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Zarembo Landscape Assessment

Wrangell Ranger District

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Abstract:
The Zarembo Landscape Assessment is an analysis and overview of existing conditions and proposed projects on Zarembo Island. It provides the context for future project decisions on National Forest System lands on Zarembo Island.

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Table of Contents

MAPS **Page**

TABLES

FIGURES

Chapter 1 – Introduction

1.1 Management Direction for Landscape Assessments

The interdisciplinary team (IDT) approached the Zarembo Landscape Analysis at the watershed scale as described in *Ecosystem Analysis at the Watershed Scale, Federal Guide for Watershed Analysis*. In addition, Appendix J of the 1997 *Tongass Land and Resource Management Plan* (herein referred to as the Forest Plan) provides direction for the content of landscape assessments. The general purpose is to provide science-based information regarding the existing condition of the watershed ecosystems as well as the impacts of past, present, and future management activities.

Information and data used in this analysis have come from several different sources. The Tongass National Forest Planning Map Layers, updated as appropriate, and additional map layers were the source for the Geographic Information System (GIS) layers used during the process. These layers include Forest Plan Land Use Designations (LUD); Tongass Timber Reform Act (TTRA) stream, beach and estuary, and riparian buffers; streams, plant associations, soil hazard classification, roads, managed stands, and volume strata. In addition, recent resource data such as road condition surveys, stream channel surveys, goshawk surveys, and bald eagle nest surveys have been incorporated into this analysis. Computer models were generated for several pieces of the analysis, including deer habitat capability models and wind-risk models.

1.2 The Purpose of the Zarembo Landscape Assessment

The Zarembo Landscape Assessment is intended to provide context to resource specialists and line officers for reference on future National Environmental Policy Act (NEPA) documents. New information will be incorporated as it becomes available.

Provide a description of the existing condition. This description will be referred to in the Existing Condition section of future NEPA documents. This landscape assessment is a precursor to NEPA analysis and is not a decision document itself and, should be considered a working document.

Increase our knowledge and understanding of the ecological systems and past and present human use on Zarembo Island. The purpose of this analysis is to provide context for future projects on Zarembo Island. By evaluating the ecological conditions and the current activities on the island, we will have a better understanding of what projects to plan and how to prepare informed decisions on future projects. This analysis will also offer a clearer picture of how the Forest Service can integrate past, present, and future projects from different resources and make them compatible. For example, knowing where future timber harvest areas are planned, recreational projects could be developed within that area, so the two resource uses are compatible. Through this analysis, we will be able to evaluate the environmental consequences and cumulative effects caused by the various past, present, and future projects on Zarembo Island.

Develop recommendations for achieving the desired future condition for the area. The Zarembo Landscape Assessment is a mid-level analysis that is between the Forest Plan and project-level analysis. Within this report, we include potential projects that may require further environmental analysis, public involvement, and decision-making mandated by the NEPA. All projects listed in this document may not be carried through for further analysis due to budgeting and personnel constraints. The process also leaves open the possibility of new projects being implemented in the project area even those not considered in the analysis. A more-detailed assessment is necessary for site-specific NEPA analysis at the project level. When planning timber sales, roads, recreational development, or fish and wildlife improvements, we often focus on small- or medium-sized project areas in one- to five-year timeframes. The present landscape and road system is a result of the past fifty years of project planning and implementation on Zarembo Island.

1.3 Location

Zarembo Island is part of the Alexander Archipelago in the south central portion of Southeast Alaska (Map 1-1). The island covers approximately 185 square miles and lies 10 miles west of the community of Wrangell, Alaska. The Forest Service currently manages just under 117,800 acres on Zarembo Island as part of the Tongass National Forest. There are 1,680 acres of non-national forest lands, conveyed to the State of Alaska in August 2004. There are no homes or communities on the island. Zarembo Island currently has approximately 107 miles of drivable roads. The road system is often used by residents of the nearby communities of Wrangell and Petersburg, Alaska.

1.3.1 Landscape Description

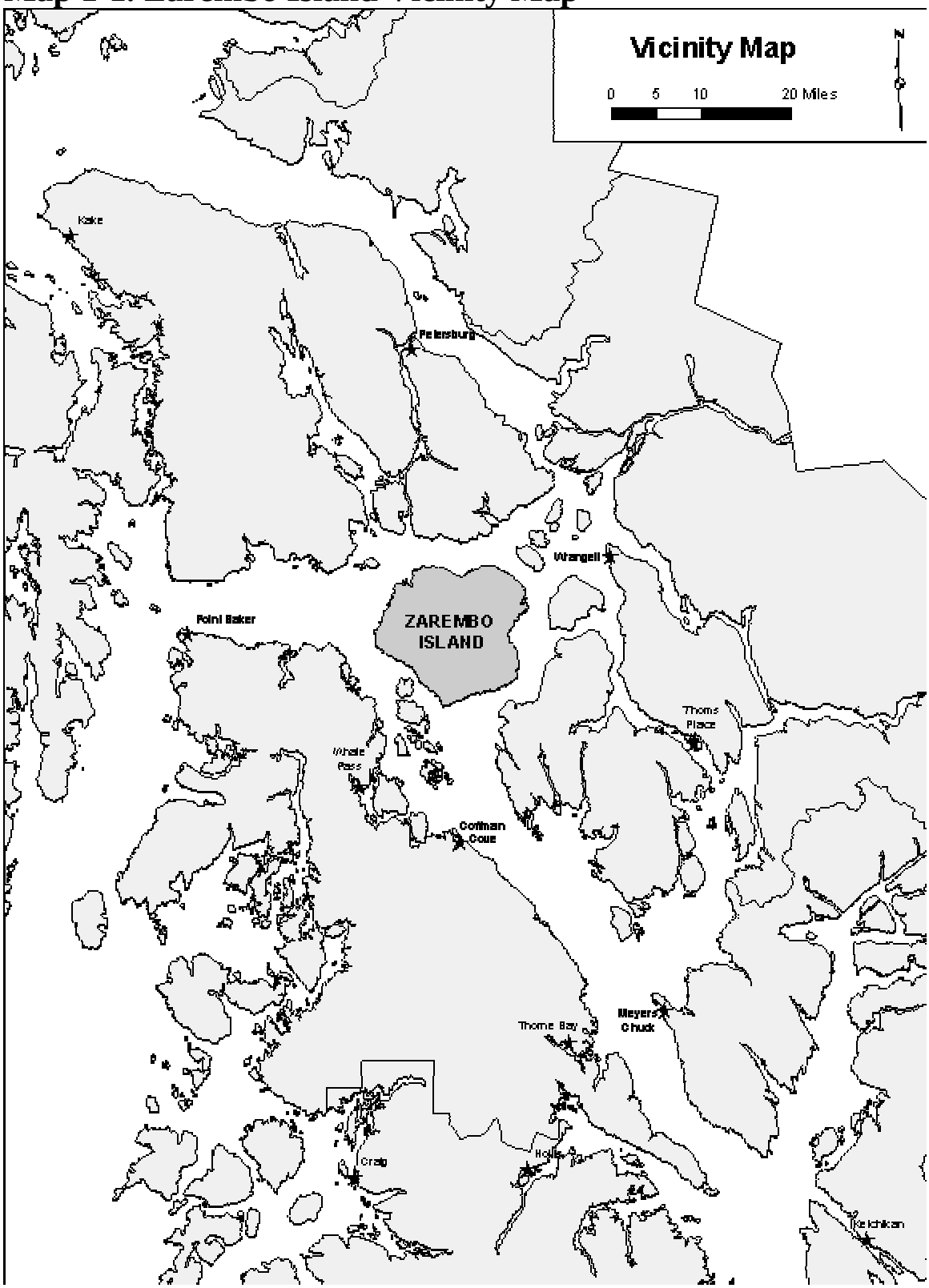
The island is located midway between the rocky western shores of the outer coastal islands and the sharp peaks of the Coastal Range that marks the boundary between Canada and Alaska. The shoreline of Zarembo Island is primarily rocky beaches or rock bluffs, with just a few protected bays and anchorages. Wide flat valleys characterize the landscape with gentle to steeply-rolling hills that rise to rounded ridge tops as high as 2,400 feet in elevation. The maritime climate provides an ample supply of precipitation with about 100 inches of rainfall annually and tends to moderate temperature extremes during all seasons of the year. The result is relatively cool summers of 50-60 degrees, rarely exceeding 70 degrees Fahrenheit, and warm winters of 20-40 degrees, rarely below 10 degrees. The vegetation is typical of Southeast Alaska's temperate rainforest, exhibiting a naturally-fragmented mix of open muskeg, scrub forest wetlands, riparian areas, and old-growth forest. Primary tree species include western hemlock, Sitka spruce, western redcedar, and Alaska yellow-cedar. Mountain hemlock and scrubby lodgepole pine can be found at the higher elevations and on poorly-drained forested wetland sites. Red alder often grows on disturbed sites.

1.4 Relationship to the Forest Plan

The Forest Plan embodies the provisions of the National Forest Management Act (NFMA), its implementing regulations, and other guiding documents. It sets forth in detail the direction for managing the land and resources of the Tongass National Forest and is the result of extensive analysis, which is presented in the Forest Plan FEIS (USDA Forest Service 1997b).

The Forest Plan guides the management of National Forest System (NFS) lands on Zarembo Island. The Zarembo Landscape Assessment is conducted at the landscape scale and does not attempt to address decisions made at higher levels. However, it does identify opportunities to implement direction provided at those higher levels.

Map 1-1. Zarembo Island Vicinity Map



Zarembo Island covers approximately 185 square miles and lies 10 miles west of Wrangell, Alaska.

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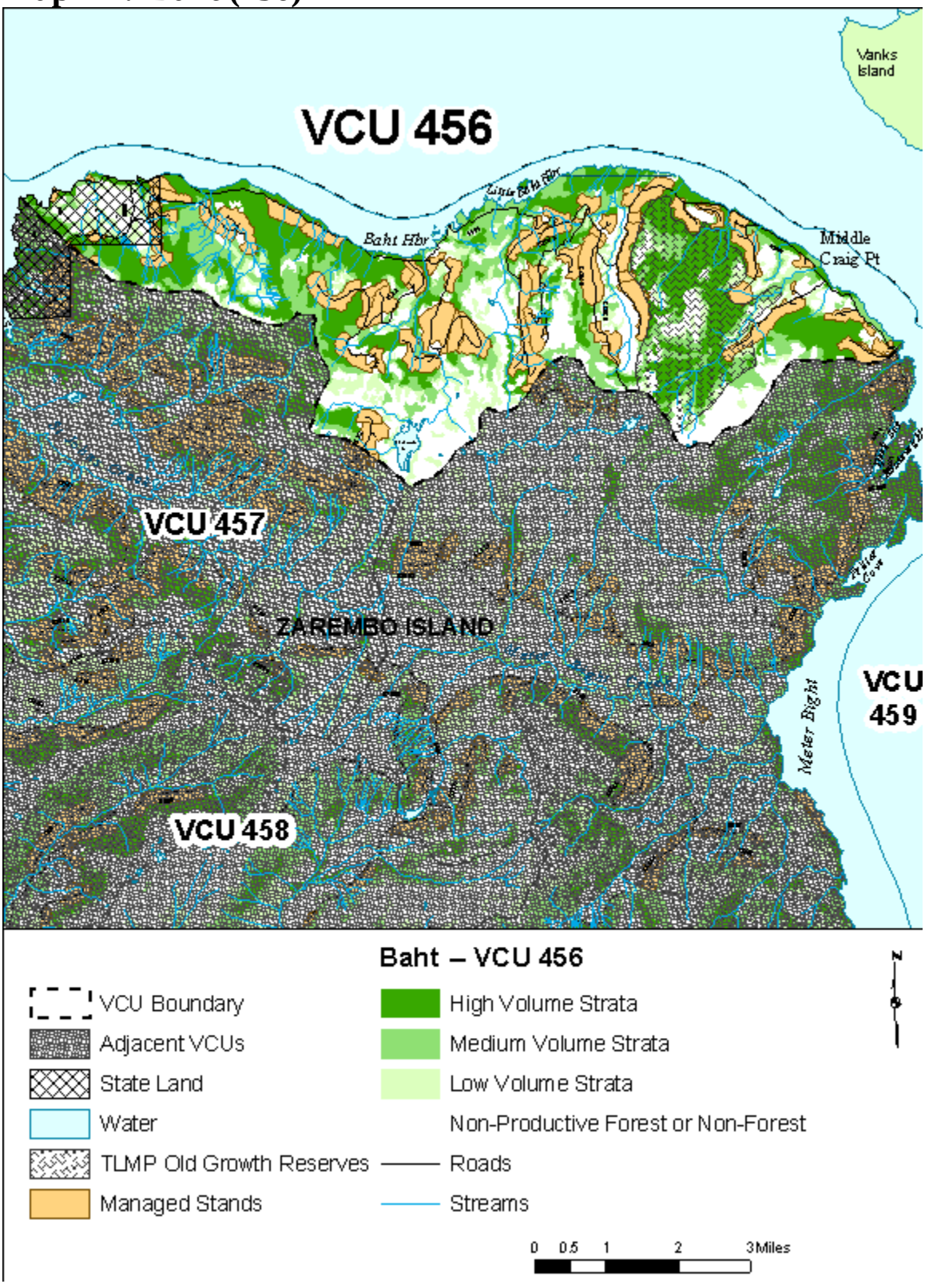
1.4.1 Value Comparison Units

The Tongass National Forest is divided into common sets of areas in which resource inventories can be conducted and resource value interpretations can be made. The Value Comparison Units (VCU) generally encompasses a drainage basin containing one or more large stream systems and usually follows easily recognizable watershed divides. There are four VCUs within the project area. The four VCUs on Zarembo Island include:

1.4.1.1 BAHT (VCU 456)

The Baht VCU encompasses the northern portion of Zarembo Island, and at approximately 17,000 acres, is the smallest of the four VCUs on the island. It is composed of mostly small, north-facing watersheds with limited fish habitat. Over 75 percent of the landscape is classified as a forested vegetation type, resulting in the least natural fragmentation of all the VCUs on Zarembo Island. The 6590 Beach Road, one of the main road corridors, passes through the full length of this VCU, from Craig Point to St. John Harbor.

Map 1-2. Baht (456)

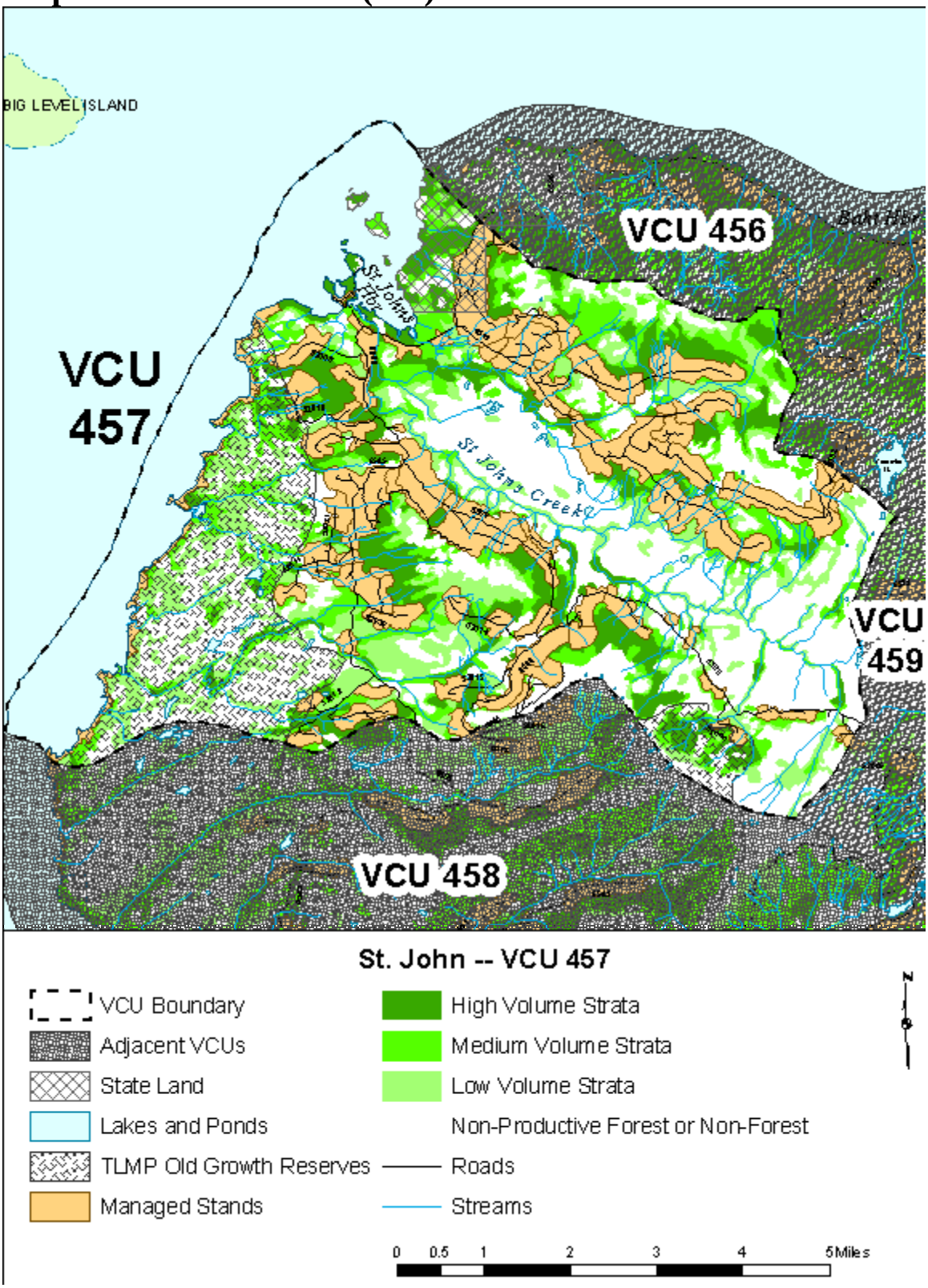


1.4.1.2 ST. JOHN (VCU 457)

The St. John VCU includes the northwest corner of Zarembo Island, and is less than 26,000 acres. It encompasses the St. John watershed and a large portion of the McNamara lowlands along the northwest coast of the island. About 58 percent of the landscape is classified as a forested vegetation type, and almost 40 percent is muskeg. This distribution results in a high degree of natural fragmentation, especially in the lower elevations along St. John Creek and the lowlands near McNamara Point. One of the main entry portals to the island is located within this VCU at St. John Harbor. The main Road 6590 enters this VCU along the northern beach route and then heads back across the center of the island up the St. John valley.

There is 1,680 acres of non-Forest Service lands located near St. John Harbor. This land was conveyed to the State of Alaska in August, 2004.

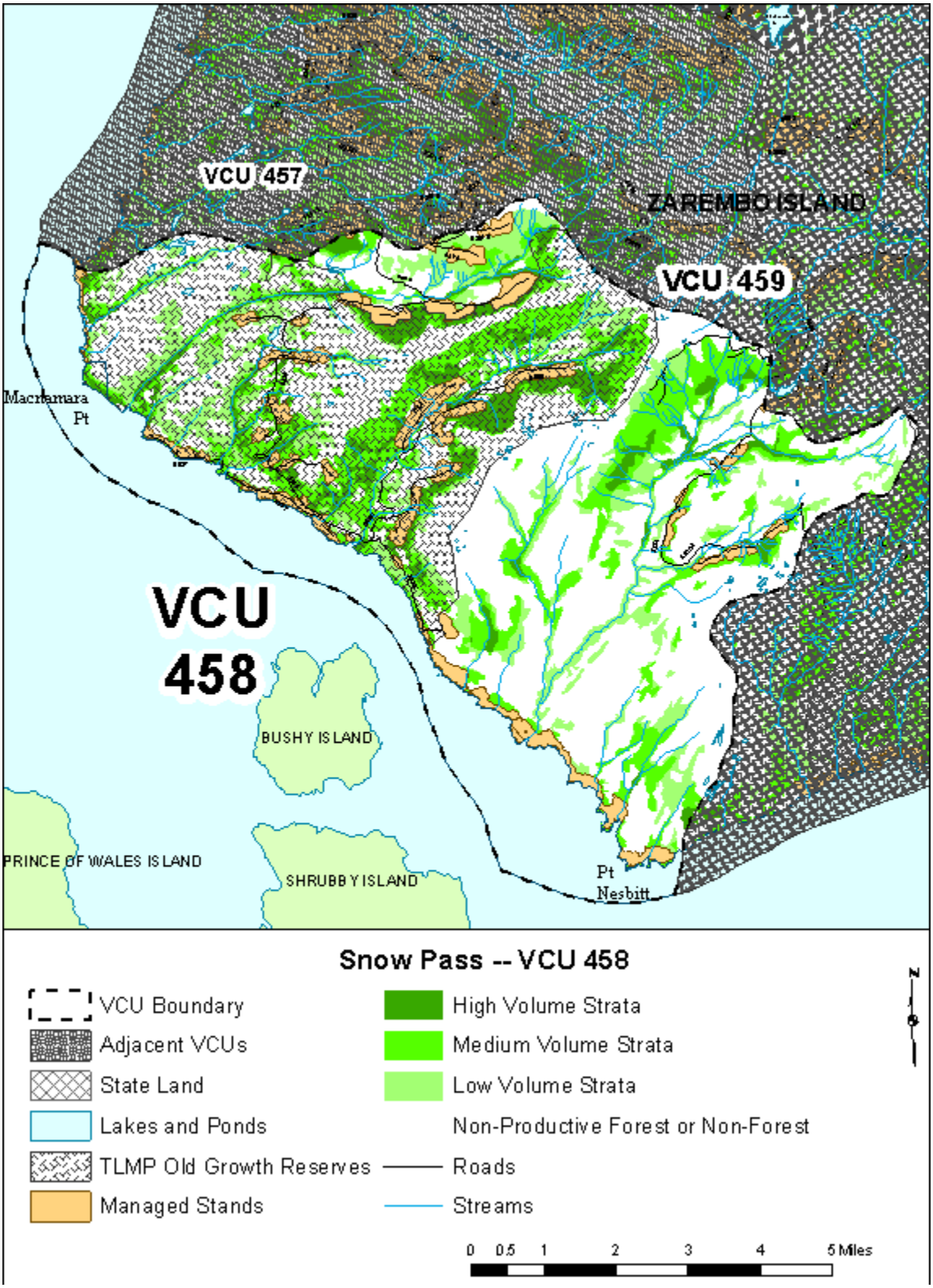
Map 1-3. St. John VCU (457)



1.4.1.3 SNOW PASS (VCU 458)

The Snow Pass VCU includes the southwest corner of Zarembo Island, from McNamara Point to Nesbitt Point, and is a little over 32,000 acres. It encompasses several medium-sized watersheds, including the Snow Pass and Nesbitt watersheds along the southwest coast of the island. About 48 percent of the landscape is classified as a forested vegetation type, with a little over 50 percent classified as muskeg. Much of this VCU is a mosaic of muskegs interspersed with narrow, low-volume, forested wetlands. This distribution results in a high degree of natural fragmentation, especially in the lower elevations along the southwest coast and the lowlands near McNamara Point. The Snow Pass valley and the western slope of the Nesbitt valley contain the largest blocks of forested vegetation types. Two roads enter this VCU from the mainline Road 6590; Road 6585 accesses the Snow Pass area and the 6594 Road accesses the Nesbitt Creek area.

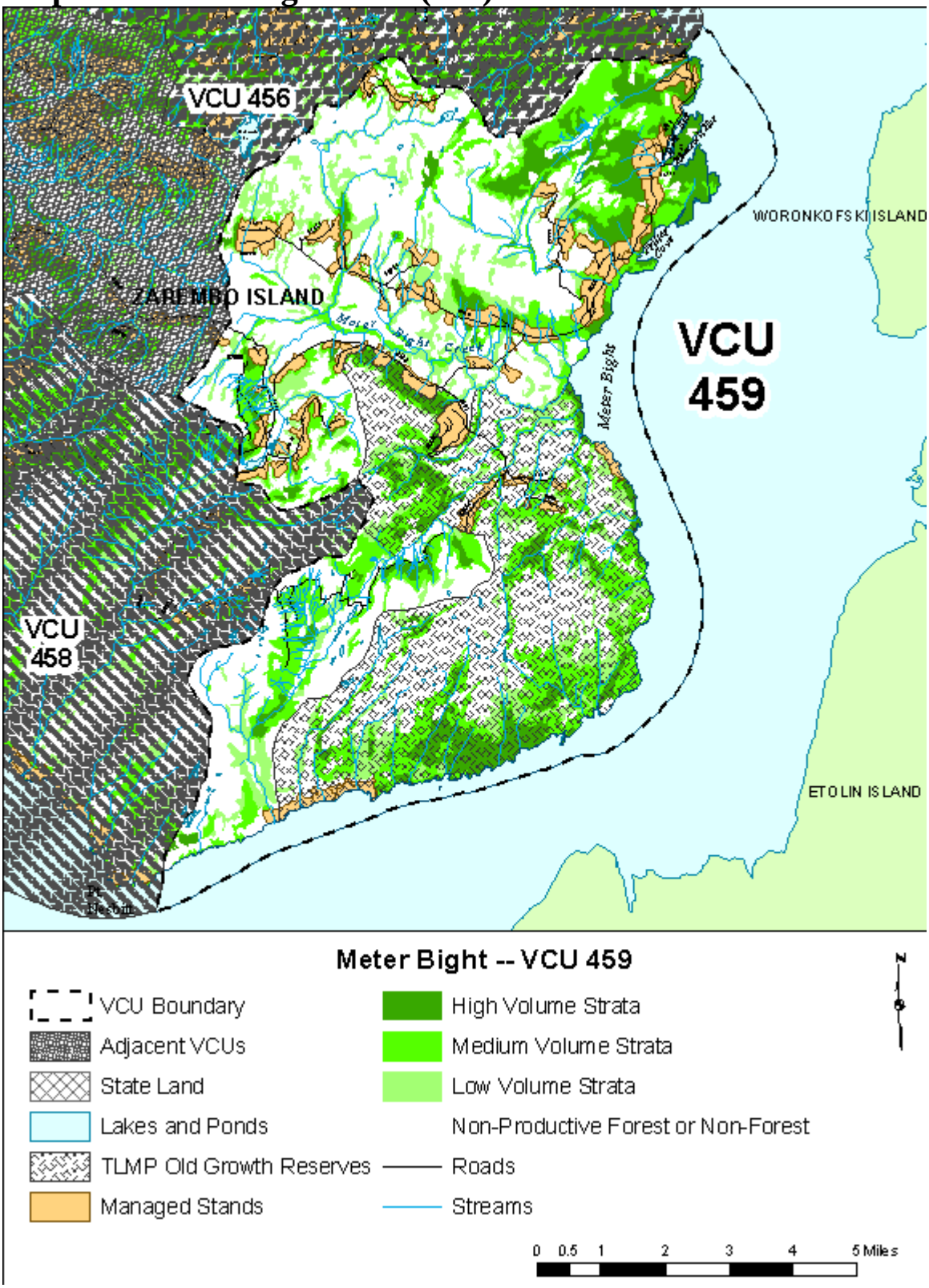
Map 1-4. Snow Pass VCU (458)



1.4.1.4 METER BIGHT (VCU 459)

The Meter Bight VCU includes most of the western portion of Zarembo Island, and at just over 42,000 acres, it is the largest of the four VCUs. It stretches from Nesbitt Point on the southern tip of the island, to Deep Bay, near the northeast corner of the island, and includes the Meter Bight watersheds. About 53 percent of the landscape is classified as a forested vegetation type, and 45 percent is muskeg. The other main entry portal to the island is located within this VCU at Roosevelt Harbor. The main Road 6590 enters this VCU at the low pass between St. John and Meter Bight watersheds, traveling along the south side of the Meter Bight valley, then along the eastern coastline to Roosevelt Harbor. The 6590 Road heads north from Roosevelt Harbor along the coast toward Craig Point.

Map 1-5. Meter Bight VCU (459)



1.4.2 Land Use Designations

The Forest Plan provides general management direction by assigning Land Use Designations (LUDs) to all VCUs. Each designation provides for a unique combination of activities, practices, and uses.

The Forest Service currently manages approximately 117,800 acres of Zarembo Island. The State of Alaska selected approximately 1,680 acres of lands, including tide lands, in the vicinity of St. John Harbor; the title to the land was conveyed in August 2004 (St. John VCU Map). Of these 1,680 acres, approximately 940 acres are uplands. There is no private land on the island.

The goals of each of the LUDs present in the project area are included below. Chapter 3 of the Forest Plan contains a detailed description of each land use designation. Table 1-1 shows LUD acres within each VCU and Map 1-6 is an island-wide map showing the Forest Plan LUDs and existing roads.

1.4.2.1 Old-Growth Habitat

There are approximately 36,947 acres collectively in the Old-Growth Habitat LUDs on Zarembo Island. The goals of this land use designation are:

- To maintain areas of old-growth forests and their associated natural ecological processes to provide habitat for old-growth associated resources; and
- To manage early seral conifer stands to achieve old-growth forest characteristic structure and composition based upon site capability.

1.4.2.2 Scenic Viewshed

There are approximately 21,261 acres in the Scenic Viewshed LUD on the Island. The goals of this designation are:

- to provide a sustained yield of timber and a mix of resource activities while minimizing the visibility of developments as seen from Visual Priority Travel Routes and Use Areas;
- to recognize the scenic values of suitable timber lands viewed from selected popular roads, trails, water travel routes, recreation sites, bays and anchorages, and to modify timber harvest practices accordingly; and
- to seek to provide a supply of timber from the Tongass National Forest which meets the annual and planning-cycle market demand, consistent with the standards and guidelines of this land use designation.

1.4.2.3 Timber Management

There are approximately 57,901 acres in the Timber Production LUD on the Island. The goals of this designation are:

- to maintain and promote industrial wood production from suitable timber lands, providing a continuous supply of wood to meet society's needs;
- to manage these lands for sustained long-term timber yields; and

- to seek to provide a supply of timber from the Tongass National Forest which meets the annual and planning-cycle market demand, consistent with the standards and guidelines of this land use designation.

1.4.2.4 Semi-Remote Recreation

There are a number of very small islands around the perimeter of Zarembo Island that have a land use designation of Semi-remote Recreation. These smaller islands collectively total about 19 acres in size. The goals of this designation are:

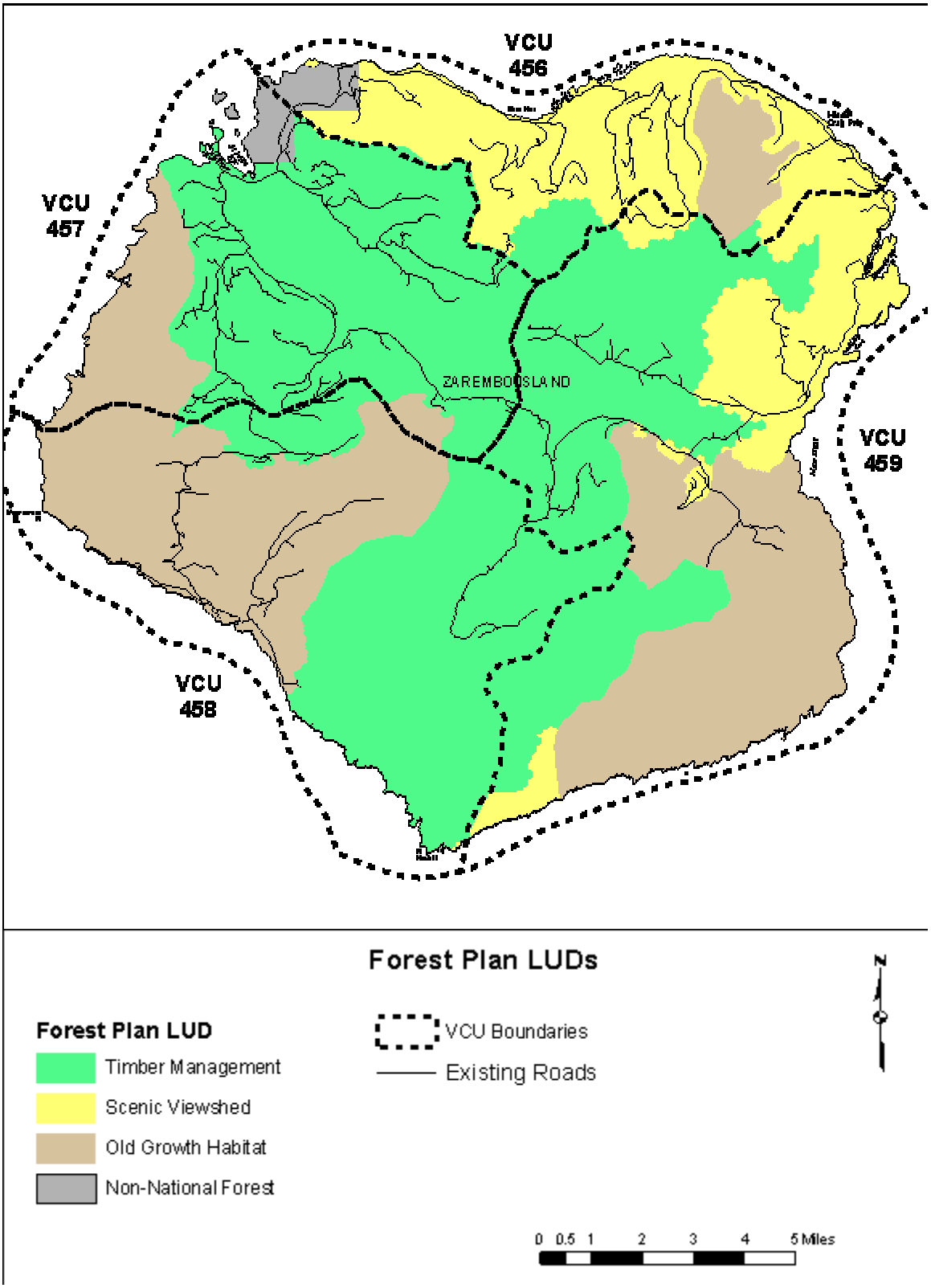
- to provide predominately natural or natural-appearing settings for the semi-primitive types of recreation and tourism and for occasional enclaves of concentrated recreation and tourism facilities; and
- to provide opportunities for a moderate degree of independence, closeness to nature, and self-reliance in environments requiring challenging motorized or non-motorized forms of transportation.
- The total acreage of Semi-Remote Recreation is minimal and is not labeled on Map 1-6.

TABLE 1-1 Acres within each VCU by Land Use Designation

Land Use Designation	Baht 456	St. John 457	Snow Pass 458	Meter Bight 459	Total Acres
Non-National Forests	892	788	0	0	1,680
Old-Growth Habitat	2,434	5,010	14,390	15,113	36,947
Semi-remote Recreation	14	2	1	2	19
Scenic Viewshed	12,102	29	13	9,117	21,261
Timber Management	1,562	20,175	17,896	18,268	57,901
Total Acres	17,000	26,000	32,300	42,500	117,800

Source: GIS data, Susan Wise-Eagle, March 2005
Totals rounded to hundreds.

Map 1-6. Forest Plan Land Use Designations



Chapter 2 - Issues and Key Questions

The issues and key questions about the Zarembo Landscape Assessment were identified by resource specialists. This Zarembo Landscape Assessment is not a decision document, but a mid-level analysis.

The district has identified the following four key issues for the Zarembo Landscape Assessment: **Human Uses, Hydrology, Vegetative Conditions, and Wildlife Habitat**. A background statement for each issue was developed to provide the context of the issue and focus for the analysis.

2.1 Human Uses

2.1.1 Roads

The Zarembo Island road system has no direct access from any community. Road access is via boat or barge, primarily from Wrangell and Petersburg. Road use is greatest during deer hunting season and less than 100 vehicles per day use the road system during this period.

Issue: There is concern that the island already has an extensive road system.

Key Question: What are the current condition and uses of the roads on Zarembo Island?

Issue: The roads deliver sediment to streams for years after logging is complete and the roads offer easy accessibility which increases hunting pressure on wildlife.

Key Questions: What resource and social concerns exist with the current road system?

What is the recommended travel and access network?

2.1.2 Recreation, Subsistence, and Commodities

A variety of human uses occur in the analysis area, including recreation, subsistence uses, and commodities resources. There are no communities on Zarembo Island, though residents of Wrangell, Petersburg, and to a lesser extent, other southeast Alaska communities, use the island.

Issue: Zarembo Island is used for a variety of recreational experiences. However, there are currently no developed camping areas, parking areas, or trails. As a result, privately-owned vehicles are sometimes left on the island year-round, the use of Off-Highway Vehicles (OHVs) has resulted in soil and vegetation damage, and a conflict has developed between motorized and non-motorized recreational users.

Key Question: What are the local community concerns and interests for Zarembo Island?

Issue: Recreational opportunities should be provided and managed consistent with the Forest Plan.

Key Question: What are the recreation facilities and uses on Zarembo Island?

Issue: Subsistence use is important to the people in the surrounding communities.

Key Question: What are the subsistence resources and uses in the area?

2.2 Hydrology

Hydrology is a complex combination of numerous physical features that all come together to determine how water moves from the uplands or headwaters of a stream down to saltwater. Hydrology can be modified through natural and human-caused disturbances such as blowdown, timber harvest, and road construction.

Issue: Natural and human-caused disturbances can expose mineral soil, which can erode and flow into streams.

Key Question: What are the current stream channel characteristics and aquatic habitat conditions?

Issue: Drainage structures are not adequately providing fish passage that meet Forest Plan standards.

Key Question: What is the status of fish stream crossings and passages?

Issue: Land management activities have affected and will continue to affect water quality and fish passage.

Key Question: What opportunities exist for watershed restoration projects?

2.3 Vegetation Condition

Past forest management and natural windthrow events have altered the character of the overall vegetation on Zarembo Island. Current concern focuses on management of vegetation based on the goals and objectives of the various LUDs and Forest Plan Prescriptions.

Issue: Provide long-term sustained yield of timber resources from suitable lands.

Key Questions: How has past harvest affected long-term sustained yield?

How much timber should be harvested per decade by LUD?

Issue: Enhance biodiversity of tree species and forest structure.

Key Questions: Has management affected species composition?

Are opportunities available to increase biodiversity?

Do current stands have species composition and forest structure distribution consistent with Forest Plan direction?

Will future stands available for timber management have species compositions and log qualities that maximize value of timber resources?

Issue: Maintain forest health and productivity.

Key Questions: Is the current vegetation condition consistent with Forest Plan direction?

Are opportunities available to increase forest health and productivity?

Issue: Manage disturbance agents, particularly windthrow.
Identify high wind hazard stands.

Key Question: What are appropriate silvicultural prescriptions in high wind hazard areas?

Issue: Develop strategy for long-term scheduling of harvest in Scenic Viewshed LUDs.

Key Questions: Can silvicultural objectives and VQOs both be met?

How will VQOs affect scheduling of harvest and silvicultural prescriptions?

2.4 Wildlife Habitat

Habitats on Zarembo Island include early-, mid- and late-successional forest, riparian areas, muskeg, and alpine. The island is home to a variety of wildlife species that are typical of southeast Alaska. Species identified for analysis in this assessment include deer, wolves, black bear, moose, elk, small mammals, bald eagles, and goshawks.

Issue: Sustain current deer population and harvest levels.

Key Questions: Where is the habitat for these species and how much habitat is in the analysis area?

What is our current knowledge of populations on Zarembo Island?

Issue: Extent of old-growth forests and connectivity between them?

Key Questions: How will the effects of high road density on wildlife species be minimized?

What is the current status of the Old-Growth Reserves?

Chapter 3

Assessment Area Description

This chapter describes the current physical, ecological and social economic structure of Zarembo Island. This includes the influences humans have had on the current landscape.

Ecological Subsections

Eighty-five ecological subsections were developed and mapped for the Tongass National Forest; these units embody similar ecological characteristics, e.g. landforms, streams, vegetation, soils and wetlands. (Nowacki, et al, 2001)

There are four ecological subsections for Zarembo Island are: Wrangell Narrows Metasediments, Stikine Strait Complex, Sumner Strait Volcanics, and Duncan Canal Till Lowlands. The following terms are used in the description of the four ecological subsections:

Granodiorite : This combination of minerals has a salt-and-pepper appearance.

Tonalite is a plutonic rock made up of a felsic (feldspar and silica) composition. It is usually light in color.

Glaciomarine: Sediments of glacial origin laid down in a marine environment in close proximity to glacier ice.

Surficial deposits: Unconsolidated surface deposits of fluvial (produced by action of a river or stream), colluvial, aeolian (results from wind), or glacial origin.

Till: An unsorted mix of unconsolidated sediments and rocks carried and deposited by a glacier.

Drift is rock debris transported and deposited by or from ice, especially by or from a glacier.

Pleistocence: This geologic timescale is marked by several glacial and interglacial episodes in the northern hemisphere, and is also called the Glacial Epoch.

The northern portion of Zarembo Island falls within the **Wrangell Narrows Metasediments** ecological subsection. Sedimentary rocks with scattered intrusions of *granodiorite* and *tonalite* underlie this area. Heavy *Pleistocene* glaciation reduced and rounded the mountains into octopus-like clusters separated by broad U-shaped valleys. Retreating glaciers left behind substantial till deposits over the landscape.

The moderately-high rainfall has eroded the rough slopes, creating moderately-steep streams that are short and mainly contained. Hemlock forests with Sitka spruce and cedar occupy the mountain slopes. Lodgepole pine and mixed-conifer forest are found on poorly-drained soils. Both forested and nonforested wetlands are common in valleys and coastal lowlands underlain with compact glacial *tills* and *glaciomarine* sediments. Thick layers of peat have developed where subsurface drainage is poor.

A portion of southeast Zarembo Island is included in the **Stikine Strait Complex** subsection. This landscape contains a mix of sedimentary and volcanic rocks and *surficial deposits*. The topography is rough, but Pleistocene glaciation has rounded the ridge tops and deposited *till* and *drift* in the lowlands. Organic soils have developed on these deposits and on other areas with poor drainage. Organic soils cover about half of the landscape and support extensive areas of wetlands and nonproductive forests. Hemlock and hemlock-spruce forests occupy most of the productive soils; mixed-conifer and lodgepole pine forests are common on soils with low site productivity. The moderately high rainfall supports many small, high-gradient streams that are contained within their channels.

The **Sumner Strait Volcanics** includes a portion of west Zarembo Island. Young volcanic flows (less than a million years old) are somewhat impermeable and gently rising from the lowland matrix of glacial till and drift. Glaciation has erased prominent volcanic features leaving behind an eroded landscape of alternative strata of volcanic flows. Slopes that follow the direction of flow are long and gentle and support a mixture of low productive forested (hemlock, Alaska yellow-cedar, and lodgepole pine) and nonforested wetlands on shallow organic soils. Slopes that cut across flows are short, steep, and stair-stepped with numerous cliffs. The mineral soils of these slopes support productive stands of hemlock, Alaska yellow-cedar, and spruce. Moderately high rainfall feeds actively eroding gullies on volcanic bedrock that contribute large amount of bedload sediments to streams. Low-to moderate-gradient streams amble to the sea across lowlands.

The **Duncan Canal Till Lowlands** subsection stretches across the central valley of Zarembo from Meter Bight to St. John Harbor. Wetlands dominate the landscape, due to the subdued, low-lying landscape and moderately high-rainfall. Stunted lodgepole pine, ericaceous shrubs, sedges, and mosses mostly characterize these wetlands. Productive forests are mainly restricted to the better-drained mineral soils that are found along slopes and streams. Most streams have moderate or low (floodplains and palustrine channels) gradients and some support good salmon runs.

3.1 Human Uses

3.1.1 Island Access Points

Roads were first developed on Zarembo Island in the early 1970s to access National Forest timber sales. Two docks were developed as access points: one at St. John Harbor on the northwest corner of the island, and the other at Roosevelt Harbor on the northeastern corner. Two separate road systems were developed from these docks as timber harvest progressed inland. The road systems were eventually joined in two places, along the northern shore and also in the Meter Bight/St. John valleys, resulting in a loop road.

There are a log transfer facility and floating dock located in St. John Harbor. The Forest Service maintains an administrative facility for crew quarters about a half-mile from the dock. The St. John dock is the primary access point for most Petersburg residents that hunt Zarembo Island. The State of Alaska selected approximately 1,680 acres of land, including tide lands, in the vicinity of St. John Harbor; the title to the land was conveyed in August 2004 (St. John VCU Map, Map 1-3, page 1-8). Of these 1,680 acres, approximately 940 acres are uplands. The Zarembo Mineral Springs is located in St. John Harbor and there is no current claim on the springs.

In conjunction with the Pacific Northern Timber contract, a logging camp was established at St. John Harbor in 1969. The camp included repair shops, offices, a large bunkhouse, trailers for families, and a school. At one point, as many as 150 people lived in the community at St. John Harbor. The camp was removed around 1985.

Roosevelt Harbor is the most heavily used access point to Zarembo Island due to its proximity to Wrangell. The floating dock located in Roosevelt Harbor is used extensively during the deer hunting season. The Forest Service maintains an administrative facility for crew quarters about a half-mile from the dock. Deep Bay, adjacent to Roosevelt Harbor, contains a log transfer facility.

A logging camp was also established at Roosevelt Harbor during the 1970s. This camp included approximately 50 people during the busy summer months. The camp at Roosevelt Harbor operated for about 5 years.

Figure 3-1. St. John Administrative Facility, 1998

3.1.2 Roads

The Zarembo Island road system has no direct access from any community. Road access is via boat or barge, primarily from Wrangell and Petersburg. Road use is greatest during deer hunting season.

The present road network was built and is maintained for timber management. The majority of the roads on Zarembo Island were constructed in the 1970s and early 1980s, using road construction standards that were not as stringent as standards used today.

A Zarembo Island Roads Analysis Plan (RAP) is scheduled for completion in 2005. The RAP will review the scope and current condition of the Zarembo Island road system including the framework of other land ownership. It will also provide information for developing the District's plan for roads management. Like this document, the Zarembo Island RAP is not a decision document.

Road Construction

Roads in southeast Alaska are generally constructed by laying organic material (e.g., tree tops, limbs, stumps) on the leveled ground surface and then covering this organic mat with two to three feet of shot rock. The shot rock comes from borrow sources (rock pits) that have been developed adjacent to the roads. An estimated 90 borrow sources with an average size of 1.5 acres have been developed on Zarembo Island. The surface on classified roads is smoothed with a grid-roller machine. Surfaces on classified roads are generally 14 to 16 feet wide with turnouts, while temporary roads range from 12 to 14 feet wide. Culverts or bridges are placed at all natural channels. Cross drains, which are small culverts intended to transport runoff underneath the road, are commonly installed. Most cut banks and fill slopes are seeded upon construction to stabilize soil and reduce erosion and sedimentation.

For the most part, the road prisms have remained stable with the exception of several washouts. The most common cause of road failure has been due to culverts that are plugged by debris torrents, which fail during periods of high stream flow. Most major stream crossings were log-stringer bridges or large culverts. A large number of these have been replaced or removed in the last six years.

Status and Maintenance Levels of Forest Roads

An Objective Maintenance Level (OML) is assigned to each forest road. The OML is the level at which a road is to be managed and takes into consideration the future road management objectives, including traffic needs, budget constraints, and environmental concerns. Roads also have an operational maintenance level, which is the actual current level of road maintenance. The operational maintenance level assigned to a road takes into consideration current needs, road conditions, budget constraints, and environmental concerns. Thus, roads may be currently maintained at one level, but are planned for maintenance at a different level for a future date. The objective maintenance level may be the same as, higher than, or lower than, the operational maintenance level.

Each of the road maintenance levels is described in the following paragraphs. Note that the description of each applies to both operational maintenance levels and objective maintenance levels.

Map 3-1 shows the roads and assigned objective maintenance level for Zarembo Island.

Closed roads (Maintenance Level 1)

Forest roads that are closed to vehicular traffic are managed according to OML 1. For a road to be assigned to this maintenance level, the period of its closure must exceed 1 year. Closed roads may provide intermittent service.

These roads receive custodial maintenance to keep damage to adjacent resources at an acceptable level and to perpetuate the road to facilitate future management

activities. Maintenance emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies include "prohibiting" and "eliminating" motorized traffic. OML 1 roads may be managed at any other maintenance level during the time they are open for traffic.

Though these roads are generally closed to vehicular traffic, they may be open for Off-Highway Vehicle (OHV) use and for non-motorized uses. While OHV traffic is typically discouraged, foot traffic is welcome.

Many roads that are closed will become overgrown with alder within 10 to 15 years.

Closed roads in the Assessment Area have been physically closed with a barrier or have been overgrown with alder. Some closed roads contain log bridges that are unsafe for vehicles. The original drainage structures remain in place on some closed roads but have been removed on others.

Open Roads (Maintenance Levels 2 through 5)

Forest roads that are open to vehicular traffic are managed according to one of four OMLs. Roads assigned to maintenance levels 2 through 5 are opened and maintained to provide constant service to motorized vehicles. All open roads should receive periodic roadside brushing and annual drainage structure maintenance. Mechanical brushing of the roadsides began in 1997, and all drivable roads have been brushed at least once during the past 3 years to reduce the encroachment of alder. Road maintenance usually occurs in conjunction with ongoing timber sales. Appropriate traffic management strategies include discouraging or prohibiting passenger cars and accepting or discouraging high-clearance vehicles. The Forest Service also contracts for road maintenance when there are no active sales on the island. There are no OML 4 and 5 roads on Zarembo Island.

Objective Maintenance Level 2

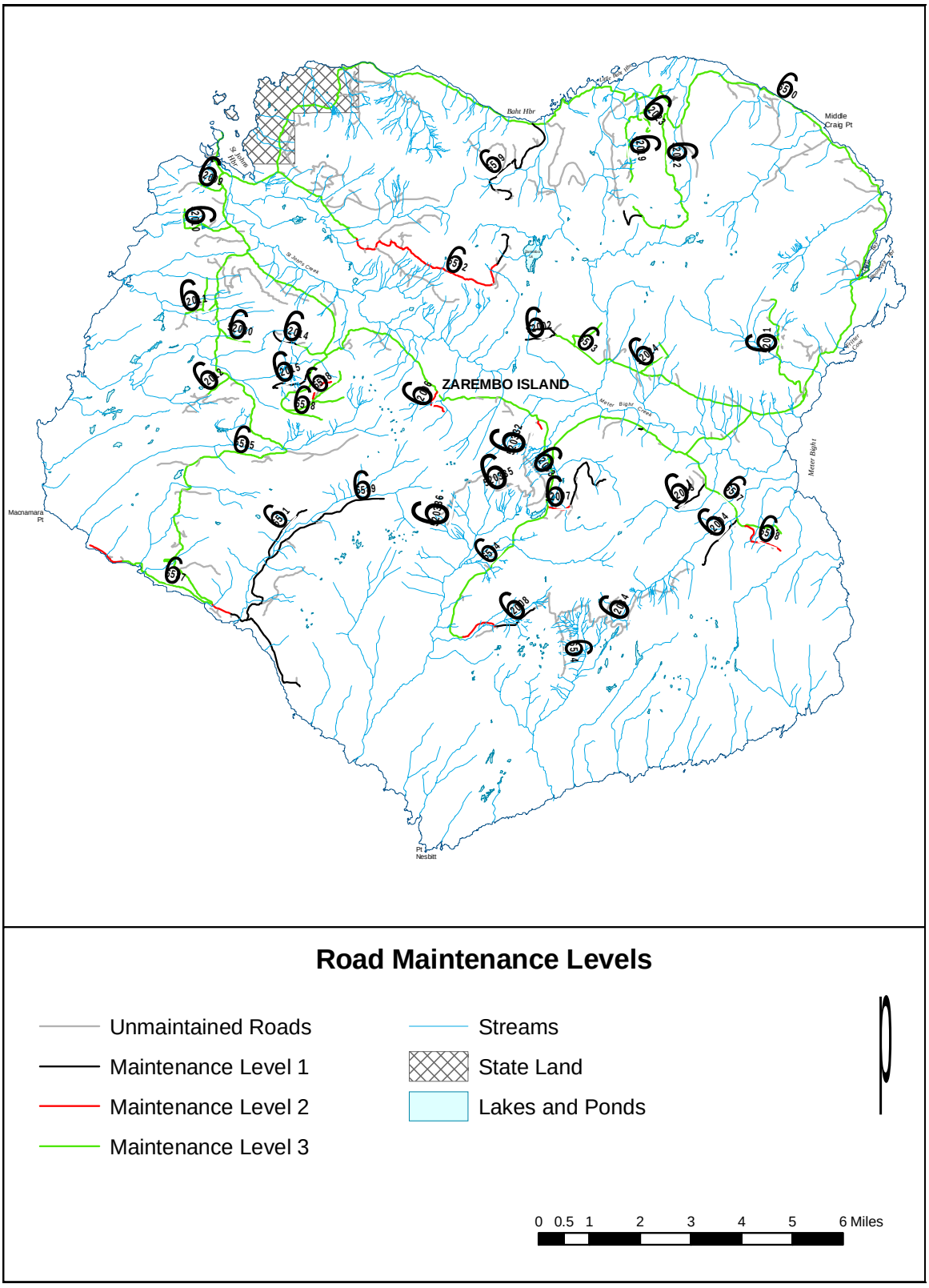
OML 2 is assigned to roads open for use by high-clearance vehicles such as four-wheel drive pickup trucks and logging traffic. Passenger car traffic is not a consideration. Traffic on these roads is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Roads may be used for log haul.

Road surface conditions on these roads are in a self-maintained condition. Drivable waterbars, which are similar to speed bumps, may be added to the road to channel storm waters off the roadway. Existing drainage structures are to be left in place and supplemented with waterbars. Vehicle speed is expected to be slow in comparison to roads open to standard passenger vehicles. This is likely to slow the formation of potholes and minimize impacts to forest wildlife.

Objective Maintenance Level 3

OML 3 roads are open and maintained for standard passenger car use. User comfort and convenience are not considered priorities. These roads typically consist of a single lane with turnouts and spot surfacing; however, some roads may be fully surfaced with either native or processed material. They are intended for use at low speeds. However, use by certain classes of vehicles or users may be discouraged or prohibited depending on the volume of commercial use.

Map 3-1. Road Maintenance Levels



Temporary, Decommissioned, and Unclassified Roads

Temporary roads are authorized by contract, permit, leases, or other written authorization, or by emergency operation. They are not intended to be part of the forest transportation system and are not necessary for long-term resource management. Temporary roads may be up to one mile in length, but are generally less than half-mile long. A common example of a temporary road would be a road leading to a landing where equipment has been placed to harvest timber.

Decommissioned roads are unneeded roads that have been stabilized and restored to a more natural state. Decommissioning includes reestablishing former drainage patterns, stabilizing slopes, and restoring vegetation. Culverts and bridges are removed, waterbars are added, and the road entrance is generally blocked to motorized traffic. Temporary roads would normally be decommissioned after a timber sale has been harvested and the log trucks are finished hauling the timber to a mill or transfer site.

Unclassified roads are roads not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a trail. It also includes roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization. When a road is not decommissioned after its authorized-use is terminated (the timber sale), it becomes an unclassified road.

Table 3-1 shows the miles and the maintenance level of the roads that have been constructed on Zarembo Island. Collector roads are the most well- traveled mainline routes such as the St. John-Roosevelt Loop (#6590), the Mustang Lake Road (#6594) and the Snow Pass Road (#6585). Local roads are shorter roads that are tributary to the main routes, such as the Flying Fish Creek Road (#52021). Non-system roads are temporary spurs that have no road number.

TABLE 3-1. Miles of Road by Maintenance Class

	Unmaintained Roads	Level 1	Level 2	Level 3	Total
Collector	4.0	0	0.7	59.3	64
Local	12.5	8.5	9.3	25.4	55.7
Non-system	68.5	0.4	1.1		70
TOTAL	85.0	8.9	11.1	84.7	189.7

Road Condition Surveys

In 1998, the Wrangell Ranger District began a Road Condition Survey (RCS) on forest roads on the district. Road condition surveys are conducted to gather information on the general condition of roads and to identify problem areas where roads have failed or where there are erosion, undersized, or collapsed cross drains and inadequate ditches.

RCSs have also been used as a tool to bring the Forest Service into compliance with rules and regulations pertaining to fish passage through culverts. Those culverts that hinder or obstruct the passage of aquatic species such as fish have been classified as "red pipes." Culverts that pose no barrier are classified as "green" and culverts that require more data are classified as "gray". Identified impediments to fish passage are inconsistent with regulations set by the Clean Water Act (CWA). CWA states "the design, construction and maintenance of road crossing shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body." The Tongass Forest Plan Standards and Guidelines also direct managers to "maintain, improve, and restore the opportunities for fish migration" in Class I and II streams. As a result of survey efforts, the repair of these "red pipes" has become a Forest priority.

RCSs identified 64 of the 97 fish crossings on Zarembo Island as not meeting the standard for fish passage (Table 3-2). These culverts were analyzed and factors, such as fish species present, available upstream habitat, and the nature of the impediment to passage, were taken into account to assess their red, gray, or green status.

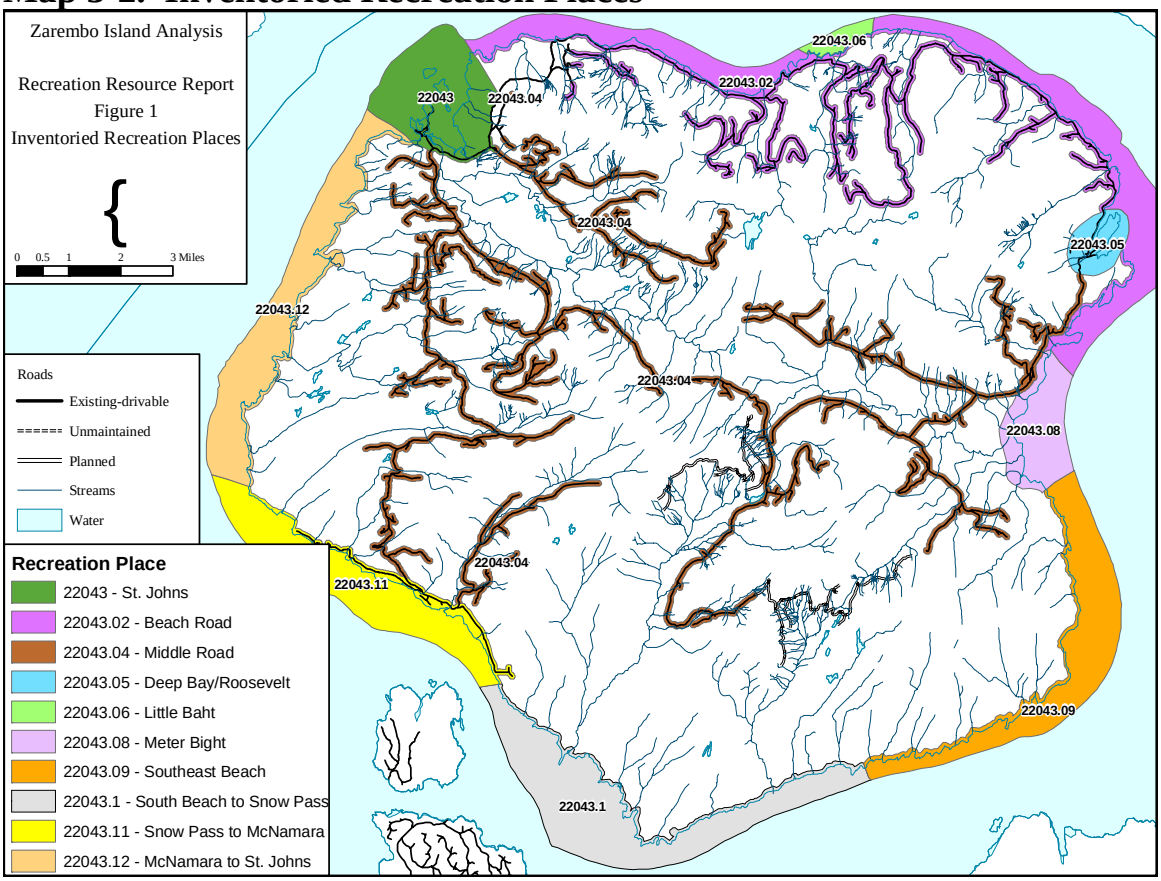
Table 3-2. Culvert Classifications by Stream Class (2004).

Pipes	Class I	Class II	Total
Red	**22**	**42**	**64**
Green	**9**	**14**	**23**
Gray	**6**	**4**	**10**
Total	**37**	**60**	**97**

In 2003, a project was developed for prioritizing red culvert replacement based on their upstream habitat values. Seventeen culverts were identified as candidates for replacement or retrofit. The seventeen culverts will be replaced by the end of 2005 to meet the forest standard and Clean Water Act for fish passage. The remaining 47 culverts are on contract to be replaced in the next two years.

Road condition surveys have been completed for all system roads and most unclassified roads. The majority of the data has been analyzed and a number of areas of concern have been identified and corrected. In 2005, several road systems in Snow Pass (#6585 and #6589), Frenchy Creek (#6592), Baht Creek (spur of #6590 at milepost 12.025) and Harpoon and Cleat Creeks (#6597 and #6598) have been decommissioned, with all drainage structures removed.

Map 3-2. Inventoried Recreation Places



3.1.3 Recreational Use

Inventoried Recreation Places

There are ten inventoried recreation places on Zarembo Island (see Map 3-2). Following is a brief discussion of each Inventoried Recreation Place.

St. John (22043)

St. John Harbor is one of the two main access points on Zarembo Island. There are a log transfer facility and floating dock located in the harbor. Approximately 4 miles of Road 6590 near the harbor are included in this inventoried recreation place. The Forest Service maintains an administrative crew quarters about a half-mile from the dock. The St. John dock is the primary access point for most Petersburg residents that hunt Zarembo. Recreationists use the dock system to access the Zarembo Island road system. The area is most active during the deer-hunting season, with hunters docking their boats, and unloading Off-Highway Vehicles (OHV) and other recreation vehicles. Recreational and commercial boaters are also known to use the harbor as a safe anchorage.

The State of Alaska selected approximately 1,680 acres of land including tide lands, in the vicinity of St. John Harbor; the title to the land was conveyed in August 2004 (Map 1-3, St. John VCU Map). Of these 1,680 acres, approximately 940 acres are uplands. The abandoned Zarembo Mineral Spring is located in St. John Harbor.

Beach Road (22043.02)

This inventoried recreation place includes the portion of the main Beach Road (Road 6590) running along the northern shore of Zarembo Island, connecting St. John and Roosevelt Harbors. It also includes forest roads that intersect with the beach road along the northern shore of Zarembo Island, accessing managed timber harvest units (Roads 6599, 52019, 52022, 52023 and numerous un-maintained, unnumbered roads forking off these) for a total of approximately 51 miles of road within the inventoried recreation place. The most predominant use of these roads is associated with hunting. Vehicular use of the road strictly for recreational use, that does not involve hunting, is rare. Hunters travel the road system in light trucks, cars, OHVs, and other recreational vehicles to hunt from the road and to provide foot access to higher elevation hunting grounds.

Middle Road (22043.04)

This inventoried recreation place includes most of the other roads in the interior of the island, with the main attraction being the portion of the 6590 Road that bisects Zarembo Island forming a loop with the Beach Road mentioned above. All interior road spurs are included in this recreation place. As mentioned above, use of these roads is primarily associated with hunting, either as a platform to hunt from or as a means to access higher hunting grounds by foot. Though rarely used for such purposes, all roads on Zarembo Island provide access to dispersed camping, cross-country hiking, and berry picking, and provide a system for mountain biking and recreational driving of all types of vehicles for those inclined to do so.

Roosevelt/Deep Bay (22043.05)

Roosevelt/Deep Bay Harbor is located on the northeastern shore of Zarembo Island, providing the closest dock for the community of Wrangell. This is the main access point for most recreational use from Wrangell, with visitors docking boats there and using the Log Transfer Facility (LTF) to off load their recreation vehicles for hunting. There is a floating dock with ramp facility accessing the road system from shore. This inventoried recreation place includes 2.7 miles of the 6590 Road near the harbor and dock system. The harbor is also a good anchorage, and is often used by commercial fishing, sportfishing, and pleasure boats as an overnight anchorage with the vessels moving on in the morning without anyone going ashore.

Little Baht Harbor (22043.06)

Little Baht Harbor is located on the northern shore of Zarembo Island. There are no facilities in this area that provide access to shore, though the Beach Road passes by the harbor right along the shoreline. All types of boats use the anchorage in good weather but generally boaters will choose St. John or Roosevelt Harbor in rougher water, as they provide better protection.

Meter Bight (22043.08)

The Meter Bight inventoried recreation place includes the beach area south of Fritter Cove, located on the east shore of Zarembo Island. The area is sometimes used as a beachcombing site or for access to sportfishing streams with anglers targeting steelhead and/or trout. There are no roads or developed recreation facilities within this inventoried recreation place.

Southeast Beach (22043.09)

This recreation place includes the beach area on the southeast corner of Zarembo Island. With no roads or developed recreation facilities, the predominant recreation use of this area is beachcombing.

South Beach/Snow Pass (22043.10)

The South Beach/Snow Pass recreation place includes the southern shoreline of Zarembo Island. Similar to other inventoried beach areas, there are no roads or developed recreation facilities within this area; the main recreation is beachcombing.

North Snow Pass/McNamara (22043.11)

This recreation place includes the southwest shore of Zarembo Island, including about 3 miles of Road 6585, and the entire 6587 Road. Road 6585 is only drivable for about one-half mile past its intersection with Road 6587 because the bridge crossing the stream has been removed and the end-section of Road 6585 is decommissioned. This recreation place provides expansive views of the Snow Pass area from the island and beachcombing opportunities for visitors.

McNamara/St. John (22043.12)

The McNamara/St. John recreation place includes the beach just southwest of St. John Harbor in Snow Pass. Snow Pass is a popular sport and commercial fishing area. This inventoried recreation place has no roads or developed recreation facilities. The tide-rip through this section of water makes it an undesirable place to anchor. The most predominant recreation use of the land in this recreation place is short visits from passengers off boats for occasional beachcombing.

Recreation Opportunity Spectrum

The Forest has the potential to provide a wide variety of recreation settings. The Recreation Opportunity Spectrum (ROS) has been developed to help identify, quantify, and describe these settings. The ROS is a system for planning and managing recreation resources that categorizes recreation opportunities into six classes, ranging from Primitive to Urban. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs. These needs are based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. Zarembo Island has been inventoried and is categorized into three ROS classes as displayed in the following table.

TABLE 3-3. Acres of Recreation Opportunity Spectrum by VCU.

	Baht (VCU 456)	St. John (VCU 457)	SnowPass (VCU 458)	Meter Bight (VUC 459)	Total
Roaded Modified	12,000	15,900	11,700	14,800	54,400
Semi Primitive Motorized	0	0	0	4,800	4,800
Semi Primitive Non-Motorized	5,000	10,100	20,600	22,900	58,600
Totals	**17,000**	**26,000**	**32,300**	**42,500**	**117,800**

Numbers rounded to nearest hundred.
Source: GIS data, Susan Wise-Eagle, March 2005.

Roaded Modified ROS areas have constructed roads with vegetation modified mostly by timber harvest. In some areas, the roads are drivable; in other areas, the spur roads are not drivable for a variety of reasons. Semi-Primitive ROS is an area not dominated by human impacts. In motorized areas, there may be sights or sounds of motorized equipment such as boats and vehicles. In non-motorized areas, these sights or sounds would not be present.

Outfitter and Guide Use

The Stikine Area Outfitter and Guide Environmental Assessment (EA), completed in 1996 and updated in 2004, calculated the recreation capacity of Zarembo Island to be about 14,320 Recreation Visitor Days (RVD). An RVD is equal to one person visiting the National Forest for 12 hours. A visit of less than 12 hours would be a fraction of an RVD, more than 12 hours would be more than one RVD.

The EA examined outfitter and guide use for the Wrangell and Petersburg Ranger Districts. The selected alternative in the EA allows for 10 percent of the calculated carrying capacity within an identified home range of a community to be allocated to outfitter guides and 25 percent of the calculated carrying capacity outside an identified home range to be allocated to outfitter guides. Portions of Zarembo Island commonly used by Wrangell residents are considered to be within the home range of the community of Wrangell (Roosevelt Harbor, the Beach Road, and Little Baht Harbor), while others are considered outside the home range of Wrangell (St. John Harbor). It was determined that recreation use on Zarembo Island was not nearing the recreation carrying capacity. In the EA, there are mitigation measures established for outfitter/guide activities to avoid user conflicts between commercial and non-commercial visitors. However, no measures were established for areas on Zarembo Island. The allocation of RVDs for outfitter/guides was reduced to 10 percent of the established allocation at St. John, the Beach Road, the Middle Road, Northern Snow Pass/McNamara, and Roosevelt/Deep Bay due to the high number of RVDs generated by the large acreages used to determine the allocation. The EA suggests monitoring of future uses and possibly increasing the allocation to outfitter/guides should demand for such use increase significantly.

There is very little outfitter/guide use requested or reported on Zarembo Island. The largest use request for 2004 was from Marlin's Fly Fishing for 12 deer hunts. There are about three outfitter/guiding businesses that regularly request large areas of use for the purposes of fishing, hiking, and sightseeing. Zarembo Island is included in their requests, but is not often used. Following is a table showing reported outfitter/guide use on Zarembo Island from 1997 through 2003.

Table 3-4. Reported Outfitter/Guide Use on Zarembo 1997-2003

Year	RVDs	Service Days*
1997	2.2	13
1998	6.25	32
1999	2.08	21
2000	3.92	17
2001	4.08	29
2002	4.5	26
2003	15.67	26

Source: Wrangell Ranger District, Outfitter/Guide Use Reports.

*****Service Day is defined as a day or any part of a day, on National Forest System lands for which an outfitter or guide provides goods or services including transportation to a client.

Non-Commercial Recreation Use

Hunting Activity

The majority of recreational use on Zarembo Island is associated with the harvest of Sitka black-tailed deer, moose and/or elk. Non-guided hunters hike cross-country and travel the roads with light trucks, motorcycles, and/or OHVs in search of animals. Deer hunting attracts the largest numbers of hunter days. The season runs from August 1 through November 30 with most activity occurring near the weekends. Most hunters are from the communities of Wrangell and Petersburg. This activity will continue as long as there are high population numbers of deer, moose and/or elk on the island and access to an extensive road system.

TABLE 3-5. Zarembo Deer Hunting – 1987 through 2003

Year	Hunters	Hunter days	Deer Harvested
1987	23	43	10
1988	11	30	11
1989	27	160	26
1990	65	115	54
1991	128	416	135
1992	57	848	85
1993	185	411	124
1994	236	702	163
1995	325	953	291
1996	Not recorded	Not recorded	309
1997	421	1,098	407
1998	347	1,177	397
1999	349	1,496	368
2000	472	1,914	430
2001	295	1,605	426
2002	306	1,176	277
2003	237	839	256

Source: Alaska Department of Fish and Game Annual Harvest Reports

Most access to the road system on Zarembo is through the developed docks at Roosevelt Harbor and St. John Harbor, initially developed as Log Transfer Facilities (LTF) for timber harvest. At each of these locations there is a floating dock with a ramp to get to shore.

Vehicle use on Zarembo Island

The number of privately-owned motor vehicles and OHVs used during deer hunting has been increasing during the past decade on Zarembo. Currently, there are no designated parking areas for private vehicles on Zarembo Island. Vehicles are often left in areas previously developed for logging camps and work yards. During the mid-1990s, commercial operators began providing transportation for vehicles and recreational trailers from Wrangell to Roosevelt Harbor just prior to the beginning of the deer hunting season. Most vehicles are returned to Wrangell at the end of the season but a few are left year-round.

Overnight Camping on Zarembo Island

It is common for deer hunters to stay overnight near the portals of Roosevelt or St. John Harbor; either on boats or in float houses. Some hunters camp in tents, while others may stay in recreational vehicles (RVs), such as fifth-wheel trailers and truck mounted campers. These RVs remain on Zarembo during most of the deer season and some owners have cleared areas to develop a place for long-term camping. Currently, there is no designated camping area for recreation vehicles on Zarembo Island. Forest Order No. 91-4 prohibits camping in excess of 14 days at one location during any 90-day period and requires subsequent camping locations to be at least one-half mile from any previous location.

Float house use

Private float houses are brought to Roosevelt Harbor and Deep Bay to be used as deer hunter camps. Current Forest policy does not allow float house shore ties to National Forest uplands without a special use permit. Enforcement of this policy is a persistent problem.

Off -Highway Vehicle Use

OHV use primarily occurs on forest development roads and is mainly associated with access for deer, moose, and/or elk hunting. Alaska National Interest Lands Conservation Act (ANILCA) Sec.1316 allows the Forest Service to permit temporary equipment and facilities directly and necessarily related to the taking of fish and wildlife. The Forest Service may authorize the temporary storage of private vehicles on Zarembo.

Some off-road use by OHVs has resulted in damage to fragile wetlands, forest, estuary, and/or high elevation soils. Off-road use by smaller three and four-wheel recreational vehicles was reported at five sites on Zarembo Island during the past years. An illegal OHV trail has been cleared from Road 6590 through the forest to the Deep Bay tidal grass area.

A conflict has been noted between motorized and non-motorized recreationists on Zarembo Island. In past years, unidentified person(s) have taken action to block motorized traffic to Road 6599 and others (motorized) have renewed the vehicle access to the same road. The action first occurred in 1999 and once again in 2000. This conflict is over access to an old road that was previously overgrown and accessible only by foot traffic. This is an indication that motorized and non-motorized access needs to be identified and possibly enforced.

Table 3-6. OHV Trails Identified on Zarembo Island

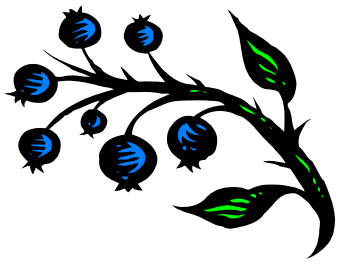
Year	Location	Length	Notes
1999 & 2000	Road 6588, Alpine Rd	about 3 miles	Currently very little use, but potential for extensive alpine access point.
2002	Road 6588, Alpine Rd into high muskeg alpine	about 3 miles	Little past use has expanded into extensive use from alpine access point.
1999, 2000 & 2001	Road 52022	about 1/4 mile	Access to ridge above road system.
2000	Road 6590, Deep Bay	Couple of hundred feet	ATV trail through beach fringe from float houses to Forest Road.
1999, 2000 & 2003	Road 52021	about 1/2 mile	*ATV trail access to small lake. Two spots noted soils/site damage.
2003	Closed Spur MP 9.75 Road 6590, Baht Harbor	about 500 ft	ATV trail across dead end muskeg. Spur rd. east Road 6590.
2002 & 2003	Road 6585, Snow Pass Cr. Bridge	about 200 ft	ATV trail across creek bed where road bridge was removed.

Source: TLMP Monitoring Report 2003

*ATV trail is unauthorized construction.

Other Recreational Activities

Other recreation activities on Zarembo include trapping, berry-picking along the roads in former timber harvest units, and beachcombing along the south and west shoreline. Trappers and berry-pickers travel on the island's road system and access the area from the major portals at Roosevelt Harbor and St. John Harbor.



3.1.4 Subsistence

Extensive subsistence analyses have been conducted for Zarembo Island as part of the Baht Timber Sale and Skipping Cow Timber Sale EISs. The Subsistence Resource Reports indicate that deer are the most significant subsistence resource on Zarembo Island with relatively little documented harvest of other resources. Based on Alaska Department of Fish and Game (ADF&G) hunter reports, residents of Wrangell and Petersburg take almost all (95 percent) of the deer harvested from Zarembo Island (ADF&G 2002 report). During the period 1992-2001, annual deer harvest grew from 85 to 426 deer. Wrangell residents reported harvest averaging just over 238 deer per year during the 1992-2001 time frames. During that time frame, the percentage of Wrangell's deer harvest from Zarembo Island went from 20 percent to as much as 60 percent.

Many hunters credit the logging on Zarembo Island with creating an increase in deer forage, while others say that the logging may have coincided with a natural increase in the deer population cycle. According to the observations of ADF&G biologists, deer forage on Zarembo was so abundant in 1997 that even though deer populations were high, there were no signs of habitat degradation or overgrazing. In 2004, Forest Service biologists surveying deer winter range noted signs of over-browsing in some areas; an indication that deer populations may be approaching carrying capacity for the island. Winter range is, in most cases, the most limiting factor for deer (Suring et al. 1992; Kirchoff & Schoen 1987). Deer populations are likely to remain high until the food supply or weather conditions change.

Zarembo Island is currently a well-roaded island, and almost all hunters use the roads, to some extent, to access hunting areas. Most of these hunters enter via St. John or Roosevelt Harbor by boat and either bring motor vehicles with them or use those kept on the island. A small percentage of hunters use boats to access the island at places other than the main entry points.

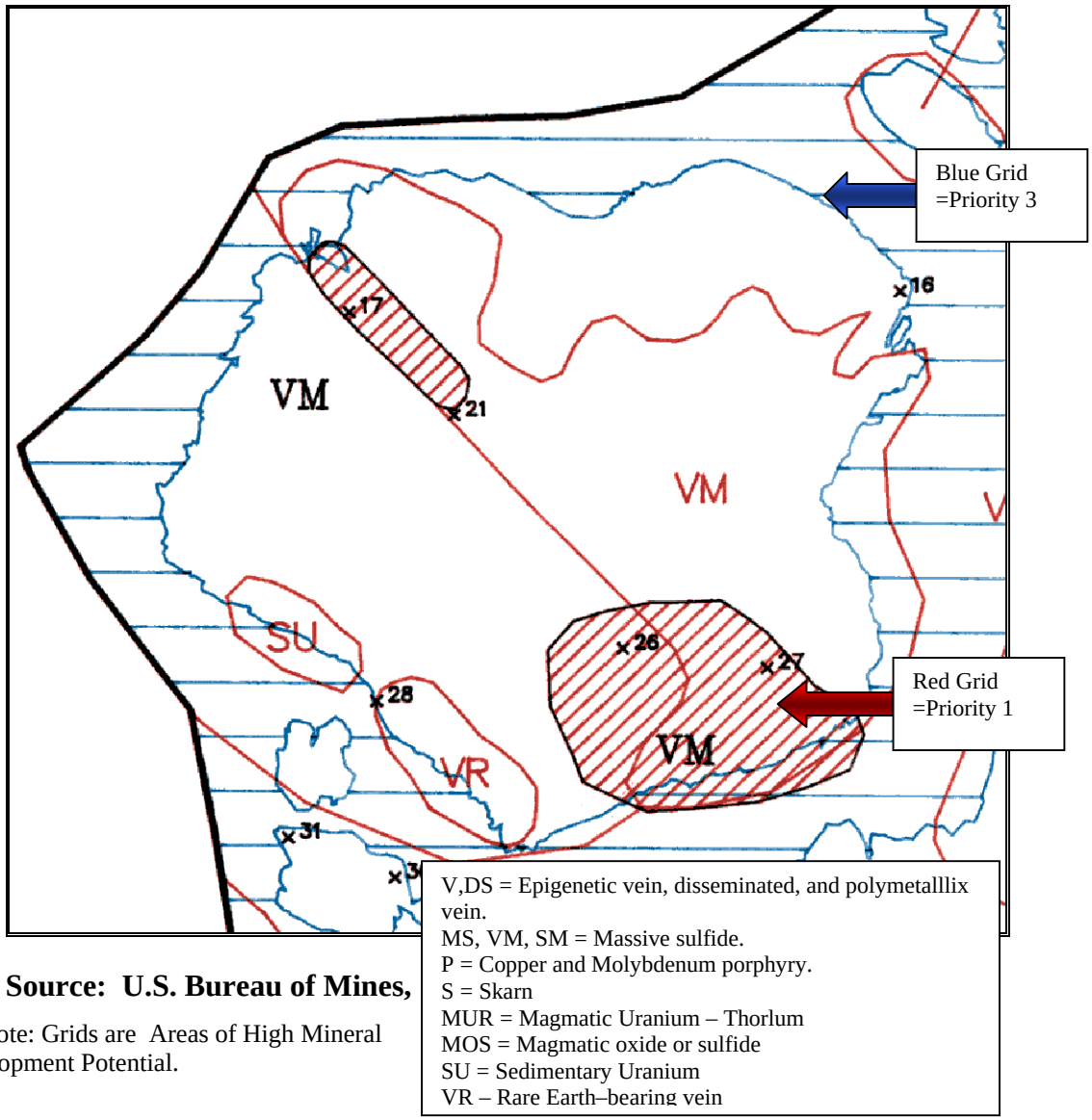
It is not likely that the construction of additional roads or the closure of some existing roads would affect the present pattern of hunting on Zarembo Island in a fundamental way. Hunters choose the specific areas they plan to hunt on the basis of anticipated success. As long as deer populations remain high, subsistence hunters will continue to hunt on Zarembo Island.

3.1.5 Non-Timber Commodities

Minerals

The map of the Mineral Development Potential identifies several areas on Zarembo Island that may be of interest for mineral development. Zones of potential mineral development occur at the extreme southwestern tip and across the central portion of the island. While several prospects for uranium and gold have been explored along the western and northern coastline of Zarembo, no significant mining has occurred. In the St. John drainage, copper exploration has been done several times by corporations during the last 50 years.

Map 3-3. Minerals Maps



Source: U.S. Bureau of Mines,

Footnote: Grids are Areas of High Mineral Development Potential.

3.1.6 Heritage Resources

Forest Plan Standards and Guidelines make heritage resources available for recreational, scenic, scientific, educational, conservation and historic uses in accordance with Historic Preservation Law. Due to the sensitive nature of archaeological sites, site-specific heritage information is not always released to the general public.

Archaeology sites are protected under Federal laws and regulations. It is unlawful to remove or disturb artifacts from a site located on federal or state lands. If you should find a site, you are encouraged to contact a Forest Service archaeologist. The Forest Service welcomes your local knowledge and appreciates your interest and participation in identifying and preserving our cultural heritage

There have been 16 cultural resource surveys conducted on Zarembo Island since 1975. Archaeologists have conducted a majority of them in response to proposed Forest Service activities such as timber sale harvest and road building, mining projects, fish pass construction, and the construction of administrative buildings. These surveys have covered all kinds of terrain, from forested landscapes and fish streams to rocky beaches and muddy tide flats. Through this work, wide arrays of cultural sites have been documented, helping us piece together the human history of Southeast Alaska and Zarembo Island.

Since the late 1980s, the survey work has become more effective as modern methodology and technology has become available. The surveys will guide our future research and the Forest Service's management of heritage resources.

Prehistory

The island's archaeological record shows that people harvested fish, created rock art, and used certain areas for ceremonial purposes. The island's rich marine environment supports plenty of fish, seaweed, sea birds, shellfish, and other marine invertebrates. Zarembo Island's plant community also offers a variety of subsistence resources such as berries, chocolate lily, goose tongue, and beach asparagus.

Traditional Territory

Zarembo Island lies within the traditional territory of the Stikine Tlingit. Oral traditions suggest the Stikine population was once scattered amongst small villages throughout the territory, and eventually concentrated at the present site of Wrangell in historic times. According to these ethnographic accounts, Zarembo Island was shared by all clans within the Stikine territory and was used for camping, hunting deer and mink, gathering seaweed and berries, and fishing for halibut (Goldschmidt and Haas 1946:78).

Historic Activity

The documentation of early historic activity in southeast Alaska refers to the first Russians, Americans, and Europeans that explored and occupied the region in the mid- to late-18th and early 19th centuries. Russian, British, French, Spanish, and American explorers all made expeditions into the Pacific Northwest. The lucrative maritime fur trade encouraged more visits. Over time the Russians, British, and Americans vied for their share of furs and the many other resources southeast Alaska had to offer: gold, fish, timber, trapping and fur farming, and eventually agriculture and homesteading (Arndt 1987:169-171, 199, 206, 207).

Captain George Vancouver explored the west coast of Zarembo Island in August and September of 1793. One of Vancouver's officers, Mr. Johnstone, led a survey party from Point McNamara through Snow Passage on the west side of the island on September 1, 1793. The party camped overnight near the southern entrance to Snow Passage. The next day, they traveled southeast to Point Nesbitt, the south tip of Zarembo Island, and continued along the west coast of Etolin Island. During the course of the day they passed three deserted villages, two of considerable size.

Zarembo Island is named for Captain Lt. Dionysius Fedorovich Zarembo, a Russian-American Company naval officer who surveyed the area in 1834 and 1838 (Orth 1967:1070). Zarembo and his crew were responsible for establishing a garrison at the present site of Wrangell. By order of Baron Ferdinand Petrovich von Wrangell, Zarembo built Redoubt St. Dionysius to prevent the British owned Hudson's Bay Company from establishing trade up the Stikine River (Arndt et al. 1987:186).

Archaeological Sites

Zarembo Island hosts a unique variety of archaeological sites that reflect the region's rich cultural history (Table 3-7). There are 18 documented sites on the island; these include ancient fish traps or weirs, rock art sites, rock alignments, rock shelters, historic period cabins. A natural mineral spring located near St. John Harbor was historically developed into a commercial enterprise. Culturally Modified Trees (CMTs) are trees that have been altered for wood or bark products and there are many scattered throughout the island. Depending on the type of modification or scar, they represent both historic and prehistoric use of the island.

Table 3-7. Archaeological Sites on Zarembo Island

Site Number	Site Type	Age
PET-00083	Natural Mineral Spring	Historic[1]
PET-00110	Rock Shelter/Depression	Unknown
PET-00156	Cabin	Historic
PET-00157	Cabin	Historic
PET-00158	Petroglyphs	Prehistoric[2]
PET-00159	Petroglyphs	Prehistoric
PET-00162	Wood Stake Fish Weir	Prehistoric
PET-00230	Wood Stake Fish Weir	Prehistoric
PET-00231	Wood Stake Fish Weir	Prehistoric
PET-00232	Cabin	Historic
PET-00233	Rock Alignments and Fish Weir	Historic/Prehistoric
PET-00234	Fish Weir	Prehistoric
PET-00235	Rock Alignments	Prehistoric
PET-00246	Rock Shelter and Pictograph	620+/-60 BP[3]
PET-00247	Rock Shelter	Unknown
PET-00453	Cabin and Garden	Historic
PET-00497	Petroglyphs	Prehistoric
PET-00498	Wood Stake Fish Trap	2120 +/- 60 BP

[1/]Historic sites range in age from after 1741 to older than 50 years.
[2/]Prehistoric sites are those that date to anytime before the year 1741, when the first of the European and Russian exploring ships reached Southeast Alaska.
[3/]Years Before Present

Fish Traps and Weirs

Fish traps and fish weirs represent the most common type of site on Zarembo Island (Figure 3-2). Built to harvest large quantities of fish, these structures were constructed from either wood or stone and function differently depending on their location and configuration within the intertidal zone. Generally, a weir forms a barrier across a stream or tide channel and a trap forms an enclosure that leads and ultimately "traps" fish that are either schooling or flooding out with the tide. Both traps and weirs can occur individually or as part of a larger complex. Stone traps and weirs are made by piling large rocks and cobbles onto one another to form an alignment. Wood stake fish traps and weirs consist of tree boughs or sapling stakes that have been sharpened at one end with a stone tool and then each driven into the tidal sediments with a hammer or rock. Tree branches and other debris may have been woven through the structures for added reinforcements. While in use, the stakes may have stood quite tall forming high fence-like structures. What we see today, however, are small nubs of wood barely protruding out of the tide flat or that lie exposed along eroding creek banks or tide channels. As tidal sediments are constantly shifting and changing, archaeologists revisit fish traps and weirs periodically as new sections of the traps may be revealed.

Figure 3-2. Wood fish trap stakes exposed along tide channels on Zarembo.

There are six wood stake fish trap or weir sites on Zarembo Island. Due to the oxygen free state of the tidal sediments, the buried section of the wood stakes are preserved well enough for us to recognize them thousands of years after they were made. A stake from one of traps was collected for radiocarbon analysis and suggests that people were harvesting fish there at least 2,120 years ago. Such large-scale fish production shows the technological innovation, resource needs, and storage capabilities of the prehistoric people of Zarembo Island.

Once wood stakes are removed, however, they can deteriorate quickly and have little or no scientific value. It is recommended to the casual observer not to remove or disturb such stakes but rather notify your local archaeologist of such discoveries.

Rock Art

Pictographs and petroglyphs are the two types of rock art in southeast Alaska; both are represented along the coastal regions of Zarembo Island. A pictograph is a design painted on rock with pigments made by mixing grease or salmon eggs with red ochre or charcoal. A petroglyph is a design that is pecked into the rock surface (Figure 3-3). Designs range from faces, circles, and spirals to abstract images and animal shapes. Though there are many theories behind the meaning of rock art, its exact function remains unclear. Some images may have been created to commemorate births, deaths, or other important events, while others may convey messages, distinguish territory, or may be a case of artistic expression. The exact age of these sites is unknown, though ethnographic accounts suggest that most petroglyphs predate the region's oral histories; it is thought that they were made within the last 10,000 years. Due to the effect that weathering and erosion can have on the delicate pigments painted on rock surfaces, surviving pictographs are probably of a more recent age, and are often found beneath overhangs or cliffs that add protection from wind and rain. One of the pictographs on Zarembo Island is a red and black circle positioned on a rock face above the high tide.

Figure 3-3. Petroglyph Designs: note faces, a bear claw, concentric circles, and Tlingit form design pecked onto the boulder's surface.

Rock Shelters

The caves and rock shelters in southeast Alaska offer a unique and invaluable link to the region's past. Because these environments offer such excellent preservation of bone and artifacts, archaeologists and paleontologists often look to caves and rock shelters to glean insight into the region's natural history. Protected from wind, rain, sun and sometimes temperature fluctuations, caves and rock shelters can preserve bone for tens of thousands of years. While a wide array of faunal remains has been found in such environments, caves and rock shelters are also associated with traditional native use such as burial interment, shamanistic or spiritual practices, tool making activity areas, or temporary and seasonal habitation.

There are three rock shelter sites on Zarembo Island's steep and rocky shore. Each of these shelters exhibits items or features that are associated with human burials, though no human remains were ever recovered. One of the shelters was reportedly the repository for a bentwood box, a traditional style cedar box exhibiting distinct ovoid form design characteristic of Northwest Coast artwork. The box measures approximately 40 cm in length, 28 cm in width, and 19 cm in height, and dates to approximately 630 years old. Bentwood boxes such as these were often used to hold the cremated remains of important figures within the Tlingit community, and are therefore quite highly revered. As word spread of the box's discovery in the mid 1980's, concerns of possible theft or vandalism prompted the Forest Service and the Wrangell Cooperative Association to transfer custody of the box to the Alaska State Museum in Juneau until a safe repository was available in Wrangell for long-term conservation.

The two other rock shelters on the island exhibit features similar to each other in their association with burials. One contains axe cut cedar bark boards, piles of locally available rocks, and faded red painting on the exterior ceiling. It is reported that the rocks could have been used as a base for the cedar planks. Red paint and possible painted design elements were reported on the exterior wall of the shelter, but appear faded and worn from exposure to sun, wind, and rain. The third shelter also contains cedar boards as well as a shallow depression that is 1 ft. deep. Informants reported a cedar mat, a bentwood box, and painting in the cave, though no such items remain there today.

Due to the fragile and sensitive nature of caves and rock shelters, people are discouraged from disturbing such sites where the archaeological or paleontological record can be easily destroyed. The Forest Service welcomes comments and information from individuals willing to share their local knowledge regarding these unique environments.

Cabins

The remains of several small cabin sites dot the shores of the island and are thought to be the remains of temporary habitation sites used for trapping and hunting. Two of the cabin sites consist of dilapidated remains with scattered garbage; both are thought to date to the 1930s. A third cabin was still intact when it was first recorded in the mid 1980s. It is thought to be a more contemporary structure due to the trash and furniture left inside of it but was probably used for the same purpose.

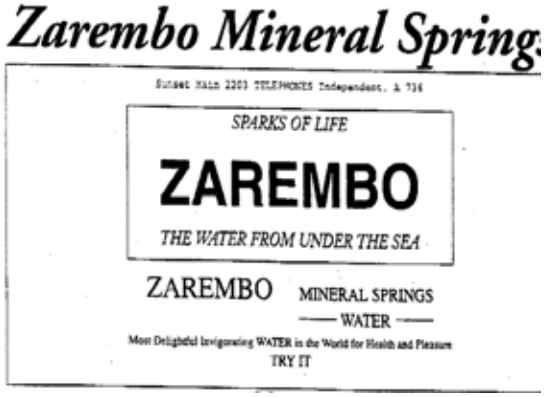
On the island's exposed and rocky southern shore sits the remains of a wood frame cabin, a wood plank fence, and a small garden plot suggesting a possible homestead site. Hardware and building technique implies the cabin dates to between 1930 and 1950. The Petersburg Area site atlas reveals an earlier occupation from the 1920s that reportedly burned down, suggesting multiple occupations of the same place.

Historic Logging

Several sites may be associated with historic logging on Zarembo Island. A series of 4 rock alignments comprised of large cobbles and small boulders encompasses 3500 square meters of an expansive tide flat in Snow Pass. The exact function of these rock alignments is unknown, though their proximity to an old clearcut along the nearby beach fringe suggests they may have been positioned to make room for heavy logging equipment or barges. Another similar site associated with past logging activities exhibits less distinctive rock alignments and a cleared rock-enclosed terrace below a clearcut along the beach fringe. A small fish weir composed of only 4 wood stakes and 2 piles of rock represent a prehistoric component of this site.

Zarembo Springs

Figure 3-4. Zarembo Mineral Springs Bottle Label



Courtesy of Alaska State Library

Zarembo Springs is a unique site that became the most significant historic development on Zarembo Island. It is here that a naturally carbonated mineral spring flows out from the expansive tidal flats of St. John's Harbor. Frank Wadsworth was the first to realize the market potential of the mineral water and established Zarembo Springs Mineral Co., appointing himself as president-treasurer (Neal 1994:17). His product, "Zarembo Mineral Water", made its United States debut in Portland, Oregon where this "Most Delightful Invigorating WATER in the World for Health and Pleasure" won a gold medal at the Lewis and Clark Centennial and American Pacific Exposition and Oriental Fair in 1904 (Neal 1994:17). The water itself was put into barrels at the spring, sealed up, and shipped to Wrangell on the ship *Zarembo*. From there the Pacific Coast Steam Ship Company transported it to Seattle. An ad from the 1905 Seattle City Directory billed Zarembo Mineral Water as the "Sparks of Life" and "The Water From Under The Sea". Bottled in a blue-aqua colored bottle, the mineral water was advertised as a cure for skin and blood diseases and for stomach, liver, kidney, and bladder troubles (Neal 1994:17).

After Wadsworth died in 1907, his widow married Archibald E. Rutherford, who took over the management of the Zarembo Mineral Springs Co. In 1909, Rutherford displayed the bottled mineral water at a booth at the Alaska Yukon Pacific Exposition in Seattle. Shortly after the expo, the company ceased operations, possibly due to the competing mineral springs closer to Seattle that did not have such high shipping costs (Neal 1994:17).

To access and contain the spring, which was covered at high tide, a small structure and a concrete box measuring 5 ft sq and 10 ft in height had been built over it. A wharf connected this to a cabin on the nearby shore (Roberts 1986:1). The only evidence of the site that remains today is a broken tile pipe that encases the spring, a few scattered pieces of pipe fragments, several large rocks positioned adjacent to the in situ pipe, two pieces of dimensional wood, and some small post remains. The tide flat around the spring is covered with a thick orange residue due to the iron in the spring water.

Courtesy of Alaska State Library

Figure 3-5. Zarembo Mineral Springs Bottle

Figure 3-6. Zarembo Spring encased at the surface in a tile pipe, 2002.

3.2 Hydrology

Zarembo Island can be divided into a number of watersheds. Watershed delineations enable land managers to evaluate the effects of various management activities on fish habitat and an aquatic system's capability to produce fish.

Impacts to Hydrology

Natural disturbances that affect hydrology are minimal on Zarembo Island. There is some blowdown that has occurred historically but most of that has been along the coast or mid- to high-elevation slopes in areas that do not produce large sediment movement into resident or anadromous fish streams. Most impacts to hydrology come from ground-disturbing activities such as timber harvest and road construction. Road construction has the most direct and long-lasting effects to watersheds, since roads can serve to redirect natural flows, constrict stream channels, expose soil (steep cutbanks), and provide a source of sediment. Timber harvest can affect hydrology through changes in water uptake by plants, exposure of soil to erosion, loss of rooting strength leading to landslides, and debris torrents created by slash build-up. Generally timber harvest effects to watersheds are transitory as trees grow back to harvested sites and evapo-transpiration returns to pre-harvest levels. However, areas that have more extensive harvest in riparian zones could show longer recovery cycles. Resulting from shortfalls in large woody debris recruitment, harvested riparian zones and associated stream channels often lack pool forming and energy reducing structure. Structure in the riparian zone reduces stream energy during flood events and, under normal flow, forms pools within the stream channel. On the Tongass, hydrologic recovery generally takes 30 years from the time of harvest. Recovery of stream channels from intensively harvested riparian areas is hard to predict, but most likely takes longer.

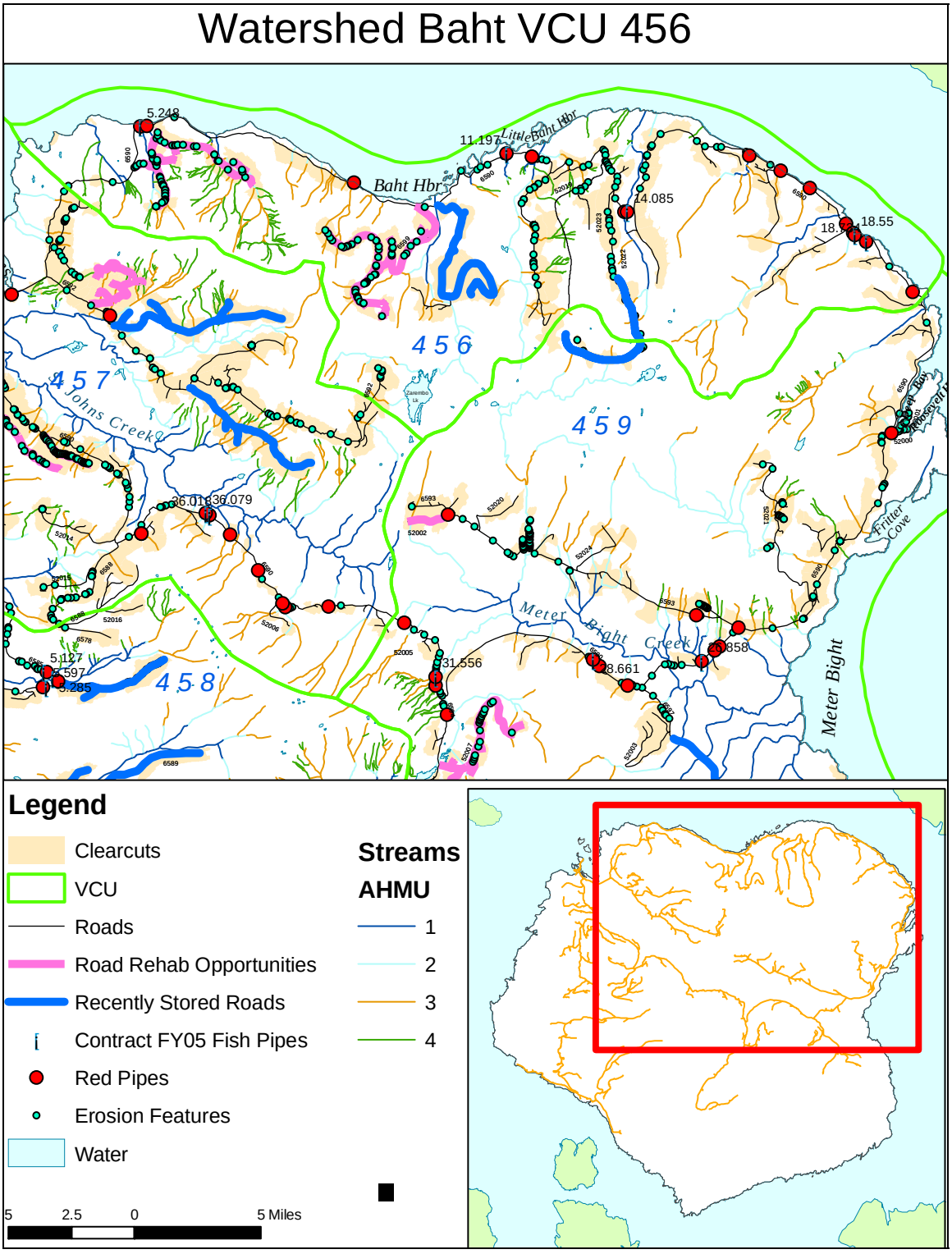
The following table shows acres of timber harvest and miles of road construction for each VCU. The Baht and the St. John VCUs have been the most heavily impacted by timber harvest and road construction.

TABLE 3-8. Timber Harvest and Total Roads by VCU

	Baht (VCU 456)	St. John (VCU 457)	Snow Pass (VCU 458)	Meter Bight (VCU 459)	Grand Total
Total Acres	**17,000**	**25,000**	**32,300**	**42,500**	**117,800**
Productive Forest	**13,056**	**15,223**	**15,534**	**22,709**	**66,522**
Harvested Acres	**3,323**	**5,534**	**2,090**	**3,247**	**14,194**
Square Miles	**26.5**	**40.6**	**50.5**	**66.4**	**184**
Total Roads (mi)	**25.40**	**43.99**	**22.99**	**35.95**	**128.33**
Total Road Density (mi/mi^2)	**1.51**	**1.29**	**0.72**	**0.79**	**0.69**

Source: GIS Layer, 2005.

Map 3-4.


Watershed Baht VCU 456
Baht Hbr
Little Baht Hbr
456
457
459
458
St Johns Creek
Meter Bight Creek
Meter Bight
Frillter Cove
5.248
11.197
14.085
18.55
26.018
36.079
5.127
5.597
5.285
31.556
28.661
Legend
Clearcuts
VCU
Roads
Road Rehab Opportunities
Recently Stored Roads
Contract FY05 Fish Pipes
Red Pipes
Erosion Features
Water
Streams
AHMU
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2
3
4
5 2.5 0 5 Miles

3.2.1 Baht VCU

This VCU contains small coastal watersheds with limited anadromous fish habitat draining into Sumner Strait between Low Point and a small bight north of Deep Bay. The Forest Service has delineated five watersheds in this unit; Baht Creek at Baht Harbor is the largest of these. The Alaska Department of Fish and Game (ADF&G) has catalogued six anadromous fish streams in the Baht VCU. Several un-catalogued streams are also known to contain anadromous fish. Bedrock barriers within one to two miles of saltwater limit anadromous fish access. The largest lake on Zarembo Island is Zarembo Lake. Fish populations in the lake have not been verified and there is no firm data for which way Zarembo Lake drains. Further assessment will be done to verify this information at the time site-specific projects are analyzed.

Of the four VCUs, Baht contains the least amount of sensitive fish habitat and supports the least production of anadromous fish. Most of the low- and moderate-gradient streams are heavily influenced by bedrock, which severely limits the development of spawning and rearing habitats. Confined alluvial streams and floodplains are limited. Riparian areas in Baht tend to be restricted to streamside slopes or vegetation within a tree-length of the stream.

These streams function primarily as sediment transport systems. They are generally steep and well-contained with bedrock control in both headwaters and lower reaches. Some streams run through reaches of unconsolidated colluviums (a deposit of soil and rock debris accumulated at the base of a slope through the action of gravity.) Sediment transport through these areas, sometimes in the form of debris torrents, develops transition zones in alluvial fans which alternately store and transport sediment and debris in stream channels that migrate back and forth across the fan. This process accounts for occasional drainage structure failures along Road 6590.

TABLE 3-9. Baht Watershed (VCU 456)

Watershed Name	Total Acres	Harvest Acres	% Total Acres Harvest	Road mi	Road Density (Mi/Mi^2)
Deep Bay North	1,780	550	31%	6.04	2.17
Beach Creek	1,190	166	14%	1.16	0.62
Little Baht	2,340	649	28%	9.32	2.55
Zarembo Lake	3,187	710	22%	7.44	1.49
Craig Point	2,272	173	8%	1.44	0.41
Totals	10,769	2,248	21%	25.4	1.51

Footnote: This table includes only third-order watersheds and larger.

The Baht watersheds rank second in overall harvest and road disturbance on the island. Harvest exceeds 20 percent of watershed acreage in several watersheds. Short reaches of riparian harvest and riparian blowdown have been observed. These watersheds need field-based hydrologic condition assessments to determine overall watershed health and potential restoration needs. The assessments will be more difficult in this VCU than in any of the other three VCUs due to limited distribution of suitable study reaches (low-gradient alluvial streams).

Since the inception of road condition surveys in 1998 on Zarembo Island, several road maintenance, storage, and fish passage projects have been initiated in the Baht VCU:

- Three “red pipes” at mileposts 9.948, 10.040, and 10.750 were replaced along Road 6590 in 2000.
- Two road storage projects occurred in 2002 at mileposts 9.762 and 12.025 protecting the road surface and re-establishing natural drainage patterns to over 6 miles of road.
- In 2004, road-stream crossings along Road 6590 were evaluated for additional maintenance needs including addition of cross drains, erosion treatments, and the replacement or re-alignment of several culverts. They are scheduled for replacement or modification in 2005.
- Additionally, in 2005, five “red pipes” will be replaced along Road 6590 to meet the standards and Clean Water Act for fish passage.

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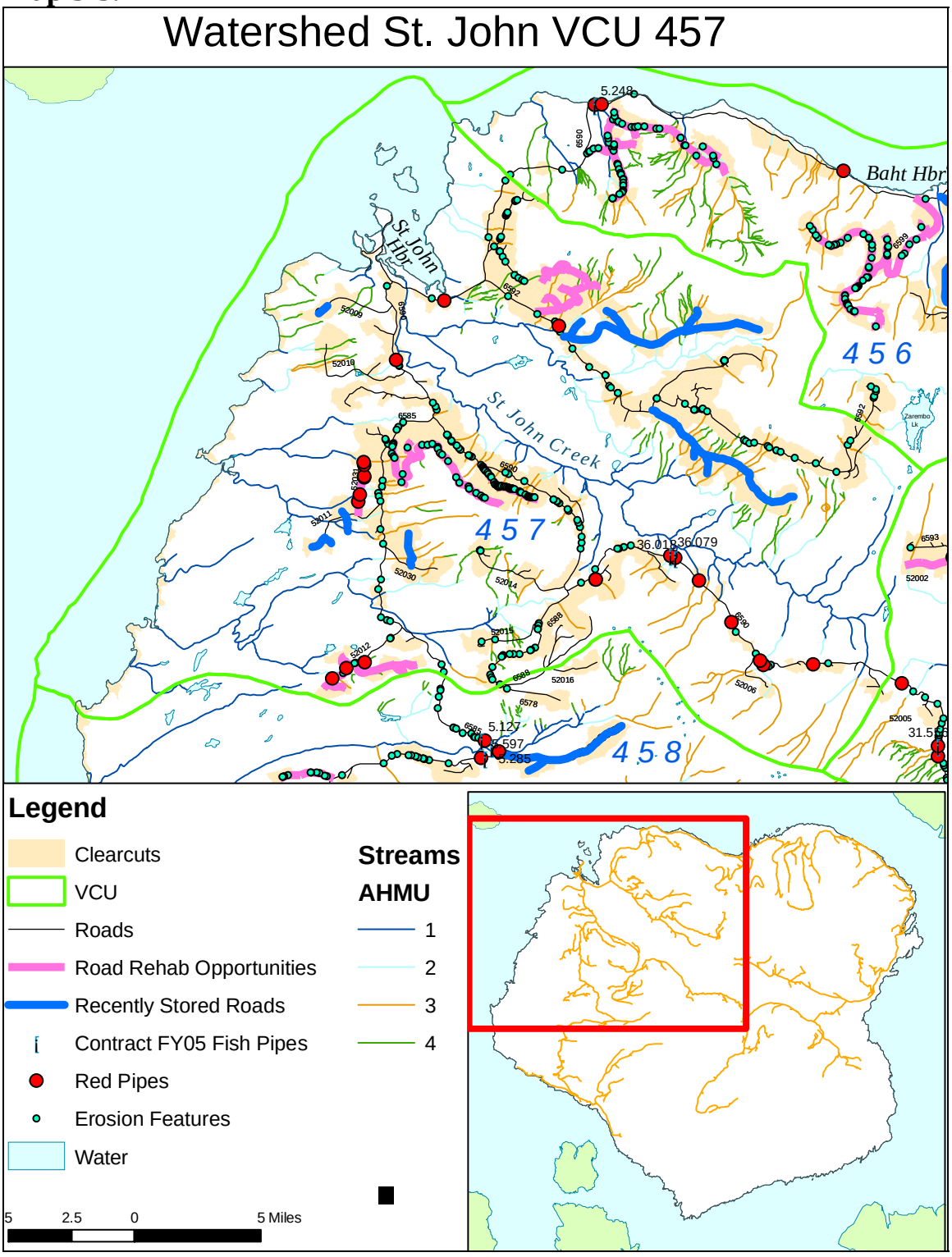
Map 3-5.


Watershed St. John VCU 457
Baht Hbr
St. John Hbr.
St John Creek
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457
458
5.248
36.018
36.079
5.127
5.597
5.285
Legend
Clearcuts
VCU
Roads
Road Rehab Opportunities
Recently Stored Roads
Contract FY05 Fish Pipes
Red Pipes
Erosion Features
Water
Streams
AHMU
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3.2.2 St. John VCU

This VCU contains four major watersheds: St. John Creek, Frenchy Creek, 52012 creek, and Big Island Creek. ADF&G has catalogued four anadromous fish streams in this VCU, and other small un-catalogued streams are known to contain anadromous fish.

St. John and its sub-watershed Frenchy Creek contain some of the highest quality fish habitat on Zarembo Island. The larger streams in these watersheds tend to receive and store sediment that is transported through bedrock reaches and from steeper tributaries. Well-developed riparian areas, floodplains, and side-channel complexes may be found throughout this VCU adjacent to the confined alluvial reaches of main stems and lower tributaries. These stream reaches provide high-quality spawning habitat. Surveys of two reaches of this high quality spawning habitat were completed in the fall of 2003. These surveys concluded that these reaches were properly functioning and in relatively good condition. Bedrock contacts repeatedly interrupt these depositional reaches and create partial migration barriers. There is an abundance of low gradient, depositional palustrine complexes, some of which are controlled by beaver. These areas provide important rearing and over-wintering habitats. St. John supports a large, well-protected estuary at its mouth. The naturally-carbonated Zarembo Spring is located in the estuary.

This VCU contains the most highly productive watersheds on Zarembo Island in terms of highly productive fish habitat (over 11 stream miles) sensitive to potential sediment deposition. Fortunately, generally speaking, it is the least active VCU in terms of sediment transport.

In 1986, an aluminum steep-pass fishway was constructed in St. John Creek about 2 miles upstream of saltwater. Coho, pink salmon, and steelhead use the fishway to access over 30 miles of upstream habitat. Based on several surveys, the upstream habitat seems to be fully stocked with juvenile coho, although the number produced is less than originally anticipated. The steelhead run has developed beyond expectations. This may have occurred because the upstream habitat has lots of bedrock and large cobble, which may be preferred by juvenile steelhead.

TABLE 3-10. St. John Watershed (VCU 457)

Watershed Name	Total Acres	Harvest Acres	% Total acres harvest	Road Miles	Road Density Mi/Mi^2
St. John	**10,674**	**3,430**	**32%**	**16.21**	**0.97**
Frenchy	**4,535**	**1,215**	**27%**	**10.21**	**1.44**
Big Island	**2,164**	**524**	**24%**	**5.69**	**1.68**
52012 Creek	**4,512**	**794**	**18%**	**11.88**	**1.69**
Totals	**21,885**	**5,963**	**27%**	**43.99**	**1.29**

Footnote: This table includes third-order watersheds and larger.

St. John VCU ranks first for acres harvested and road disturbance among the four VCUs. Twenty-three percent of the major watershed acres have been harvested since 1970. In addition to the cumulative level of harvest, nearly 5,000 feet of stream-length riparian forest was harvested on the south side of the main stem of St. John Creek. Un-mapped anadromous fish streams tributary to Big Island Creek were clearcut in the early 1990s. Some mitigation and monitoring was conducted in this area for a few years following harvest. Sporadic mining exploration (localized drilling) has occurred in Frenchy Creek, a major St. John tributary.

A combination of high road density (>1 mi/sq mi), drainage structure failures, fish passage issues, and identified sites of road erosion have prompted the following roads and stream crossing projects in this VCU.

- Storage of two unclassified roads at mileposts 1.197 and 2.745 of the 6592 Road, restored natural stream drainage and re-vegetated over 5.5 miles of road.
- In 2001, a series of three 36" culverts and one 24" culvert were replaced with two permanent slab bridges restoring fish passage and natural drainage of the stream and surrounding wetland area.
- In 2004, storage of an unclassified section at milepost 0.397 of Road 52030 restored natural stream drainage to over 0.30 mile of road.
- In 2005, culverts at milepost 36.079 and 36.018 will be replaced to meet the standards for fish migration.

A road condition survey was completed for all of the roads in this VCU in the fall of 2003. Updates to this survey have occurred as recently as the fall of 2004 on the major routes (Roads 6585 and 6590).

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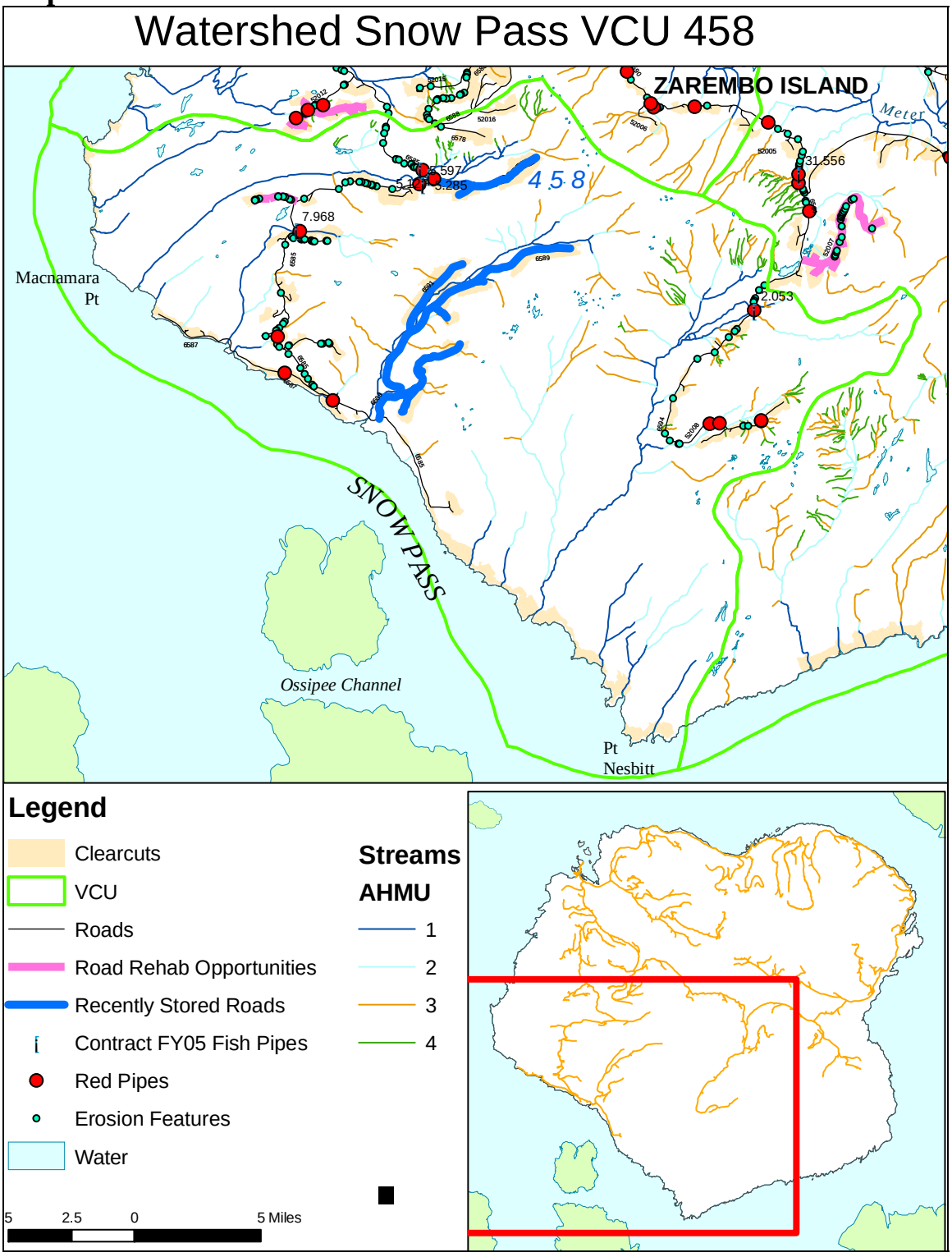
Map 3-6.


Watershed Snow Pass VCU 458
ZAREMBO ISLAND
458
7.968
5.597
5.285
31.556
2.053
Macnamara Pt
SNOW PASS
Ossipee Channel
Pt Nesbitt
Legend
Clearcuts
VCU
Roads
Road Rehab Opportunities
Recently Stored Roads
Contract FY05 Fish Pipes
Red Pipes
Erosion Features
Water
Streams
AHMU
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3.2.3 Snow Pass

This VCU contains three major watersheds: Nesbitt Creek is the largest of these; the other two are Snow Pass and McNamara Creeks. ADF&G has catalogued five anadromous fish streams here; we know that additional un-catalogued streams also contain anadromous fish. The larger streams in these watersheds tend to receive and store sediment that is transported through bedrock reaches and from steeper tributaries. Well-developed riparian areas, floodplains, and side-channel complexes may be found adjacent to the confined alluvial reaches of main stems and lower tributaries throughout this VCU. These stream reaches provide high-quality spawning habitat. Bedrock contacts repeatedly interrupt these depositional stream reaches and create partial migration barriers. Low-gradient, depositional palustrine (marsh or swamp area) complexes, some of which are controlled by beaver, provide important rearing and over-wintering habitats.

TABLE 3-11. Snow Pass Watershed (VCU 458)

Watershed Name	Total Acres	Harvest Acres	% Total acres harvest	Road Miles	Road Density Mi/Mi^2
McNamara	4,717	498	11%	9.44	1.28
Snow Pass	5,299	521	10%	8.05	0.97
Nesbitt	10,451	231	2%	5.50	0.34
Totals	20,467	1,250	6%	22.99	0.72

Footnote: This table includes only third-order watersheds and larger.

This VCU contains a wide array of fish habitats and sediment transport processes. It is generally intermediate in terms of sediment transport capability. It contains over ten miles of fish habitat streams of concern. Nesbitt Creek probably produces the most anadromous fish.

Although this VCU has the least amount of harvest and road disturbance, there has been some tractor logging in riparian areas near the beach and both natural and harvest-related riparian windthrow. In the late 1970s, a project was designed to monitor pre- and post-harvest effects of timber harvest and road construction on upper McNamara Creek. Precipitation, stream flow, and water quality data were collected seasonally from about 1977 through 1979, but project files are not complete and it appears that the project was discontinued before its full objectives were obtained.

Although road densities are lower in this VCU than all the others, watershed and wildlife concerns have driven the completion of several road related projects.

- In 1999, Road 6599 was decommissioned due to fisheries and wildlife concerns, closing over 5.5 miles of road and re-establishing natural drainage and fish passage.
- In 2003, alder wildling (a wild plant transplanted into a cultivated location) plantings were placed along removed bridge sites along the decommissioned 6599 Road. Grass seeding of the roadbed was applied at various locations.
- In the summer of 2004, a road at milepost 5.353 of the 6585 Road was placed in storage, re-establishing natural drainage and addressing several road erosion problems along 1.6 miles of unclassified road.
- In the spring of 2005, six "red pipes" are contracted to be replaced or retrofitted along Roads 6585 and 6594 to meet the Forest standard for fish passage.

A road condition survey was completed for all of the roads in this VCU in the fall of 2003. Updates to this survey have occurred as recently as the fall of 2004 on Road 6585. This re-survey has revealed several problematic undersized or misaligned culverts that initiate surface, cutslope, and ditch erosion from milepost 9.6 to milepost 11.

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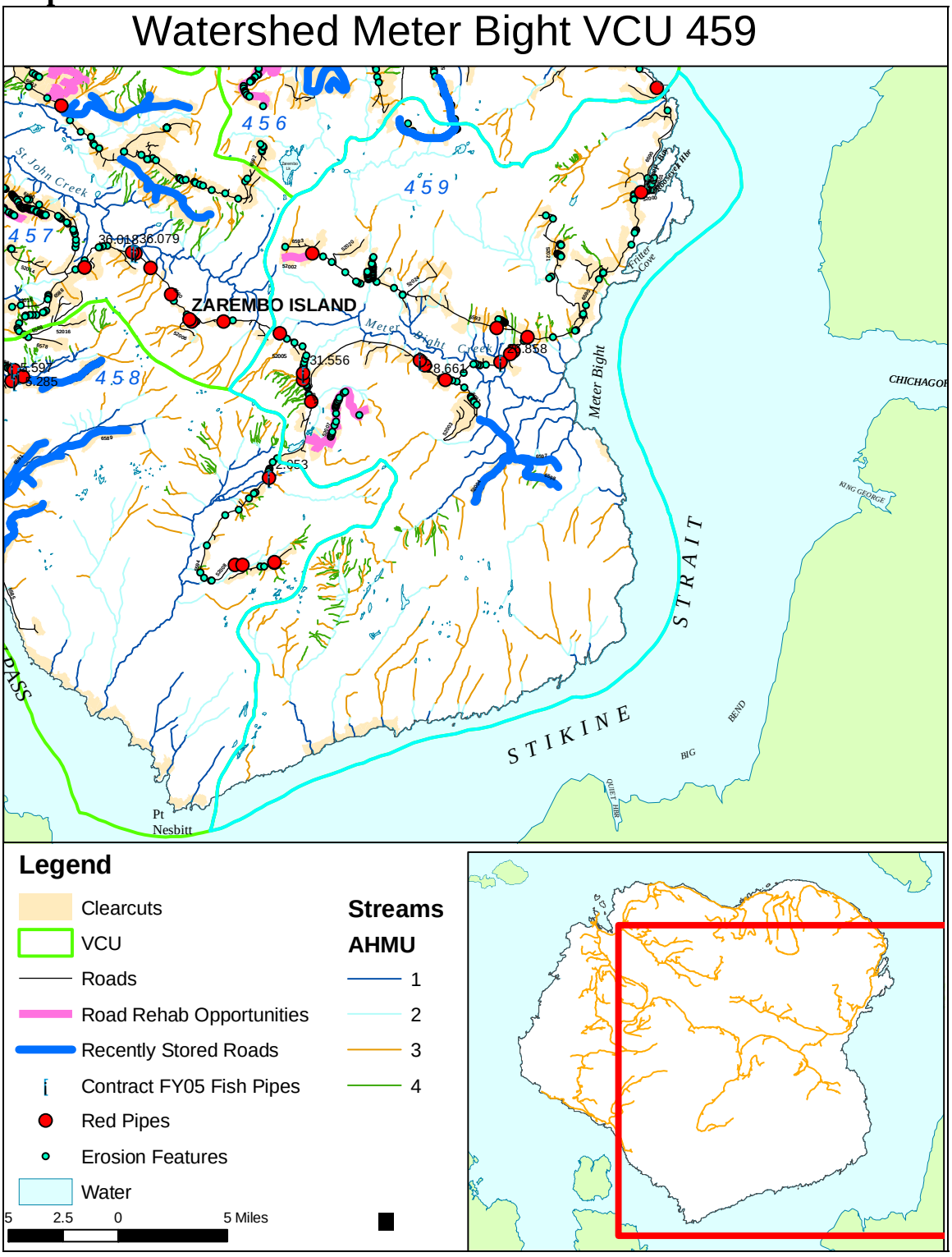
Map 3-7.


Watershed Meter Bight VCU 459
456
459
457
458
ZAREMBO ISLAND
St John Creek
Meter Bight Creek
Meter Bight
Critter Cove
STRAIT
STIKINE
PASS
Pt Nesbitt
CHICHAGOF
KING GEORGE
BEND
BIG
QUIET TIME
Legend
Clearcuts
VCU
Roads
Road Rehab Opportunities
Recently Stored Roads
Contract FY05 Fish Pipes
Red Pipes
Erosion Features
Water
Streams
AHMU
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4
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3.2.4 Meter Bight

This VCU is comprised of five major watersheds and four sub-watersheds that make up Meter Bight Creek. Meter Bight Creek is broken up into four sub-watersheds. They include: Meter Bight, Happy Valley, North Meter Bight, and Mustang Creeks. Considered in its entirety, Meter Bight Creek is the largest watershed on the island; other watersheds in this VCU include Flying Fish Creek, Harpoon, Cleat, Keg Valley, and Vial Creeks. Nine streams have been catalogued by ADF&G as anadromous fish streams; other streams are suspected to support anadromous fish as well.

The larger streams in these watersheds function primarily as low gradient channels with low to medium gradient bedrock transport channels mixed in. Well-developed riparian areas, floodplains, and side-channel complexes may be found throughout this unit adjacent to the confined alluvial reaches of mainstems and lower tributaries. These stream reaches provide high-quality spawning habitat. Bedrock contacts repeatedly interrupt these depositional stream reaches and create partial migration barriers. Low-gradient, depositional palustrine complexes, some of which are controlled by beaver, provide important rearing and over-wintering habitats. Overall, this VCU has intermediate sensitivity to sediment deposition. Although it has about 10 miles of sediment-sensitive fish streams, it has relatively low geomorphic activity related to sediment transport.

TABLE 3-12. Meter Bight Watershed (VCU 459)

Watershed Name	Total Acres	Harvest Acres	% Total acres harvest	Road Miles	Road Density Mi/Mi^2
Keg Valley	1,658	45	3%	0.38	0.15
Meter Bight	4,806	571	12%	10.29	1.37
Mustang	3,290	388	12%	7.43	1.44
Happy Valley	5,920	468	8%	7.93	0.86
North Meter Bight	1,504	205	14%	2.97	1.26
Flying Fish	2,874	232	8%	3.12	0.69
Harpoon	2,989	110	4%	1.97	0.42
Cleat	2,317	68	3%	1.86	0.51
Vial	3,578	18	1%	0.00	0.00
Totals	28,936	2,105	7%	35.95	0.79

Footnote: This table includes third-order watersheds and larger.

In the early 1990s, several fishways were constructed in Meter Bight Creek, about one mile upstream from saltwater. The structures consist of a series of concrete

weirs with pools and stream channel modifications. The objective was to provide pink salmon with access to over 18 miles of habitat. Coho salmon and steelhead were already known to pass through this point. Fish production has been modest and may be increasing with 2,000 adult pinks counted upstream in 1993 and 6,700 in 1997. Generally, expectations have been met, with pink salmon accessing all useable mainstem habitats and using the fishway during low return years.

Current disturbance levels are relatively low in this VCU. Riparian harvest and tractor logging has occurred, particularly along the southern beach.

Road condition surveys have been completed for all of the classified roads and most of the unclassified roads in this VCU. Resulting from the analysis of this information, this VCU was one of the first areas to prompt fish migration and road storage projects to address watershed and wildlife concerns. The completed products from this analysis include the following.

- In 1998, over 2.7 miles of the 6597 and 6598 Roads were placed in storage past milepost 0.87. This re-established natural stream courses and re-vegetated portions of these road systems.
- In 2000, three “red pipes” were replaced and retro-fitted to meet the standards for fish passage along Road 6590.
- In 2000, road protection and storm-proofing measures were conducted on Roads 52020 and 52024. No culverts were removed, but drivable waterbars were constructed beside stream crossings to help deter potential road washouts.
- In the spring of 2005, one bridge and two culverts will be installed on Road 6590 to replace three existing “red pipes” to bring these stream crossings up to fish migration standards.

3.3 Vegetation Condition and Timber Resources

Forest Structure

This analysis will evaluate current vegetation communities and forest structure across the landscape to make recommendation on how to maintain and enhance vegetative diversity and provide long-term resource opportunities. This document will use commonly accepted terminology to describe silvicultural systems, regeneration methods, and forest management as defined in the Forest Service Manual.

Forested stands in southeast Alaska progress through predictable stages of structural development following stand-replacing disturbance and harvest. Stand structural development is described by Oliver and Larson (1996) and progresses following stand-replacing disturbance as follows:

1. Stand Initiation (SI) – Year 0 – 20 [Year 0 - 35 with pre-commerical thinning (PCT)]. Trees, shrubs, and herbaceous plants colonize sites following disturbance or harvest. Tree colonization continues through the first 10 years, reaching typical stocking levels of 3,000 + trees per acre (TPA). PCT will typically be conducted late in the SI stage or early in the next stage of development. PCT can prolong the SI stage and maintain a vigorous understory of shrubs and herbaceous plants which can benefit some wildlife species.

2. Stem Exclusion (SE) – Year 20 to 150 (Year 35 – 80 with PCT). Tree competition is intense resulting in tree mortality and/or differentiation into canopy classes. Tree canopy closes resulting in a loss of understory vegetation. This stage of development will persist until mortality reduces tree stocking enough for large tree development (OS) or create growing space for understory development (UR). Unmanaged stands may remain in the SE stage of development with little or no understory vegetation for 150 or more years, depending on the level of disturbance. Early PCT and later commercial thinning can progress a stand into the next stage of development much sooner (80+ years) by creating growing space for understory development. Partial disturbance (wind) can have similar influence on stand development.

3. Understory Reinitiation (UR) – Year 150+ (80+ with commercial thinning). Overstory mortality and/or thinnings create enough openings in the canopy to allow development of an understory of young trees, shrubs, and herbaceous plants. The stand begins to increase in structural diversity by developing vertically-stratified canopy layers. Even-aged stands created by windthrow or harvest may skip this phase of development without significant partial disturbance or thinning during the SE stage of development, and progress directly to the OS stage. UR structure stands are best characterized as two-aged stands progressing towards uneven-aged structure through gap-phase disturbance. Large scale disturbance will revert stands to SI structure.

4. Old-Forest Single-Storied (OS) – Year 80 – 250. Stand progresses directly from the SE stage to the OS stage without developing a significant understory layer. The OS structure type is common in high wind-hazard areas, particularly on windward exposures at mid-slope. Such stands typically exhibit even-aged structure and are replaced by wind events prior to developing complex vertical stratification. Older OS structure stands typically contain the highest net volume of timber and fit in well with even-aged harvest systems. Such stands are not well suited for two-aged or uneven-aged harvest.

5. Old-Forest Multistoried (OM) – Year 250+ (Year 150+ with active management). Gap-phase disturbance creates growing space through mortality/windthrow of individual trees or small groups of trees. This additional growing space allows for the development of multiple canopy layers and a high level of structural diversity. OM structure may be characterized as two-aged stands or uneven-aged stands, and may revert back to SI structure with major wind events. This structure is most common on sites that are protected from strong wind events.

6. Savannah or Non-Productive Forest (SV) – Various Ages (generally old). This structure is highly variable and includes all forested sites that are not capable of growing 20 cubic feet/acre/year. SV stands include mixed-conifer sites, muskeg/scrub forest complexes, and high-elevation low-productivity stands. This structure is characterized by scattered trees and abundant openings which allow for diverse and well stocked understory of brush and herbaceous vegetation. These sites are valuable wildlife habitat and are commonly characterized as forested wetlands.

7. Non-Forested (NF) – These sites are not forested and not capable of growing trees for a variety of reasons which include lack of soil, excess wetness, high elevation, land use, lakes, ponds, etc.

Details of stand structural development and associated vegetation and habitat characteristics are listed in the Vegetation Types – Plant Associations, (section 3.3.1) of this chapter. The following tables and figures show stand structure by VCU. Map 3-8 shows spatial distribution of forest structures on Zarembo Island.

Table 3-13. Forest Structure Acres by VCU

Structure	Baht (456)	VCU St. John (457)	Snow Pass (458)	Meter Bight (459)	Total
Non-Forested (NF)	260	490	450	900	2100
Savannah (SV)	3,590	8,220	15,900	19,000	46,710
Stand Initiation (SI)	1,850	2,050	1,850	2,250	8,000
Stem Exclusion (SE)	1,480	3,720	340	1,150	6,690
Understory Reinitiation (UR)	0	0	40	0	40
Old-Forest Single-Storied (OS)	2,050	1,420	2,650	3,050	9,170
Old-Forest Multistoried (OM)	7,770	10,100	11,070	16,150	45,090
TOTALS	17,000	26,000	32,300	42,500	117,800

Source: GIS data layers, 2001.

Figure 3-7. Percent Representation of Forest Structure Types on Zarembo Island.

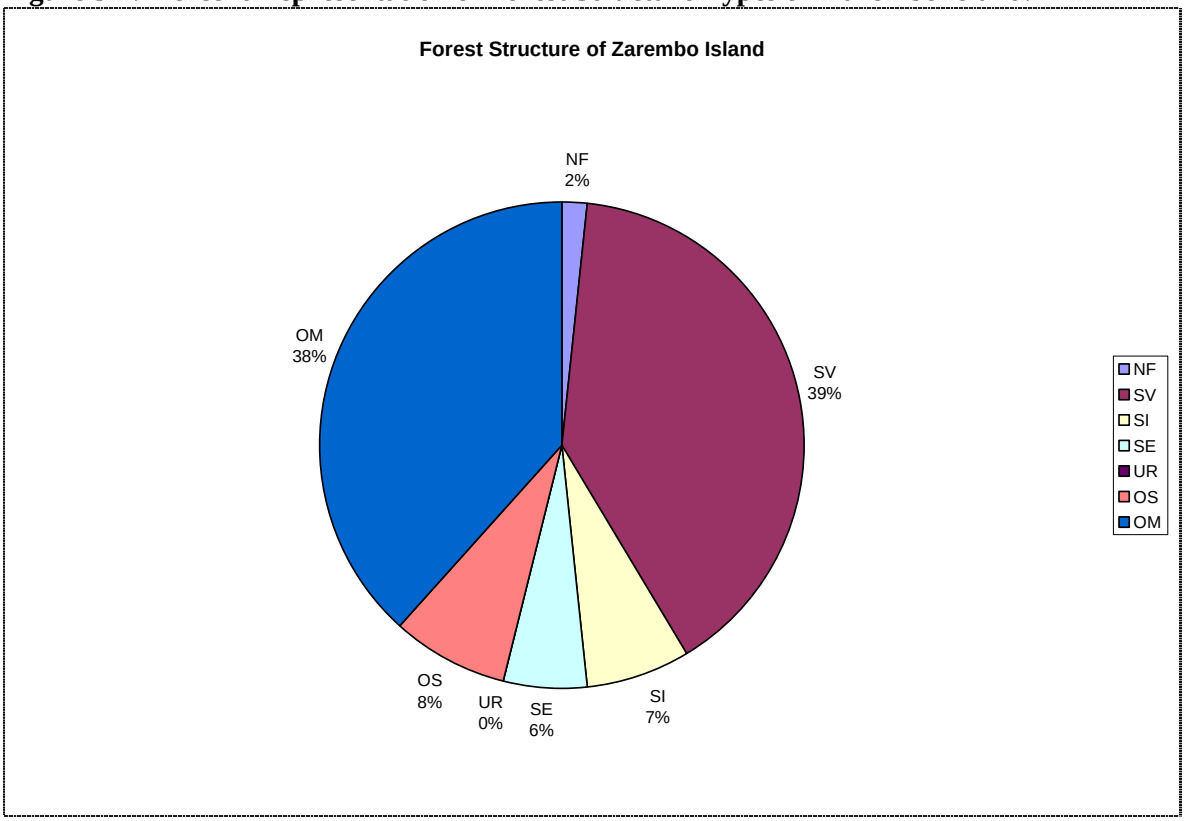
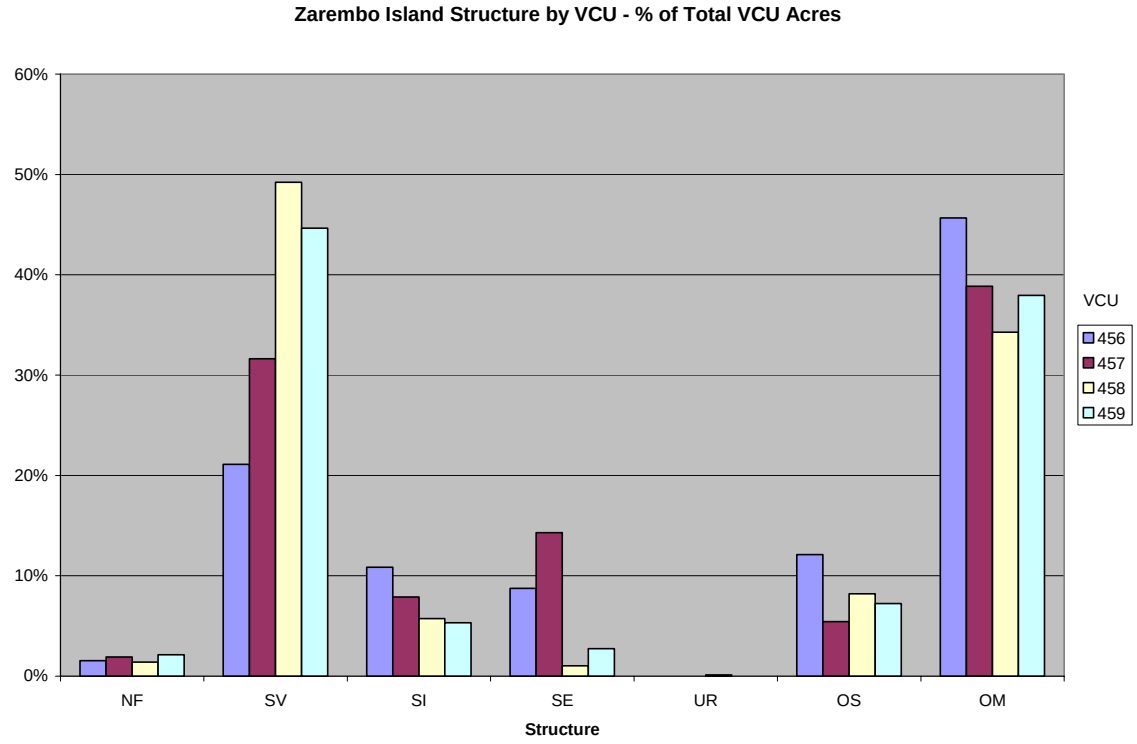
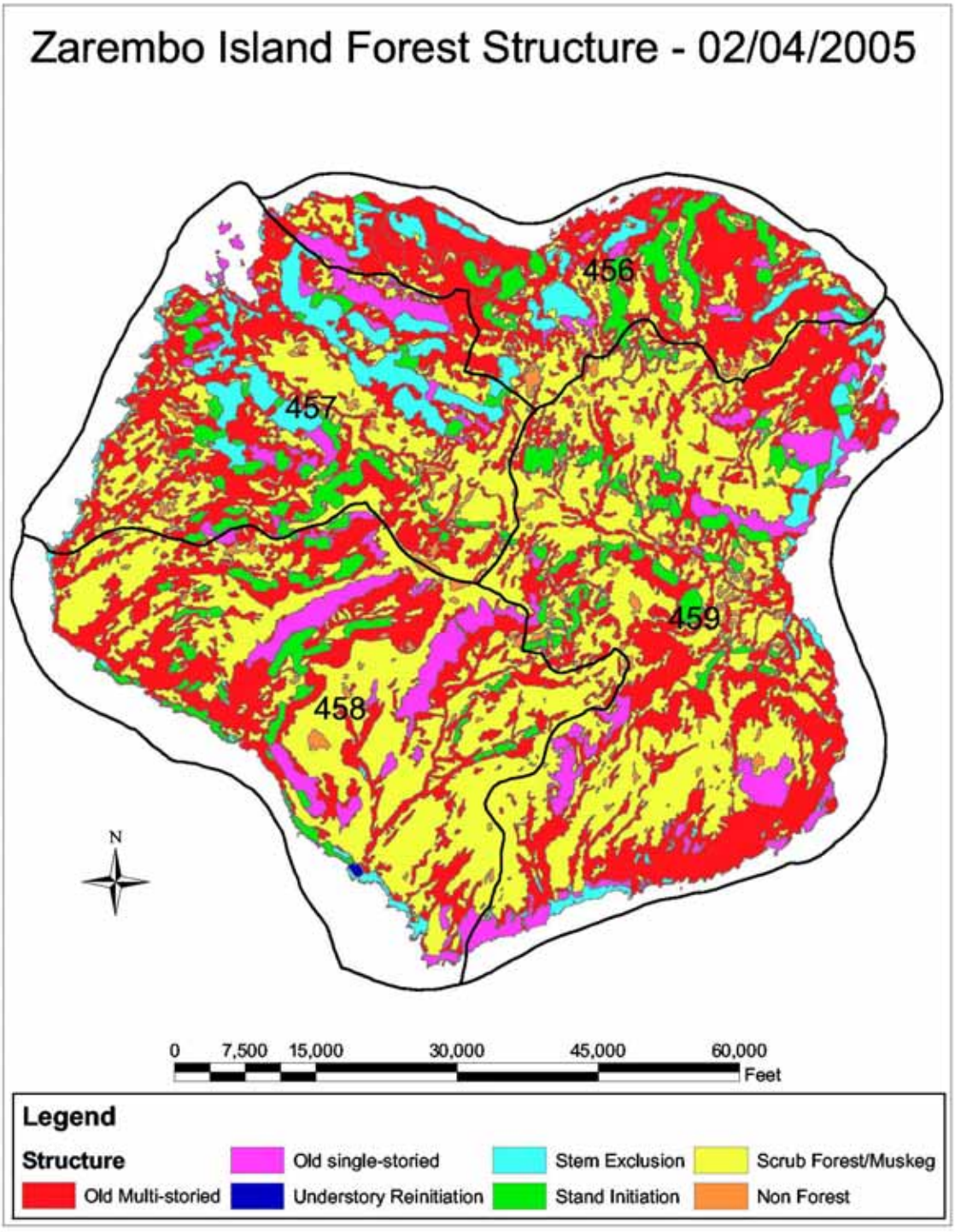


Figure 3-8. Percent Representation of Forest Structure Types by VCU.



Map 3-8. Zarembo Island Forest Structure Map



3.3.1 Vegetation Types – Plant Associations

Map 3-9, Table 3-14 and Figure 3-9 display major vegetation types on Zarembo Island. This data was obtained through on-the-ground stand examinations supplemented with GIS data for un-surveyed stands. The following is a general description of the major vegetative types found on Zarembo Island. A detailed description of major plant associations on Zarembo Island can be found in the "Preliminary Forest Plant Associations of the Stikine Area" (Pawuk, Kissinger, 1972), located in the Zarembo planning record.

Western Hemlock Series

Western Hemlock (WH) dominates the overstory. Sitka spruce is an important component, but rarely approaches western hemlock in abundance. Mountain hemlock, Alaska yellow-cedar, lodgepole and western redcedar are typically absent or may be a very minor component of the stand. The western hemlock series occurs from sea level to about 2,000 feet. It is the most common and widespread series on the island. Plant associations within the series occur on a wide variety of sites, but are characterized by a dominance of western hemlock in both the overstory and understory. Site productivity in this series is high, and ranges from about 75 to 100 feet (Farr 50-year base). Stands with a higher component of spruce (20 percent or more) but not typing out in the Sitka Spruce series were categorized as Western Hemlock-Sitka Spruce in this analysis. These sites are generally on the higher productivity range of the series.

This series is divided into five associations using key understory indicators. Blueberry is abundant in four of the associations – (WH)/Blueberry, /Blueberry/Shield Fern, /Blueberry/Skunk Cabbage, /Blueberry-Devil's Club. One association is dominated by devil's club in the understory and a lack of blueberry.

Western Hemlock/Alaska Yellow-Cedar Series

Both western hemlock and Alaska yellow-cedar (AYC) are present in the overstory. Western hemlock is normally more abundant, but Alaska yellow-cedar is always present as a co-dominant species. Other species do not occur or are a minor component of the overstory. Western hemlock dominates understory tree vegetation. This series occurs throughout the island at elevations ranging from near sea level up to the subalpine zone where it is replaced by the mountain hemlock forest. This series is divided into two associations defined by the abundance of skunk cabbage – WH-AYC/Blueberry and /Blueberry/Skunk Cabbage. Site productivity is moderate to high, and the site index ranges from about 75 to 80 feet (Farr-50). Sites with abundant skunk cabbage are on the lower productivity range.

Sitka Spruce Series

This forest is characterized by mature forest stands dominated by Sitka spruce in the overstory. They typically occur on sites with reoccurring soil disturbance. On more stable sites, western hemlock eventually replaces the less shade-tolerant Sitka spruce following disturbance. The Sitka spruce forest is found primarily on flood plains and alluvial fans where soils are periodically flooded. On other sites, disturbance is from windthrow, colluvial deposition, snow movement, or periodic deposition of windblown silt. In the Sitka spruce forest, disturbance is sufficiently frequent and naturally occurring that Sitka spruce communities are the climax plant communities. Sitka spruce is dominant or co-dominant with western hemlock in the overstory. Other tree species are usually absent. This series is divided into eight plant associations with blueberry, skunk cabbage, devil's club, enchanter's nightshade, alder, and mountain hemlock used as indicator species. This series is high in productivity with the site index ranging from 85 to 100+ feet (Farr-50). This series is not common on Zarembo Island (2 percent).

Mixed-Conifer Series

The Mixed-Conifer (MC) series is generally comprised of lower productivity stands that contain several conifer species. These stands are primarily on poor sites, usually very wet, where no tree species has a competitive advantage over the other species. Mountain hemlock, western hemlock, Sitka spruce, Alaska yellow-cedar, western redcedar, and lodgepole make up the overstory and understory. The presence of mountain hemlock at low elevations is a relatively good indicator of the mixed-conifer forest. Western redcedar is often present on these sites on Zarembo Island. Blueberry and rusty menziesia make up a typically dense tall shrub layer in this forest. Site index productivity is low, typically less than 50 feet (Farr-50). Three of the five plant associations in this series are found on Zarembo Island – MC/Blueberry, /Blueberry/Skunk Cabbage, and /Blueberry/Deer Cabbage.

Mountain Hemlock Series

The Mountain Hemlock (Mt. Hem) series is comprised of subalpine forest communities. It is characterized by the presence of mountain hemlock in the overstory as a dominant or co-dominant species. Sitka spruce and Alaska yellow-cedar are often present. Western hemlock is a significant component of stands on lower elevation sites, but is typically absent near timberline. Plants indicative of high elevations such as copperbrush, starry cassiope, mountain heather, and luetkea are common, and are increasingly more prevalent as elevation increases. Conversely, species such as red huckleberry that are common at low elevations rarely occur. Mountain hemlock forests can usually be found at elevations of 1,300 to 3,000 feet; on sites that are cold and have a relatively short growing season. Site productivity is generally low, ranging from 50 to 80 feet (Farr-50). This series is divided into five plant associations – Mt Hem/Blueberry, /Blueberry-Copperbush/Deer Cabbage, /Blueberry/Marsh Marigold, /Blueberry/Skunk Cabbage, and /Mertens Cassiope.

Pine/Muskeg Complex

This vegetation type is a complex of the lodgepole series "scrub" forest and non-forest muskeg. Muskeg is a colloquial term used to describe the open scattered tree, brush, and non-forest habitats, which are a mosaic of fens, bogs, and scrub forests. Muskegs typically have deep peat soils, though extensive areas on Zarembo Island have shallow peat over bedrock. Formation of muskegs is the result of an accumulation of vegetative material over time. The high precipitation and cool temperatures contribute to their formation. Vegetation in this type is variable and extremely diverse, particularly in forbs and shrubs. Stunted lodgepole pine, redcedar, Alaska yellow-cedar, mountain hemlock, and western hemlock are found in most muskegs. Sphagnum moss is a dominant plant in peat bogs, as are short sedges, rushes, forbs, and low-growing shrubs. Tall sedges are found in muskegs with higher nutrient status. Sweet gale (*Myrica gale*), a nitrogen fixing species, was found in a muskeg on the southwest side of Zarembo. This is the only known location of this plant on the Wrangell District. This series is not considered productive forest and does not contribute to timber management objectives. These are non-productive forest lands and do not contribute to the allowable sale quantity.

Western Hemlock-Western Redcedar Series

This series is characterized by the presence of both western hemlock and Western redcedar (WRC) in the overstory in roughly equal proportions. Other tree species are not common. It is typically encountered at low elevations but may range as high as 1,000 feet on south facing slopes. The series is best represented on the south portion of the island and becomes rare on the northern portion of the island. The series is divided into two associations – WH-WRC/Blueberry and /Blueberry/Skunk Cabbage, with the former being high in site productivity (85 feet, Farr-50) and the latter being poor to moderate in site productivity (65 feet, Farr-50).

Sub-Alpine Mixed

Sub-alpine mixed habitats are similar to muskeg in that many of the trees and plants found in the low elevation muskegs are also found on the high elevation ridge tops on Zarembo Island. These areas are distinguished from muskegs by the presence of sub-alpine plant species such as sub-alpine daisy (*Erigeron peregrinus)*, alpine-azalea (*Loiseleuria procumbens)*, partridgefoot (*Luetkea pectinata)*, copperbush (*Cladothamnus pyroliflorus*), and members of the heather family. Trees in this ecotype exhibit stunted growth and poor vigor.

Non-Forested

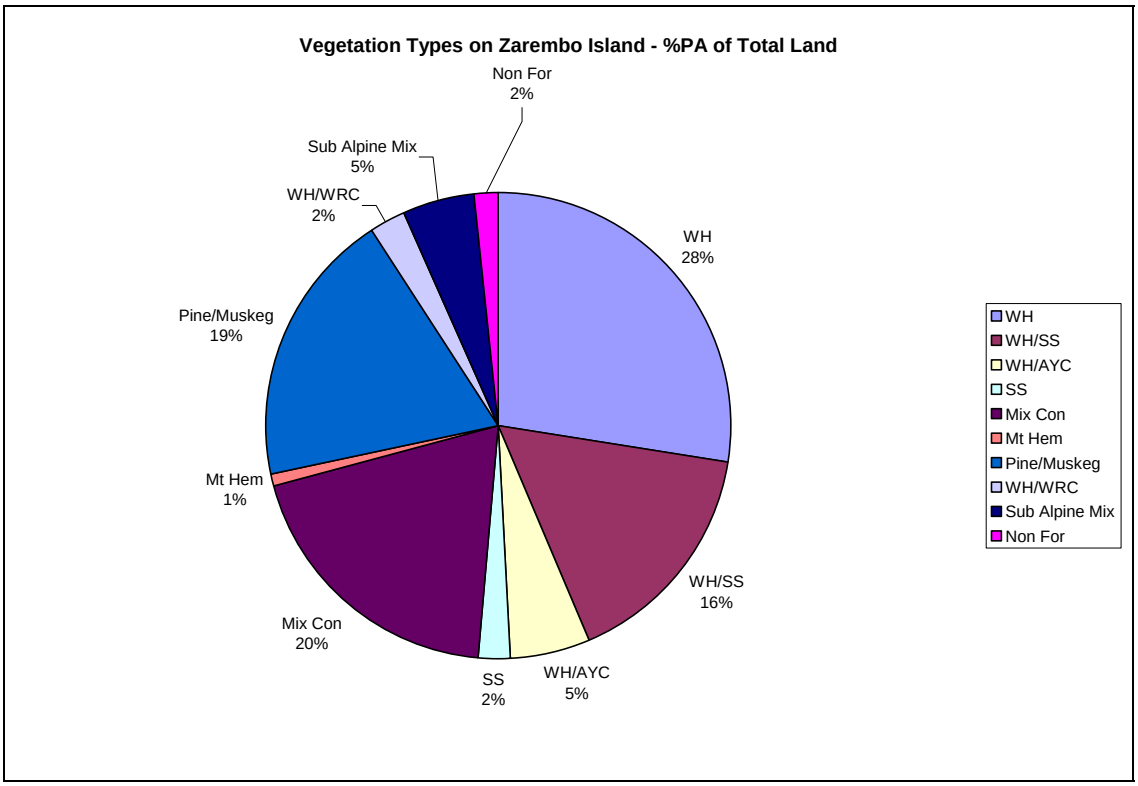
This type includes non-forest site due to a variety of conditions such as exposed rock, water, land use, etc.

Table 3-14. Acres of Vegetation Type by VCU for Zarembo Island

			Vegetation Type - Plant Association In Acres							
VCU	WH	WH/SS	WH/ AYC	SS	Mix-Conifer	Mt Hem	Pine-Muskeg	WH-WRC	Sub-Alpine Mix	Non Forest
Baht 456	6,500	4,400	0	700	2,100	200	2,400	0	300	300
St. John 457	7,900	5,800	1,100	700	4,800	200	4,000	500	600	400
Snow Pass 458	7,500	3,700	3,050[1]	400	6,900	0	6,900	1,100	2,300	400
Meter Bight 459	10,400	5,300	2,300	900	9,100	350[1]	9,400	1,200	2,800	900
Total	32,300	19,200	6,450[1]	2,700	22,900	750[1]	22,700	2,800	6,000	2,000

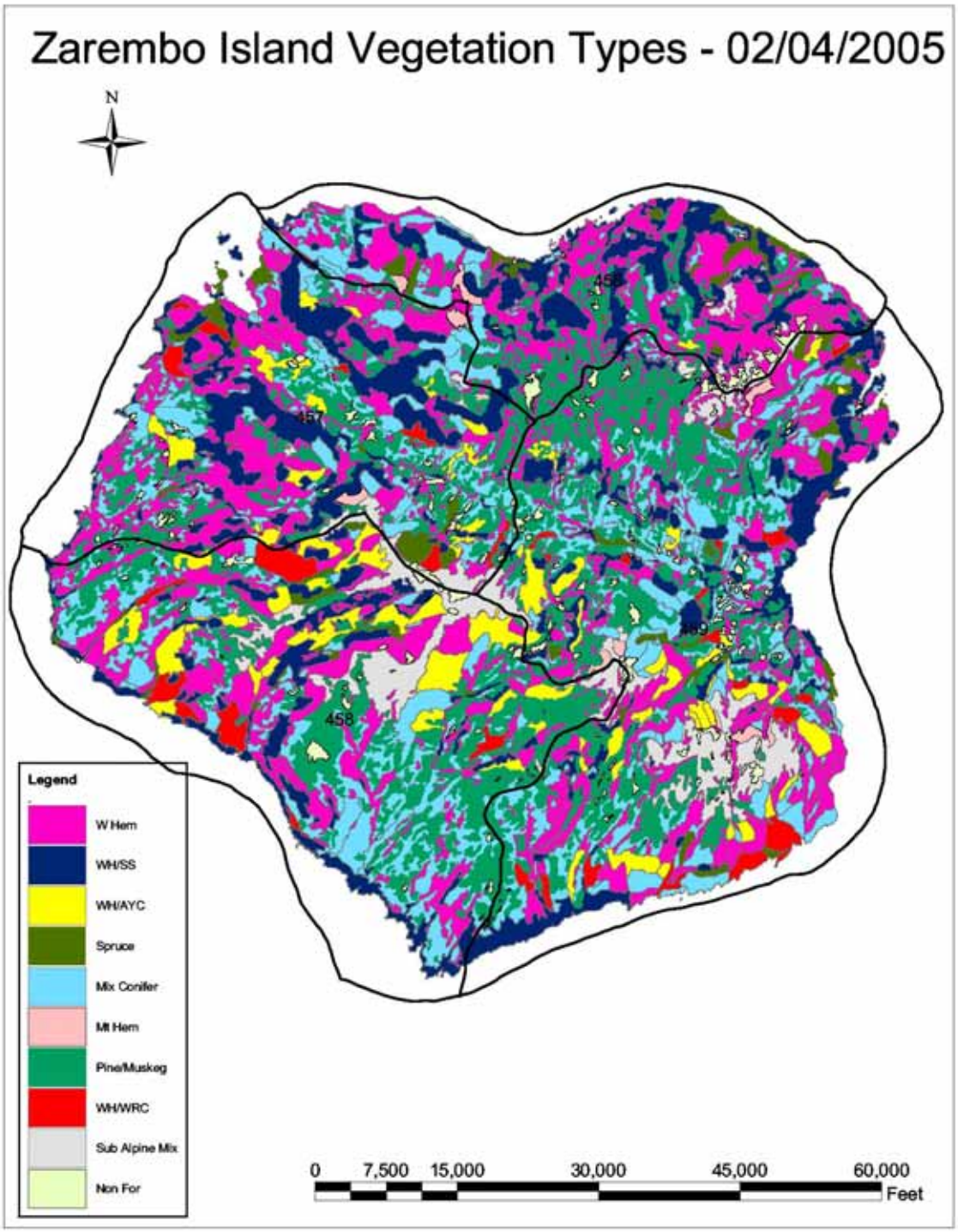
Numbers rounded to the nearest hundred.
[1] Totals rounded to the nearest ten.
WH (Western Hemlock) AYC (Alaska Yellow-Cedar)
SS (Sitka Spruce) WRC (Western redcedar)

Figure 3-9. Vegetation Types on Zarembo Island.



%PA: Plant Association percentage.

MAP 3-9.


Zarembo Island Vegetation Types - 02/04/2005
N
456
457
458
459
Legend
W Hem
WH/SS
WH/AYC
Spruce
Mix Conifer
Mt Hem
Pine/Muskeg
WH/WRC
Sub Alpine Mix
Non For
0
7,500
15,000
30,000
45,000
60,000
Feet

Invasive Plants

There has not been a systematic inventory of invasive plants on Zarembo Island, however a number of infestations have been noted in the course of conducting other work. Reed canary grass (*Phalaris arundinacea*) is the most widespread invasive plant. It was planted along the edge of roads to stabilize bared soil (BMP 12.17 and14.8). It is found on nearly every road system, some roads have a fairly solid cover and on other roads it is sparse. It is spreading down riparian areas and along the beaches. An inventory of the streams in the Meter Bight area found reed canary grass growing along streams from the 6590 Road all the way to salt water. It was also found in lower Frenchy Creek. Frenchy Creek is the most heavily harvested watershed on Zarembo, though the only observable disturbance noticed in the lower stream reaches was the reed canary grass growing on stream banks.

Wall lettuce (*Muralis lactuca*) was found along the "zig zag" spur road that goes north off the 6285 Road. This invasive plant is widespread on Kuiu Island near Rowan Bay. It has the potential to expand on Zarembo Island if not contained.

Hairy cat's ear (*Hypochaeris radicata)* is another invasive plant found along the 6585 Road system. It was hand picked in 2003; no other control has been attempted.

Dandelion (*Taraxacum officinale),* White clover (*Trifolium repens* L), Alsike clover (*Trifolium hybridum*) have also been noted on the island.

Oxeye daisy (*Leucanthemum vulgare*) was found at the junction of the Roosevelt Harbor spur and the 6590 Road. No control has been attempted.

Invasive species that are likely to invade include: orange hawkweed and yellow hawkweed, Bull thistle (*Cirsium vulgare*), and European mountain ash (*Sorbus aucuparia*). Implementation of the Tongass Draft Invasive plant management plan is imperative if invasive plants are to be controlled on Zarembo Island. Reed canary grass is currently the greatest threat to riparian and beach plant communities, it presents a management challenge.

Other disturbance

Grazing by the expanding elk herd appears to be changing the vegetative community composition in some areas. Heavy grazing pressure was observed on a ridge top in the Zarembo Lake area. There was a noticeable decline in species diversity and an increase in the amount of bare soil. A unique plant association, Sitka spruce/bluejoint reedgrass, is common along the Snow Pass beach fringe (Billl Pawuk, personal communication 1995). This area may be receiving heavy grazing pressure use by elk. Monitoring vegetative conditions is necessary to understand the impact caused by the introduced elk.

3.3.2 Timber Management

Timber History

Much of the beach fringe throughout Southeast Alaska was selectively hand-logged in the late 1800s and early 1900s to provide lumber for homes, float logs for fish traps, crates for fish packing plants, and high-grade spruce for airplane construction. Most hand-logging was done within 500 feet of the shoreline, and much of the Zarembo shoreline shows evidence of this type of activity.

The first clearcut on Zarembo was a 35-acre unit harvested in 1938, in the Snow Pass area. The second clearcut, a 41-acre unit east of Nesbitt Point, was cut in 1948. Additional harvest occurred along the western shore and near Deep Bay in the late 1960s, with a total of 235 acres harvested during the decade of the 1960s. Intensive management began in earnest in the 1970s under the Pacific Northern Timber long-term contract. During the 1970s, trees were cut on 8,953 acres. In the 1980s, the number of acres harvested dropped to 3,021.

Selective timber harvest occurred along the coastline for many years. Significant harvest on the island began in the late 1960s and peaked during the period 1970-1989, when 11,974 acres were harvested. Almost all of the harvest was accomplished with even-aged clearcut prescriptions. These areas were harvested prior to the current Forest Plan, and some of the past harvest units now reside within areas that do not allow programmed timber harvest such as old-growth reserves, 1,000-foot beach buffers and stream-side buffers. The following table shows that more than 2,000 acres of the total acres harvested on Zarembo Island are in areas that are no longer considered suitable for timber harvest.

TABLE 3-15. Acres of Timber Harvest by decade within current Land Use Designations or Buffers.

LUD/ Buffer	1930	1940	1950	1960	1970	1980	1990	Total Acres
TM or SV	2			2	6,890	2,650	1,670	11,244
OGR[1]					731	219	64	1,014
BEACH[1]	32	35		226	1,136	64	51	1,544
TTRA[2]	1	6		7	196	88	94	392
Totals	35	41	0	235	8,953	3,021	1,909	14,194

[1] Areas no longer considered suitable for timber harvest
[2]Tongass Timber Reform Act (TTRA)

Skipping Cow timber sale and Deer Run salvage sale are not included in the acreage table above (Table 3-15), since no harvest has occurred on either project as of the writing of this analysis. Deer Run salvage sale is closed due to a purchaser default and will not be completed. The project area was about 6 acres of blowdown salvage in Baht VCU.

The Skipping Cow timber sale area is located primarily in the Nesbitt and Vial Creek drainages of the Snow Pass and Meter Bight VCUs. The Record of Decision for Skipping Cow EIS was signed on May 3, 2000. The selected alternative proposed to harvest an estimated 19 million board foot from 906 acres of land. The Skipping Cow timber sale was not awarded. The project area will be re-cruised and offered for sale at a later date.

Timber Management

Most of Zarembo Island is in a Land Use Designation that has timber management as a major objective. To date, 14,194 acres of the 66,500 acre productive forest base has been converted to a managed stand, mostly with even-aged systems. Much of this harvest was in response to salvaging windthrow timber. Typically, old stands that are flat or declining in volume growth are regenerated using even-aged systems and the clearcut harvest method. Regeneration is typically prolific, with 3,000 or more trees per-acre becoming established by year 4. Supplemental planting has occurred, typically to favor underrepresented tree species.

Newly-established stands typically become overstocked by about year 30, and are Pre-Commercial Thinned (PCT) prior to this, typically near year 20. The PCT operation serves a dual purpose of reducing tree density and achieving a desirable species composition. These stands may be commercially thinned, and then eventually regenerated near Culmination of Mean Annual Increment (the point of optimum net wood production on an acre of forest land.) Table 3-16 lists acres treated by VCU.

TABLE 3-16. Acres Treated by VCU.

Treatment	Baht (VCU 456)	St. John (VCU 457)	Snow Pass (VCU 458)	Meter Bight (VCU 459)	Total Acres
Regeneration Harvest	**3,323**	**5,534**	**2,090**	**3,247**	**14,194**
Planted	**96**	**315**	**279**	**1,038**	**1,728**
Thinned	**1,604**	**5,098**	**820**	**677**	**8,199**
Pruned		**128**			**128**
Fertilized		**44**	**56**		**100**

Source: Silvicultural Information System (SIS) 2005.

3.3.3 Management Activities by VCU

Baht VCU (456)

The Baht VCU is the smallest of the four VCUs on Zarembo, but it is also the most densely forested. Over 75 percent of the land base is considered forested. Of that, 3,323 acres have been harvested using even-aged management (clearcut). Most of the past harvest in this VCU took place in the 1970s, with just under 400 acres harvested in each of the following decades.

Most of the past harvested acres are suitable for future timber management (3,000 acres). In addition, based on Geographical Information System (GIS) data, 5,000 acres of old-growth are suitable for harvest consideration. The current Logging System Transportation Analysis (LSTA) indicates 3,500 of those acres are realistically available for harvest within the Baht VCU at this time. Thinning has occurred on 1,604 acres to date. Small amounts of blowdown have occurred along the edges of several past harvest units.

St. John VCU (457)

The St. John VCU is the second smallest of the four VCUs on Zarembo but it has had the most acres harvested. Approximately 59 percent of the land base is forested. Of that, 5,534 acres have been harvested using even-aged management (clearcut). Most of the past harvest in this VCU took place in the 1970s, with about 700 acres harvested in each of the following decades.

Most of the past harvested acres are suitable for future timber management (5,000 acres). In addition, based on GIS data, 7,000 acres of old-growth are suitable for harvest consideration. The current LSTA indicates 4,400 of those acres are available for harvest within the St. John VCU at this time. Thinning has occurred on 5,098 acres to date. Small amounts of blowdown have occurred along the edges of several past harvest units.

Snow Pass VCU (458)

The Snow Pass VCU is the second largest of the VCUs on Zarembo and it has the highest percentage of non-forested acres (52 percent). Over 48 percent of the land base is forested. Of that, 2,090 acres have been harvested using even-aged management (clearcut). Most of the past harvest in this VCU took place in the 1970s, with just over 200 acres harvested in each of the following decades.

Only 32 percent of the past harvested acres are suitable for future timber management (680 acres). In addition, based on GIS data, 4,800 acres of old-growth are suitable for harvest consideration. The current LSTA indicates 3,100 of those acres are realistically available for harvest within the Snow Pass VCU at this time. The Skipping Cow timber sale will harvest on 200 acres of the current LSTA acres. Thinning has occurred on 820 acres to date.

Meter Bight VCU (459)

The Meter Bight VCU is the largest of the four VCUs on Zarembo. Fifty-four percent of the land base is forested. Of that, 3,247 acres have been harvested using even-aged management (clearcut). Most of the past harvest in this VCU took place in the 1980s.

Most of the past harvested acres are suitable for future timber management (2,500 acres). In addition, based on GIS data, 8,100 acres of old-growth are suitable for harvest consideration. The current LSTA indicates 5,000 of those acres are realistically available for harvest within the Meter Bight VCU at this time. The Skipping Cow timber sale will harvest on 630 acres of the current LSTA acres.

Thinning has occurred on 677 acres to date. Small amounts of blowdown have occurred along the edges of several past harvest units.

Logging System Transportation Plan

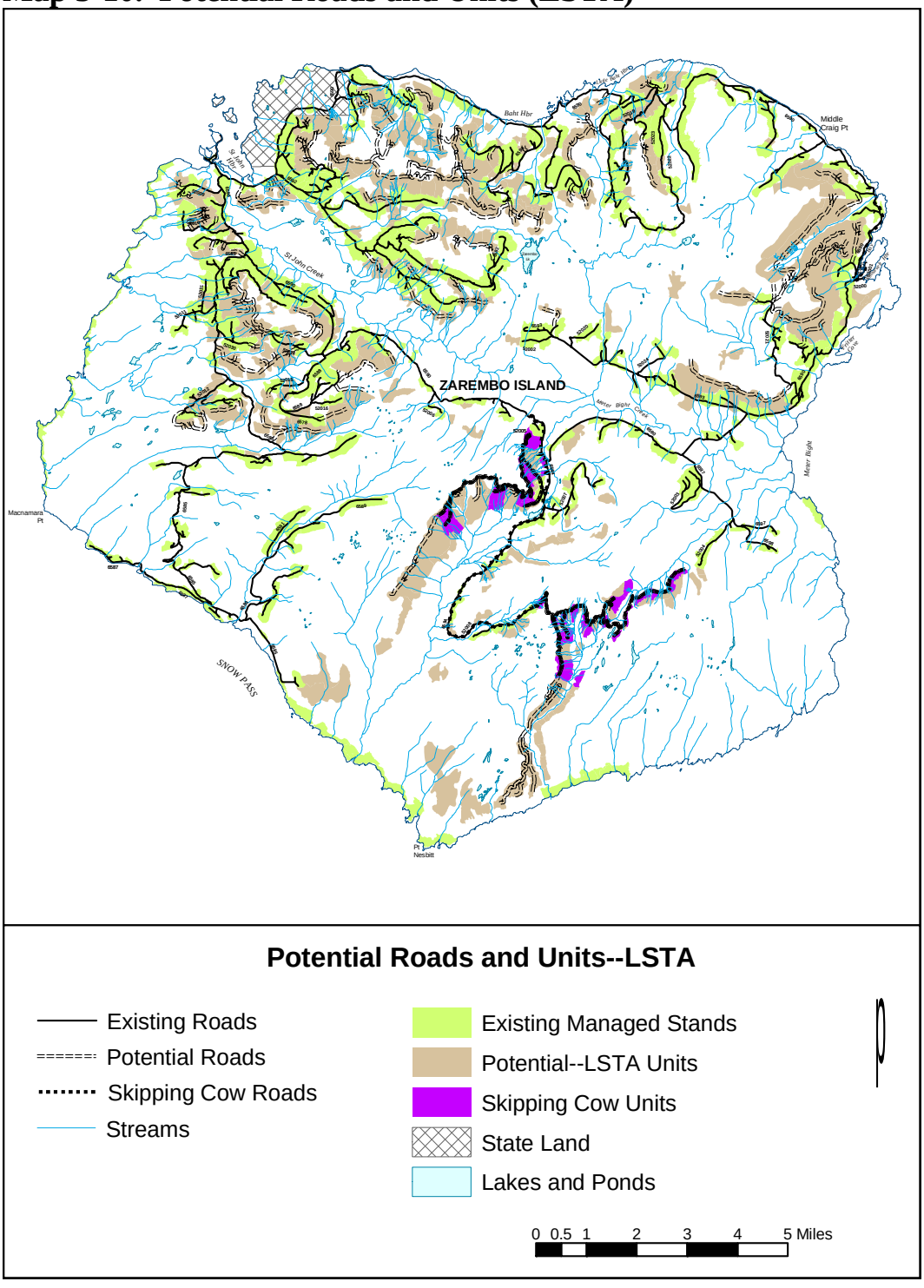
We will continue to provide for timber harvest consistent with the Forest Plan. A Logging Systems Transportation Plan has been completed for the island. There are approximately 36,200 acres of productive forest land that are suitable for timber management. Approximately 24,000 acres are currently available for harvest consideration under the Forest Plan. Based on current logging technology and economic considerations, only about 16,000 acres are considered feasible for entry at this time.

Suitable forest land is split between Timber Management (two-thirds) and Scenic Viewshed (one-third). Timber Management objectives include intensive harvest of the available forest, using even-aged management with a 100-year rotation. Forest land in the Scenic Viewshed LUD is harvested less intensively, using two-aged management, uneven-aged management, or even-aged management on longer rotations (170 years). Zarembo Island contains 28,000 acres of suitable forest land. The land use designations are Timber Management (19,000 acres) and Scenic Viewshed (9,000 acres).

To calculate harvestable acres per decade, the rotation age for each designation must be determined. The rotation age for Timber Management on Zarembo Island is 100 years, which equates to harvesting 1,900 acres per decade on a sustainable basis. The rotation age for Scenic Viewshed is calculated at 170 years due to harvest restrictions which yields 530 acres per decade. Combined this equals 2,430 acres per decade of sustainable timber harvest on Zarembo Island.

This does not take into account the volume that will be harvested by commercial thinning.

Map 3-10. Potential Roads and Units (LSTA)



3.3.4 Disturbance Factors

Vegetative conditions are dynamic and there are a number of natural disturbance factors at work across the landscape of Zarembo Island.

Windthrow

Windthrow is a dominant disturbance agent on Zarembo Island. It occurs in two forms: small-scale and large-scale. Most of the island is subject to small-scale windthrow events. Individual trees or small groups of trees, blow-over during wind storms, opening the canopy and allowing young trees to grow to fill the openings. This results in complex, multi-aged stands. Studies in Southeast Alaska indicate that these small-scale events occur nearly constantly and result in openings ranging from 6 to 13 percent of the canopy. The majority of these openings result from stem-snap, which is a process where the tree bole snaps off at some point above the ground, as opposed to root pull, where the trees roots are pulled from the ground. Stem-snap causes little soil disturbance (Nowacki and Kramer, 1998).

Those areas not protected by topographic barriers from the severe effects of infrequent, major storms, are subject to large-scale windthrow events and catastrophic damage. Entire stands have been blown down in the past. Catastrophic blowdown can result in an even-aged stand with a uniform canopy or a two-aged stand with a diverse canopy, depending on the degree of blowdown. Most openings are less than 50 acres. Unlike small-scale wind disturbance, the majority of trees blow over rather than break. This results in the exposure of mineral soil. Catastrophic blowdown events generally reoccur often enough that old-growth conditions are not attained in areas not protected from major storms by topographic features (Nowacki and Kramer, 1998). There are stands on Zarembo Island that are hundreds of acres in size that are a direct result of a catastrophic wind event. The oldest known stand with this type of origin is 250 years old. Approximately 9,791 acres have been affected by stand-replacing windthrow.

Windthrow can be associated with timber harvest or road construction that creates abrupt stand edges that receive new exposure to wind. A windthrow prediction model has been developed for Southeast Alaska. The results of that model are displayed in Table 3-17, which shows the acres at risk for windthrow on Zarembo Island by hazard class for each VCU.

Table 3-17. Acres of Windthrow Risk by VCU.

Windthrow Hazard	Baht (VCU 456)	St. John (VCU 457)	Snow Pass (VCU 458)	Meter Bight (VCU 459)	Total
High	**7,500**	**5,100**	**7,900**	**11,400**	**31,900**
Medium	**4,500**	**7,800**	**5,200**	**7,200**	**24,700**
Low	**4,400**	**3,700**	**2,600**	**3,600**	**14,300**
None	**600**	**9,400**	**16,600**	**20,300**	**46,900**
Total	**17,000**	**26,000**	**32,300**	**42,500**	**117,800**

All numbers rounded to the nearest hundred. *Source*: GIS data layer, 2001.

Landslides

Landslides occur naturally throughout Southeast Alaska, including Zarembo Island. In their most basic form, landslides occur when the forces of gravity overcome soil, rocks, and trees. Often, landslides are precipitated by rain events combined with strong winds. The soil becomes saturated and the wind rocks the trees, in effect, stirring the saturated soil until it liquefies. This liquefied soil can no longer stay on the hillslope and a landslide ensues. Most of the slides on Zarembo are relatively small in size.

Red Alder

Red alder is the most common tree species to become established on severely disturbed sites. Areas such as landslides, gravel roadbeds, and heavily-used skid trails, or landings, are likely locations for monoculture alder stands. Red alder has invaded the old campsite at St. John Harbor and numerous old roads on Zarembo Island. Alder is an early successional species. It has the ability to fix atmospheric nitrogen, thus it can survive and out compete other species on sites with marginal fertility. Over time, red alder improves the site productivity and conifers, such as Sitka spruce, start appearing in the alder stands. The acres dominated by alder on Zarembo Island are shown in Table 3-18 by VCU.

Beaver Kill

Beaver build burrows and lodges in pools of water to protect themselves from predators. To assure adequate water depth and to keep lodge entrances under water, streams are dammed using branches, logs, mud, and stones. Their main activities are cutting trees for building or repairing lodges and dams, or for winter food. Beavers flood areas around the ponds killing trees left in flood waters. The acres of trees killed by beaver are shown in Table 3-18 by VCU.

Alaska Yellow-Cedar Decline

The cause of yellow-cedar decline is unknown. The primary cause is likely an abiotic factor, probably associated with poorly drained soils or soil temperature. The decline began about 1880 on all sites, but is not known to have spread to new sites. Alaska yellow-cedar growing on more productive sites is not declining. Smaller trees coming up under the declining canopy are mostly western hemlock. The acres dominated by yellow-cedar decline on Zarembo Island are shown in Table 3-18 by VCU.

Elk Grazing

Grazing by the expanding elk herd appears to be changing the vegetative community composition in some areas. Heavy grazing pressure was observed on a ridge top in the Zarembo Lake area. There was a noticeable decline in species diversity, and an increase in the amount of bare soil. A unique plant association, Sitka spruce/bluejoint reedgrass, is common along the Snow Pass beach fringe (Bill Pawuk, personal communication 1995). This area is likely receiving heavy grazing pressure use by elk. Monitoring vegetative conditions is necessary to understand the impact caused by the introduced elk.

TABLE 3-18. Acres of disturbance by VCU.

	Baht (VCU 456)	St. John (VCU 457)	Snow Pass (VCU 458)	Meter Bight (VCU 459)	Grand Total Acres
Windthrow	**2,095**	**1,659**	**2,781**	**3,256**	**9,791**
Red Alder	**132**	**45**	**166**	**68**	**411**
Beaverkill	**10**	**132**	**58**	**63**	**263**
Yellow-Cedar Decline	**0**	**6**	**474**	**132**	**612**

Source: GIS data layer, 2001.

3.4 Soils

Soil Development

Soils develop in parent material originating from a variety of geologic and vegetative sources. Parent material is the inorganic or organic material in which soils develop. Soil development is strongly influenced by high precipitation and cold soil temperatures. Under such conditions, organic matter decomposes slowly and tends to accumulate on site. Tree rooting is generally very shallow, even on deep soils, with most of the roots present in the surface organic layers and the upper few inches of mineral soil. Typically this rooting zone is never dry, is very acid, and contains most of the nutrients available for plant growth.

Soil Productivity

Soil productivity is the inherent capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. It can be expressed in terms of volume of weight /unit area /year, percent plant cover, or other measures of biomass accumulation. The productivity of soils directly or indirectly affects the productivity of other forest resources. Tree growth, wildlife and fish habitat quality, and recreation uses and potentials are in part dependent on the quality of the soils. In Southeast Alaska, soil productivity, in terms of tree growth, is high on well-drained soils, and decreases as latitude and elevation increase and as drainage becomes poorer.

Soil productivity and nutrient status can be influenced in a number of ways by management activities. Timber harvest removes the canopy of mature and over mature forest allowing increased solar radiation to penetrate and warm the soil. Increased soil temperature accelerates microbial activity and nutrient cycling, thus increasing the availability of soil nutrients, particularly nitrogen. The result is a proliferation of rapidly growing forbs, shrubs, and tree seedlings. Consequently, the net annual biomass production is greater than it was in the old-growth forest. This effect is relatively short lived however, and tends to diminish as the young forest stand closes canopy and again shades the soil surface (stem exclusion phase of stand development). With a substantial proportion of the nutrients of these soils in the upper organic-rich layers, destruction or removal of these layers will have a severe adverse effect on tree growth. This can occur by landslides, surface erosion, severe burning, or by displacement by road, skid trails, landing, or rock pits. Road construction takes land “out of production” and increases erosion because of the destabilizing effect of cuts, fills, and drainage alteration, thereby reducing soil productivity.

The Region 10 Soil Quality Standards (FSM 2500 R-10 Supplement 2500-92-1) establishes threshold limits of detrimental soil properties. It defines detrimental soil conditions for such properties as soil compaction, puddling, displacement, etc. It is assumed that long-term soil productivity is maintained if these soil properties remain within these standards.

Some types of soil disturbance can have a positive effect on soil productivity. Mixing the upper organic soil layers with the underlying mineral horizons generally increases soil tilth, permeability, and available minerals in the upper part of the soil profile available to tree roots.

Most undisturbed soils on Zarembo Island are very resistant to surface erosion. Thick layers of surface organic matter and surface mats of vegetation act as effective protective covers that nearly eliminate surface erosion.

Mass Movement

Soil mass movement is the dominant erosional process. 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 sloping parallel to the surface. When subjected to heavy rainfall, these areas have a high likelihood of mass movement, especially if disturbed by blasting of rock pits or road pioneering, side casting of excavated material, or logging practices that cause substantial surface disturbance. Recent research on landslides in Southeast Alaska (Swanston, 1991) has concluded that while over 90 percent of all landslides in the past 20 years were not related to logging or roads, logging and roads do increase the potential for landslides at a given site. Much of Zarembo Island has rounded rolling hills with moderate slopes. Subsequently, there are relatively few landslides.

Vegetation has a stabilizing effect on slopes. This is especially true of tree roots. Strength of tree roots tend to decrease four to seven years after the tree is cut. This decrease in soil holding capability results in an increased likelihood of soil movement on steep slopes following clearcutting. Further, the displaced roots of uprooted trees can disturb the soil mantle whenever windthrow occurs. Under natural conditions, windthrow is an important triggering device of debris avalanches and flows in Southeast Alaska.

3.5 Wetlands

Wetlands are located on low-gradient landforms from sea level to upper elevations on Zarembo Island. Various laws, initiatives, and Executive Orders require protection of wetlands. The President's 1993 Wetlands Plan was the formal adoption of an interim goal of no overall net loss of the nation's remaining wetlands, and the long-term goal of increasing the quality and quantity of the nation's wetland resource base. The Army of Corps of Engineers is responsible for regulation of dredge and fill-in waters and wetlands through a permitting process.

Wetlands are defined as "areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions." Wetlands are described by the type of vegetation they support for the purpose of discussion in this document. The CLU (common land unit) spatial database was the primary means of assessing wetland location and type. The National Wetland Inventory (NWI) is another source of information on wetlands. Following is a description of wetland types found on Zarembo Island.

3.5.1 Wetland Type Descriptions

Estuarine Wetlands (240 acres)
Estuaries are intertidal zones where brackish saltwater mixes with fresh water from rivers or streams. They provide high-value habitat for vegetation, fish and wildlife. Estuarine wetlands are of two basic types: emergent wetlands in the upper tidal zone and the regularly flooded zones. The emergent wetland are characterized by grasses and sedges, especially tufted hairgrass, Lyngby's Sedge and dune wild rye in the upper tidal zone with beach-carrot, beach pea, large headed sedge, paintbrushes, and lupine commonly found on the upper beaches. The intertidal, regularly flooded zone is comprised largely of aquatic algal beds and rocky or unconsolidated shore. The Forest Service only manages the wetlands above mean high tide.

Forested Wetlands (14,443 acres)
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. These wetlands function as recharge areas for groundwater and streams, and for deposition of sediment and nutrients. They also produce commercial forest products. Tree cover ranges from a minimum of 10 percent to about 60 percent canopy cover. The low canopy cover allows more light to reach the understory creating a dense shrub understory. Canopy height is at least 25 feet. Plant associations are primarily Mixed-Conifer/Blueberry/Skunk Cabbage, Mixed-Conifer/Blueberry/Deer Cabbage, Western Hemlock/Blueberry/Skunk Cabbage, Shorepine/Blueberry, and some Mountain Hemlock/Blueberry/Skunk Cabbage. Forested wetlands typically have peat over mineral soils.

Muskeg (14,888 acres)
Bogs or peatlands (commonly called muskegs) are dominated by sphagnum moss with a wide variety of other plants adapted to very wet, acidic, organic soils. Muskegs have deep peat soils, which have developed from the gradual accumulation of plant material over time. Tree cover is less than 10 percent, consisting mainly of stunted lodgepole pine with lesser amounts of western hemlock, mountain hemlock, and Alaska yellow-cedar. Common shrubs include juniper, Labrador tea, crowberry, mountain cranberry, dwarf blueberry, bog laurel, and bog cranberry. These wetlands function as areas for recharge of groundwater and streams and for deposition and storage of sediment, and nutrients. They are a valuable source of biological and vegetative diversity. Muskegs are most commonly found in broad valley bottoms, on rounded hilltops, and on rolling lowlands.

Forested Wetland/Muskeg Complex (33,370 acres)
Small patches of muskegs and forested wetlands, as described above, arranged in a mosaic pattern on the landscape. These areas have vegetative properties of each of the respective components, but function somewhat differently in respect of habitats due to their small size and spatial arrangement

Forested Wetland/Upland Mosaic (21 acres)
Small patches of forested wetland as described above in a mosaic pattern with forested non-wetland ecosystems. The forested wetland portion is typically on concave positions on these gently-sloping or rolling landscapes and functions somewhat differently than a large, contiguous area of forested wetland due to its orientation.

Tall Sedge Wetlands (97 acres)
Tall Sedge Wetland (fens) are characterized by a diverse community of sedges and forbs and occasional stunted trees, usually spruce or hemlock. Unlike muskegs, or bogs, lodgepole are usually not present in fens. Oregon crab apple and highbush cranberry are common on the margins of fens; forb diversity is relatively high in these wetlands. Soil and water in a fen is less acidic and has a higher nutrient content than muskegs. Tall sedge wetlands usually occur adjacent to streams, or on the fringe of muskegs where they receive nutrient enrichment from upslope runoff. They occur in landscape positions where they receive some runoff from adjacent slopes resulting in somewhat richer nutrient status than bogs. These wetlands function as areas for recharge of groundwater and streams, deposition and storage of sediment and nutrients, and for waterfowl and terrestrial wildlife habitat, including black bear, mink, river otter, and beaver. Many sedge fens contain beaver ponds that often provide high quality waterfowl and salmon rearing habitat.

Alpine/Sub-alpine Forested wetland/Meadow mosaic (1,170 acres)
Small patches of alpine shrubs and small trees within a matrix of meadow as described above. The trees are stunted lodgepole pine or mountain hemlock.

Vegetation is a combination of muskeg and sedge meadows on peat deposits, and low-growing blueberry and heath on higher rises. Stunted lodgepole pine and mountain hemlock are common. These wetlands are important for snow storage and can be a source for snowmelt water throughout the summer. They also provide summer habitat for terrestrial wildlife species. These wetlands are located at elevations of 1,200 to 2,500 feet.

Typical forest management activities that affect wetlands are road construction and rock pit development. These activities directly impact the wetland by converting them to a non-wetland condition. Timber harvest on wetlands changes the vegetation structure; wetland status is usually not changed. Motorized recreational use has caused some minor disturbance in open muskegs on Zarembo Island.

3.6 Wildlife Habitat

3.6.1 Fragmentation

Forest fragmentation is the term we use to describe a process in which a forest block becomes subdivided into smaller, more isolated units. When fragmentation occurs in a forested environment we see an increase in the amount of "edge" habitat and a decrease in "interior" forested habitat (Alaback 1982). Some wildlife species prefer edge habitats (American robin); others prefer interior habitat (hairy woodpecker) and others may even utilize both types of habitat (Sitka black-tailed deer). Fragmentation can cause problems for interior forest-dependent wildlife by isolating populations, which in turn can lead to local extirpations (Saunders et al. 1991).

Natural fragmentation along with human-caused fragmentation next to the St. John and Meter Bight Creek drainages has potentially isolated old-growth forest species on the north half of the island from those on the south half. The beach fringe on the south end of the island has been highly fragmented due to timber harvest as well as natural and harvest-related windthrow. The beach fringe on the north end of the island is more intact, but is likely compromised by the road that runs right along or through it. Old-growth habitat on the north end of the island has been highly fragmented by timber harvest and road building. Much of the original productive old-growth forest that was harvested likely functioned as important summer or winter habitat for deer. Loss of upland habitat impacts landbirds and furbearers.

Old-Growth Reserves and Connectivity: Zarembo Island has a system of medium and small Old-Growth Habitat Reserves (OGR) intended to maintain wildlife viability at the landscape level. These are the Snow Pass and Round Point medium OGRs and the McNamara and Craig Point small OGRs. Forested connections (connectivity) between the Snow Pass and Round Point OGRs on the south end of the island are very limited due to natural and human-caused fragmentation.

There is little connectivity between reserves on the south and north ends of the island. Natural fragmentation and human-caused fragmentation to date have limited the options for placement of the reserves.

Wildlife corridors are areas of suitable habitat that allow a species to move from one large habitat block to another. Corridors are most important for species that are strongly tied to specific habitat types. Some species may be reluctant or unable to cross an area of unsuitable habitat or may be vulnerable while trying to reach suitable habitat (Kirchoff & Schoen 1987). Large mammals such as deer and bears are not as restricted by gaps in forested habitat, yet may become more vulnerable to hunting or predation if they have to cross a road or other opening (McCorqudale et al. 2003). Smaller animals, such as red squirrels are, by reason of their size, less mobile and therefore, may be more restricted by loss of sheltered corridors. Research indicates that fragmentation may not functionally isolate populations under all circumstances (Bowman & Fahrig 2002; Bayne & Hobson 2000).

Road System

The presence of the road system on Zarembo Island adds to fragmentation and has impacts on wildlife species such as deer, elk, and wolves, as well as smaller species (Reed et al 1996; Trombulak & Fressell 2000). In addition to the reasons given above, many of these animals cross or travel down the roads, which make them susceptible to legal or illegal hunting (poaching). Populations of these species can sustain a certain amount of harvest or loss due to predation, but excessive mortality can lead to population declines and even localized extinctions in rare cases. For example, scientific information from Southeast Alaska and other areas suggests that road densities of greater than 0.7 to 1 mile of open road per square mile of land can lead to mortality rates that cannot be sustained by wolf populations (Person 2001). Others believe that the number of roads is not the issue so much as a matter of informing the public about the conservation needs of different species. Illegal harvest adds to the total harvest of a species and is often strongly associated with road systems, especially with species such as deer and elk.

Taken in this context, road density on the island is moderate to high overall. Relatively large roadless areas in the southern and southwestern portions of the island dilute the effects of much higher road densities in localized areas such as the north end of the island. The actual placement of the roads may be more critical than just the overall number of roaded miles per square mile of land. For example, the roads that cut through the important beach fringe habitat on the north shore would be expected to have a greater effect on wildlife than a similar length of road in alpine habitat, though the road density may be the same. Additionally, the roads along the bottom of the St. John and Meter Bight Creek drainages add further fragmentation and potential barriers to an already disrupted travel route for wildlife.

TABLE 3-19. Open Road Density on Zarembo Island by VCUs.

VCU	Baht	St. John	Snow Pass	Meter Bight
Miles of Road per Square Mile	0.95	0.87	0.34	0.42

3.6.2 Deer Habitat

The abundance and quality of deer winter habitat is likely the most critical factor limiting the deer population on Zarembo (Kirchoff & Schoen 1987; Kang-Tsung et al. 1995). High-quality deer winter habitat generally occurs in productive old-growth forest at lower elevations and on more south-facing slopes. These areas tend to have lower snow accumulation that allows more forage to be available (Suring et al. 1993; Alaback 1982). Abundant forage also occurs in younger clearcuts but becomes unavailable during heavy snow years. As young forests grow older, trees crowd together and shade out shrubs and forbs underneath, this diminishes the value of the stands for wildlife. This condition persists for 50 to 100 years until natural aging processes and competition between trees create openings that begin to let light reach the forest floor once again (Deal 1997).

Deer winter habitat receives the greatest amount of protection in beach fringe and old-growth habitat reserves. GIS models identify the vast majority of the island as low-value deer winter range, though there are patches or blocks of higher-quality habitat, mostly scattered along the shore of the island. The Habitat Capability Model (HCM) for deer has identified 1,347 acres of high-value deer habitat on Zarembo Island, most of which occurs on the southern end and Snow Pass area due to lower snow levels. The patches are generally elongated or small, meaning that edge-effects are proportionately greater. The largest patch of high-quality habitat is located in the Round Point OGR. There is minimal high-quality habitat indicated for the interior of the island. These valuations are made on an absolute scale, as defined by the GIS habitat capability model for deer. This is not to infer that other areas do not have great value relative to the habitat that is available, especially given the large number of deer observed on and harvested from the island each year, and the observed high use by deer in those same areas. South-facing, lower elevation slopes in larger blocks of old-growth habitat had the most evidence of deer use. Field data suggests deer are using the old-growth habitat much more in the winter than they are using second growth stands. Browsing is heavy in certain areas and more moderate in others, indicating that carrying capacity is perhaps being approached on a localized basis. There is more specific area discussion on deer winter range beginning on page 3-75 to 3-78 (3.6.4 Wildlife Habitat by VCU).

3.6.3 Wildlife Species

Deer

An estimate of the deer population on Zarembo Island is not available at this time. A computer model is used to estimate deer habitat capability, which is an estimate of the number of deer that can be sustained over time. The habitat capability model does not project actual deer numbers. The model is based primarily on deer winter habitat as the primary population-limiting factor. Zarembo Island has experienced a relatively long period of mild winters, has a low natural predation level, and has abundant forage, which are all factors that favor a larger deer population. Due to these factors, Zarembo Island may be an example where the present deer population exceeds the HCM values. The HCM indicates that habitat on Zarembo could support 2,463 deer in the presence of wolf predation at carrying capacity. The modeled density of deer island-wide averaged 13 deer per square mile in the presence of wolf predation.

Deer populations in Southeast Alaska tend to experience cycles. Harvest reports, limited deer pellet transect data, deer check station data, and anecdotal observations indicate that the population on Zarembo is at a higher level than past years. While Zarembo is currently very rich in deer forage, it has a relatively small amount of high-value winter deer habitat. Zarembo Island has a great deal of low- and medium-value winter deer habitat, which is most useful in mild and moderate winters, but which provides little protection or forage for deer in years of heavy snow. Whether the current population level and harvest can be sustained is unknown, but unlikely, given historical cycles, recent mild winters, and reduction in winter range.

Moose

Moose are a relatively new, though naturally arrived, species in Southeast Alaska. Moose use habitats and foods similar to deer at certain times of the year, but tend to be able to browse much of the vegetation down to a coarser condition and tolerate deeper snow, which creates the potential for them to out-compete the deer, especially during a heavy-snow winter (Kirchoff & Larsen 1998; Doerr 1983).

Wolf

The abundance of wolves on Zarembo is unknown. The size of area used by wolf packs in other areas of Southeast Alaska is generally slightly more than 100 square miles per pack on average. Given the size of Zarembo, it is likely only sufficient to support 2 wolf packs. Recorded pack size for Southeast Alaska averages from 7-9 animals, although a much larger group of wolves (20+) has occasionally been observed on Zarembo. Potential prey for wolves includes deer, elk, moose, beaver, and spawning salmon, as well as occasionally other small mammals. The ability of the habitat to support deer populations is believed to be the most significant factor affecting the viability of wolf populations in Southeast Alaska. Another key factor

in maintaining wolf populations involves controlling road density and the related human access (Person 2001). Roads create increased risks to wolves because they facilitate hunting, trapping and poaching along the roaded corridor.

Black Bear

The black bear was not recorded historically on Zarembo but has recently been documented in small numbers on the island. Salmon are a seasonally important food source for bears, though a great part of their diet consists of vegetative matter. The quantity and abundance of anadromous fish habitat has an important role in determining the growth and limits on bear populations in Southeast Alaska. Therefore, past and future fish habitat improvements will likely allow this small population to grow.

Roosevelt elk (Introduced species)

Roosevelt elk (*Cervus canadensis roosevelti*), introduced to Etolin Island in 1986, have rapidly spread to Zarembo Island, as well as other islands and the Southeast Alaskan mainland. As elk are large ungulates, feeding on a wide variety of vegetation, there is some concern about possible interactions detrimental to indigenous deer and moose populations. Currently, little is known about the absolute numbers of elk in Southeast Alaska; estimates by ADF&G place the population on Zarembo Island at 50-100 animals. Four elk were reported as harvested from Zarembo Island during the 2004 hunting season, according to ADF&G figures.

Figure 3-10. Elk on Zarembo Island Road

(Photo courtesy of Daniel Barnett)

3.6.4 Wildlife Habitat by VCU

Baht (456)

The old-growth forest habitat in this area has been highly fragmented and reduced by timber harvest and road building. The road system also allows humans extensive access for harvest of deer and other wildlife. Because much of the area is north-facing, a severe, heavy snowfall winter could make forage in open areas (especially clearcuts) unavailable and could have a heavy impact on the deer population in that specific area. The anadromous fish and riparian habitat will likely limit potential use of this area by bears as the bear population on the island increases.

Habitat loss in this area likely impacted important summer or winter habitat for deer and habitat for landbirds and furbearers. Open road density for this area is moderately high (0.95 mi/mi^2). The high variability in total road density in the different watersheds (0.41 - 2.55 mi/mi^2) indicates the potential for highly-localized effects of roads, especially in areas with important corridors or other habitat features.

High value deer winter range is currently very limited in this area because, it is in a moderate snow zone and can only be classified as medium value deer winter range. There are stands that are good deer winter habitat. The majority of the best deer winter range is in the beach fringe area and is fragmented or otherwise compromised by the road that parallels the shoreline along the northern shore of Zarembo Island. Other blocks of higher quality deer habitat occur in the eastern portion. Field surveys have revealed that deer use of the remaining habitat is locally heavy, indicating that the lower quality habitat still has significant relative importance to deer. The habitat capability of this area has been estimated at 316 deer with predation present. The model estimated a density at carrying capacity of 12 deer per square mile.

The Craig Point small old-growth reserve is located in the eastern portion of this area. It currently contains 2,434 total acres of which 2,044 acres are productive old-growth acreage. Field observations showed heavy use by deer, indicated by signs of browsing and numerous pellet groups. This indicates that the remaining habitat has higher relative value to the deer than indicated by GIS analysis. The Craig Point OGR contains 29 acres of young second-growth stands. There are no roads passing through it.

Based on the size of the Baht VCU, the Forest Plan requires that the Craig Point small OGR contain a minimum of 2,701 total acres and 1,350 acres of productive old-growth. The Craig Point small OGR currently meets standards for productive old-growth, but requires an additional 268 acres to meet requirements for total size. The recommended change can only be done in a decision document.

St. John (457)

Fragmentation of habitat has occurred as a result of road building and timber harvest, especially on both sides of the St. John Creek valley. The relatively unforested muskeg complexes of the valley bottom are essentially unroaded. This area contains approximately 7,000 acres of young second-growth stands from either natural windthrow or timber management that occur in protected beach fringe outside of the available timber base, not including acres in OGRs.

The productive old-growth forest that was harvested likely functioned as important summer or winter habitat for deer. Loss of upland habitat also impacts landbirds and furbearers. A loss of eagle nesting habitat occurred as a result of beach fringe harvest and windthrow. Open road density for this area is moderately high (0.87 mi/mi^2). The variability in total road density in the different watersheds (0.97 - 1.69 mi/mi^2) indicates the potential for highly-localized effects of roads, especially in areas with important corridors or other habitat features.

This area contains the McNamara small old-growth reserve. It currently contains 5,010 total acres of which 2,785 acres are productive old-growth forest. This reserve adjoins to the Snow Pass OGR on it southeastern edge. The McNamara OGR contains 41 acres of second-growth stands from beach harvest that occurred from 1966 to 1970. It has no roads passing through it.

St. John Creek and the broad adjacent muskeg system likely serve as an east-west corridor to the Meter Bight Creek system for riparian species and large mammals. However, the broad and open expanses in the valley bottom likely limit movement between the north and south ends of the island for old-growth forest dwelling wildlife such as red squirrels. The wide riparian areas along St. John Creek have value for a potentially growing black bear population and other wildlife because of the anadromous fish populations and abundant palatable riparian vegetation.

Deer winter range identified as high-value by GIS habitat models is very limited (Only 1 acre HCI >.67 value) and is concentrated on State selected lands around St. John's Bay, as well as the ridge to the south of the bay. Much of the original deer winter range has been reduced or fragmented by timber harvest. However, the remaining old-growth habitat likely has higher relative value to the deer than indicated by the GIS model. The habitat capability of this area has been estimated at 516 deer. The model estimated a density at carrying capacity of 13 deer per square mile in the presence of predation.

Snow Pass (458)

The beach fringe has been reduced and highly fragmented by timber harvest activities and natural and harvest-related windthrow, interrupting potential movement of old-growth forest species between the east and west sides of the island and reducing winter range habitat and eagle nesting habitat. Loss of upland habitat

also impacts landbirds and furbearers, and summer range for deer. An upland corridor between the Snow Pass and Round Point Reserves has been identified, but could potentially be compromised by proposed harvest activities. In certain areas, the riparian areas have value for a potentially growing black bear population and other wildlife because of the anadromous fish populations and abundant palatable riparian vegetation, along with a mosaic of other forest types. Natural and human-caused fragmentation and reduction in forested habitat may limit forage availability for deer in winters with heavy snowfall.

Open road density for this area is low (Table 3-20). The variability in total road density in the different watersheds (0.34 – 1.28 mi/mi^2) indicates the potential for highly-localized effects of roads. This is especially important within high-value corridors or other habitat features. Some of the higher localized densities occur in the Snow Pass Medium OGR, though a substantial portion of those roads are currently undrivable.

The Snow Pass medium OGR currently contains 14,376 total acres of which 7,281 acres are productive old-growth. The OGR contains 761 acres of young second-growth stands. It has had approximately 19 miles of roads constructed within it prior to its designation as a reserve. Approximately 6 miles of these roads remain administratively open and passable to motor vehicles.

Previous analyses have identified a portion of the south end of this area as important deer winter range. In a recent analysis, we identified 553 acres in the high-value range (HCI>.67) using the deer habitat model. Lower snow accumulations in this area likely account for some of the increased values. Recent GIS analysis showed that the habitat currently has the capability to support an estimated maximum of 773 deer with predation. We estimated a density at carrying capacity of 15 deer per square mile in the presence of predation. Nesbitt Ridge provides an important area for deer in the spring and summer. The effects of proposed harvest activities in this area could be mitigated by closing the new road on Nesbitt Ridge to vehicle travel after harvest is completed to reduce impacts of harvest on the local deer population.

Meter Bight (459)

Meter Bight Creek forms an east-west corridor to St. John Creek for riparian species and large mammals. However, the wide expanse of open muskeg wetlands in the Meter Bight Creek valley bottom may form a barrier between the north and south ends of the island for species that need forest cover to travel or disperse. This natural fragmentation is amplified by past timber harvest and road building in the Meter Bight Creek watershed. This habitat likely functioned as important summer or winter habitat for deer. Loss of upland habitat also likely impacted landbirds and furbearers. However, the beach fringe area is relatively intact and may provide a travel corridor for wildlife between the north and south ends of the island. The wide riparian areas along Meter Bight Creek have value for a potentially growing

black bear population and other wildlife because of the anadromous fish populations and abundant palatable riparian vegetation.

Open road density for this area is low (Table 3-20). The lower overall density is likely due in part to road closures and the large roadless expanse in the Round Point medium OGR. The variability in total road density in the different watersheds (0 - 1.44 mi/mi^2) indicates the potential for highly-localized effects of roads, especially in areas with important corridors or other habitat features.

The Round Point medium OGR currently contains 15,127 total acres, of which 8,003 acres are productive old-growth. The OGR contains 185 acres of young second-growth stands, Round Point OGR contains 4.4 miles of roads that are now closed to motor vehicles.

A moderately-sized block of high-quality deer habitat remains in the south end of the VCU in the vicinity of Round Point. That area lies within the Round Point medium OGR. We identified 793 acres in the high-value range (HCI>.67) using the HCI model. Lower snow accumulations in this area likely account for some of the increased values. Recent GIS analysis showed that the habitat currently has the capability to support an estimated maximum of 858 deer with predation. We estimated a density at carrying capacity of 13 deer per square mile in the presence of predation, using the HCI model.

3.7 Roadless Areas on Zarembo Island

There are three Roadless Areas on Zarembo Island (Final SEIS, 2003). See Map 3-11 for locations of the Roadless Areas.

The West Zarembo Roadless Area (#235)

The West Zarembo Roadless Area is located on the west side of Zarembo Island. Clarence Strait lies to the southwest, Sumner Strait lies to the west and northwest and the remainder of the area is bounded by roaded areas.

The West Zarembo Roadless Area includes 8,544 acres. The area is allocated to three LUDs under the Forest Plan: 8,078 acres are within the Old-growth habitat LUD, 464 acres are within the Timber Production LUD, and 2 acres are within the Semi-remote Recreation LUD.

The East Zarembo Roadless Area (#236)

The East Zarembo Roadless Area is located on the northeast side of Zarembo Island. Sumner Strait lies to the north and Stikine Strait to the east.

The East Zarembo Roadless Area includes 16,175 acres. The area is allocated to three LUDs under the Forest Plan: 1,839 acres are within the Old-growth Habitat LUD, 3,968 acres are within the Scenic Viewshed LUD, and 10,368 acres are within the Timber Production LUD.

The South Zarembo Roadless Area (#237)

The South Zarembo Roadless Area is located on the south side of Zarembo Island. Stikine Strait borders the area on the east and south and Clarence Strait lies to the southwest. A fish improvement project exists in the Meter Bight Area. The Skipping Cow Timber Sale would result in roads and timber harvest within this roadless area.

The South Zarembo Roadless Area includes 41,999 acres. The area is allocated to four LUDs under the Forest Plan: 18,970 acres are within the Old-growth Habitat LUD, 1,323 acres are within the Scenic Viewshed LUD, 21,696 acres are within the Timber Production LUD, and 10 acres are within the Semi-remote Recreation LUD.

Map 3-11. Roadless Areas on Zarembo Island

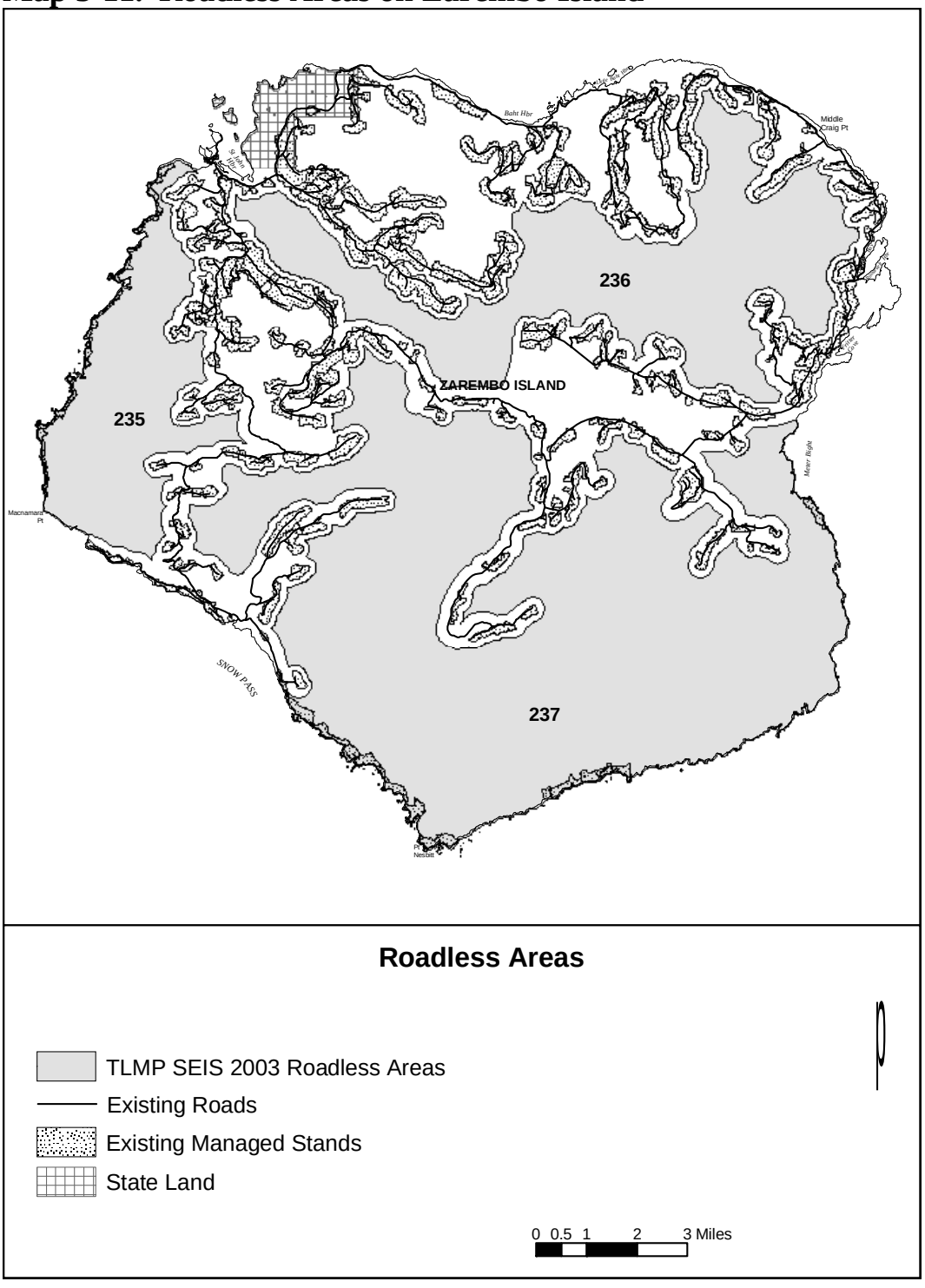


TABLE 3-20. Zarembo Island - Existing Condition Summary Table

	Baht (456)	St. John (457)	Snow Pass (458)	Meter Bight (459)	Total
Total Acres	17,000	26,000	32,300	42,500	117,800
ACRES by LUD					
Old-growth Habitat	2,434	5,010	14,390	15,113	36,947
Semi-Remote Rec	14	2	1	2	19
Scenic Viewshed	12,102	29	13	9,117	21,261
Timber Production	1,562	20,175	17,896	18,268	57,901
Non-Nat'l Forests	892	788	0	0	1,680
ROADS					
Square Miles	26.50	40.60	50.50	66.40	184.00
Total Roads built	25.40	43.99	22.99	35.95	128.33
Total Road Density (mi/mi^2)	1.51	1.29	0.72	0.79	0.69
Open Road miles	25.10	35.20	17.30	27.70	105.30
Open Road Density (mi/mi^2)	0.95	0.87	0.34	0.42	0.57
VEGETATION CONDITION	**Baht (456)**	**St. John (457)**	**Snow Pass (458)**	**Meter Bight (459)**	**Total**
Total Acres[1]	17,000	26,000	32,300	42,500	117,800
Forested Acres[1]	16,740	25,510	31,850	41,600	115,700
Non-Forested Acres[1]	260	490	450	900	2,100
Total Harvest	3,323	5,534	2,090	3,247	14,194
Planted Acres	96	315	279	1,038	1,728
Thinned Acres	1,604	5,098	820	677	8,199
Pruned Acres		128			128
Fertilized Acres		44	56		100
Harvested Acres/ Suitability Class	**Decades 1930-1969**	**Decade 1970**	**Decade 1980**	**Decade 1990**	**Total Acres**
TTRA Buffers[3]	14	196	88	94	392
Beach Buffers	293	1,136	64	51	1,544
Old-growth Reserve	0	731	219	64	1,014
TM or SV	4	6,890	2,650	1,697	11,241
Total Harvest	311	8,953	3,021	1,906	14,191

WILDLIFE HABITAT	Baht (456)	St. John (457)	Snow Pass (458)	Meter Bight (459)	Total
High-value Deer Habitat Acres	0	1	553	793	1,347
Carrying Capacity (deer/mi^2)	12	13	15	13	13
Modeled Habitat Capability (# of deer)	316	516	773	858	2,463

[1] Rounded to the nearest ten or hundred.
[3] Tongass Timber Reform Act (TTRA)

The table data below is Island-wide.

Culvert Classification by Stream Class

HYDROLOGY	Stream Class I	Stream Class II	Total Culverts
Red	22	42	64
Green	9	14	23
Gray	6	4	10
Total	37	60	97

Red: Obstruct passage.
Green: No barrier.
Gray: Require more data.

Miles of Road by Maintenance Class

Road Maintenance Level	Collector miles	Local miles	Non-System miles	Total miles
Level 0	4.0	12.5	68.5	85.0
Level 1		8.5	0 .4	8.9
Level 2	0.7	9.3	1.1	11.1
Level 3	59.3	25.4		84.7
Total	64.0	55.7	70	189.7

Collector Roads are well-traveled main roads.
Local Roads are tributary roads to main routes.
Non-System Roads are temporary spur roads.

Zarembo Island Small Old-Growth Reserve Requirements

VCU	Current Size (Acres)	Required Size (Acres)	Current POG Acres	Required POG Acres	Possible Refinement
Baht 456	2,434	2,720	2,044	1,360	Add 268 acres to meet required size.
St. John 457	5,010	4,155	2,785	2,077	Meets criteria.

Zarembo Island Medium Old-Growth Reserve Requirements

VCU	Current Size (Acres)	Required Size (Acres)	Current POG Acres	Required POG Acres	Possible Refinement
Snow Pass 458	14,376	5,170	7,281	2,585	Meets criteria.
Meter Bight 459	15,127	6,802	8,003	3,401	Meets criteria.

Chapter 4 – Recommendations

Desired Future Condition for Land Use Designations

The Forest Plan describes the desired future conditions for the Land Use Designations (LUD) represented on Zarembo Island as follows:

Old-Growth Habitat (Forest Plan 3-75)

The desired future condition for old-growth habitat is that all forested areas attain old-growth forest characteristics and provide a diversity of old-growth habitat types, associated species and subspecies, and ecological processes.

Scenic Viewshed (Forest Plan 3-125)

Visitors using popular travel routes or use areas within the Scenic Viewshed LUD will view a natural-appearing landscape. Proposed activities in the foreground will not be evident to the casual observer. Activities in the middleground and background will be subordinate to the characteristic landscape. Roads, facilities, and other structures are either not visually evident or are subordinate to the landscape. Areas topographically screened from popular travel routes and use areas may be heavily modified. Timber harvest is typically small and affects only a small percentage of the seen area. A variety of successional stages providing wildlife habitiat occur, although late successional stages predominate. Recreation and tourism opportunities in a range of settings are available. A yield of timber is produced which contributes to the Forest-wide sustained yield.

Semi-Remote Recreation (Forest Plan 3-82)

In the Semi-Remote Recreation LUD, the desired condition is to maintain a generally unmodified natural environment, with minimal human use and activities.

Timber Production (Forest Plan 3-144)

Suitable timber lands are managed for the production of sawtimber and other wood products on an even-flow, long-term sustained yield basis. An extensive road system provides access for timber management activities, recreation uses, hunting and fishing, and other public and administrative uses. Management activities will generally dominate most seen areas. Tree stands are healthy and in a balanced mix of age classes from young stands to trees of harvestable age, often in 40- to 100-acre stands. A variety of wildlife habitats, predominately in the early and middle successional stages, are present.

4 Recommendations

4.1 Human Uses

4.1.1 Road Access Management

Road Access Management Desired Condition

Consistent with public desires, a substantial road network on Zarembo Island should remain open and available for recreation and future timber access. We have identified and implemented opportunities to close or shorten several roads to reduce road density in some watersheds or improve the habitat value for wildlife, without negatively affecting recreation. Some roads have closed "naturally" as alder has taken over. The majority of these roads will likely remain closed and will be inventoried to determine erosion control needs. We also will examine road closures for new proposed roads rather than closure of existing roads. The current road system and potential roads are shown on the LSTA Map 3-10 (page 3-61). A Zarembo Island Roads Analysis Plan (RAP) is scheduled for completion in 2005. The RAP will review the scope and current condition of the Zarembo Island road system including the framework of other land ownership. The Zarembo Island RAP is not a decision document.

Roads constructed as temporary roads, will be "closed" by blocking access, removing culverts, and restoring natural drainage across the road (water bars). These roads will revegetate over time (usually with alder) and may still serve as foot or bicycle trails.

Most of the roads that remain open for public travel, but are not considered "mainline" roads, will be maintained for high clearance vehicles or Objective Maintenance Level 2. Some of these roads may be gated to prevent motorized access and enhance wildlife habitat values. Gates would allow access to maintain culverts. In general, such road closures will require further environmental review and public comment under the National Environmental Policy Act (NEPA). This could be completed in one environmental analysis or as part of other nearby project planning. Level 2 roads will be shown as such on Zarembo Island road maps to alert the public to the need for high clearance. Gated roads will not be shown as such until the NEPA process is complete and a final decision is made.

Recommendations for Future Management Opportunities

- An Access Travel Management Plan (ATMP) is planned for 2006 for most of Wrangell Ranger District. The ATMP will describe maintenance levels, decommissioning, construction, etc. for roads on Zarembo Island.
- All mainline roads are maintained for passenger vehicles or Objective Maintenance Level 3 (Level 3). We propose Level 3 for the roads listed in Table 4-1, because they access future timber harvest areas or lead to existing or proposed recreation sites.

TABLE 4-1. Level 3 Proposed Roads

Road	Notes
6590	Mainline loop road along the North Zarembo shoreline and through the St. John/Meter Bight valleys.
6593	Accesses the north side of the Meter Bight valley
6594	Accesses the Mustang Lake and Nesbitt Creek areas
6588	High elevation route above St. John valley
6585	Accesses Snow Pass area
6592	Zarembo Lake Road on the north side of St. John valley

4.1.2 Recreation and Subsistence

Recreation Desired Condition

The desired condition for future recreation on Zarembo Island includes providing a variety of opportunities for recreational and subsistence access such as hiking, off-highway vehicles (OHV), and motor vehicles. Roads will be managed for recreational access consistent with timber, silviculture, and wildlife needs. Improve camping and toilet facilities, including tent platforms and cabins, located near the access portals of St. John and Roosevelt Harbor. Anchorages are protected and adequate docking facilities are provided for safe and secure boat access to the island.

Subsistence Desired Condition

Wildlife habitat and harvest levels will be managed to insure adequate populations capable of withstanding a consistent and sustained level of subsistence and sport hunting for deer, moose, and elk.

Recommendations for Future Management Opportunities

In 1992, the Wrangell District began a process to set goals for the recreation program for five year increments. That process involved extensive public input and was completed for 1992 through 1997, and 1997 through 2001. No recreation goals were identified for Zarembo Island during the first five-year period. The 1997-2001 public input, which occurred as interest in deer hunting on Zarembo Island was increasing, identified the following three topics as important for future management:

- Leave logging roads open for public use.
- Consider using roads as trails for hiking or mountain biking.
- Convert landing and sort areas into recreation parking and camping areas.

4 Recommendations

Since the update of the recreation goals the Forest Service has received informal inquiries about the following:

- Permitting the use of roads for mountain biking and permitted camping by an outfitter/guide.
- Request a special-use permit for a tent platform.
- Storing vehicles on National Forest System lands on Zarembo Island during periods of non-use.
- Expansion of recreational-use facilities available especially cabins.

The Wrangell District long-term facilities master planning identified the following future need:

- Construct simple public restroom facilities near the boat docks at Roosevelt Harbor and St. John Harbor. This need was identified to provide for public health and safety.

We developed several ideas to create low-cost recreation opportunities on Zarembo Island. These ideas take advantage of existing infrastructure and may require further study. If no further analysis or study is required, the project may be implemented, but subject to available funds and personnel.

- Publish a Zarembo Island Road Guide.
- Designate some decommissioned roads as ATV/OHV trails and other decommissioned or closed roads as hiking trails for non-motorized use.
- Designate areas suitable for tent platform sites and issue tent platform permits.
- Designate parking or "storage" areas for vehicles at the former camp sites or log storage areas, and issue vehicle parking/storage permits.
- Designate areas suitable for commercial recreational development sites.
- Consider providing additional moorage areas to meet recreational users demand for safe anchorages.
- A cabin accessible from the road system or by boat could be placed near one of the major portals to the island.
- Use of commercial outfitter/guide services could provide for hunting, wildlife viewing tours, etc.

4.1.3. Commodities

Commodities Desired Condition

We will encourage mineral exploration on Zarembo Island consistent with the Forest Plan land use designations. Responsible mineral development could provide economic opportunities for the communities of Wrangell and Petersburg without degrading the ecological processes on Zarembo Island.

Recommendation for Future Management Opportunities

- The geology information for Zarembo Island will be updated in the near future.

4.2 Hydrology

Hydrology Desired Condition

The desired condition for hydrology is to establish and maintain healthy watersheds across the Zarembo Island landscape. Riparian habitat that has been harvested or altered may be restored through planting and/or thinning of trees to promote old-growth type forest characteristics along stream banks. Tree growth will be enhanced to promote development of large wood. Large woody debris may be introduced through mechanical means in areas where it is absent. Beaver activity may be encouraged through planting of alder in areas that will not interfere with stream crossings.

Recommendations for Future Management Opportunities

Correct water quantity and quality problems identified in future analysis. The following list is a general list of concerns for the island:

1. All fish stream crossings will be evaluated and corrections made. Corrective efforts will focus simultaneously on correcting the most important stream crossings and fixing the "easiest" crossings to correct. Any new stream crossings will be installed to meet fish passage requirements.
2. Clearcut harvest units less than 30 years old will not exceed 20 percent of the land base within any watershed. Generally, stands that are 30 years old or more are considered to have recovered from a watershed function standpoint.
3. Watersheds should not have an open road density that exceeds 1 mi/mi^2. Areas with higher road densities will be evaluated for potential to decommission or close roads and restore natural drainage patterns. Exposed soil areas such as cutbanks, fill slopes, and landslides (natural or man-made) will be revegetated to reduce sediment transport potential.
4. Anadromous fish streams will be enhanced where possible, including removal of natural and man-made barriers.
5. A future field visit will be made to verify Zarembo Lake fish populations and gather firm data for which way Zarembo Lake drains.

Recommendations by VCU

Baht (456)

Because road densities exceed 2 miles/square mile in two watersheds and is higher overall in Baht watersheds than any of the other VCUs, particular attention should continue to occur in this VCU. The following list of known projects is indicative to the type of project of concern (some of these have been completed already, others have not):

- 6590 Spur at milepost 6.401 is 3.5 miles long with numerous road erosion features and problematic culverts.
- 6599 Road is 4.5 miles long with numerous road erosion features and problematic culverts. This road is inaccessible by high clearance vehicles. Store road by removing drainage structures and/or design rehabilitation efforts for OHV use.
- Address fish passage concerns with the remaining 10 "red pipes" along the 6590 Road.

St. John (457)

Analysis of the road condition survey (RCS) data has revealed several opportunities to address maintenance, fish passage, erosion control, and storage opportunities that will help dissipate road/watershed health issues in this VCU. Known opportunities are listed below, some of these are already completed but all indicate the type of future projects (future analysis will find new concerns):

- Six culverts on Road 52031 (all fish streams) were evaluated for fish passage and determined to be probable barriers, potentially blocking access to about 0.5 mile of total habitat.
- 6585 Spur at mile post 0.620 is 2.4 miles long and has numerous sites of surface erosion and failing culverts.
- 6590 Spur at mile post 39.904 has numerous road erosion and washout problems.
- 52012 Road past milepost 0.576 has been closed but not to Forest standards. Several culverts remain in place including two "red pipes" and many erosion features have been identified.
- Ten other "red pipes" remain in this VCU and should be considered for replacement or retrofit.
- The main stem, St. John Creek crossing and approach, also needs assessment to resolve concerns for channel stability and flood passage.
- Evaluate documented problematic culverts, water on road, cut-slope, and surface erosion on the 6592 Road and its associated unclassified spurs.

Snow Pass (458)

Analysis of the RCS data has revealed two opportunities to address fish passage and storage opportunities that will help dissipate road/watershed health issues in this VCU. Known opportunities are listed below, some of these are already completed but all indicate the type of future projects (future analysis will find new concerns):

- 6585 Spur at milepost 7.447 is 0.60 miles long and has two failing culverts and several identified erosional features.
- Six remaining "red pipes" located at the headwaters of Nesbitt Creek and along the 6585 Road need replacement or retrofit to meet the Forest standard for fish passage.
- Evaluate documented problematic culverts, water on road, cut-slope, and surface erosion on the 6585 Road particularly from milepost 9.6 to 11 for replacement and erosion control treatments.
- Conduct follow-up monitoring on McNamara Creek to complete the project that collected precipitation, stream flow, and water quality data from 1977 to 1979.

Meter Bight (459)

Projects with the potential to improve general watershed condition should be considered for implementation. Known opportunities are listed below, some of these are already completed but all indicate the type of future projects (future analysis will find new concerns):

- Storage of the 52002 Road to re-establish natural drainage and fish passage of one "red pipe."
- Storage of the 52007 Road to re-establish natural drainage and treat 17 erosion sites at mileposts 0.545 through 1.415.
- Restore fish passage to 11 remaining "red pipes" along the 6590, 6593, and 6594 Roads in this VCU to the Forest standard.
- Evaluate documented water on road cut-slope, and surface erosion on an un-classified road at milepost 3.124 of the 6593 Road and the 52004 Road for possible erosion control treatments.

4.3 Vegetation Management and Timber Resources

Vegetation Management and Timber Resources Desired Condition

The desired condition for vegetation management and timber resources on Zarembo Island is for all even-aged and two-aged stands to be precommercially thinned at appropriate times to encourage improved tree growth and prolong understory vegetation. Design each stand according to thinning prescriptions for the LUD or standard and guide. Reducing tree density will benefit wildlife and timber resources.

Recommendations for Future Management Opportunities

- Strive to spread timber harvest spatially and temporally across the landscape as equally as possible over the 100- to 150-year rotation. This will give wildlife a balanced landscape on Zarembo and balance the volume for timber over the rotation.
- Use the Scenic Viewshed LUD to grow higher quality timber on longer rotations. Since there will be higher retention in the Scenic Viewshed LUD, the timber will grow slower and annual rings will be tighter. Prescribe pruning for all harvest units with retention greater than 40 percent. Avoid large clearcuts on north aspects over 1,000 feet in elevation, since regeneration does not respond well in these areas.
- In LUDs that allow timber harvest, use timber management strategies that promote healthy and vigorously growing forests that are commercially valuable and diverse in habitats. Managed stands should have a diverse tree species mix that is suited to the site. Maintain stocking levels that promote timber growth and form, while improving wildlife habitat. Consider supplemental site prep and planting to promote species diversity and future timber value.
- Schedule timber harvest to achieve a long-term sustained yield. On an island basis, approximately 2,430 acres should be harvested each decade to achieve even-flow sustained yield. Use even-aged systems in Timber Production LUDs to best achieve the Desired Future Condition and objectives in the Forest Plan. Use even-aged systems in Modified Landscape and Scenic Viewshed LUDs when the risk of windthrow is high and when dwarf mistletoe and disease are a concern. Maintain an extensive road system to allow for forest management activities beyond regeneration harvest.
- Consider windthrow and forest health in all harvest prescriptions and unit layout. Promptly salvage windthrow when feasible. Use caution with two-aged and uneven-aged systems in regard to windthrow risk and forest health. These systems should be used only to address concerns that override timber management objectives. Use of these systems will reduce yields and projections used in calculation of the Forest Plan Allowable Sale Quantity (ASQ) and as such, ASQ reduction should be anticipated with extensive use of such systems. When resource objectives conflict with sound silviculture, display trade-offs to the decision-maker for an informed decision.

4 Recommendations

- Improve species composition in regenerating stands through supplemental site preparation and planting when necessary. Especially look for opportunities in improving Alaska yellow-cedar and western redcedar representation in managed stand for biodiversity and greater future timber value.
- Use conventional cable logging systems when possible. Limited soil disturbance and scarification is beneficial for reducing initial competition and creating germination sites for Sitka spruce and cedars. Destruction of advanced regeneration (mostly suppressed hemlock) is desirable and will aid in establishment of desirable species mixes. Do not allow protection of un-merchantable trees in timber sale contracts unless silviculturally desirable or unless overriding resource objectives dictate. Improve forest management objectives, forest health, and timber yields through use of even-aged systems when possible.
- Avoid retention of trees infected with dwarf mistletoe. Girdle retained trees that have dwarf mistletoe.
- Avoid use of uneven-aged or two-aged systems in high wind hazard locations. When retention is required to meet non-timber management objectives, develop marking guidelines that favor retention of wind-firm trees. Generally, cedars are more wind-firm than spruce, while hemlock is least windfirm. Low height to diameter ratio trees are generally more wind-firm. Low retention levels (10-50 percent) and scattered distribution of leave trees are most susceptible to windthrow. Use aggregated retention or higher levels of scattered retention strategies in windthrow prone stands.
- Use the guidelines developed by Harris (1989) for scheduling harvest in high-wind hazard areas. Generally, cut into the wind and promptly salvage windthrow.
- Control tree stocking and species composition while improving wildlife habitat through PCT. Use Trees Per Acre (TPA) system for improved tree selection opportunities.
- Look for opportunities for commercial thinning of stands of sufficient size to offer a commercial product. Uphill yarding is essential for successful commercial thinning, so consider road location in regeneration harvests.
- Explore commercial alder harvest opportunities.
- Monitor elk grazing to understand the impact on vegetative conditions cause by the introduction of elk to Zarembo Island.

4.4 Wildlife Habitat

Wildlife Habitat Desired Condition

Maximizing late-successional stages to the extent consistent with the different land use designations on Zarembo Island will retain valuable wildlife habitat features. Wildlife dependant on old-growth structural features will benefit from reductions in the use of clearcutting and increased uneven-aged management of forest. Young second-growth stands within Old-Growth Reserves (OGR) and beach fringe should be treated so as to accelerate attainment of old-growth structural features and to maintain the shrub and forb understory. Pre-commercial thinning is also compatible with Timber LUD objectives and will still have similar benefits to wildlife, although specific prescriptions may differ.

Wildlife will benefit from a reduction in open road density through reduced hunting pressure and eventual reduction of fragmentation when unused roads become revegetated. The Forest Plan mentions road access management as a strategy for achieving general wildlife objectives, with specific mention of moose and wolves. Road densities at or below 0.7 – 1.0 mile/mi^2 are to be implemented where road access has been determined to significantly contribute to wolf mortality. According to Forest Plan guidance, road management objectives in the OGR and Scenic Viewshed portions of the individual VCUs may include temporary or permanent road closures and may be specific to individual road classification types. Road closures may be carried out when identified as a priority during project interdisciplinary review.

TABLE 4-2. Open Road Density on Zarembo Island by VCUs.

VCU	Baht	St. John	Snow Pass	Meter Bight
Open Road Density (mi/mi^2)	0.95	0.87	0.34	0.42

Recommendations for Future Management Opportunities

- Research and monitoring of deer habitat and populations, elk and moose interactions, road effects and access needs will help address information needs and direct future activities.

- Road closures will benefit wildlife by reducing human-caused mortality associated with road access. Encouraging vegetation to reclaim road surfaces will reduce the fragmentation of corridors caused by roads.

- Second-growth thinning that increases the amount of shrub and herb forage for deer and other wildlife and accelerates development of overhead canopy will be beneficial.

- Managing to retain alder in second growth stands will benefit wildlife by increasing the vegetative productivity of the sites.

Connectivity

- There is a need to enhance connectivity between the north and south ends of the island. Certainly, some of that deficiency is natural, but it has been accelerated by human-caused change.

- Pre-commercial, and potentially commercial, thinning of existing harvest units in the beach fringe and other potential corridors, along with other silvicultural treatments designed to speed habitat conditions along toward old-growth structural conditions, should be carried out.

- Closing and treating roads that pass through corridors or OGRs would also enhance connectivity. Planting of closed roads and other fragmented areas would potentially increase ease of movement of forest dwelling species.

Riparian Habitat

- Efforts to enhance fisheries or riparian health and width of riparian vegetation would benefit the variety of species that depend upon salmon or associated habitat. Salmon are a keystone species that are used extensively by a wide variety of wildlife on a seasonal basis. The growth of the bear population on the island may ultimately be limited by the abundance and availability of the island's anadromous fish populations.

- Encouraging establishment of beaver colonies may enhance degraded watersheds. Beaver create additional riparian habitat, modify stream flows, provide additional fish habitat, and can be an important alternative food source for wolves. Planting willows and alder in riparian areas may increase beaver colonization because of their importance as a food source. This would also provide an important winter food source for moose.

OGRs

- The Forest Plan gives size criteria for medium and small OGRs. Modification of OGRs will meet the Forest Plan Standards. Other factors to be considered in reserve design and placement include inclusion of important deer winter range, known or suspected goshawk and marbled murrelet nesting habitat, rare features such as underrepresented forest plant associations, and the largest remaining blocks of contiguous old-growth within a watershed. Furthermore, the amount of early seral habitat (i.e., young second-growth) and roads in OGRs are to be minimized to the extent feasible.

Medium Old-Growth Reserves

The Forest Plan requires that the all medium OGRs contain a minimum of 10,000 total acres, 5,000 acres of productive old-growth, and 2,500 acres of high-volume strata old-growth forest.

- The Snow Pass medium OGR currently meets standards for total size, productive old-growth, and high-volume strata forest.

- The Round Point medium OGR currently meets standards for total size, productive old-growth, and high-volume strata.

TABLE 4-3. Medium Old Growth Reserves and Forest Plan Criteria.

VCU	Current Size (Acres)	Required Size (Acres)	Current POG Acres	Required POG Acres	Possible Refinement
Snow Pass 458	14,376	5,170	7,281	2,585	Meets criteria.
Meter Bight 459	15,127	6,802	8,003	3,401	Meets criteria.

Small Old-Growth Reserves

Small reserves are to consist of a contiguous landscape of at least 16 percent of the total area of each value comparison unit (VCU) and 50 percent of that area must be productive old-growth forest (POG).

- Based on the size of the Baht VCU, Forest Plan requires that the Craig Point small OGR contain a minimum of 2,701 total acres and 1,350 acres of productive old-growth. The Craig Point small OGR currently meets standards for productive old-growth, but requires an additional 268 acres to meet requirements for total size. The recommended change can only be done in a decision document.

- Based on the size of the St. John VCU, the Forest Plan requires that the McNamara small OGR contain a minimum of 4,148 total acres and 2,074 acres of productive old-growth. The McNamara small OGR currently meets standards for size.

TABLE 4-4. Small Old Growth Reserves and Forest Plan Criteria.

VCU	Current Size (Acres)	Required Size (Acres)	Current POG Acres	Required POG Acres	Possible Refinement
Baht 456	2,434	2,720	2,044	1,360	Add 268 acres to meet required size.
St. John 457	5,010	4,155	2,785	2,077	Meets criteria.

4.5 Heritage

Heritage Recommendations

- Possibilities for future work on Zarembo Island include additional surveys of its shoreline for any habitation sites or prehistoric campsites, both of which are missing from the island's archaeological record. With modern technology and subsurface testing using soil augers, it may be possible to find such sites where previous and more limited reconnaissance surveys did not.
- Other future heritage work could include a Passport in Time volunteer project recording and mapping fish traps or a detailed rock art study documenting and photographing the images that have been carved or painted along Zarembo Island's coast.

Appendix A

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Glossary

Access

The opportunity to approach, enter, and make use of public lands.

Alaska National Interest Lands Conservation Act (ANILCA)

Passed by Congress in 1980, this legislation designated 14 National Forest wilderness areas in Southeast Alaska. The Alaska National Interest Lands Conservation Act of December 2, 1980. Public Law 96-487, 96th Congress, 94 Stat. 2371-2551. In Section 810 requires evaluations of subsistence impacts before changing the use of these lands.

Alaska Native Claims Settlement Act (ANCSA)

Public Law 92-203, 92nd Congress, 85 Stat. 2371-2551. Approved December 18, 1971, ANCSA provides for the settlement of certain land claims of Alaska natives and for other purposes.

Allowable Sale Quantity (ASQ)

ASQ refers to the maximum quantity of timber that may be sold each decade from the Tongass National Forest. This quantity, expressed as a board foot measure, is calculated per timber utilization standards specified in the Alaska Regional Guide, the number and type of acres available for timber management, and the intensity of timber management. The ASQ was calculated at 4.5 billion board feet per decade for the Tongass National Forest.

Alluvial Fan

A cone-shaped deposit of organic and mineral material made by a stream where it runs out onto a level plain or meets a slower stream.

Alluvium

Material deposited by rivers or streams, including the sediment laid down in river beds, floodplains and at the foot of mountain slopes and estuaries.

Alpine

Parts of mountains above tree growth and/or the organisms living there.

Alternative

One of several policies, plans, or projects proposed for decision making.

Anadromous Fish

Anadromous fish (such as salmon, steelhead, and sea run cutthroat trout) spend part of their lives in freshwater and part of their lives in saltwater.

Aquatic Habitat Management Unit (AHMU)

A mapping unit that displays an identified value for aquatic resources. It is a mechanism for carrying out aquatic resource management policy.

Class I: Streams and lakes with anadromous or adfluvial fish habitat; or high quality resident fish waters listed in Appendix 68.1, Region 10 Aquatic Habitat Management Handbook (FSH 2609.24), June 1986; or habitat above fish migration barriers known to be reasonable enhancement opportunities for

anadromous fish.

Class II: Streams and lakes with resident fish populations and generally steep (6-15 percent) gradient (can also include streams from 0-5 percent gradient) where no anadromous fish occur, and otherwise not meeting Class I criteria. These populations have limited fisheries values and generally occur upstream of migration barriers or have other habitat features that preclude anadromous fish use.

Class III: Perennial and intermittent streams with no fish populations, but which have sufficient flow or transport sufficient sediment and debris to have an immediate influence on downstream water quality or fish habitat capability. These streams generally have bankfull widths greater than 5 feet and are highly incised into the surrounding hillslope.

Class IV: Intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality or fish habitat capability. These streams generally are shallowly incised into the surrounding hillslope.

Background

The distant part of a landscape. The seen or viewed area located from three or five miles to infinity from the viewer. (See "Foreground" and "Middleground".)

Beach Fringe

Habitat that occurs from the intertidal zone inland 1,000 feet, and islands less than 50 acres.

Bedload

Sand, silt, and gravel, or soil and rock debris rolled along the bottom of a stream by the moving water.

Best Management Practice (BMP)

Land management methods, measures, or practices intended to minimize or reduce water pollution. Usually BMPs are applied as a system of practices rather than a single practice. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

Biological Diversity (Biodiversity)

The variety of life in all its forms and at all levels. This includes the various kinds and combinations of: genes; species of plants, animals, and microorganisms; populations; communities; and ecosystems. It also includes the physical and ecological processes that allow all levels to interact and survive. The most familiar level of biological diversity is the species level, which is the number and abundance of plants, animals, and microorganisms.

Blowdown

See windthrow.

Board Foot (BF)

A unit of wood 12" X 12" X 1". One acre of commercial timber in Southeast Alaska on the average yields 28,000-34,000 board feet per acre (ranging from

8,000-90,000 board feet per acre). One million board feet (MMBF) would be the volume of wood covering one acre two feet thick. One million board feet yields approximately enough timber to build 120 houses or 75,555 pounds of dissolving pulp.

Brush Disposal

Cleanup and disposal of slash and other hazardous fuels within the forest or project areas.

Buffer

An area around a resource where timber harvest is restricted or prohibited. For example, the Tongass Timber Reform Act (TTRA) requires that timber harvest be prohibited in an area no less than 100 feet on each side of all Class I streams and Class II streams which flow directly into Class I streams. This 100-foot area is known as a "stream buffer".

Capability

An evaluation of a resource's inherent potential for use.

Clearcut

The harvesting in one cut of all trees on an area. The area harvested may be a patch, strip, or stand large enough to be mapped or recorded as a separate class in planning for sustained yield. Clearcut size on the Tongass National Forest is limited to 100 acres, except for specific conditions noted in the Alaska Regional Guide.

Code of Federal Regulations (CFR)

A codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.

Commercial Forest Land (CFL)

Productive Forest and that is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and generally capable of producing in excess of 20 cubic feet per acre of annual growth or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

Connectivity

A measure of the extent that forest areas between or outside reserves provide habitat for breeding, feeding, dispersal, and movement.

Corridor

Connective links of certain types of vegetation between patches of suitable habitat which are necessary for certain species to facilitate movement of individuals between patches of suitable habitat. Also refers to transportation or utility rights-of-way.

Cover

Refers to trees, shrubs, or other landscape features that allow an animal to partly or fully conceal itself.

Critical Habitat

Specific terrain within the geographical area occupied by threatened or endangered species. Physical and biological features that are essential to conservation of the species and which may require special management considerations or protection are found in these areas.

Cultural Resources

See Heritage Resources.

Cumulative Effects

The impacts on the environment resulting from additional incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

Deer Winter Range

A combination of environmental elements that support Sitka black-tailed deer under moderately severe or severe winter conditions. Usually associated with high volume old-growth stands at low elevations and south aspects.

Developed Recreation

Recreation that requires facilities that, in turn, result in concentrated use of an area. Facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, and buildings.

Direct Employment

Jobs that are immediately associated with a timber sale, including, for example, logging, sawmills, and pulpmills.

Dispersal

The movement, usually one way, of plants and animals from their point of origin to another location where they subsequently produce offspring.

Distance Zone

Areas of landscapes denoted by specified distances from the observer (foreground, middleground, or background). Used as a frame of reference in which to discuss landscape characteristics of management activities.

Diversity

The distribution and abundance of different plant and animal communities and species within the area controlled by the Forest Plan.

Eagle Nest Tree Buffer Zone

A 330-foot radius around eagle nest trees established in an Agreement between the U.S. Fish and Wildlife Service and the Forest Service.

Ecological Province

Twenty-one ecological subdivisions of Southeast Alaska that are identified by generally distinct ecological, physiographic, 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.

Ecosystem

A community of organisms and its physical setting. An ecosystem, whether a fallen log or an entire watershed, includes resident organisms, non-living components such as soil nutrients, inputs such as rainfall, and outputs such as organisms that disperse to other ecosystems.

Effects

Effects, impacts, and consequences as used in this environmental impact statement are synonymous. Effects may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historical, cultural, economic, or social, and may be direct, indirect, or cumulative.

Direct Effects: Results of an action occurring when and where the action takes place.

Indirect Effects: Results of an action occurring at a location other than where the action takes place and/or later in time, but in the reasonably foreseeable future.

Cumulative Effects: See Cumulative Effects.

Endangered Species

Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act. See also, threatened species, sensitive species.

Endemic

Restricted to a particular locality. For example, a particular species or subspecies may occur on only one or a very few islands.

Environmental Assessment (EA)

A statement of environmental effects for a major Federal action which is released to the public and other agencies for comment and review prior to a final management decision. Required by Section 102 of the National Environmental Policy Act (NEPA).

Estuary

For the purpose of this EA process, estuary refers to the relatively flat, intertidal, and upland areas generally found at the heads of bays and mouths of streams. They are predominately mud and grass flats and are not forested except for scattered spruce or cottonwood.

Even-Aged Stand Management

The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. The difference in age between trees in forming the main canopy level of a stand usually does not exceed 20 percent of that age of the stand at harvest rotation age. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

A Appendix

Executive Order

An order or regulation issued by the President or some administrative authority under his or her direction.

Fen

A tract of low, wet ground containing sedge peat, relatively rich in mineral salts, alkaline in reaction, and characterized by slowly flowing water. Unlike peatlands (commonly referred to as bogs or muskegs), fens contribute to stable stream flows, provide nutrient input to streams and often contribute to fish rearing habitat.

Floodplain

That portion of a river valley, adjacent to the river channel, which is covered with water when the river overflows its banks at flood stages.

Foreground

The stand of trees immediately adjacent to a scenic area, recreation facility, or forest highway; area located less than 1/4 mile from the viewer. See also, Background and Middleground.

Forest and Rangeland Renewable Resources Planning Act of 1976 (RPA)

Amended in 1976 by the National Forest Management Act. See RPA Assessment and Program.

Forest or Forest Land

National Forest lands currently supporting or capable of supporting forests at a density of 10 percent crown closure or better. Includes all areas with forest cover, including old growth and second growth, and both commercial and non-commercial forest land.

Forested Habitat

All areas with forest cover. Used in this EA to represent a general habitat zone.

Forested Wetland

A wetland whose vegetation is characterized by an overstory of trees that are 20 feet or taller.

Forest Plan

The Tongass Land Management Revision, signed in 1997. This is the 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning, the daily uses, and the activities carried out within the forest.

Fragmentation

An element of biological diversity that describes the natural condition of habitats in terms of the size of discrete habitat blocks or patches, their distribution, the extent to which they are interconnected, and the effects of management on these natural conditions. Also the process of reducing the size and connectivity of stands within a forest.

FSH

Forest Service Handbook.

FSM

Forest Service Manual.

Geographic Information System (GIS)

An information processing technology to input, store, manipulate, analyze, and display spatial and attribute data to support the decision-making process. It is a system of computer maps with corresponding site specific information that can be electronically combined to provide reports and maps.

Guideline

A preferred or advisable course of action or level of attainment designed to promote achievement of goals and objectives.

Habitat

The sum total of environmental conditions of a specific place occupied by an organism, population, or community of plants and animals.

Habitat Capability

The estimated number of healthy animals that a habitat can sustain. Often shown as a relative percentage of optimum habitat conditions.

Habitat Suitability Index

This is a value assigned to a unit of land using a computerized model that relates vegetative and geographic characteristic (e.g. stand volume, proximity to a stream or cliff, slope, aspect, etc.) to the land unit's value for a particular wildlife species. Values generally range from 0 to 1, with 1 being the best. The Habitat Capability Models used to generate HSIs were developed by interagency teams of biologists using the best available information including research results and best professional judgement.

Heritage Resources

Also known as Cultural Resources. Historic or prehistoric objects, sites, buildings, structures, and their remains, resulting from past human activities.

Important Subsistence Use Area

Important Subsistence Use Areas include the "most -reliable" and "most often hunted" categories from the TRUCS survey and from subsistence survey data from ADFG, the University of Alaska, and the Forest Service, Region 10. Important use areas include both intensive and extensive use areas for subsistence harvest of deer, furbearers, and salmon.

Indirect Employment

The jobs in service industries that are associated with a timber sale including, for example, suppliers of logging and milling equipment.

Interdisciplinary Team (IDT)

Two or more natural resource planners who use relevant information to develop alternative design and comparison for a proposed project. The team insures that integrated use of environmental, social, and economic information is clearly presented so the best decision can be made.

A Appendix

Intermediate Stand Treatments

A stand management treatment which manipulates stand growth, composition, structure, or tree quality. Intermediate treatments include thinning, pruning, clearing, weeding, liberation, release, improvement, salvage, and sanitation cutting to achieve different management objectives. These stand treatments do not attempt to obtain new tree regeneration, and they occur before the final regeneration harvest. Some treatments such as salvage cutting or commercial thinning result in the harvest of forest products.

Irretrievable Commitments

Losses of production or use of renewable natural resources for a period of time. For example, timber production from an area is irretrievably lost during the time an area is allocated to a no-harvest prescription; if the allocation is changed to allow timber harvest, timber production can be resumed. The production lost is irretrievable, but is not irreversible.

Irreversible Commitments

Decisions causing changes which cannot be reversed. For example, if a roadless area is allocated to allow timber harvest and timber is actually harvested, that area cannot, at a later date, be allocated to wilderness. Once harvested, the ability of that area to meet wilderness criteria has been irreversibly lost. Often applies to nonrenewable resources such as minerals and cultural resources.

Issue

A point, matter, or section of public discussion or interest to be addressed or decided.

Landslides

The moderately rapid to rapid down slope movement of soil and rock materials that may or may not be water-saturated.

Log Transfer Facility (LTF)

A facility that is used for transferring commercially harvested logs to and from a vessel or log raft, or the formation of a log raft. It is wholly or partially constructed in waters of the United States and location and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed "terminal transfer facility" or "log dump".

Logging Systems

Cable: Ground based yarding of logs using a steel cable to pull logs to a landing.

Helicopter: Flight path cannot exceed 40 percent downhill or 30 percent uphill; landings must be selected so there is adequate room for the operation and so that the helicopter can make an upwind approach to the drop zone.

MBF

A thousand board feet net sawlog and utility volume.

MMBF

A million board feet net sawlog and utility volume.

Management Indicator Species (MIS)

Species selected in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish.

Management Prescriptions

Method of classifying land uses presented in the Forest Plan. Replaces the Land Use Designations (LUDs) originally presented in TLMP.

Mass Movement

The downslope movement of a block or mass of soil. This usually occurs under conditions of high-soil moisture and does not include individual soil particles displaced as surface erosion.

Memorandum of Understanding (MOU)

A legal agreement between the Forest Service and others agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project. A memorandum of understanding is not a fund obligating document.

Middleground

The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly for the landscape; area located from 1/4 to 5 miles from the viewer. See also, Foreground and Background.

Mineral Soils

Soils consisting predominately of, and having its properties determined by, mineral material.

Minimum Viable Population

A population with the estimated numbers and distribution of reproductive individuals to maintain the population over time.

Mitigation

Measures designed to counteract environmental impacts or to make impacts less severe. These may include: avoiding an impact by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources.

Mixed Conifer

In Southeast Alaska, mixed conifer stands usually consist of western hemlock, mountain hemlock, Alaska yellowcedar, Western redcedar, and Sitka spruce species. Shorepine may occasionally be present.

Model

A representation of reality used to describe, analyze, or understand a particular concept. A model may be a relatively simple qualitative description of a system or organization, or a highly abstract set of mathematical equations. A model has

limits to its effectiveness, and is used as one of several tools to analyze a problem.

Monitoring

A process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized. Monitoring can occur at different levels: to confirm whether mitigation measures were carried out in the manner called for, to determine whether the mitigation measures were effective, or to validate whether overall goals and objectives were appropriate. Different levels call for different methods of monitoring.

Multiple-aged Stands

An intermediate form of stand structure between even and uneven-aged stands. These stands generally have two or three distinct tree canopy levels occurring within a single stand.

Multiple Entry

More than one stand or land treatment activity during a rotation of a stand or area.

Multiple Use

The management of all the various renewable resources of the National Forest System to be used in the combination that will best met the needs of the American people.

Muskeg

In Southeast Alaska a type of bog that has developed over thousands of years in depressions or flat areas on gentle to steep slopes. Also called peatlands.

National Environmental Policy Act (NEPA) of 1969

An Act to declare a national policy which will encourage productive and enjoyable harmony between humankind and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality (The Principal Laws Relating to Forest Service Activities, agric. Handb. 453. USDA Forest Service, 359 p.).

National Forest Management Act (NFMA)

A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act requiring the preparation of Regional Guides and Forest Plans and the preparation of regulations to guide that development.

National Wild and Scenic River System

Rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act of 1968 and amended in 1986, for preservation of their free-flowing condition. May be classified and administered under one or more of the following categories: Wild, Scenic, and/or Recreational.

Net Sawlog Volume

Tree or log volume suitable in size and quality to be processed into lumber. In Southeast Alaska, depending on the market, the volume may be processed as pulp or lumber.

No action Alternative

The most likely condition expected to exist in the future if current management direction were to continue unchanged.

Non-Commercial Forest Land

Land with more than 10 percent cover of commercial tree species but not qualifying as Commercial Forest land. These are typically very steep.

Non-Forest Land

Land that has never supported forests and lands formerly forested but now developed for such nonforest uses as crops, improved pasture, etc.

Objectives

The precise steps to be taken and the resources to be used in achieving goals.

Old Growth

Ecosystems distinguished by old trees and related structural attributes. Old-growth forests are characterized by larger tree size, higher accumulations of large dead woody material, multiple canopy layers, different species composition, and different ecosystem function. The structure and function of an old-growth ecosystem will be influenced by its stand size and landscape position and context.

Old-Growth Habitat

Wildlife habitat managed to maintain old-growth forest characteristics through the planning period.

Organic Soils

Soils that contain a high percentage (generally greater than 20 to 30 percent) of organic matter throughout the soil depth.

Partial Cut

Method of harvesting trees where any number of live stems are left standing in any of various spatial patterns. Not clearcutting. Can include seed tree, shelterwood, or other methods.

Patch

A non-linear surface area differing in appearance from its surroundings.

Planning Record

A system that records decisions and activities that result from the process of developing a forest plan, revision, or significant amendment.

Process Group

A combination of similar stream channel types based on major differences in landform, gradient, and channel shapes.

Productive Old Growth (POG)

Old-growth forest capable of producing at least 20 cubic feet of wood fiber per

acre per year, or having greater than 8,000 board feet per acre.

Public Participation

Meetings, conferences, seminars, workshops, tours, written comments, responses to survey questionnaires, and similar activities designed and held to obtain comments from the public about Forest Service activities.

Reforestation

The natural or artificial restocking of an area with trees.

Regeneration

The process of establishing a new crop of trees on previously harvested land.

Reserve Trees

Live or dead trees that are retained for various resource objectives such as wildlife, structural diversity, etc.

Resident Fish

Fish that are not migratory and complete their entire life cycle in freshwater. Fish that are not anadromous and that reside in freshwater on a permanent basis. Resident fish include non-anadromous Dolly Varden char and cutthroat trout.

Resource values

The tangible and intangible worth of forest resources.

Responsible Official

The Forest Service employee who has the delegated authority to make a specific decision.

Revegetation

The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of reforestation or reseeding.

Riparian Area

Geographically definable area with distinctive resource values and characteristics that contain elements of aquatic and riparian ecosystems.

Riparian Ecosystem

Land next to water where plants that are dependent on a perpetual source of water occur.

Riparian Management Area (RMA)

Land areas delineated in the Forest Plan to provide for the management of riparian resources. Specific standards and guidelines, by stream process group, are associated with riparian management areas. Riparian management areas may be modified by watershed analysis.

Roads

Specified: Roads usually developed and operated for long-term land and resource management purposes to constant service.

Temporary: For National Forest timber sales, temporary roads are constructed to

harvest timber on a one-time basis. These logging roads are not considered part of the permanent Forest transportation network and have stream crossing structures removed, erosion measures put into place, and the road closed to vehicular traffic after harvest is completed.

Roadless Area

An area of undeveloped public land, identified in the roadless area inventory of the 1997 TLMP, within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.

Rotation

The planned number of years (approximately 100 years in Alaska) between the time that a Forest stand is regenerated and its next cutting at a specified stage of maturity.

Sawlog

That portion of a tree that is suitable in size and quality for the production of dimension lumber collectively known as sawtimber.

Scoping Process

Early and open activities used to determine the scope and significance of a proposed action, what level of analysis is required, what data is needed, and what level of public participation is appropriate. Scoping focuses on the issues surrounding the proposed action, and the range of actions, alternatives, and impacts to considered in an EA or an EIS.

Scrub-Shrub Wetland

Wetlands dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. In Southeast Alaska this includes forested lands where trees are stunted because of poor soil drainage.

Second Growth

Forest growth that has become established following some disturbance such as cutting, serious fire, windthrow, or insect attack; even-aged stands that will grow back on a site after removal of the previous timber stand.

Sediment

Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by streams or mass movement.

Sensitive Species

Plant and animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Species that are recognized by the regional forester as needing special management to prevent placement on Federal or state lists.

Seral

Early stage of succession.

Silviculture

The branch of forestry involving the theory and practice of manipulating the

establishment, composition, structure, and growth of forest vegetation. Silviculture involves the appropriate application of ecological, social, and economic principles of vegetative management to achieve resource management objectives and desired future forest conditions.

Silvicultural Prescription

A written technical document which provides detailed implementation direction about methods, techniques, timing, and monitoring or vegetative treatments. A prescription is prepared after a preferred treatment alternative has been selected, but before the project is implemented. A prescription is prepared by a silviculturist who uses interdisciplinary input to best achieve established objectives, direction, and requirements for land managed by the USDA Forest Service.

Site Productivity

Production capability of specific areas of land.

Slash

Debris left over after a logging operation; i.e. limbs, bark, broken pieces of logs.

Snag

A standing dead tree.

Soil Productivity

The capacity of a soil, in its normal environment, to produce a specific plant or sequence of plants under a specific system of management.

Soil Resource Inventory (SRI)

An inventory of the soil resource based on landform, vegetative characteristics, soil characteristics, and management potentials.

Split Yarding

The process of separating the direction of timber harvest yarding into opposite directions. Often a stream is used as a dividing line.

Stand (Tree Stand)

An aggregation of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the trees in adjoining areas.

Standard

A course of action or level of attainment required by the forest plan to promote achievement of goals and objectives.

State Historic Preservation Officer (SHPO)

State appointed official who administers Federal and State programs for cultural resources.

Stocking

The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard; that is, the basal area or number of trees required to fully use the growth potential of the land.

Structural Diversity

The diversity of forest structure, both vertically and horizontally, which provides for a variety of forest habitats such as logs and multi-layered forest canopy for plants and animals.

Stumpage

The value of timber as it stands uncut in terms of dollar value per thousand board feet.

Project Area

The area of the National Forest System controlled by a decision document.

Subsistence

The term "subsistence uses" means the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal, or family consumption as food, shelter, fuel, clothing , tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; and for customary trade.

Subsistence Use Area

Important Subsistence Use Areas include the "most reliable" and "most often hunted" categories from the Tongass Resource Use Cooperative Survey (TRUCS) and from subsistence survey data from ADFG, the University of Alaska, and the Forest Service, Region 10. Important use areas include both intensive and extensive use areas for subsistence harvest of deer, furbearers, and salmon.

Substrate

The type of material in the bed (bottom) of rivers and streams.

Succession

The ecological progression of community change over time, characterized by displacements of species leading towards a stable climax community.

Suitability

An evaluation based upon a resource's potential use within proposed management activities.

Suitable Forest land

Forest land for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions, and for which there is reasonable assurance that such lands can be adequately restocked, and for which there is management direction that indicated that timber production is an appropriate use of that area.

Sustained Yield

The amount of renewable resources that can be produced continuously at a given intensity of management.

Thinning

The practice of removing some of the trees in a stand so that the remaining trees

will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may also be done to change the characteristics of a stand or wildlife or other purposes. Thinning may be done at two different stages.

Threatened Species

Plant or animal species which is likely to become endangered throughout all or a significant portion of its range within the foreseeable future, as defined in the Endangered Species Act of 1973, and which has been designated in the Federal Register by the Secretary of the Interior as a threatened species. (See also, endangered species, sensitive species.)

Threshold

The point or level of activity beyond which an undesirable set of responses begins to take place within a given resource system.

Timber Classification

Forested land is classified under each of the land management alternatives according to how it relates to be management of the timber resource. The following are definitions of timber classifications used for this purpose.

Nonforest: Land that has never supported forests and land formerly forested where use for timber production is precluded by development or other uses.

Forest: Land at least 10-percent stocked (based on crown cover) by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use.

Suitable or suitable available: Land to be managed for timber production on a regulated basis.

Unsuitable: Forest land withdrawn from timber utilization by statute or administrative regulation (for example, wilderness), or identified as inappropriate for timber production in the Forest planning process.

Commercial forest: Forest land tentatively suitable for the production of continuous crops of timber and that has not been withdrawn.

Timber Harvest Unit

A "Timber Harvest Unit" is an area within which Forest Service specifies for harvest all or part of the timber.

Timber Stand Improvement (TSI)

All noncommercial intermediate cutting and other treatments to improve composition, condition, and volume growth of a timber stand.

Tongass Land Management Plan (TLMP)

See Forest Plan

Understory

The trees and shrubs in a forest growing under the canopy or overstory.

Unsuitable Forest Land

Forest land withdrawn from timber utilization by statute or administrative regulation; for example, Wilderness, or identified as not appropriate for timber production in the forest planning process.

Utility Logs

Those logs that do not meet sawlog grade but are suitable for production of firm useable pulp chips.

Value Comparison Unit (VCU)

Areas which generally encompass a drainage basin containing one or more large stream systems; boundaries usually follow easily recognizable watershed divides. Established to provide a common set of areas where resource inventories could be conducted and resource interpretations made.

Viable Population

The number of individuals of a species required to ensure the long-term existence of the species in natural, self-sustaining populations adequately distributed throughout their region.

Viewshed

An expansive landscape or panoramic vista seen from a road, marine water way, or specific viewpoint.

Visual Quality Objectives (VQO)

A desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape.

Preservation: Permits ecological changes only. Applies to wilderness areas and other special classified areas. Management activities are generally not allowed in this setting.

Retention: Provides for management activities that are not visually evident to the casual Forest visitor.

Partial Retention: Management activities remain visually subordinate to the natural landscape.

Modification: Management activities may visually dominate the characteristics landscape. However, activities must borrow from naturally established form-line color and texture so that the visual characteristics resemble natural occurrences within the surrounding area when viewed in the middleground distance.

Maximum Modification: Management activities may dominate the landscape but should appear as a natural occurrence when viewed as background.

V-Notches

A deeply incised valley along some waterways that would look like a "V" from a cross-section. These abrupt changes in terrain features are often used as harvest unit or yarding boundaries.

Volume

Stand volume based on standing net board feet per acre by Scribner Rule.

Volume Strata

Categories of timber volume derived from the timber type data layer (TIMTYP) and the common land unit data layer (CLU). Three volume strata (low, medium,

and high) are recognized in the Forest Plan.

Watershed

The area that contributes water to a drainage or stream. Portion of land from which all surface water drains to a common point. Watersheds can range from a few 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.

Wetland

Areas that are inundated by surface or groundwater frequently enough to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include: swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds.

Wildlife Analysis Area (WAA)

A division of land used by the Alaska Department of Fish and Game for wildlife analysis and harvest statistics.

Wildlife Habitat

The locality where a species may be found and where the essentials for its development and sustained existence are obtained.

Windfirm

Trees that have been exposed to the wind throughout their life and have developed a strong root system or trees that are protected from the wind by terrain features.

Windthrow

The act of trees being uprooted by the wind. In Southeast Alaska, Sitka spruce and hemlock trees are shallow rooted and susceptible to windthrow. There generally are three types of windthrow:

Endemic: where individual trees are blown over;

Catastrophic: where a major windstorm can destroy hundreds of acres; and

Management Related: where the clearing of trees in an area make the adjacent standing trees vulnerable to windthrow.

Winter Range

An area, usually at lower elevation, used by big game during the winter months; usually smaller and better defined than summer ranges.

Yarding

Moving timber from the stump to a collection point done with helicopter, cable or shovels.