the Iyouktug project area. All of the existing roads in the Iyouktug project area have avoided the high-value wetlands (estuaries and tall sedge fens) (Table 3WE-2).

### Existing Harvest in Wetlands

Approximately 461 acres (15 percent of the existing harvest) of forested wetland have been harvested in the project area (Table 3WE-3).

## Environmental Consequences

### Levels of Effect Definitions for Wetlands

**Negligible:** No roads are located on wetlands. Wetlands retain their natural hydrologic functions

**Minor:** Some of the roads are located on wetlands. Wetlands retain their natural hydrologic functions and vegetation only changes in the road footprint. The high value wetlands (tall sedge fens and estuaries) are avoided.

### Direct and Indirect Effects on Wetlands

The high density of wetlands in the Iyouktug project area makes complete avoidance of wetlands impossible while implementing any of the action alternatives. During unit design, all high-value wetlands (estuaries and tall sedge fens) were completely avoided.

### Effects of Roads on Wetlands

Roads through wetlands can affect the flow of water in the wetland. Placement of culverts and the use of coarse rock help to maintain the flow of water. Where practicable, roads are located to avoid wetlands. It is not always possible or desirable to locate forest roads on upland sites rather than on wetlands for economic or slope stability reasons. Wetlands covered by the road prism lose

most of their functions and properties. They are effectively converted from wetlands to uplands.

The road and unit cards (in Appendix B and C of the DEIS and C of the FEIS) discuss specific wetland avoidance, minimization, and mitigation measures as well as the wetland functions considered in the system road location. Hydrologic connectivity and function should be retained by implementing BMPs.

In Alternatives 2, 3, 4, and 5 there will be about 0.4 mile of unauthorized road reclassified as NFS road. These are small sections of existing road accessing rock pits. About 0.2 miles exist on GIS-mapped wetland. While identified as "construction", there is no reconstruction or construction associated with this activity, thus no additional effects on wetlands.

### Effects of Timber Harvest on Wetlands

Timber harvest on wetlands has temporary effects on wetland hydrology. Due to more rainfall hitting the soil surface (Patric 1966; Banner et al. 2005). Wetlands where trees have been harvested tend to become wetter than under pre-harvest conditions resulting in slower growth in the seedling and sapling stage. Soil moisture conditions may remain high until evapotranspiration rates of the young stand become equivalent to pre-harvest conditions. This effect can range from less than five years to more than 30 years (Jones 2000), but in all cases the effect is expected to be temporary. In partially harvested stands, retention of a portion of the canopy cover would further minimize the effect of timber harvest on soil moisture

### Alternative 1 (No Action)

There is a negligible effect to wetlands under Alternative 1. No wetland would be impacted under Alternative 1. Vegetation on forested wetlands harvested in the past would continue to grow toward hydrologic maturity. Wetlands impacted by roads in the past would receive periodic maintenance and use. Vegetation will occupy ditchlines and in the cases of closed roads the roadbed. The road prism would remain in an upland condition. Hydrologic and vegetation effects would remain limited beyond the road prism (Glaser 2000).

### Alternative 2 (Proposed Action)

There is a minor effect to wetlands under Alternative 2. A total of 36 acres of wetland would be converted to road. The specific effects are described above. At 36 acres, the effect on wetlands is the greatest of the four action alternatives (Table 3WE-2).

Alternative 2 proposes to harvest timber from approximately 1,097 acres of forested wetland. Trees growing on these wetlands would likely grow slower than trees on upland sites. Soil moisture would temporarily increase as described above (Table 3WE-3).

### Alternatives 3, 4, and 5

There is a minor effect to wetlands under Alternatives 3, 4, and 5. A total of 13 acres of wetland would be converted to road in Alternatives 3 and 5; in Alternative 4, 19 acres of wetland would be converted to road (Table 3WE-2).

Alternatives 3, 4, and 5 propose to harvest timber from approximately 822, 586, and 371 acres of forested wetland, respectively. Trees growing on these wetlands would likely grow slower than trees on upland sites. Soil moisture would temporarily increase as described above (Table 3WE-3).

## Cumulative Effects on Wetlands

Cumulative effects include the past timber harvest and roads, the proposed Iyouktug activities and future ground-disturbing activities in the project area. These are new trail construction, recreation projects, and ongoing small timber sales.

Future projects include two proposed recreation projects in the Iyouktug project area: one in Whitestone Harbor and one in False Bay. Wetlands exist in both areas. It is likely that both these projects will alter less than four acres of wetland. The section 404 permitting process, required for recreation projects, is designed to minimize the effects to wetlands and to avoid high-value wetlands.

No future roads are proposed in the project area (Table 3WE-2). The cumulative effect to wetlands by roads is minor in all action alternatives (Alternatives 2-5) because there are no future effects due to roads. The cumulative effects are negligible in Alternative 1. Following implementation of any of the alternatives less than 1 percent of muskegs or forested wetlands will be converted to roads on the project area.

Table 3WE-2: Cumulative Effects to Wetland by Roads in Acres

| Wetland Type | Acres | | | | | |
|---|---|---|---|---|---|---|
| | Existing Roads | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 |
| **Muskeg** | 30 | 0 | 11 | 3 | 6 | 3 |
| **Alpine/subalpine wetlands** | - | 0 | - | - | - | - |
| **Short Sedge Fens** | 15 | 0 | - | - | - | - |
| **Tall Sedge Fens** | - | 0 | - | - | - | - |
| **Forested Wetlands** | 79 | 0 | 25 | 10 | 13 | 10 |
| **Estuarine Wetlands** | - | 0 | - | - | - | - |
| **Uplands** | 169 | 0 | 50 | 18 | 25 | 22 |
| **Total** | 292* | 0 | 86 | 31 | 44 | 34 |

Source: * rounding error. GIS coverages of Roads and Soil, using the wet-hab attribute in soils. Acres calculated by multiplying length of road in GIS query by 42 feet

Since the effects to wetlands by timber harvest are temporary, there are not any cumulative effects outside the proposed harvest unit boundaries. There are

ongoing small sales activities that will affect wetlands in the Iyouktug project area (Table 3WE-3). The effects to wetlands by these small sales are the same as the effects discussed above and are expected to be temporary.

Table 3WE-3: Cumulative Timber Harvest on Wetlands

| | Existing harvest | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 | Alt. 5 | Future Harvest |
|---|---|---|---|---|---|---|---|
| **Wetland harvest** | | | | | | | |
| **Acres** | 461 | 0 | 1,097 | 822 | 586 | 371 | 45 |
| **% of Total Harvest** | 15% | -- | 26% | 25% | 23% | 42% | 53% |
| **Upland Harvest** | | | | | | | |
| **Acres** | 2,643 | 0 | 3,087 | 2,510 | 1,998 | 512 | 40 |
| **% of Total Harvest** | 85% | -- | 74% | 75% | 77% | 58% | 47% |
| **Total** | **3,104*** | **0** | **4,185*** | **3,332** | **2,584** | **883** | **85** |

Source: * rounding error. GIS coverages of the unit pool and soil, using the wet-hab attribute in soil.

No future projects are proposed on any high-value wetlands.

### Wetland Avoidance

One way to estimate wetland avoidance at the project scale is to compare the proportion of roads on wetlands to the proportion of roads on uplands. Most existing roads in the Iyouktug area are located in uplands. Approximately 42 percent of the existing roads are on wetlands, whereas about 48 percent of the project area is considered wetland. Roads proposed on wetlands through the action alternatives vary between 37% and 43% of the total road proposed in each alternative (Table 3WE-2). The numbers suggest that past and proposed road construction has avoided wetlands. Many of the upland forested sites on the Iyouktug project area occur on steep slopes. Avoiding steep slopes by building road across the more gently sloped wetlands is environmentally preferred when compared to road construction across steep slopes.

Approximately 15 percent of the existing timber harvest is on wetlands, whereas about 26 percent of the project area is forested wetland. Proposed timber harvest on wetlands range between 23 percent and 42 percent of the total harvest proposed in each alternative. The forested wetlands on the Iyouktug project area often include stands of commercial timber and are managed for their timber resources. Management of the forested wetland timber stands is part of the project goals and objectives.

Within the context of overall project objectives, including economics and minimizing harm to the environment, past road construction has avoided wetlands to the extent practicable in the project area.

By avoiding wetlands where practicable and wholly avoiding high-value wetlands with all of our alternatives, all alternatives comply with the criteria for the Silvicultural exemption from the section 404 permitting process.

# Findings and Disclosures

Several of the laws and executive orders listed in Chapter 1 require project-specific findings or other disclosures. These are included here, and would be included in the Record of Decision. They apply to all alternatives considered in detail in this EIS.

### National Forest Management Act

All project alternatives fully comply with the Forest Plan. This project incorporates all applicable Forest Plan Forest-wide Standards and Guidelines and management area prescriptions as they apply to the project area, and complies with Forest Plan goals and objectives. All required interagency review and coordination has been accomplished; new or revised measures resulting from this review have been incorporated.

The Forest Plan complies with all resource integration and management requirements of 36 CFR 219 (219.14 through 219.27). Application of Forest Plan direction for the Iyouktug project ensures compliance at the project level. Specific NFMA findings pertaining to silvicultural systems are included in Chapter 3 and the project record.

### Endangered Species Act

All the alternatives are not anticipated to have a direct, indirect or cumulative effect on threatened or endangered species in or outside the project area except for humpback whale, Steller sea lion and salmonid species. The action alternatives are not likely to adversely affect these species. A Biological Evaluation/Assessment was completed to analyze threatened, endangered, sensitive and petitioned species and is included in the project record. Consultation with the FWS and NMFS was initiated as required; documentation is in the Iyouktug Project record.

### Tongass Timber Reform Act

Application of Forest Plan Riparian Standards and Guidelines ensures that no commercial timber harvest will occur within 100 feet of any Class I stream or any Class II stream flowing directly into a Class I stream as required in Section 103, TTRA. This proposed project would provide timber for the Tongass timber program to seek to meet market demand if an action alternative is selected.

### National Historic Preservation Act

Cultural resource surveys of varying intensities have been conducted, following inventory protocols approved by the Alaska State Historic Preservation Officer. Native communities have been contacted and public comment encouraged. We have determined that no sites eligible to the National Register of Historic Places will be affected by the proposed project.

### Federal Cave Resource Protection Act

No known significant caves in the project area will be directly or indirectly affected by project activities. Forest Plan Karst and Caves Standards and Guidelines are applied to areas known or suspected to contain karst resources.

### Alaska National Interest Lands Conservation Act (ANILCA)

An ANILCA Section 810 subsistence evaluation was conducted. Subsistence hearings were held as required in Hoonah and Angoon. The evaluation can be found in the Subsistence section of this chapter.

The Forest Plan Final EIS concluded that Forest-wide, under full implementation of the Forest Plan, the only subsistence resource that may be significantly restricted in the future by Federal forest management activities is subsistence use of deer (Forest Plan Final EIS, p. 3-224 to 3-229).

As a result of cumulative activities, including the impacts of a recent severe winter, this project may result in a significant restriction on the abundance and distribution of, access to, or competition for subsistence resources for deer in the project area (see the Subsistence Report in the project record).

### Clean Water Act

Congress intended the Clean Water Act of 1972 (Public Law 92-500) as amended in 1977 (Public Law 95-217) and 1987 (Public Law 100-4) to protect and improve the quality of water resources and maintain their beneficial uses. Section 313 of the Clean Water Act and Executive Order 12088 of January 23, 1987 address Federal agency compliance and consistency with water pollution control mandates. Agencies must be consistent with requirements that apply to "any governmental entity" or private person. Compliance is to be in line with "all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution".

The Clean Water Act (Sections 208 and 319) recognized the need for control strategies for nonpoint source pollution. The National Nonpoint Source Policy (December 12, 1984), the Forest Service Nonpoint Strategy (January 29, 1985), and the USDA Nonpoint Source Water Quality Policy (December 5, 1986) provide a protection and improvement emphasis for soil and water resources and water-related beneficial uses. Soil and water conservation practices (BMPs) were recognized as the primary control mechanisms for nonpoint source pollution on National Forest System lands. The Environmental Protection Agency supports this perspective in their guidance, "Nonpoint Source Controls and Water Quality Standards" (August 19, 1987).

The Forest Service must apply Best Management Practices that are consistent with the Alaska Forest Resources and Practices Regulations to achieve Alaska Water Quality Standards. The site-specific application of BMPs, with a monitoring and feedback mechanism, is the approved strategy for controlling nonpoint source pollution as defined by Alaska’s Nonpoint Source Pollution

Control Strategy (2007). In 1997, The State approved the BMPs in the Forest Service's Soil and Water Conservation Handbook (FSH Handbook 2509.22, October 1996) as consistent with the Alaska Forest Resources and Practices Regulations. This Handbook is incorporated into the Tongass Land Management Plan.

A discharge of dredge or fill material from normal silviculture activities such as harvesting for the production of forest products is exempt from Section 404 permitting requirements in waters of the United States, including wetlands (404(f)(1)(A). Forest roads qualify for this exemption only if they are constructed and maintained in accordance with best management practices to assure that flow and circulation patterns and chemical and biological characteristics of the waters are not impaired (404)(f)(1)(E). The BMPs that must be followed are specified in 33 CFR 323.4(a). These specific BMPs have been incorporated into the Forest Service's Soil and Water Conservation Handbook under BMP 12.5.

### Clean Air Act

Air quality would diminish on a recurring, temporary basis due to the construction of roads, timber harvest, and hauling. Limbs and logging slash would be burned at sort yards intermittently throughout the logging periods, which would deposit minor amounts of particulate matter and smoke into the air. Emissions anticipated from the implementation of any project alternative will be of short duration and are not expected to exceed State of Alaska ambient air quality standards (18 AAC 50).

### Coastal Zone Management Act

To make the process more efficient, categories of activities may be evaluated and reviewed together under what is called a "general consistency determination" (GCD). Upon approval of a GCD, activities within that category do not require an individual consistency determination or review. The Forest Service has developed a GCD for timber harvest activities conducted on the Tongass National Forest, and the State of Alaska has agreed that Tongass timber harvest activities are consistent to the maximum extent practicable with the enforceable policies of the ACMP.

Due to limits on the types of activities that qualify for a GCD, and provisions of the Alaska Forest Resources and Practices Act (FRPA), certain activities are outside the scope of the GCD and will continue to require individual ACMP consistency review. The GCD does not apply to any activity that requires a State or Federal authorization under any authority other than FRPA. Nor does it apply to any activity related to the planning, construction modification, or removal of any structure or facility intended for use by the general public. Specifically, it does not apply to logging camps or construction of log transfer facilities that require State or Federal permits, or to construction or reconstruction of roads that require such non-FRPA permits. Any Tongass timber sale that involves activities not covered by the scope of the GCD continues to require an individual consistency determination if those activities

have reasonably foreseeable effects on coastal uses or resources, but the scope of that determination and consistency review will be limited to those portions of the project not covered by the GCD.

The Iyouktug Timber Sales project will not include any activities outside the scope of the GCD. Consequently, no individual ACMP consistency determination or review is required. The Forest Service received a letter from the State of Alaska, Office of Project Management and Permitting agreeing that the GCD applies to the Iyouktug project, as described, and that no additional ACMP review is required (see Appendix B of this FEIS).

### Magnuson-Stevens Fishery Conservation Act of 1996

The Magnuson-Stevens Fishery Conservation Act (1996) requires that all federal agencies consult with the National Marine Fisheries Service (NMFS) when any project "may adversely affect" essential fish habitat. The Forest Service sent a copy of the Iyouktug DEIS to NMFS which formally started the consultation process. NMFS has reviewed the DEIS and provided comments on the findings of the assessment and made one conservation recommendation pertaining to the project in a letter dated November 7, 2007 (see Appendix B of this FEIS for letter). The Forest Service has responded to the conservation recommendations made by the NMFS in a letter dated December 14, 2007 (in the project record). These responses can be found in the Response to Comments (Appendix B) section of this FEIS. The original EFH Assessment, with one minor addition requested by NMFS, is included in Chapter 3 in this FEIS.

### USDA Forest Service Transportation; Final Administrative Policy

This project is consistent with the Travel Management Rule by limiting the transportation system to the minimum amount necessary for project activities.

### Executive Order 11593

Executive Order 11593 directs federal agencies to provide leadership in preserving, restoring and maintaining the historic and cultural environment of the Nation. The work accomplished in accordance with Section 106 of the National Historic Preservation Act for the Iyouktug project area meets the intent of this Executive Order.

### Executive Order 11988

The numerous streams in the Iyouktug project area make it essentially impossible to avoid all floodplains during timber harvest and road construction. Forest Plan Standards and Guidelines for riparian areas exclude most commercial timber harvesting from floodplains. Roads may be constructed in or through floodplains subject to the design requirements of the Best Management Practices. Effects on floodplains from project activities have been avoided or minimized as much as possible.

### Executive Order 11990

Executive Order 11990 requires Federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the

destruction or modification of wetlands. Because wetlands are so extensive in the Iyouktug project area, it is not feasible to avoid all wetlands. Chapter 3 describes the types and amounts of wetlands in the project area and how they will be affected by this project.

Road construction requires the filling-in of wetlands and creates permanent loss of wetland habitat. Effects to wetlands are minimized through the application of BMPs. Road construction through wetlands is avoided where possible. Road cards (Appendix C of the DEIS and this FEIS) contain site specific details on road location through wetlands and how BMPs will be implemented. Based on the analysis in Chapter 3, it is estimated that the alternatives will result in the loss of approximately 13 to 36 acres (which equates to 0.1% to 0.3% of wetland acreage in the project area) due to road fill.

### Executive Order 12898

Executive Order 12898 directs Federal agencies to conduct effective public participation with low-income and minority communities. The public participation process involved public scoping through notification in local papers, agency public websites, written letters to individuals, agencies, governments, and notices in the Federal Register. The impact of this project is expected to be similar among local populations; minority populations or low-income populations should not be disproportionately impacted under any alternative. With the avoidance of heritage resource sites and the consideration of traditional values, Native populations, minority populations, or low-income populations should not be disproportionately impacted under any alternative.

### Executive Order 12962

Executive Order 12962 requires Federal agencies to evaluate the effects of proposed activities on aquatic systems and recreational fisheries. This order directs Federal agencies to evaluate effects on aquatic ecosystems and recreational fisheries; develop and encourage partnerships; promote restoration; provide access; and promote awareness of opportunities for recreational fishery resources. The Action Alternatives minimize the effects on aquatic systems through project design, watershed assessment, application of standards and guidelines, BMPs, and site-specific mitigation measures. With the application of Forest Plan Standards and Guidelines, including those for riparian areas, no significant adverse effects to freshwater or marine resources will occur. Recreational fishing opportunities would remain essentially the same because aquatic habitats are protected through implementation of BMPs and riparian buffers. Partnerships continue to be used to leverage Federal project funds to address water quality concerns in areas of the Tongass National Forest; however, none have been proposed for recreational fisheries in conjunction with this project.

### Executive Order 13007

Executive Order 13007 directs Federal agencies to accommodate access to and ceremonial use of American Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such

sacred sites. In a government-to-government relationship, the tribal government is responsible for notifying the agency of the existence of a sacred site. A sacred site is defined as a site that has sacred significance due to established religious beliefs or ceremonial uses, and which has specific, discrete, and delineated location, which has been identified by the tribe. Tribal governments or their authorized representatives have not identified any specific sacred site locations in the project area.

## Effects on Prime Farm Land, Range Land, and Forest Land

No prime farm land or range land would be adversely impacted by the action alternatives. Forest land would maintain its productivity, except for those lands permanently occupied by roads built for long-term access for forest management.

# 3 Environment and Effects

This page left blank intentionally.