United States
Department of
Agriculture

Forest Service

Tongass
National Forest
R10-MB-370b

August 1998

Port Houghton/ Cape Fanshaw Timber Sale Project

Revised Draft Environmental Impact Statement

Volume 1 - EIS

Prepared by

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Contract No. 53-01-9-2-0039
Port Houghton/Cape Fanshaw

United States Department of Agriculture | Forest Service | Alaska Region Tongass National Forest | Chatham and Stikine Areas

File Code: 1950

Date: August 1998

Dear Reviewer:

Enclosed for your review and comment are documents related to the Revised Draft Environmental Impact Statement (EIS) for the Port Houghton/Cape Fanshaw Timber Sale Project. If you received a complete copy of the EIS, the following are in the package:

1. Volume I: Revised Draft Environmental Impact Statement
2. Volume II: EIS Appendices

If you elected to receive only the Summary document (Volume III) but would like to receive Volumes I and II, please direct your request to Tom Parker at the address below. Copies will also be available at local libraries in most communities throughout Southeast Alaska.

Comments on the Revised Draft EIS should be written and must be received by October 16, 1998. These comments should be sent to:

Tom Parker
USDA Forest Service
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A public meeting concerning the project will be held in Petersburg during the public comment period. The date, time and specific location of the meeting will be announced by future notification in local newspapers.

I want to encourage you to take the time to review and comment on the Revised Draft EIS and to participate in the subsistence hearing. Your input will be considered in preparation of the Final EIS and the Record of Decision. Your interest in the management of the Tongass National Forest is appreciated.

Sincerely,

FOR BRADLEY E. POWELL
Forest Supervisor

Enclosures

Port Houghton/Cape Fanshaw Timber Sale Project

Revised Draft Environmental Impact Statement

USDA Forest Service, Alaska Region
Tongass National Forest, Chatham and Stikine Areas
Juneau and Petersburg Ranger Districts

Lead Agency:

USDA Forest Service
Tongass National Forest,
Chatham and Stikine Areas

Cooperating Agency:

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Responsible Officials:

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Abstract: The USDA Forest Service (USDA-FS) initially proposed the harvest of approximately 120 million board feet (MMBF) of timber in the Chatham and Stikine Areas within the Port Houghton/Cape Fanshaw project area using a variety of silvicultural prescriptions. The project includes the construction and/or use of log transfer facilities along with necessary road construction for the transport of timber. This EIS describes the effects of the one "no-action" alternative and six "action" alternatives that meet the Forest Plan Standards and Guidelines. The alternatives are: 1) "no-action", proposes no new harvest for the project area at this time; 2) provides timber harvest throughout the project area on available lands (Proposed Action); 3) limits harvest to the north shore of Port Houghton where no new permanent roads are required; 4) maximizes the amount of timber harvested throughout the project area; 5) focuses timber harvest on the North Shore of Port Houghton and towards the middle of Fanshaw Peninsula emphasizing visual resource protection; 6) avoids the North Shore of Port Houghton while establishing a minimal infrastructure on the Fanshaw Peninsula; and 7) identifies harvest units to emphasize timber sale economics and conventional cable yarding methods. The actions analyzed in this EIS are designed to implement direction contained in the Tongass Land Management Plan (TLMP 1997) and the Tongass Timber Reform Act (TTRA). The Forest Service Preferred Alternative is Alternative 5.

Reviewers should provide the Forest Service with their comments during the review period of the Draft Environmental Impact Statement (DEIS). This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the Final Environmental Impact Statement, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act (NEPA) process so that it is meaningful and alerts the agency to the reviewer's position and contentions. *Vermont Yankee Nuclear Power Corp. v NRDC, 435 U.S. 519,553 (1978).* Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the Final Environmental Impact Statement. *City of Angoon v Hodel (9th Circuit, 1986)* and *Wisconsin Heritages, Inc. v Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980).* Comments on the DEIS should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

Table of Contents

Contents - Volume I

Contents - Volume 1

Chapter 3

Contents - Volume 1

Contents - Volume 1

Contents - Volume 1

Contents - Volume 1

Contents - Volume 1

LIST OF FIGURES

LIST OF TABLES

Contents - Volume 1

Acronyms

Acronyms

%	Percent
AAC	Alaska Administrative Code
AD	Anno domini (In the year of the Lord)
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADGC	Alaska Department of Governmental Coordination
ADNR	Alaska Department of Natural Resources
AHRS	Alaska Heritage Resource Survey
ANCSA	Alaska Native Claims Settlement Act of 1971
ANHP	Alaska National Heritage Program
ANILCA	Alaska National Interest Lands Conservation Act of 1980
ATTF	Alaska Timber Task Force
BMP	Best management practice
BP	Before present
C	Candidate
C2	Category 2 candidate species
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COE	United States Army Corps of Engineers
CZMA	Coastal Zone Management Act of 1976
dbh	Diameter at breast height
DEIS	Draft environmental impact statement
E	Endangered
EA	Environmental assessment
EIS	Environmental impact statement
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
EVC	Existing visual condition
FEIS	Final environmental impact statement
FP	Floodplain
FPA	Forest Practices Act
ft	foot or feet
GIS	Geographic information system
GNP	Gross national product
GSP	Gross State Product
HCA	Habitat conservation area
HSI	Habitat suitability index
ID Team	Interdisciplinary team
KPC	Ketchikan Pulp Corporation
KV	Knutsen-Vandenberg Act
LSTA	Logging system and transportation analysis
LTF	Log transfer facility
LUD	Land use designation
MBF	One thousand board feet
MC	Moderate gradient contained
MDF	Medium density fiberboard

Acronyms

MIS	Management indicator species
MLLW	Mean lower low water
MM	Moderate gradient mixed control
MMBF	Million board feet
MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
MUSY	Multiple Use Sustained Yield Act of 1960
NA	Not applicable
NEPA	National Environmental Policy Act of 1969 (as amended)
NFMA	National Forest Management Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
ORV	Off-road vehicle
P	Preservation
RM	Roaded modified
ROD	Record of Decision
ROS	Recreation opportunity spectrum
S	Sensitive
SAI	Sale area improvement plan
SBA	Small Business Administration
SPM	Semi-primitive motorized
SPNM	Semi-primitive non-motorized
SRI/CSE	Stream reach inventory and channel stability evaluation
T	Threatened
T/yr	Tons per year
TES	Threatened, endangered, and sensitive
TLMP	Tongass Land Management Plan
TRUCS	Tongass resource use cooperative survey
TTRA	Tongass Timber Reform Act
U.S.	United States
USBLM	United States Bureau of Land Management
USBOM	United States Bureau of Mines
USDA-FS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VCU	Value comparison unit
VQO	Visual Quality Objective
WAA	Wildlife analysis area
°F	Fahrenheit

Executive Summary

Executive Summary

Overview of Project

This revised draft environmental impact statement (RDEIS) describes seven alternatives for timber harvest, road and log transfer facility (LTF) construction, and related activities for a proposed timber harvest in the Port Houghton/Cape Fanshaw area on the mainland of Southeast Alaska. The no-action alternative would result in no timber harvest on National Forest land in the project area. In addition to describing the alternatives, this EIS documents the analyses of the expected environmental, economic and social effects of each alternative.

Proposed Action

The Chatham and Stikine areas of the Tongass National Forest propose to make available for harvest approximately 120 million board feet (MMBF) of timber within the Port Houghton/Cape Fanshaw project area. Associated with the proposed action would be construction of one log transfer facility (LTF) and about 80 miles of road. The timber harvest planned for the project area would include several timber sales over a multi-year time period beginning in 2003.

Purpose and Need

The purpose and need for the project is to respond to the goals and objectives identified by the Forest Plan for the timber resource and to move the project area towards the desired future condition. The Forest Plan identified the following goals and objectives: (1) manage the timber resource for production of saw timber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, long-term sustained yield basis and in an economically efficient manner (Forest Plan page 2-4); (2) seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber, and the demand for the planning cycle (Forest Plan page 2-4); and (3) maintain and promote industrial wood production from suitable timber lands, providing a continuous supply of wood to meet society's needs (Forest Plan page 3-144). The Port Houghton/Cape Fanshaw project would be designed to produce desired resource values, products, and conditions in ways that also sustain the diversity and productivity of ecosystems (Forest Plan page 2-1).

Project Area Location

The Port Houghton/Cape Fanshaw project area is located on the mainland of Southeast Alaska, 30 air miles northwest of Petersburg and 80 miles south of Juneau. Project area boundaries are from Cape Fanshaw east to the Farragut Bay North Arm and Glory Lake, and north to an area above Port Houghton (see project area map in Chapter 1).

Significant Issues

The regulations implementing the NEPA require Federal agencies to determine "the scope of issues to be addressed" and to identify "the significant issues related to a proposed action" (40 Code of Federal Regulations [CFR] 1501.7). The significant issues related to the Port Houghton/Cape Fanshaw project were identified through the scoping process. They were raised by the public, including individuals and organizations; by other Federal, State, and local agencies; or by tribal organizations. Some of these issues were identified through scoping within the Forest Service and relate to concerns about specific resources and legal requirements.

The issues raised during scoping were analyzed and similar issues were grouped when appropriate. This analysis also identified those "issues that are truly significant to the action in question" (40 CFR 1500.1(b)). NEPA regulations require agencies to "identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review" (40 CFR 1501.7(a)(3)). In particular, the release of the revised Land and Resource Management Plan for the Tongass National Forest provided specific management prescriptions and standards and guidelines that eliminate or minimize the effects of many issues commonly identified in the past.

The significant issues identified as a result of this analysis were used to direct the formulation and evaluation of the alternatives. Other issues, resources, and effects may be discussed in Chapter 3, Chapter 4, and in the planning record for this project, however the discussion of these issues will focus on "a brief presentation of why they will not have a significant effect on the human environment" or provide "a reference to their coverage elsewhere" (40 CFR 1501.7(a)(3). Each issue described below is followed by approaches that are used to measure differences among the alternatives in this EIS.

Issue 1: Timber Harvest

This issue is focused on the amount and type of timber harvest planned in the project area and the effects of that harvest on a wide range of resources. This issue includes concerns about the number and size of clearcuts proposed.

Issue 2: Marine Resources

This issue is focused on the potential effects of timber harvest, road construction, and construction and use of log transfer facilities on marine resources. This issueincludes concerns about the effects on fish habitat and on commercial fishing off the shores of the project area. The amount of harvest and the method of access will determine the use and development of LTF sites.

Issue 3: Wildlife

This issue is focused on the potential effects of timber harvest on wildlife habitat and populations of wildlife associated with old-growth forest conditions. This issue includes concerns about the effects of logging activities, and the subsequent access that logging roads provide, on species such as mountain goat.

Issue 4: Subsistence

This issue is focused on the potential effects of logging activities on subsistence uses and resources within the project area. This includes concerns regarding the abundance and distribution of subsistence resources, access, and competition.

Issue 5: Scenery and Recreation

This issue is focused on the potential effects of logging activities on the scenic and recreation resources of the project area. This includes the concern that the experiences of both visitors and residents would be affected by changes in the scenery and recreational settings.

Development of Alternatives

Each alternative presented in this EIS represents a different response to the issues discussed in Chapter 1. Six action alternatives were developed that meet the stated purpose and need of the project. Each action alternative consists of a site-specific proposal developed through interdisciplinary discussion and evaluation. The locations of units and roads are based on ground verification of all units and roads considered, along with aerial photo, topographic map, and geographic information system (GIS) review. More detailed considerations in the development of alternatives are discussed in Chapter 2.

Alternatives Considered in Detail

Alternative 1 (No-Action Alternative)

A no-action alternative is analyzed in this EIS and is a requirement of NEPA. In addition to being a viable alternative, the no-action alternative provides a benchmark for comparison of the action alternatives.

No harvest activities on National Forest system lands are planned in the project area for this alternative. Logging may occur on the Goldbelt, Inc. lands in the project area until harvest is completed in a few years. For the most part, conditions that currently exist in the project area represent the no-action alternative.

Alternative 2 - Proposed Action

Alternative 2 helps maintain a current timber supply for the wood products industry throughout Southeast Alaska while also considering the need to provide strong protection measures for fish, wildlife, and other resources important to subsistence and recreation. Road management for this alternative includes a gate on the road near the Chatham and Stikine administrative boundary to minimize potential impacts to mountain goats from encounters with people in vehicles. The roads on the North Shore would be closed and allowed to naturally revegetate. See Table ES-1 for a comparison of alternative features.

Alternative 3

The objective of this alternative is a small sale on the north shore of Port Houghton that does not require construction of permanent roads. Timber harvest has already occurred on adjacent private land so the area has lost its unroaded character. Some infrastructure is already in place in the form of the Goldbelt, Inc. road system and LTF in Hobart Bay. The Cape Fanshaw Peninsula would be avoided to preserve its unroaded character.

Alternative 4

The primary objective of Alternative 4 is to include as many units from the unit pool within Forest Plan goals and objectives and consistent with standards and guidelines. This alternative is most responsive to the timber industry concern for a long-term timber supply and their desire to obtain full production from lands allocated in the Forest Plan to the Timber Production LUD. The roads on the North Shore would be put to bed but the roads on the Fanshaw Peninsula would be maintained but gated near the LTF in Little Lagoon.

Alternative 5

The objective of this alternative is to focus timber harvest on the north shore of Port Houghton and towards the middle of the Fanshaw Peninsula. This alternative emphasizes visual resource protection and avoids Haystack, Placer and Negro Creek watersheds, which have anadromous streams. Roads in the North Shore area would be closed and allowed to revegetate naturally following timber harvest but roads to the Little Lagoon LTF would be maintained for future entries, but gated near the LTF.

Alternative 6

The objective of Alternative 6 is to avoid potential cumulative effects of timber harvest in the North Shore area and to establish minimal infrastructure on the Fanshaw Peninsula. This alternative would avoid concerns about timber harvest on mountain goat winter range and concerns about the effects of roads on goat mortality or migration between areas of suitable habitat. Roads would be maintained but gated near the LTF.

Alternative 7

The objective of Alternative 7 is to emphasize economics by favoring ground-based logging systems. This alternative would harvest the most volume using ground-based logging systems for the miles of road built, and would be most responsive to concerns about economical timber sales. No units would be harvested in the North Shore area. Roads would be maintained and left open following timber harvest.

Comparison of Alternatives by Significant Issue

The comparison of alternatives draws together the conclusions from the materials presented throughout this EIS, and provides the results of the analysis in a brief summary. Table ES-2 provides a comparison of the alternatives by the identified issue. The baseline for comparing the alternatives is Alternative 1, the no-action alternative, which also represents existing conditions. Chapter 2 contains a more detailed comparison of the alternatives, and Chapter 4 contains the detailed evaluation of the potential effects on the natural and social resources from timber harvest and road construction under each alternative.

Identification of the Forest Service Preferred Alternative

The Forest Service has identified Alternative 5 as the Preferred Alternative. All of the alternatives will be examined before preparation of a Final EIS. Public comments will be taken into consideration, as well as additional information and analysis. Comments on the Preferred Alternative and the other alternatives in this Revised Draft EIS will be most useful if they focus on particular aspects of the alternatives that the reviewer either likes or dislikes. The final selected alternative may be the same as the Preferred Alternative, or a modified version, or an entirely different alternative.

Table ES-1
Port Houghton/Cape Fanshaw Alternative Summary

Item	1	2	3	4	5	6	7
Total Unit Acres:		5,171	550	6,224	3,706	951	3,489
Number of Units (Total 125):	0	100	14	124	65	25	76
Number of Unit Openings (Total 134):[1]	0	107	14	124	69	28	76
Average Acres/Unit:	0	52	39	50	57	38	46
Average MBF/Unit:	0	1,068	668	985	1,063	831	1,127
Total Net Sawlog MMBF:	0	106.8	9.4	122.1	69.1	20.8	85.7
Total Net + Utility (MMBF):	0	121.7	11.4	138.9	77.7	23.4	98.8
Average MBF/Acre:	0	22	21	21	20	22	26.5
Helicopter Portion MBF:	0	27,180	9,353	27,530	15,695	- -	- -
Helicopter Portion Acres:	0	1,338	550	2,206	899	- -	- -
Silvicultural Methods (% by acres)							
Clearcut & w/Reserves	0	58	60	55	57	58	88
Shelterwood w/Reserves	0	26	- -	27	20	42	12
Group Selection	0	1	40	5	2	- -	- -
Sanitation Salvage	0	15	- -	12	21	- -	- -
Overstory Removal	0	< 1	- -	- -	- -	- -	- -
Logging System (% by acres)							
Helicopter	0	32	100	33	39	- -	- -
Running Skyline	0	16	- -	20	12	29	30
Slackline	0	25	- -	22	21	18	30
Small Slackline	0	20	- -	18	19	44	30
Gravity Return	0	6	- -	6	8	9	8
Shovel	0	1	- -	1	1	- -	2
Highlead	0	< 1	- -	< 1	< 1	- -	< 1
Total Road Miles:	0	78.6	0.20	92.2	51.0	23.0	72.2
MBF/Mile Cable Yard:	0	978	- -	1,012	997	912	1,135
MBF/Mile Total Yard:	0	1,312	- -	1,307	1,289	912	1,135
Specified Road Miles:	0	64.2	0	74.1	40.7	19.4	59.6
MBF/Specified Mile Cable:	0	1,201	- -	1,224	1,245	1,062	1,361
MBF/Specified Mile Total:	0	1,612	- -	1,581	1,611	1,062	1,361

[1]Total unit openings are greater than the total number of units because some units were split into two or more parts because of stream buffers bisecting units.
[2]Road corridor width is greater than 50 feet and includes disturbance areas (ROW = right-of-way). ROW volume is not included in alternative totals.
Source: Jenkins 1998.

Table ES-2
Comparison of Environmental Consequences

Item	Alternative 1	2	3	4	5	6	7
Timber							
Species Composition of Harvest Acres (%)							
Western hemlock	0	63	40	62	58	67	65
Sitka spruce	0	17	21	17	16	17	17
Alaska yellow-cedar	0	13	1	14	17	11	14
Mountain hemlock	0	7	38	7	9	5	4
Marine							
Marine habitat filled (acres)	0	up to 0.2	0	up to 0.2	up to 0.2	up to 0.2	up to 0.2
Bark deposition/dispersion (acres)	0	up to 0.8	0	up to 0.8	up to 0.8	up to 0.8	up to 0.8
Little Lagoon LTF (MMBF)	0	94.8	0	110.3	57.1	20.8	85.7
Hobart Bay LTF (MMBF)	0	12.0	9.4	11.8	12.0	0	0
TES species effects	none	none	none	none	none	none	none
Wildlife Habitats (acres affected)							
Saltwater	0	< 1	0	< 1	< 1	< 1	< 1
Beach fringe	0	14	0	14	14	14	14
Scrub	0	< 1	< 1	< 1	<1	0	< 1
Forest volume strata low	0	785	85	1,288	563	303	623
Forest volume strata medium	0	2,510	261	2,818	1,840	258	1,523
Forest volume strata high	0	2,042	195	2,278	1,399	429	1,502
Bogs, fens, and peatlands	0	144	6	184	119	55	120
Alpine	0	1	0	1	< 1	< 1	< 1
Wildlife Carrying Capacities in number of individuals (percent decrease from existing conditions)							
Vancouver Canada goose	257	250 (3)	257 (0)	248 (4)	251 (2)	256 (< 1)	252 (2)
Brown creeper	4,156	3,897 (6)	4,146 (< 1)	3,879 (7)	4,028 (3)	4,110 (1)	3,956 (< 1)
Bald eagle,	296	295 (< 1)	296 (0)	295 (< 1)	295 (< 1)	296 (0)	295 (< 1)
Hairy woodpecker	2,251	2,105 (6)	2,245 (< 1)	2,084 (7)	2,163 (4)	2,223 (1)	2,140 (5)
River otter	110 (0)	110 (0)	110 (0)	110 (0)	110 (0)	110 (0)	110 (0)
Marten	295	283 (4)	294 (< 1)	280 (5)	286 (3)	292 (1)	286 (3)
Sitka black-tailed deer	2,206	2,093 (5)	2,200 (< 1)	2,075 (6)	2,130 (3)	2,183 (1)	2,115 (4)
Mountain goat	312	309 (1)	311 (< 1)	308 (1)	309 (1)	312 (0)	311 (< 1)
Red squirrel	107,071	103,520 (3)	106,770 (< 1)	102,937 (4)	105,010 (2)	106,238 (1)	104,125 (3)
Red-breasted sapsucker	14,995	14,286 (5)	14,928 (< 1)	14,140 (6)	14,522 (3)	14,826 (1)	14,405 (4)
Black bear	278	260 (6)	278 (0)	258 (7)	262 (6)	271 (3)	260 (6)

Table ES-2 (continued)
Comparison of Environmental Consequences

Item	Alternative 1	2	3	4	5	6	7
Biodiversity							
Number of old-growth patches	108	279	113	310	246	153	247
Average old-growth patch size (acres)	818	297	777	264	343	571	343
Maximum old-growth patch size (acres)	56,316	50,823	56,316	38,673	52,474	54,977	51,692
Interior area of old-growth forest (acres)	50,739	43,221	49,956	42,032	45,871	49,425	45,266
% of old-growth in patches > 100 acres	98	97	98	97	97	98	97
% of old-growth in patches > 1,000 acres	97	94	97	95	95	96	96
Fish/Water Quality							
Road construction miles in stream buffers	0	13.0	0	15.6	7.7	0.6	9.7
Number of road crossings over streams							
Class I/II	0	56	0	62	31	26	57
Class III	0	80	0	79	41	9	64
Area in high potential erosion class soils (acres)	0	1,528	121	1,707	1,073	341	1,208
Geology/Minerals/Soils							
Effects on mining claims	none	none	none	none	none	none	none
Total acres of soil disturbance	0	233	5	273	138	57	212
% road miles ≥ 60% slopes	0	< 1	0	< 1	< 1	< 1	< 1
Unit acrs on ≥ 72% slopes	0	12	6	12	6	< 1	6
Unit acres in wetlands	0	526	80	697	433	59	204
Road acres in wetlands	0	133	0	146	104	36	108
Floodplain crossing in acres	0	17	0	19	9	6	16
Unit acres in Soil hazard	0	1,451	121	1,618	1,024	318	1,138
Class III	0	77	0	89	49	23	70

Table ES-2 (continued)
Comparison of Environmental Consequences

Item	Alternative 1	2	3	4	5	6	7
Subsistence							
Significant Possibility of a Significant Restriction							
Salmon, finfish, shellfish	no	no	no	no	no	no	no
Deer	no	no	no	no	no	no	no
Waterfowl	no	no	no	no	no	no	no
Harbor seals	no	no	no	no	no	no	no
Furbearers	no	no	no	no	no	no	no
Bear	no	no	no	no	no	no	no
Cultural Resources							
Overall risk to cultural resources	none	low	low	low	low	low	low
Resource sites potentially affected	none	none	none	none	none	none	none
Recreation Opportunity Spectrum - % of acreage on National Forest Lands							
Primitive	50	26	49	25	26	46	27
Semi-Primitive Non-Motorized	38	38	37	36	49	37	41
Semi-Primitive Motorized	12	14	12	13	12	12	14
Roaded Modified	0	22	2	26	13	5	18
Commercial Recreation/Tourism Use and Income Summary							
Range of total recreation/tourism dollars generated	$48,010-$72,250/yr.	$27,380-$39,650/yr 43-45% decrease	Same as 1	Same as 2	Same as 2	Same as 2	Same as 2
Range of numbers of people willing to pay for recreation/tourism experience	84-134/yr	68-102/yr 19-24% decrease	Same as 1	Same as 2	Same as 2	Same as 2	Same as 2
Average days of use by groups generated dollars	136/yr	84/yr 38% decrease	Same as 1	Same as 2	Same as 2	Same as 2	Same as 2

Chapter 1

Purpose and Need

Chapter 1

1. Purpose and Need For Action

1.1. Project Area Location

The Port Houghton/Cape Fanshaw project area is located on the mainland of Southeast Alaska, 30 air miles northwest of Petersburg and 80 miles south of Juneau (Figure 1-1). Project area boundaries are from Cape Fanshaw east to the Farragut Bay North Arm and Glory Lake, and north to an area above Port Houghton (see project area map).

For reference, the project area has been subdivided into four geographic areas: (1) North Shore, which includes the project area north of Port Houghton from the western shoreline to Rusty River; (2) East Houghton from east of Sandborn Canal and associated tributaries to Rusty River; (3) North Fanshaw, which includes the Chatham Area portion of the project area that is south of Port Houghton and west of Sandborn Canal; and (4) South Fanshaw, which is the Stikine portion of the project area (see project area map).

1.2. Project Overview

On September 12, 1994, a Notice of Intent to prepare an Environmental Impact Statement (EIS) for the Port Houghton/Cape Fanshaw timber sale project was published in the Federal Register (Vol. 59, No. 175, pp. 46819-46820). A revised Notice of Intent was published on August 14, 1995 (Federal Register Vol. 60, No. 156, p. 41862) stating that two decision-makers will sign the Record of Decision and providing a revised date for EIS publication. Public scoping, in September and October of 1994, included public meetings in Petersburg, Wrangell, Juneau, Hobart Bay and Kake.

A Draft EIS was published in December 1995. Subsistence hearings, pursuant to Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA), were held in Kake, Petersburg, and Hobart Bay during the public comment period on the Draft EIS. The public comment period on the Draft EIS ended on March 26, 1996. Responses to the public comments on the 1995 Draft EIS are included in Appendix D.

The Port Houghton/Cape Fanshaw project was initiated under the direction of the 1979 Tongass National Forest Land Management Plan (TLMP, as amended).

Figure 1-1.
Location of the Port Houghton/ Cape Fanshaw Project Area on the Mainland of Southeastern Alaska

Project Area with Land Status, VCUs, and Subareas

Prepared by Parametrix, Inc. File: subareas.gra Date: July 14, 1998

Port Houghton/Cape Fanshaw project planning incorporated standards and guidelines being considered in the revised TLMP, to the extent they were known. On May 23, 1997, the Record of Decision (USDA Forest Service [USDA-FS] 1997b) for the revised TLMP (here after referred to as the Forest Plan) was signed. The Forest Plan (USDA-FS 1997c) includes some land allocations and standards and guidelines that were not anticipated during project planning. This has resulted in the need for a Revised Draft EIS for the Port Houghton/Cape Fanshaw timber sale project.

This Revised Draft EIS is tiered to the Final EIS for the Forest Plan (USDA-FS 1997b) and is consistent with the goals, objectives, standards and guidelines, and land use allocations in the Forest Plan. A Notice of Intent to prepare a Revised Draft EIS was published on September 23, 1997 (Federal Register Vol. 62, No. 184, pp. 49665-49666).

1.2.1. Proposed Action

The Chatham and Stikine areas of the Tongass National Forest propose to make available for harvest approximately 120 million board feet (MMBF) of timber within the Port Houghton/Cape Fanshaw project area. Associated with the proposed action would be construction of one log transfer facility (LTF) and about 80 miles of road. The timber harvest planned for the project area would include several timber sales over a multi-year time period beginning in 2003.

1.2.2. Purpose and Need

The purpose and need for the project is to respond to the goals and objectives identified by the Forest Plan for the timber resource and to move the project area towards the desired future condition. The Forest Plan identified the following goals and objectives: (1) manage the timber resource for production of saw timber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, long-term sustained yield basis and in an economically efficient manner (Forest Plan page 2-4); (2) seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber, and the demand for the planning cycle (Forest Plan page 2-4); and (3) maintain and promote industrial wood production from suitable timber lands, providing a continuous supply of wood to meet society's needs (Forest Plan page 3-144). The Port Houghton/Cape Fanshaw project would be designed to produce desired resource values, products, and conditions in ways that also sustain the diversity and productivity of ecosystems (Forest Plan page 2-1).

1.2.3. Decision to be Made

The Tongas National Forest Supervisor will decide whether or not to make timber available in the Port Houghton/Cape Fanshaw project area to help meet market demands and Forest Plan goals for the Tongass National Forest. If the Forest Supervisor decides, based on the analysis of the environmental consequences, to harvest timber in this area, they will also decide:

- the amount of timber volume to make available for harvest;

- the location and design of timber harvest units;
- the location and design of roads;
- road management objectives (RMOs) for post-sale resource protection;
- location and type of LTFs;
- whether there may be a significant restriction on subsistence uses;
- mitigation measures associated with each alternative; and
- monitoring requirements.

Decisions will be documented in the Record of Decision (ROD).

1.3. Background

1.3.1. Historical Studies in the Project Area

An environmental assessment (EA) and Decision Notice were prepared in 1983 (USDA-FS 1983a) for a timber sale in the Port Houghton/Cape Fanshaw project area. A timber sale offering of 47 MMBF (net sawlog plus utility, including road right-of-way) occurred following the Decision Notice but no bids were received due to the timber market at that time. The offering was located primarily in the North Fanshaw portion of the project area, but included South Fanshaw directly north of Farragut Bay (see Figure 1-2). No Forest Service timber sale activities have occurred in the project area since that time, prior to this current project.

In 1989, portions of the project area were considered by the U.S. Congress for Wilderness in the Tongass Timber Reform Act (TTRA) deliberations. The final TTRA bill excluded any portion of the project area as Wilderness.

1.3.2. Scoping and Public Involvement

Public scoping was initiated formally for this EIS with the mailing of a scoping brochure in September 1994 to 755 interested individuals, agencies, industries, and environmental organizations. Public notices were placed in local newspapers (Juneau Empire, Wrangell Sentinel, and Petersburg Pilot) requesting public comment and announcing public scoping meetings in Hobart Bay, Wrangell, Petersburg, Kake, and Juneau. In addition, an open house was held in Juneau in late October 1994, after the initial scoping meeting. A second brochure was sent in March, 1995, to individuals on the mailing list, to describe the comments received from the public.

In September 1997, a new scoping brochure was mailed to everyone on the project mailing list informing them of the intent to prepare a Revised Draft EIS, the new proposed action, and the new project schedule. The brochure invited additional input about the project and comments on the new proposed action.

1.4. How This Project Relates to the Forest Plan

The National Forest Management Act of 1976 (NFMA) directs each National Forest to prepare a plan to guide the management of its lands. The management of the Tongass National Forest is guided by the Tongass Land and Resource Management Plan (USDA-FS 1997c), referred to as the Forest Plan.

The ROD for the Forest Plan (USDA-FS 1997b) includes instructions for making a transition from the 1979 TLMP. Timber sale projects, which were initiated under the direction of the 1979 TLMP, and which will be completed within the next few years, may be affected to varying degrees by the new Forest Plan. The ROD describes four categories of timber sale projects, and their relationship to the Forest Plan (Forest Plan ROD at page 41). The Port Houghton/Cape Fanshaw project is identified under Category 3: "Timber sale projects now being planned, but for which a National Environmental Policy Act (NEPA) decision document will not be signed before the effective date of this Plan."

The ROD directs that Category 3 projects (including the Port Houghton/Cape Fanshaw project) need to be consistent with applicable management direction in the Forest Plan, except for certain standards and guidelines for wildlife addressing landscape connectivity, endemic terrestrial mammals, northern goshawk, and marten management. The ROD further directs that the extent to which these new wildlife measures should be incorporated into the projects will be determined through review by an interagency implementation team consisting of the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and pertinent State agencies.

The Forest Service met with representatives from the interagency implementation team on September 23, 1997 (USFWS, Alaska Division of Governmental Coordination, Alaska Department of Fish and Game [ADF&G] and Alaska Department of Environmental Conservation [ADEC]) and October 10, 1997 (NMFS and U.S. Environmental Protection Agency [USEPA]) to review the extent to which the new wildlife standards and guidelines should be incorporated into the Port Houghton/Cape Fanshaw project.

The Port Houghton/Cape Fanshaw project EIS is tiered to the Forest Plan EIS (USDA-FS 1997b), and also to the Alaska Regional Guide (USDA-FS 1983b). General discussions from these documents and the administrative planning record are incorporated by reference rather than repeated in this EIS (40 CFR 1502.21).

1.4.1. Land Use Designations

The project area is comprised of 11 value comparison units (VCUs) with VCUs 79 to 84 within the Chatham Area and VCUs 85 to 89 within the Stikine Area. The VCUs within the Chatham Area and VCUs 78 and 88, which are part of the

Tracy Arms-Ford Terror Wilderness, comprise the State of Alaska Wildlife Analysis Area (WAA) 2927. The Stikine Area of the project area represents WAA 1601.

The Forest Plan designates areas appropriate for various activities through six Land Use Designation (LUD) allocations: Timber Production, Old-Growth Habitat, Modified Landscape, Scenic Viewshed, Semi-remote Recreation, and Research Natural Area (see Figure 1-3). Management Prescriptions for these LUDs are described in the Forest Plan. The Forest Plan allocated approximately 49 percent of the land within the Port Houghton/Cape Fanshaw timber sale project area to the Timber Production LUD. The desired future condition for these lands, as identified by the Forest Plan, states that they are to be managed for the production of sawtimber and other wood products on an even-flow, long-term sustained yield basis (Forest Plan, p. 3-144). Another 25 percent of the land within the Port Houghton/Cape Fanshaw timber sale project area is allocated to the Modified Landscape and Scenic Viewshed LUDs. The desired future condition for these lands states, in part, that they will produce a yield of timber which contributes to the Forest-wide sustained yield (Forest Plan, pp. 3-135 and 3-126). Harvesting aging stands, including those in declining health, on lands that allow timber harvest and replacing them with faster growing, healthy stands will reduce the volume loss associated with decay and disease and increase the growth and yield of the managed forest land.

The remaining 26 percent of the project area is allocated to the Old-growth Habitat, Research Natural Area, and Semi-remote Recreation LUDs. The desired future condition for these lands emphasizes natural conditions and natural ecological processes.

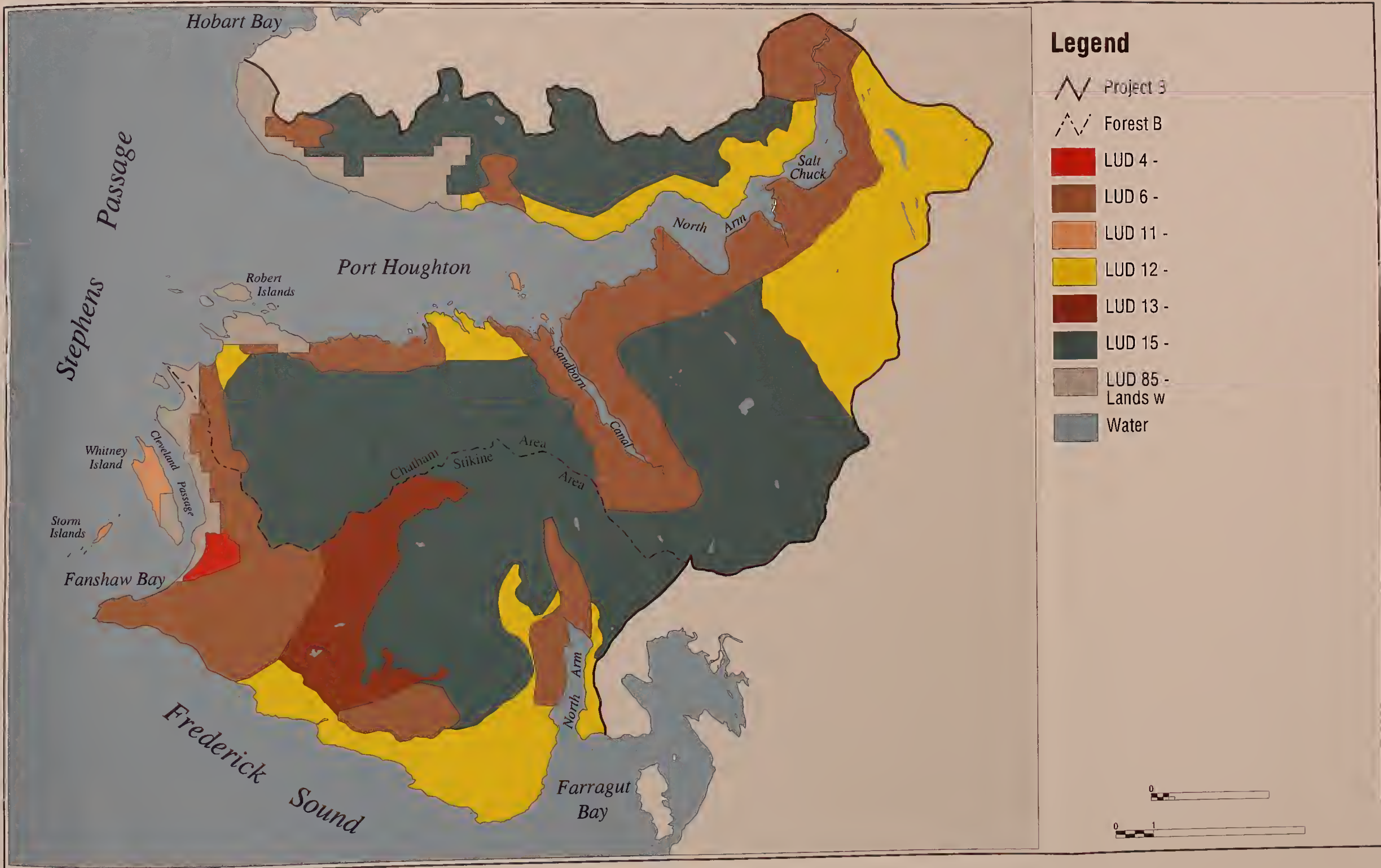
1.4.2. Selection of the Port Houghton/Cape Fanshaw Project Area

The Port Houghton/Cape Fanshaw project area was selected for environmental analysis as part of the implementation process of the 1979 TLMP, as amended. The 1979 TLMP allocated lands within the Port Houghton/Cape Fanshaw project area for timber production, and scheduled timber sale activities in both management areas C14 and S01. The Port Houghton/Cape Fanshaw timber sale project was then added to both the Chatham and Stikine areas' Ten Year Timber Sale Plans; an EA was developed for the project; the timber sale package prepared; and the sale offered to industry in 1983. The sale was not sold due to low market conditions during the time of offer and the sale was placed on the shelf as fully prepared volume. The Forest Service intended to reoffer the sale when market conditions improved due to the significant investments made in the development of the timber sale project. These investments included resource inventories, road locations and design, timber harvest unit location and design, and log transfer locations and permits with the State of Alaska and Corps of Engineers (COE).

The 1979 TLMP was amended during the winter of 1985/1986 for the purpose of bringing the Plan in line with several changes that had occurred since its passage.

Figure 1-3

Land Use Designations in the Port Houghton/Cape Fanshaw Project Area



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The 1983 Port Houghton timber sale was not effected by the update of 1979 TLMP due to the project area still being identified for timber production, the project still being scheduled for implementation, and the sale still being active as NEPA cleared volume pending reoffer. However, market conditions immediately after the update of 1979 TLMP remained relatively the same and the sale remained unsold.

In 1990, the TTRA legislated certain lands on the Tongass National Forest as Wilderness and LUD II. The Port Houghton/Cape Fanshaw area was not affected by these designations and remained in the same allocations as before the Act was passed. TTRA did, however, mandate buffers on all Class I streams and all Class II streams flowing directly into Class I streams which needed to be incorporated into the Port Houghton timber sale (1983).

In January 1993, the Stikine and Chatham Area Forest Supervisors made an administrative decision to again look at the Port Houghton/Cape Fanshaw area for a timber sale project for the purposes of recapturing prior investments in the immediate vicinity, to help provide an orderly flow of timber from National Forest system lands to dependent industry, and for implementation of the 1979 TLMP, as amended. The project was again added to the Chatham and Stikine areas' Ten Year Timber Sale Plan as Port Houghton/Cape Fanshaw. Based on the age of the environmental analysis for the Port Houghton timber sale (1983), the Forest Service decided to reanalyze an expanded project area taking into consideration the passage of the TTRA in 1990, a need for an extensive cumulative effects analysis, and work that was underway in the revision of the 1979 TLMP.

Under the 1997 Forest Plan, there remains a sufficient amount of harvestable timber volume on lands designated as Timber Production, Modified Landscape and Scenic Viewshed to achieve the purpose and need for the project. Available information indicates that harvest of the amount of timber being considered for this project is consistent with the Forest Plan standards and guidelines and other requirements for resource protection.

The volume anticipated to be made available from the Port Houghton/Cape Fanshaw area is not excessive to the supply needs of the existing timber industry in Southeast Alaska. Without the timber volume proposed to be authorized through this analysis, there is potential for not achieving an orderly flow of timber from National Forest System lands to dependent industry. Additional information about why the Port Houghton/Cape Fanshaw project area was selected is located in Appendix N.

1.4.3. Future Sales in the Project Area

The Sikine Area's tentative ten-year timber sale schedule (October 30, 1997) identifies a future small timber sale project for the project area. The South Fanshaw timber sale, with a harvest of 25 MMBF, would only occur in the Stikine portion of the project area. The State of Alaska is considering a timber sale on State land on the Cape Fanshaw Peninsula but has no plans yet for when, where, or how large the sale might be.

1.5. Significant Issues

The regulations implementing the NEPA require Federal agencies to determine "the scope of issues to be addressed" and to identify "the significant issues related to a proposed action" (40 Code of Federal Regulations [CFR] 1501.7). The significant issues related to the Port Houghton/Cape Fanshaw project were identified through the scoping process. They were raised by the public, including individuals and organizations; by other Federal, State, and local agencies; or by tribal organizations. Some of these issues were identified through scoping within the Forest Service and relate to concerns about specific resources and legal requirements.

The issues raised during scoping were analyzed and similar issues were grouped when appropriate. This analysis also identified those "issues that are truly significant to the action in question" (40 CFR 1500.1(b)). NEPA regulations require agencies to "identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review" (40 CFR 1501.7(a)(3)). In particular, the release of the revised Land and Resource Management Plan for the Tongass National Forest provided specific management prescriptions and standards and guidelines that eliminate or minimize the effects of many issues commonly identified in the past.

The significant issues identified as a result of this analysis were used to direct the formulation and evaluation of the alternatives. Other issues, resources, and effects may be discussed in Chapter 3, Chapter 4, and in the planning record for this project, however the discussion of these issues will focus on "a brief presentation of why they will not have a significant effect on the human environment" or provide "a reference to their coverage elsewhere" (40 CFR 1501.7(a)(3). Each issue described below is followed by approaches that are used to measure differences among the alternatives in this EIS.

1.5.1. Issue 1: Timber Harvest

This issue is focused on the amount and type of timber harvest planned in the project area and the effects of that harvest on a wide range of resources. This issue includes concerns about the number and size of clearcuts proposed.

This issue is evaluated by the change in the timber resource as a result of the amount, size, dispersion of harvest, and harvest method for each alternative. Soils, wildlife, silvicultural, fisheries, and visual concerns with clearcutting for some units resulted in the development of various alternative silvicultural treatments. Differences in the proposed alternatives are compared by: the type and amount of various alternative silviculture proposed, logging system, vegetative type, volume, landscape design, and regeneration plans.

1.5.2. Issue 2: Marine Resources

This issue is focused on the potential effects of timber harvest, road construction, and construction and use of log transfer facilities on marine resources. This issue includes concerns about the effects on fish habitat and on commercial fishing off the shores of the project area. The amount of harvest and the method of access will determine the use and development of LTF sites.

This issue will be assessed by comparing alternatives for the number of LTF sites to be developed, LTF location and acreages affected, expected volume of timber to be delivered to each LTF, LTF compliance with Alaska Timber Task Force (ATTF) guidelines (developed to minimize impacts to marine resources), type of facility, and area of marine habitat affected. Effects to fisheries resources are measured by: the number of road crossings of Class I and II streams; and acres harvested and roaded in high hazard (Class III) soils.

1.5.3. Issue 3: Wildlife

This issue is focused on the potential effects of timber harvest on wildlife habitat and populations of wildlife associated with old-growth forest conditions. This issue includes concerns about the effects of logging activities, and the subsequent access that logging roads provide, on species such as mountain goat.

This issue is measured by the changes in habitat quality and/or wildlife habitat capability for each management indicator species (MIS), as well as to other species of importance to the public. Measurements are made by assessing changes to the amount, location, and connectivity of old-growth habitats among alternatives; the amount of new edge created; and alterations of habitat diversity and structure.

1.5.4. Issue 4: Subsistence

This issue is focused on the potential effects of logging activities on subsistence uses and resources within the project area. This includes concerns regarding the abundance and distribution of subsistence resources, access, and competition.

Increased access, human presence, and modifications as a result of development within the project area would both attract and discourage different users. The resource trade-offs in the initial development of an undisturbed area are described for hunters, gatherers, and fishers who have historically used the project area. The effects for new users, who would be attracted to a more accessible area, are described to the extent possible.

1.5.5. Issue 5: Scenery and Recreation

This issue is focused on the potential effects of logging activities on the scenic and recreation resources of the project area. This includes the concern that the experiences of both visitors and residents would be affected by changes in the scenery and recreational settings.

Effects are assessed by changes in the recreation opportunity spectrum (ROS), identification of resources important to recreationists, consistency of proposed harvest with the Forest Plan adopted Visual Quality Objectives (VQOs) for the project area, changes in anchorage sites, and amount of harvest near existing and proposed recreational sites. ROS and VQO are defined in the Glossary.

1.6. Issues Not Addressed in the EIS in Detail

In addition to the issues identified above, the effects of the alternatives on other relevant resources were also analyzed, including floodplains, wetlands, water quality, soil stability, biodiversity, cultural resources, and economics. These resources will be discussed briefly in Chapter 3 and Chapter 4. Some issues raised by the public are not project-specific or are the subject of pending decisions at a higher level of planning. Examples of issues or comments beyond the scope of this document follow:

1.6.1. Wild and Scenic Rivers

Will the proposed timber harvest affect consideration of the Rusty River (Salt Chuck) or Sandborn River as a Wild and Scenic River (WSR)?

The Wild and Scenic Rivers Act of 1968 established a program whereby selected rivers in the United States with “outstandingly remarkable” values would be protected. The Act created a national WSR system and outlined the process by which additional rivers or portions of rivers could be added to the system. There are currently no rivers in the Port Houghton/Cape Fanshaw project area that have been designated to this status.

When developing the TLMP Revision, all rivers were evaluated for eligibility into the WSR System. Rivers in the project area were determined to be ineligible because they had no rare, unusual, or exemplary riverine features and were not unique within the region.

Comments received during the public scoping process identified three rivers people would like considered for inclusion in the WSR system: (1) Sandborn River; (2) Rusty River, which flows from the Tracy Arm-Fords Terror Wilderness into the Salt Chuck; and (3) Glen Creek, which flows into the entrance of the Salt Chuck from the south. Although it was outside the project area, Farragut River was also included in the recommendation. None of the alternatives would affect the eligibility of these rivers for inclusion into the Wild and Scenic Rivers system.

Forest Service Handbook 1909.12, 8.11 defines how rivers will be considered for inclusion in the WSR system. The Tongass followed the direction to incorporate river studies into the TLMP planning process and found 112 rivers, in whole or in part, eligible for designation as part of the WSR system. The TLMP recommended 32 of the eligible rivers for inclusion in the WSR system.

All alternatives being considered for this EIS would preserve the option of reconsidering the eligibility of the Rusty River, Sandborn River, or Glen Creek in a future forest planning process.

1.6.2. Field Inventories

There has been additional field work since the initial field inventory work done for this project in the summer of 1994. Additional cultural resource inventory work was conducted during the summer of 1995 regarding an intertidal prehistoric site. Additional field work on goshawks was conducted in 1995, 1996, and 1997. Additional stream inventory and reclassification work was done in 1997. Additional marine inventory work was done at the LTF site in Little Lagoon in 1998. Though more information is always desirable, requests for other studies were considered and it was determined that additional data was not necessary in making a reasoned choice among alternatives.

1.6.3. Goldbelt, Inc. Land Exchange

A land exchange has been requested by Goldbelt, Inc. (a Native corporation) in the Hobart Bay area. No land within the Port Houghton/Cape Fanshaw project area is included in the request for exchange.

The Goldbelt, Inc. land exchange proposal, relative to the Port Houghton/Cape Fanshaw project, was evaluated considering Council of Environmental Quality (CEQ) regulations regarding connected, cumulative, or similar actions (40 CFR 1508.24(a)), and it appears that it would be inappropriate to include the Port Houghton/Cape Fanshaw project and the Goldbelt land exchange in the same EIS (Weber 1996). A separate analysis will be done for the effects of the proposed land exchange.

1.7. Permits and Licenses

To proceed with the timber harvest as proposed in this EIS, various permits must be obtained from other agencies. Administrative actions on these permits would take place after the FEIS is filed with the USEPA. The COE is a cooperating agency. The permitting agencies and their responsibilities are listed below.

U.S. Army Corps of Engineers (COE). Authorizes dredge or fill activities in the waters, including wetlands, of the United States (Section 404 of the Clean Water Act).

Authorizes structures that may impede navigation in navigable waters of the United States (Section 10 of the Rivers and Harbors Act of 1899).

U. S. Environmental Protection Agency (USEPA). Authorizes point source discharge based on a National Pollutant Discharge Elimination System (NPDES) review (Section 402 of the Clean Water Act).

State of Alaska, Department of Natural Resources (ADNR). Authorizes occupancy and use of tidelands and submerged lands.

State of Alaska, Department of Environmental Conservation (ADEC). Authorizes disposal with a Solid Waste Disposal Permit.

Issues a Certificate of Reasonable Assurance which is incorporated into the COE permit. This certifies that there is a reasonable assurance that the proposed activity will meet or exceed State water quality standards (Section 401 of the Clean Water Act).

U.S. Coast Guard. A Coast Guard Bridge Permit (in accordance with the General Bridge Act of 1946) is required for all structures constructed across navigable waters of the U.S.

U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). These agencies determine compliance with the Endangered Species Act.

1.8. Legislation and Executive Orders Related to This EIS

Shown below is a brief list of laws pertaining to preparation of EISs on federal lands. Some of these laws are specific to Alaska, while others apply to all federal lands.

Archeological Resources Protection Act of 1980
American Indian Religious Freedom Act of 1978
Alaska Native Allotment Act of 1906
Antidegradation Policy [40 CFR 131.12]
Executive Order 12962 (recreational fisheries)
Executive Order 11988 (floodplains)
Executive Order 11990 (wetlands)
Executive Order 11593 (cultural resources)
Executive Order 12898 (environmental justice)
National Historic Preservation Act of 1966
National Environmental Policy Act (NEPA) of 1969 (as amended)
Clean Air Act of 1970 (as amended)
Alaska Native Claims Settlement Act (ANCSA) of 1971

Marine Mammal Protection Act of 1972
Endangered Species Act of 1973
Forest and Rangeland Renewable Resources Planning Act of 1974
National Forest Management Act (NFMA) of 1976 (as amended)
Clean Water Act of 1977
Alaska National Interest Lands Conservation Act (ANILCA) of 1980
Federal Cave Resource Protection Act of 1988
Tongass Timber Reform Act (TTRA) of 1990
Native American Graves Protection and Repatriation Act of 1990
Coastal Zone Management Act (CZMA) of 1976 (as amended)
Wild and Scenic Rivers Act of 1968, amended 1986

1.9. Availability of the Planning Record

In general, the objective of this EIS is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated.

More detailed reports and references are available upon request at the Forest Supervisors' offices in Petersburg and Sitka, Alaska. Other reference documents such as the Forest Plan, the TTRA, the Resources Planning Act, and the Alaska Regional Guide EIS are available at public libraries around the region, as well as at the Assistant Supervisors' offices.

Chapter 2

Alternatives

Chapter 2

2. Alternatives Including the Proposed Action

This chapter summarizes the development of alternatives for timber harvest in the Port Houghton/Cape Fanshaw project area. The seven alternatives considered for the project area are discussed and compared in this chapter, as well as presented in more detail in Chapter 4. After this comparison, the Forest Service preferred alternative is presented. Specifically, this chapter presents the following information:

- alternative formulation process,
- alternative development for the Port Houghton/Cape Fanshaw project area,
- alternatives considered but eliminated from detailed study,
- alternatives considered in detail,
- actions common to all alternatives, and
- a summary comparison of alternatives.

2.1. Development of Alternatives

Each alternative presented in this EIS represents a different response to the issues discussed in Chapter 1. Six action alternatives were developed that meet the stated purpose and need of the project. Each action alternative consists of a site-specific proposal developed through interdisciplinary discussion and evaluation. The locations of units and roads are based on ground verification of all units and roads considered, along with aerial photo, topographic map, and geographic information system (GIS) review.

Each unit and road depicted in an alternative was ground-verified by a team of specialists. Most field effort encompassed: (1) investigating roads, landings, and unit boundaries; (2) conducting timber resource inventories and preparing silvicultural prescriptions; (3) flagging streams within and adjacent to units and crossed by roads; (4) flagging problem areas where mitigation is necessary to avoid impacts; and (5) field review of all sensitive soils within the vicinity of units and roads to verify the accuracy of soils classification, and to move units and roads out of extreme hazard soils.

Other field inventories performed by resource specialists determined existing conditions for their respective discipline. These activities included: (1) a search for caves and other karst features in the project area; (2) fish and water quality measurements in the vicinity of units and roads; (3) wildlife surveys for threatened, endangered, and sensitive species (TES); MIS; and other uncommon and common species; (4) marine surveys in the vicinity of LTF sites and within Port Houghton; (5) searches for sensitive plants; (6) a review of the recreational opportunities and use in the project area; (7) cultural resource investigations; and (8) determining visual sensitivity of units and roads in the project area and photographing viewpoints selected for analysis.

Using ground verification data and interdisciplinary team (ID Team) recommendations, units and roads were modified, deleted, or added to the unit and road pool. Unit and road cards were completed by the resource specialists. Units that could not be mitigated adequately were deleted.

The ID Team reviewed and analyzed the issues developed during scoping and identified the significant issues described in Chapter 1. Alternative themes were developed that addressed as many of the significant issues as possible. Units and roads were then selected from the field-inventoried unit and road pool to best complement a particular theme. Some issues did not drive alternative development but rather were used to compare the potential environmental effects of alternatives.

Each action alternative considered for detailed study meets the stated purpose and need of the project, which is to make timber available from the Port Houghton/ Cape Fanshaw project area in a manner consistent with the Forest Plan management direction/emphasis and the desired future condition for the project area.

Ecosystem management opportunities that were incorporated into alternatives were considered both at the landscape level (e.g., project area, VCU, watershed, or viewshed) and at the stand level (e.g., individual harvest unit). Some of these incorporated opportunities include:

At the landscape level,

- maintaining large, unfragmented blocks of old-growth forest;
- minimizing the amount of edge by designing larger harvest units; and
- using beach and estuary fringe and stream buffers as corridors between old-growth blocks.

At the Stand level,

- retaining snags in harvest units (where safety regulations allow);
- retaining individual live reserve trees or small patches of live reserve trees in clearcuts;
- using selective harvest systems to maintain visual quality and wildlife habitat for some species;
- using shelterwood harvest systems to maintain visual quality and wildlife habitat; and
- maintaining down woody material in harvest units.

2.2. Considerations in the Development of Alternatives

During field investigations, a six-digit numbering system was devised for the compilation of data in each harvest unit. The watershed number was used for the first three digits and the last three digits were used for the individual unit (e.g., unit 331049 is unit 49 within Forest Service Watershed 331). Because of the difficulty in mapping, this six-digit number was changed to a 1- to 3-digit number on the EIS alternative maps to maintain the integrity of the data. Both unit numbers will be referred to in the text but only the 1- to 3-digit number will be shown on the EIS maps in Chapter 2. For ease of reference, a crosswalk table of the unit numbers is provided at the end of Chapter 2 and in Appendix A.

2.2.1. Adaptive Management

The adaptive management concept was integrated into action alternatives and unit design for the proposed timber sale. It is a sequence of planning, acting, monitoring, evaluating, and adjusting future management actions based on information gained from the initial action. For the Port Houghton/Cape Fanshaw project, the actions are developed primarily from the implementation and monitoring of silvicultural prescriptions. These prescriptions were prepared based on interdisciplinary concerns and the most recent research conducted in the fields of soils science, forest regeneration, vegetation composition and control, wildlife habitats, and visual concerns. Some examples include combining silvicultural systems within units, combining logging systems within units, implementing salvage and group selection (as described below), developing approaches to take advantage of windthrow, and observing aesthetic differences among the varying silvicultural methods. The specific adaptive management approaches developed for the project area are described in detail in Appendices E and L which additionally include the monitoring and mitigation plans, respectively.

2.2.2. Salvage Areas

During field investigations, a 679-acre area (divided into three subareas [261, 271, 291]) within the South Fanshaw portion of the project area was observed to have a substantial number of Alaska yellow-cedar trees that are dead or dying. Many of the stands in this area have Alaska yellow-cedar components that range from 20 to 50 percent of the basal area. This area is recommended to be managed through selective helicopter harvesting of individual cedar trees. The intent is to remove salvageable dead or dying trees and leave trees that are healthy. Because of its high value, selective logging of Alaska yellow-cedar can result in an economic benefit, while conserving Alaska yellow-cedar growing stock and seed sources for natural regeneration.

Treatment areas for salvage were selected based on an existing contiguous forest cover that is at least 200 acres in size, the presence of Alaska yellow-cedar decline, and the feasibility of helicopter logging. Treatment areas are separated from Class I, II, and III streams by distances prescribed in the Forest Plan and avoid Very High Hazard soils, non-timbered low-productivity areas, high-volume areas of cedar, and areas of windthrow risk.

The planned entry cycle for the salvage area is every 20 to 25 years. Alaska yellow-cedar that are to be cut should be 24 to 30 inches diameter-at-breast height (dbh), and have tree characteristics that are undesirable as seed trees (such as a perched rooting system, suppressed crown class, dead, and diseased trees). Trees to leave in place are those with crown ratios of 35 percent or greater, no pathogen indicators, rooting systems that are not perched, minimal defects, and well-formed tops. Timber harvest volume is expected to range from 2 to 12 thousand board feet (MBF) per acre depending on specific stand conditions.

2.2.3. Group Selection Areas

Group selection is an uneven-aged timber management approach that would result in the harvest of groups that are approximately 2 acres in size or less. A group is considered similar to a forest gap; it is less than stand size but larger than the area occupied by a single tree. The proposed project recommends group selection on both a forest basis (large-scale) and unit (small-scale) basis. On a forest basis, five larger areas (into one to several stands) have been identified: 321 (164 acres), 322 (186 acres), 331 (45 acres), and 332 (151 acres), and 398 (151 acres).

Within each stand designated for group selection, selective cuts of up to 2 acres are recommended, and the stands would be helicopter harvested. All groups would be a minimum distance of 100 feet from Class I and II streams and would avoid Very High Hazard soils, non-timbered low-productivity areas, high-volume areas, and areas of windthrow risk. About 25 percent of these stands would be harvested every 30 years.

Because of the difficulty of tracking and controlling planting and other silvicultural operations on 2-acre (or less) units, natural regeneration would be used with this method. Most groups would likely regenerate to hemlock. Where possible, spruce and cedar would be left on group edges as a seed source.

The group selection harvest method is also recommended for harvest units as shown in Section 4.1.1.2. Group selection harvest within units would include helicopter, cable, and ground-based logging methods.

2.3. Alternatives Considered But Eliminated From Detailed Study

The following alternatives were considered but dropped from further evaluation.

2.3.1. 1995 Draft EIS Alternatives

The original Draft EIS for this project, published in 1995, included four action alternatives for harvesting timber in the project area. Although they were evaluated in the Draft EIS, they were not carried forward into this Revised DEIS. As discussed in Chapter 1, the original alternatives conflicted, to varying degrees, with the standards and guidelines and land use allocations in the new Forest Plan. Rather than modifying the old alternatives to make them consistent with the Forest Plan, it was decided that a broader range of alternatives, that could be more responsive to some issues, was needed. Hence, the old alternatives were dropped from further evaluation and new alternatives were developed.

2.3.2. Scenic Quality

An alternative was initially considered that would result in no units and roads being seen in the project area from the water. This was not possible because of the topography of the project area and the economics of having to balance timber harvest with the construction of facilities. It would not be possible to offset the costs of constructing a LTF and a road system to harvest only unseen areas of the project area. Furthermore, it would be unavoidable that the LTF would be visible from the water, which would conflict with the objective of the alternative.

2.3.3. Habitat Conservation Areas

Several public comments requested avoidance of initially recommended habitat conservation areas (HCAs) for all action alternatives. However, not all of the initially recommended HCAs met the basic criteria for HCAs. The HCA concept has been incorporated into the new Forest Plan through designation of Old Growth Habitat LUDs and all alternatives in this project are consistent with the new Forest Plan allocations.

2.4. Alternatives Considered in Detail

2.4.1. Alternative 1 (No-Action Alternative)

A no-action alternative is analyzed in this EIS and is a requirement of NEPA. In addition to being a viable alternative, the no-action alternative provides a benchmark for comparison of the action alternatives.

No harvest activities on National Forest system lands are planned in the project area for this alternative. Logging may occur on the Goldbelt, Inc. lands in the project area until harvest is completed in a few years. For the most part, conditions that currently exist in the project area represent the no-action alternative which is shown in the Alternative 1 figure.

2.4.2. Alternative 2 - Proposed Action

Alternative 2 helps maintain a current timber supply for the wood products industry throughout Southeast Alaska while also considering the need to provide strong protection measures for fish, wildlife, and other resources important to subsistence and recreation. Road management for this alternative includes a gate on the road near the Chatham and Stikine administrative boundary to minimize potential impacts to mountain goats from encounters with people in vehicles. The roads on the North Shore would be closed and allowed to naturally revegetate. This alternative attempts to address the broadest range of comments and concerns expressed by the public about the project, ranging from comments requesting specific areas to be avoided to others requesting the maximum harvest practicable for timber production.

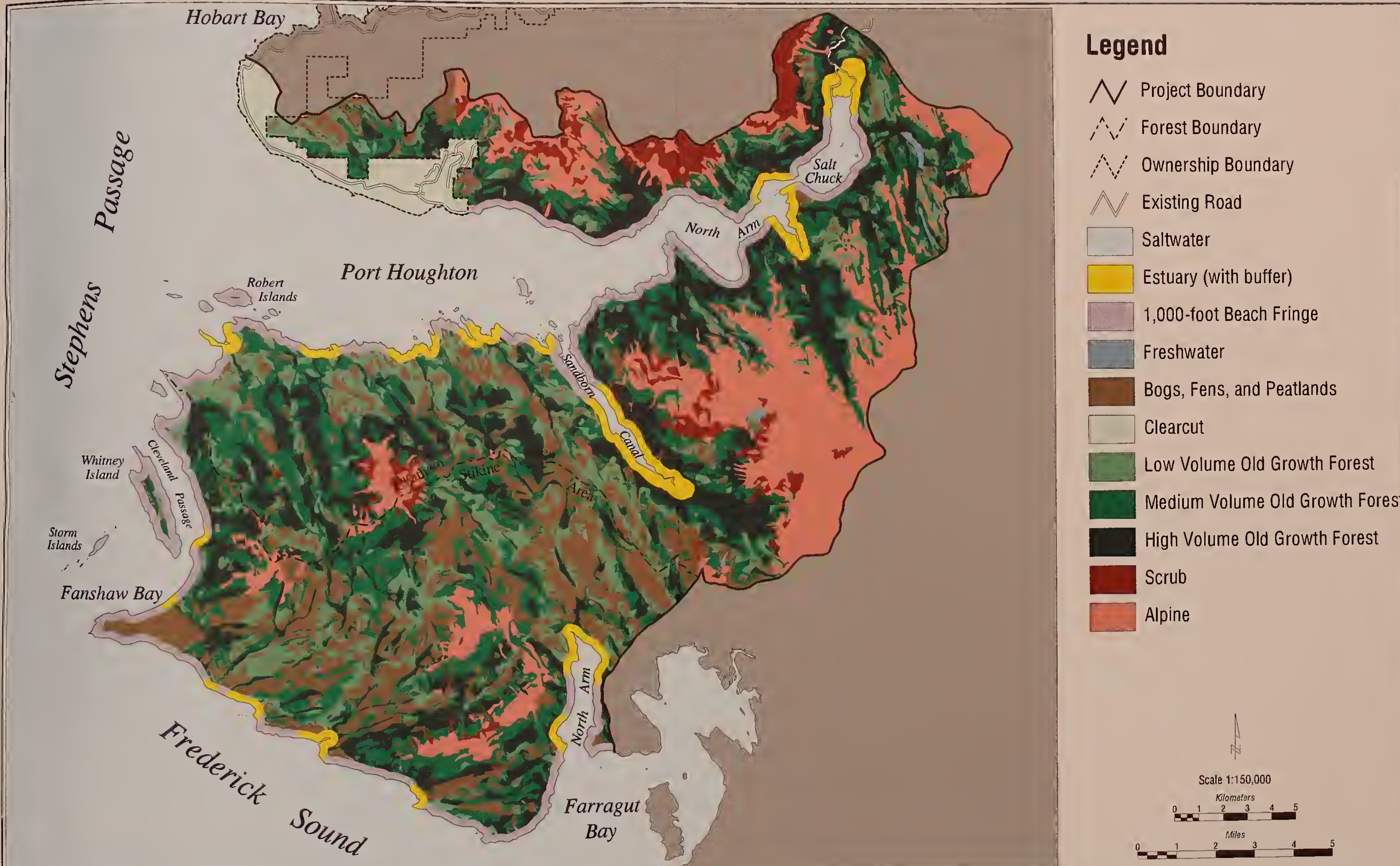
Alternative 2 has 100 units planned for harvest with a total of approximately 5,171 acres and a total timber volume of 121.7 MMBF (see Alternative 2 figure).

This alternative has four proposed silvicultural methods with 58 percent of the total unit acreage being harvested as either clearcut or clearcut with reserves. About 26 percent would be cut as shelterwood with reserves and 15 percent as sanitation salvage. Group Selection is planned for 1 percent of the total acreage that is proposed for harvest in Alternative 2. (See the Glossary for definitions of silvicultural methods.)

The majority of the acreage harvested (68 percent) would be logged using conventional logging systems. The other acreage is proposed to be harvested using helicopters.

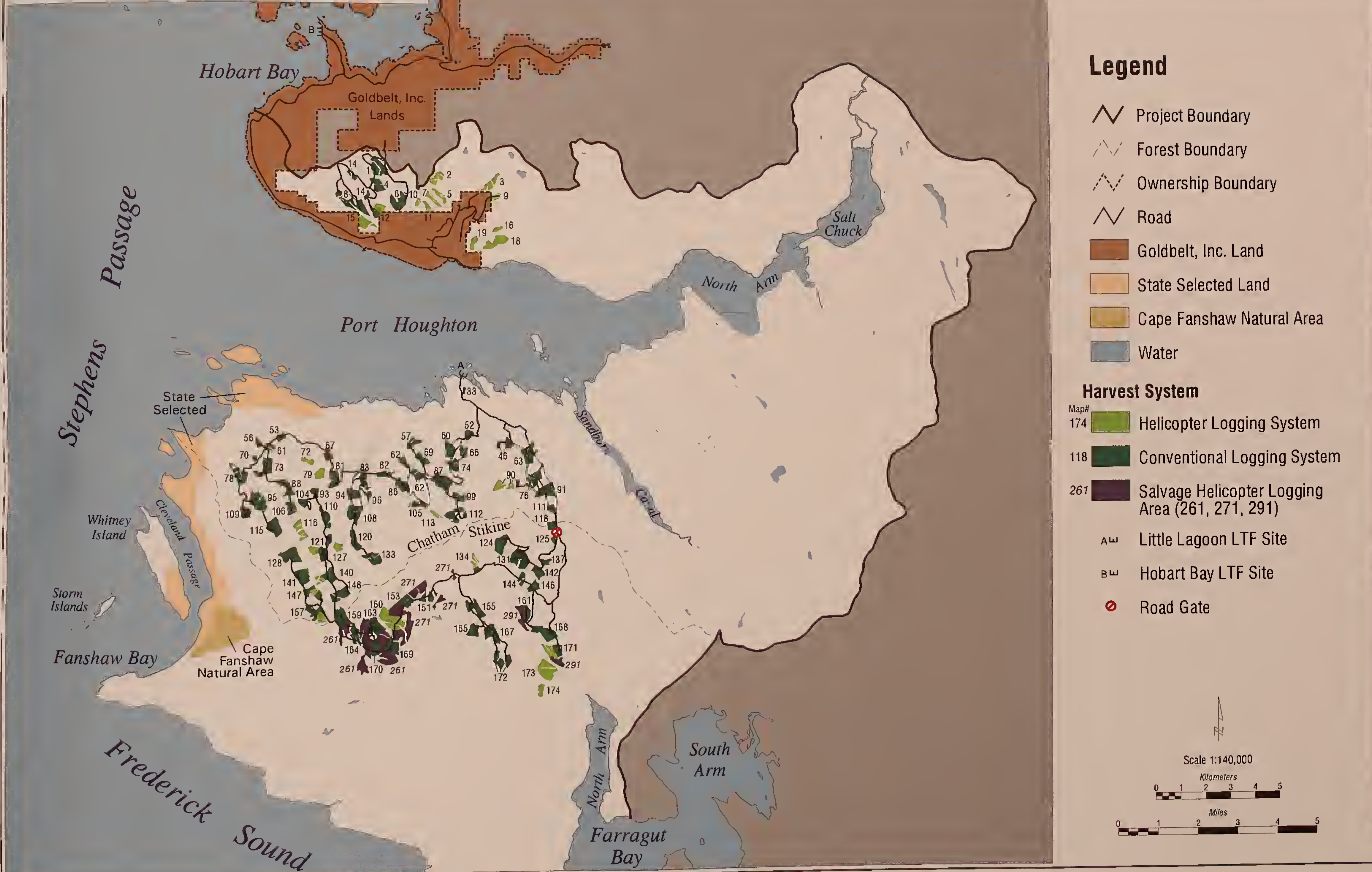
One new LTF (a low angle ramp with slide at Little Lagoon) is planned for Alternative 2 with 89 percent of the timber volume being transported through the Little Lagoon LTF (Table 2-1). The existing Hobart Bay LTF would be used for 11 percent of the timber volume.

Figure 2-1
Alternative 1 - No-action Alternative



Prepared by Parametrix, Inc. File: no_action.gra Date: July 14, 1998

Alternative 2 Harvest Units and Roads



Prepared by Parametrix, Inc File: rdunitalt2.gra Date: July 14, 1998

About 78 miles of road would be constructed to harvest and transport timber to the LTFs (Table 2-2). Specified road construction would be utilized on 82 percent (64 miles) with the remaining 18 percent (14 miles) being temporary construction. (See Glossary for definitions of specified and temporary roads.)

Table 2-1.
Timber Volume (Net Sawlog MMBF) to be Transported at Each LTF

	Alternative						
LTF Site	1	2	3	4	5	6	7
Little Lagoon	0	94.8	- -	110.3	57.1	20.8	85.7
Hobart Bay[1]	0	12.0	9.4	11.8	12.0	- -	- -
Total	0	106.8	9.4	122.1	69.1	20.8	85.7

[1]Existing LTF site on private land outside of the project area.
Source: Jenkins 1998.

Table 2-2.
Estimated Total Road Construction Mileage

	Alternative						
VCU	1	2	3	4	5	6	7
79	- -	- -	- -	- -	- -	- -	- -
80	- -	- -	0.2	- -	- -	- -	- -
81	- -	7.2	- -	4.1	7.7	- -	- -
82	- -	26.0	- -	- -	9.5	- -	21.6
83	- -	21.7	- -	28.0	10	22.9	25.5
84	- -	- -	- -	27.8	- -	- -	- -
85	- -	- -	- -	- -	- -	- -	- -
86	- -	3.3	- -	3.3	3.3	- -	3.3
87	- -	6.0	- -	6.0	6.0	- -	6
88	- -	- -	- -	- -	- -	- -	- -
89	- -	14.5	- -	23.0	14.5	0.1-	15.8
Total	- -	78.6	0.2	92.2	51.00	23.0	72.2

Source: Jenkins 1998.

2.4.3. Alternative 3

The objective of this alternative is a small sale on the northshore of Port Houghton that does not require construction of permanent roads. Timber harvest has already occurred on adjacent private land so the area has lost its unroaded character. Some infrastructure is already in place in the form of the Goldbelt, Inc. road system and LTF in Hobart Bay. The Cape Fanshaw Peninsula would be avoided to preserve its unroaded character.

Fourteen units are planned for harvest in Alternative 3. All of the timber harvest for Alternative 3 would occur in the North Shore portion of the project area (see Alternative 3 figure). Total timber volume is 11.4 MMBF. Approximately 550 acres would be harvested.

No new LTFs are planned for Alternative 3. The existing Hobart Bay LTF would be used to transport all of the timber volume.

This alternative has two proposed silvicultural methods with 60 percent of the acreage being harvested as either clearcut or clearcut with reserves. About 40 percent would be cut as group selection harvest areas. All units would be harvested using helicopter logging.

There is no specified road construction for this alternative. However, there is 0.20 mile of temporary road planned. This will access a helicopter landing location north of unit 381139 (19). This landing will be used to helicopter log units 381138 (16), 381140 (18), and 381139 (19).

2.4.4. Alternative 4

The primary objective of Alternative 4 is to include as many units from the unit pool within Forest Plan goals and objectives and consistent with standards and guidelines (see Alternative 4 figure). This alternative is most responsive to the timber industry concern for a long-term timber supply and their desire to obtain full production from lands allocated in the Forest Plan to the Timber Production LUD. The roads on the North Shore would be put to bed but the roads on the Fanshaw Peninsula would be maintained but gated near the LTF in Little Lagoon.

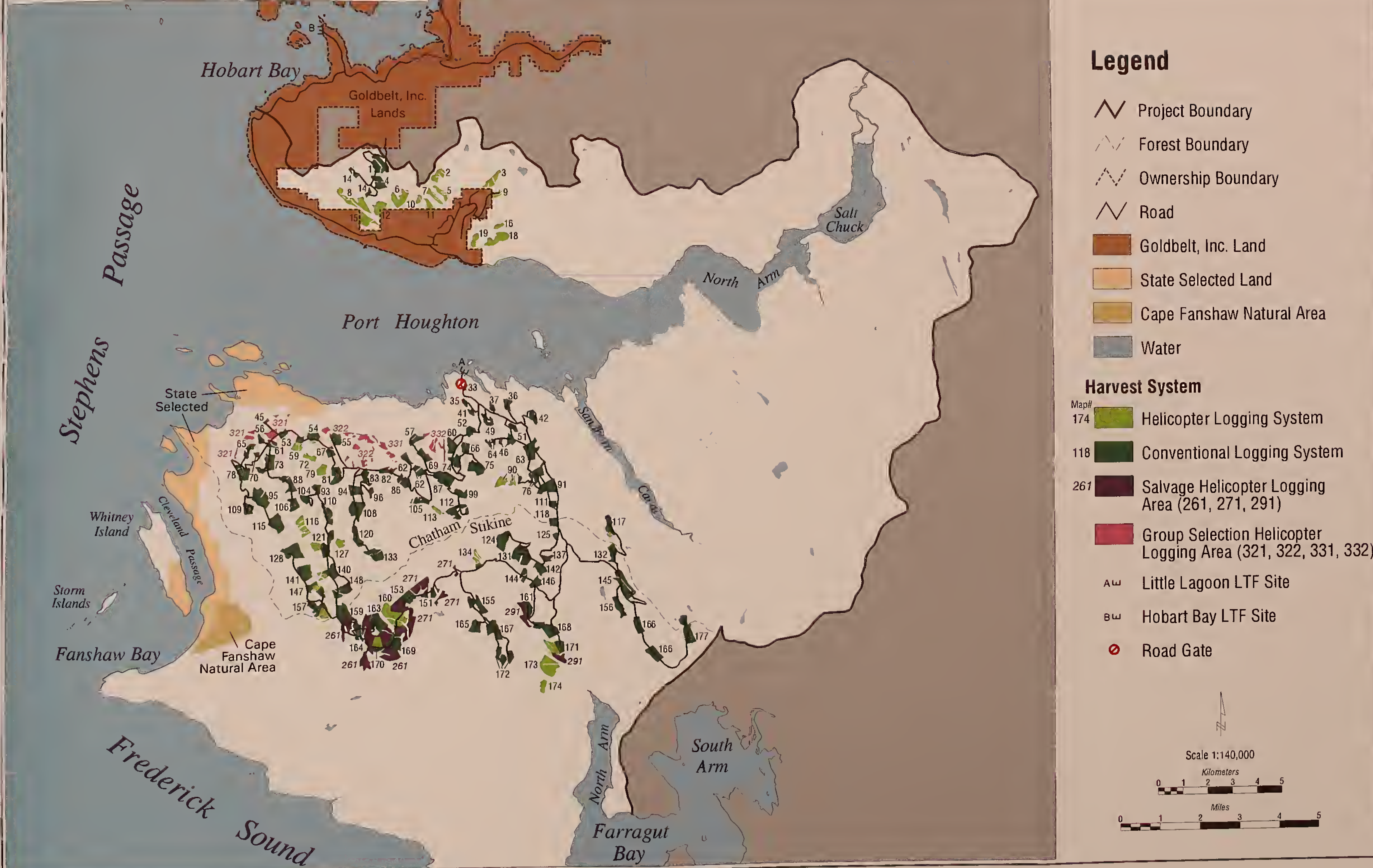
Alternative 4 has more harvest units and acres than any other action alternative with 124 units and 6,224 acres planned for harvest, including road right-of-way acreage. Total timber volume is 138.9 MMBF.

This alternative has four proposed silvicultural methods with 55 percent of the total acreage being harvested as either clearcut or clearcut with reserves. About 27 percent would be cut as shelterwood with reserves and 5 percent as group selection. Sanitation salvage is planned in 12 percent of the acreage being harvested, which would occur in the South Fanshaw area.

Alternative 3 Harvest Units and Roads

Prepared by Parametrix, Inc File: rdunitalt3.gra Date: July 14, 1998

Alternative 4 Harvest Units and Roads



Prepared by Parametrix, Inc File: rdunitalt4.gra Date: July 14, 1998

The majority of the acreage harvested (67 percent) would be harvested using conventional logging systems. Helicopter logging would be used for the remaining acreage (33 percent).

One new LTF (Little Lagoon) is planned for Alternative 4 with 90 percent of the timber volume being transported through the Little Lagoon LTF (Table 2-1). The existing Hobart Bay LTF would be used to transport 10 percent of the timber volume.

This alternative has the highest amount of new road construction (Table 2-2). About 92 miles of road would be constructed to harvest and transport timber to the LTFs. Specified road construction would be used on 80 percent (74 miles) with the remaining 20 percent (18 miles) being temporary construction.

2.4.5. Alternative 5

The objective of this alternative is to focus timber harvest on the north shore of Port Houghton and towards the middle of the Fanshaw Peninsula (see Alternative 5 figure). This alternative emphasizes visual resource protection and avoids Haystack, Placer and Negro Creek watersheds, which have anadromous streams. Roads in the North Shore area would be closed and allowed to revegetate naturally following timber harvest but roads to the Little Lagoon LTF would be maintained for future entries, but gated near the LTF. Sixty-five units are planned for harvest in Alternative 5. Total timber volume is 77.7 MMBF with 3,706 acres being harvested.

This alternative has four proposed silvicultural methods with 57 percent of the unit acreage being harvested as either clearcut or clearcut with reserves. About 20 percent would be cut as shelterwood with reserves. About 2 percent would be cut as group selection. Sanitation salvage is planned for 21 percent of the acreage being harvested.

The majority of the acreage harvested (61 percent) would be harvested using conventional logging systems. Helicopter logging would be used for the remaining acreage (39 percent).

One new LTF (Little Lagoon) is planned for Alternative 5 with 83 percent of the timber volume being transported through the Little Lagoon LTF (Table 2-1). The existing Hobart Bay LTF would be used to transport 17 percent of the timber volume.

Approximately 51 miles of road would be constructed to harvest and transport timber to the LTF (Table 2-2). Specified road construction would be utilized for 80 percent (41 miles) with the remaining 20 percent (10 miles) being temporary construction.

2.4.6. Alternative 6

The objective of Alternative 6 is to avoid potential cumulative effects of timber harvest in the North Shore area and to establish minimal infrastructure on the Fanshaw Peninsula (see Alternative 6 figure). This alternative would avoid concerns about timber harvest on mountain goat winter range and concerns about the effects of roads on goat mortality or migration between areas of suitable habitat. Roads would be maintained but gated near the LTF. Twenty-five units are planned for harvest in Alternative 5. Total timber volume is 23.4 MMBF with approximately 951 acres being harvested.

This alternative has two proposed silvicultural methods with 58 percent of the acreage being harvested as either clearcut or clearcut with reserves. About 42 percent would be cut as shelterwood with reserves. No sanitation salvage or group selection harvest is planned.

All units would be harvested using conventional logging systems. There would be no helicopter logging.

One new LTF (Little Lagoon) is planned for Alternative 6 with all of the timber volume being transported through the Little Lagoon LTF (Table 2-1).

Approximately 23 miles of road would be constructed to harvest and transport timber to the LTF (Table 2-2). Specified road construction would be utilized for 84 percent (19 miles) with the remaining 16 percent (4 miles) being temporary construction.

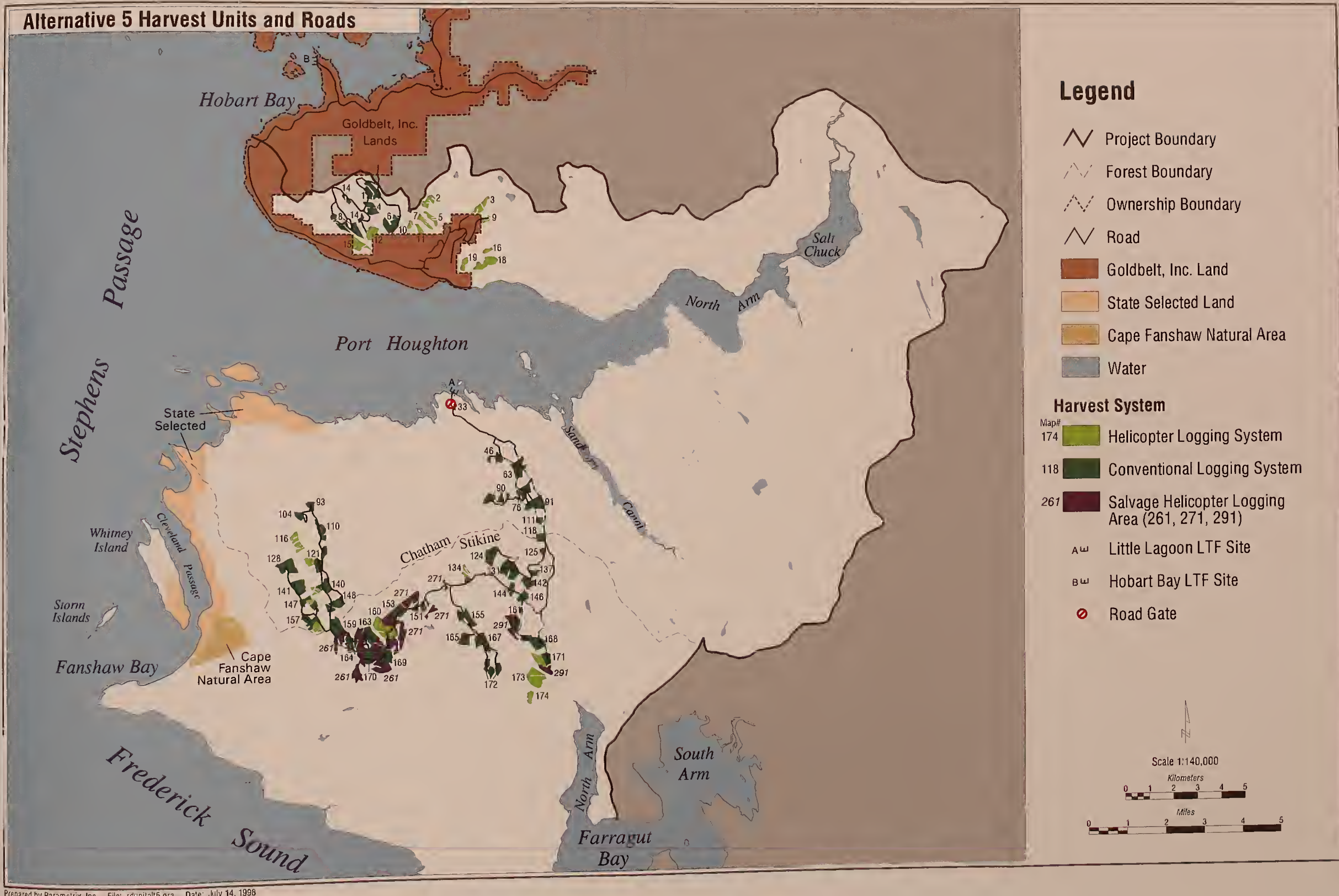
2.4.7. Alternative 7

The objective of Alternative 7 is to emphasize economics by favoring ground-based logging systems. This alternative would harvest the most volume using ground-based logging systems for the miles of road built, and would be most responsive to concerns about economical timber sales. No units would be harvested in the North Shore area (see Alternative 7 figure). Roads would be maintained and left open following timber harvest. Seventy-six units are planned for harvest in Alternative 7. Total timber volume is 98.8 MMBF with approximately 3,489 acres being harvested.

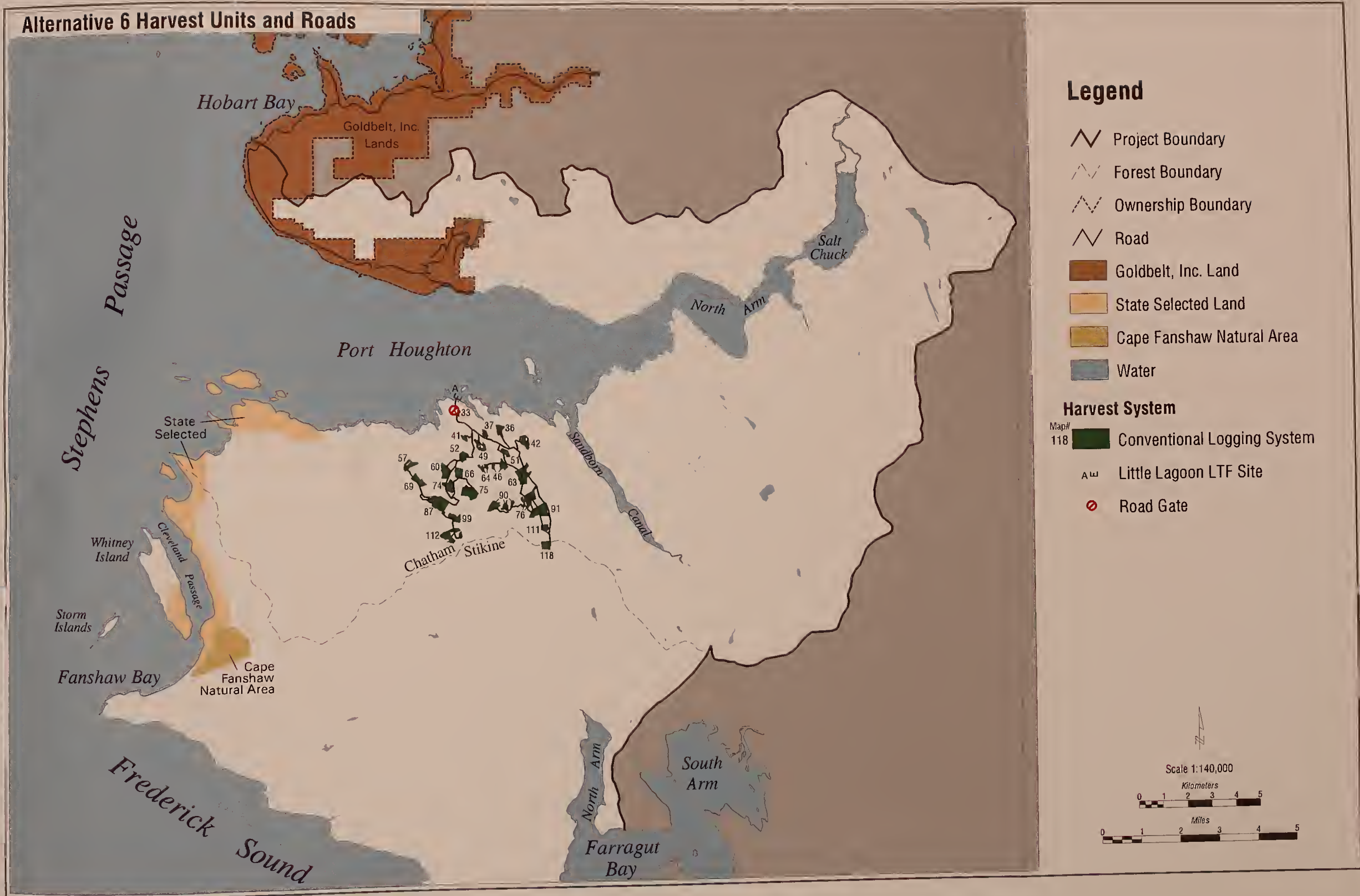
This alternative has two proposed silvicultural methods with 88 percent of the acreage being harvested as either clearcut or clearcut with reserves. About 12 percent would be cut as shelterwood with reserves. No sanitation salvage or group selection harvest is planned.

All units would be harvested using conventional logging systems. There would be no helicopter logging.

One new LTF (Little Lagoon) is planned for Alternative 7 with all of the timber volume being transported through the Little Lagoon LTF (Table 2-1).



Alternative 5 Harvest Units and Roads
Hobart Bay
Goldbelt, Inc. Lands
Stephens Passage
Port Houghton
North Arm
Salt Chuck
Sanborn Canal
State Selected
Whitney Island
Cleveland Passage
Storm Islands
Fanshaw Bay
Cape Fanshaw Natural Area
Chatham / Stikine
Frederick Sound
North Arm
South Arm
Farragut Bay
Legend
Project Boundary
Forest Boundary
Ownership Boundary
Road
Goldbelt, Inc. Land
State Selected Land
Cape Fanshaw Natural Area
Water
Harvest System
Map#
174 Helicopter Logging System
118 Conventional Logging System
261 Salvage Helicopter Logging Area (261, 271, 291)
A Little Lagoon LTF Site
B Hobart Bay LTF Site
Road Gate
Scale 1:140,000
Kilometers
Miles
Prepared by Parametrix, Inc File: rdunitalt5.gra Date: July 14, 1998



Prepared by Parametrix, Inc File: rdunitalt6.gra Date: July 14, 1998

Alternative 7 Harvest Units and Roads

Prepared by Parametrix, Inc File: rdunitalt7.gra Date: July 14, 1998

Approximately 72 miles of road would be constructed to harvest and transport timber to the LTF (Table 2-2). Specified road construction would be utilized for 83 percent (60 miles) with the remaining 17 percent (12 miles) being temporary construction.

2.5. Actions Common To All Action Alternatives

All action alternatives would include building roads and use of LTFs, harvesting timber, and providing camp facilities for workers. For each of these activities, a range of options and methods is described below.

2.5.1. Roads

Timber harvest in Southeast Alaska typically requires a road network to transport logs from harvest units to LTFs. This network consists of specified and temporary roads built to appropriate standards to support the planned traffic and to minimize environmental impacts. Roads are normally intended to provide long-term access for recurring resource management activities. Temporary roads are constructed (when needed) for one-time, short-term harvest access. These roads generally serve only one or two harvest units. After log haul is completed, temporary roads are obliterated by water barring the roadbed and removing drainage structures. Planned road construction mileages are shown for each alternative in Table 2-2.

Potential rock sources are noted on the road and unit cards. A rockpit will be developed in unit 332050 (33) to initiate construction on the Little Lagoon LTF and the road system on the Fanshaw peninsula.

Where roads cross streams in the project area, culverts or bridges are planned to allow continuous stream flow. Bridges are proposed where (1) large volumes of water must be crossed, (2) there is a heavy bedload of woody debris or rock, and/or (3) fish habitat protection is necessary.

Bridges on specified roads would be designed to pass a 50-year flood event. Bridge construction materials would include steel, concrete, treated timber, and log stringers. Bridges built on temporary roads would be removed when the road is obliterated. Culverts would be installed in small drainages to provide relief drainage under the road when needed. Culverts would be sized for a 50-year flood event, with additional allowance for bedload passage. Culverts placed in Class II streams would be installed to permit fish passage.

Both the TTRA and the Forest Plan require that best management practices (BMPs) be used to prevent degradation of streams during and after road construction and road obliteration. The BMPs control any instream construction work. Fish passage requirements for Class I and II stream crossings are also specified. BMPs for this project are considered standard operating procedures and would be applied automatically.

Following construction, the road system would be managed to provide the necessary access to meet land use objectives and activities. Environmental protection, user safety, and preservation of improvements for future use are all considered when formulating a road management plan. Roads may be physically or administratively closed, obliterated, or maintained open. Commonly used methods of road closure include signing, barricading, gating, and alder encroachment. Roads that are permanently closed would have all drainage structures removed to provide free passage of storm runoff. Rock can also be removed to the extent practicable from temporary roads and used in other road construction.

The U.S. Army Corps of Engineers considers the proposed roads exempt from Section 404 of the Clean Water Act regulations because the roads are intended for silvicultural use. Section 404 concerns dredge or fill activities in wetlands.

The Forest Service has easements for use of the Goldbelt, Inc. roads needed to access units 381133 (3), 381135 (9), 381140 (18), and 381139 (19). Additional easements would have to be negotiated to access the other units at North Shore.

2.5.2. Log Transfer Facilities

One new LTF site was identified for timber transport in the project area (see alternative maps for location), in addition to planned use of the existing Hobart Bay LTF site on Goldbelt, Inc. lands for units in the North Shore portion of the project area. The Forest Service has an easement for use of the Hobart Bay LTF. The volume of timber transferred from each LTF site varies by alternative (Table 2-1) with the majority of the timber being transferred through the Little Lagoon site, except for Alternative 3.

Low-angle ramp and slide and bulkhead type LTF facilities were considered for this project. A low-angle ramp with slide is considered best suited for the geography and management objectives of the Little Lagoon site. A low-angle ramp with slide is less expensive to build, operate, and maintain than bulkhead type facilities, it minimizes the area of intertidal fill, and has the flexibility to accommodate large and small timber sales. This facility would be most compatible with desires for small timber sales.

2.5.2.1. Low-Angle Ramp and Slide

Ramp - The low-angle ramp is constructed on a 10-12 percent grade, utilizing shot rock. The running surface width of the ramp varies from 20 feet, for a 1-2 year operation, to a width of 30 feet for longer life. The design includes armor rock for protection from wave action. The low end of the ramp terminates at a -2.0 foot elevation. A log stacker or front end loader carries the log bundle down to the ramp and places the bundle in the water. The ramp has a low profile and blends in with the surrounding terrain. Construction costs are low ($5-15,000) and the footprint is kept to a minimum (less than 0.25 acre). Velocity of entry for the log bundles into the water is considered zero.

Slide - The low-angle slide is constructed in a similar manner as a ramp with the addition of steel pipe rails being placed on the ramp surface. The running surface width of the ramp is typically 30 feet. Steel pipe rails are placed on the ramp. The low ends of the rails terminate at a -2.0 foot elevation and the top end of the rails is +15.0 feet. A log stacker or front end loader places the log bundles on the rails and pushes the bundles down the rails till they float off. The low-angle slide has a low profile and blends in with the surrounding terrain. Construction costs vary depending on the site conditions ($50-80,000). Between periods of nonuse, the rails can be taken out and used on other sites. The footprint is kept to a minimum (less than 0.25 acre). Velocity of entry for the log bundles into the water is less than 3 feet/second.

2.5.2.2. Bulkhead

Bulkheads are used as a platform to place log bundles directly into the water for rafting or onto a barge. Bulkheads have been constructed from a variety of materials of which the most common is the native log crib. Steel rail cars and sheet piling are two other types of material in use. Some advantages of bulkheads are decreased impacts from sinking logs and bark deposition and dispersal, whereas disadvantages are increased visual impacts when barges are loading logs and limitations for use by small operators contracted for smaller timber sales.

A-Frame or Crane - Bulkheads used to transfer logs directly to the water for rafting are sited in water depths of as little as -2.0 feet with a top elevation of +22-24 feet. The face of the bulkhead is 60-80 feet wide. An A-frame or crane is used to lift the log bundles off the trucks and lower them into the water. Entry velocity is controlled by the design of the system and the operator. The area of intertidal fill depends on the slope of the shoreline (less than 0.50 acre). Large quantities of shot rock fill are needed. This type is suited for beaches with steep gradients. Construction costs range from $40-80,000, excluding the cost of the hoist and A-frame. The visual profile is higher than for the ramp type.

Small Barge - Bulkheads used to transfer logs to a small barge are sited in water depths of -12.0 feet with a top elevation of +12.0 feet. The face of the bulkhead is 30-40 feet wide. Construction costs are low and range from $10-20,000. The footprint is kept to a minimum (less than 0.25 acre). This bulkhead can be used also for equipment off-loading, minimizing impacts to the intertidal waters. Small barges carry approximately 250-500 MBF.

Large Barge - Bulkheads used to transfer logs to a large barge are sited in water depths of -20 to -24 feet with a top elevation of +24.0 feet. The face of the bulkhead is 40 feet wide. Construction costs are high and range from $150-300,000. The footprint is usually less than 0.40 acres. The large barge bulkhead also requires a separate equipment off-loading facility. Large barges typically carry approximately 1-2 MMBF. This facility is designed for permanent installations and has a 40-50 year design life.

2.5.3. Scale Yard and Decking Areas

Forest Service log accountability requirements include on-site scaling, when possible. Barging of logs requires a decking area of sufficient size to hold one or more barge loads of logs. Ample land area is available for these activities at several alternative sites near the proposed Little Lagoon LTF, as well as 1 to 3 miles south of the LTF (Appendix K). One or more areas of 3 to 5 acres would be cleared and rocked for these purposes. Visual screening from the beach would be achieved by the topography and a 100-foot buffer of standing timber (Appendix K).

There is an existing 4-acre scaleyard adjacent to the Hobart Bay LTF.

Ancillary facilities usually sited at a sort yard, or else at the camp, would include rough-lumber buildings for equipment storage and repair, small administrative buildings, a diesel generator, and fuel storage tanks.

2.5.4. Camps

An estimated work force of between 50 and 150 people would be needed to harvest the timber in the action alternatives. These people and the families of some would be housed in either a land or floating camp. If a land-based camp is proposed by the operator, it would likely be constructed during the first year of operations, while roads are being built. Normally, camps are sited as close as possible to LTFs without being so close as to interfere with operations.

A land camp would require the clearing of an area of 10-20 acres. The only area of suitable contour that meets all camp criteria is adjacent to Little Lagoon (Appendix K). Living and office space would be within modular structures and mobile homes. Garbage would be disposed of in an incinerator. Sewage would be disposed of in a drain field. A diesel generator would provide electricity. There is a Forest Service administrative cabin near Little Lagoon that would be used to support timber sale layout and administration. A radio repeater may have to be positioned on the North Shore of Port Houghton for administrative and safety reasons in support of the timber sales.

There is an existing land camp near the Hobart Bay LTF. This is a private logging camp located on private land.

2.5.5. Windfirm Boundaries

All units were designed to minimize windthrow. Boundaries are located around topographical features and vegetative conditions that provide protection from wind. Natural windfirm areas, such as muskegs, are used as boundaries when available.

2.5.6. Water Quality

The TTRA requires a buffer zone no less than 100 feet wide on each side of all Class I and most Class II streams. The Forest Plan includes standards and guidelines for delineating the Riparian Management Area (RMA) for Class I, II and III streams plus an additional windfirm zone. The Forest Plan links RMA distances to specific channel type process groups (USDA-FS 1992). Protection of RMAs is in accordance with the intent of the Alaska Anadromous Fish Habitat Assessment (USDA-FS 1995b). Adjustments to the RMA standards and guidelines may be made after completion of a watershed analysis and if the channel process group objectives can be met (USDA-FS 1997a).

These features are incorporated into all action alternatives where harvest units are adjacent to these streams. The streams and their respective buffers are located outside of harvest units.

In addition to the RMA standards and guidelines, BMPs (USDA-FS 1996) would be employed to protect water quality and fish habitat during timber harvest activities. For Class IV streams, these measures may include directional falling of trees away from streams, partial or full suspension of logs, split-yarding, and removal of logging debris from stream courses.

TLMP also states that roads can be located in the RMA only when other feasible routes do not exist. Stream course protection plans are required for stream crossings and no borrow pits are allowed within the active floodplain. Primary objectives are to maintain fish passage and access to all available habitats and avoid diverting surface drainage channels.

2.5.7. Cultural Resources

Mitigation of adverse effects to significant sites would follow the procedures set forth in Section 106 of the National Historic Preservation Act of 1966 and 36 CFR 800. Following these procedures would ensure that the public's concerns about cultural resources are effectively mitigated. This includes data collection, site protection and preservation, as well as confidentiality of site information.

2.5.8. Enhancement Opportunities

Fisheries and recreation enhancement projects may be possible through funding under the Knutson-Vandenburg (KV) Act. This Act allows the Forest Service to collect receipts from timber sales for Sale Area Improvement (SAI) projects. The SAI plan may consider one or more fisheries or recreation enhancement projects. See Appendix J for specific enhancement opportunities.

2.5.9. Sale Packaging and Small Sale Opportunities

Sale packaging decisions are routinely made following the signing of the ROD for a project. Decisions to be made include: the number of sales to offer from the project, the volume to be offered with each sale, and the combination of roads and units and the mix of logging systems (helicopter and cable/shovel) in a particular sale. While the actual decision on whether to offer small sales of 5 MMBF or less from the Port Houghton project will be made in the future, some consideration of these sales can be made now.

In general, for sales of 0.5 MMBF or less, there should be minimal road building required, yarding by either shovel or trackloader (a small cable machine with short yarding distances) and harvest of mainly sawtimber, or at the least, inclusion of the minimum amount of utility volume. Sales of 0.5 to 2 MMBF are similar with the exception that short temporary road construction is feasible in certain cases, as long as rock pit development is not required. For sales of 2 to 5 MMBF, there can be temporary road construction with some minor rock pit development. Yarding should be limited to shovel and smaller, simple cable machines such as trackloaders and swing yarders. Some utility volume can be offered in the larger sales in this category. An operator can request approval to yard by helicopter.

Units requiring short sections of temporary or specified road offer good opportunities for small sales of over 0.5 MMBF. For those sales less than 0.5 MMBF, units on roads built under previous sales (including earlier scheduled sales from the same project) provide the best opportunities. No North Shore roads are planned to be left open following sale activities under any alternative, which could eliminate this area from consideration for small sales of less than 5 MMBF.

2.6. Comparison of Alternatives by Significant Issue

The comparison of alternatives draws together the conclusions from the materials presented throughout this EIS, and provides the results of the analysis in a brief summary. Tables 2-3 and 2-4 at the end of this chapter provide quantitative comparisons of the alternatives for the timber resource and other environmental resources, respectively. The following sections compare alternatives by significant issue, proposed activity, and environmental consequence. The baseline for comparing the alternatives is Alternative 1, the no-action alternative, which also represents existing conditions. Chapter 4 contains the detailed evaluation of the potential effects on the natural and social resources from timber harvest and road construction under each alternative.

2.6.1. Issue 1: Timber

No significant changes in timber volume class, plant associations, and dispersion of forested areas in the project area would occur for the no-action alternative. The only existing clearcuts in the project area occur on Goldbelt, Inc. land. The timber volume of old-growth forest that would be harvested would range from a low of 11 MMBF (net scribner volume) for Alternative 3 to a high of 140 MMBF for Alternative 4. Timber volumes by alternatives are displayed in Table 2-3 at the end of this chapter. Timber harvest planned in the project area would effect from 1 to 13 percent of the suitable available commercial forest land, and is directly correlated with acreage harvested.

The location of harvest within the project area varies among alternatives. Alternative 3 has harvest only on the North Shore of Port Houghton while Alternatives 6 and 7 do not include harvest on the North Shore. Alternatives 2, 4, and 5 have harvest distributed both on the Cape Fanshaw peninsula and on the North Shore of Port Houghton. No timber harvest is planned east of Sandborn Canal in any alternative.

The silvicultural methods vary by alternative but with clearcut and clearcut with reserve areas being the predominant method in all alternatives. Alternative methods to traditional even-aged silviculture (clearcutting), that include shelterwood, group selection and sanitation salvage, represent between 12 (Alternative 7) and 44 percent (Alternative 4) of the acreage harvested. Cable logging systems predominate in most alternatives (Table 2-3) with the exception of Alternative 3, which includes all helicopter logging. Alternatives 6 and 7 do not include any helicopter logging.

Alternative 7, with no helicopter yarding and the highest ratio of cable volume to miles of road, has the highest net stumpage value. Alternative 3, with the lowest total volume and all yarding by helicopter, has the lowest projected net stumpage value. Implementing Alternative 4, the highest volume alternative, would result in the most jobs and income generated. Implementation of the lowest volume alternative (Alternative 3) would provide the least jobs and income of any of the action alternatives (see Table 2-4 at the end of this chapter).

2.6.2. Issue 2: Marine Resources

Logging-associated disturbances in marine waters would occur in Port Houghton for all action alternatives. No marine disturbances would occur in the vicinity of Farragut Bay. These disturbances are related to construction and use of LTFs (Table 2-1). All action alternatives, except Alternative 3, would result in the construction of one LTF in Little Lagoon. Alternatives 2, 4, and 5 would additionally require use of the existing Hobart Bay LTF site. Alternative 3 would use the Hobart Bay LTF site exclusively. The Little Lagoon LTF site would be constructed for long-term usage. Impacts from LTF development include fill (less than one acre), bark deposition and dispersion (less than one acre), and shading below log rafts and floating camps. Commercial fisheries could be temporarily displaced while log rafts or barges move through Port Houghton. None of the alternatives is expected to significantly affect the commercial fishing industry.

Sediment from roads has the most potential to adversely affect aquatic and marine resources. Generally, there is a direct correlation between the miles of road constructed and the amount of timber harvested. Alternative 4 proposes the most road construction and timber harvest and has the most stream crossings and miles of road in stream buffers for the action alternatives (see Table 2-4 at the end of this chapter). In contrast, Alternative 3 which proposes no specified roads and only two-tenths of a mile of temporary road, has no stream crossings or roads located in stream buffers. The ratio of the number of stream crossings to the amount of timber volume harvested (MMBF) for each alternative provides a rough comparison of the risk of potential adverse affects (Table 2-5). There is less risk associated with a low ratio. Among the alternatives that include specified road construction, Alternative 5 has the lowest risk of adverse effects for the amount of volume harvested.

Table 2-5
Ratio of Stream Crossings to Volume Harvested by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Number of Stream Crossings	0	136	0	141	72	35	121
Volume Harvest (MMBF)	0	121.7	11.4	140	77.7	23.4	99.0
Ratio	0	1.12	0	1.00	.93	1.50	1.22

2.6.3. Issue 3: Wildlife

Most of the 12 wildlife MIS carrying capacities would decrease from 0 to 7 percent under each action alternative compared to existing conditions. No changes in carrying capacity are predicted for the gray wolf, river otter, and bald eagle. Changes in carrying capacity are proportional to harvest volumes. In comparing carrying capacity decreases among all action alternatives, Alternative 3 has the least effect on carrying capacities and Alternative 4 has the greatest effect.

The three northern goshawk nests observed in the project area would be protected, consistent with Forest Plan standards and guidelines, in all alternatives. The one known wolf den would also be protected.

About 108 old-growth patches occur in the project area under existing conditions (Table 2-4). This number would be increased to a low of 113 patches (Alternative 3) up to a high of 310 patches (Alternative 4). The average size of old-growth forest patches is 818 acres under existing conditions, and would decrease to a low of 264 (Alternative 4) or a high of 777 (Alternative 3) acres. The largest old-growth patch is 56,316 acres under existing conditions, and would decrease to a low of 38,673 acres (Alternative 4) to a high of 56,316 acres (Alternatives 3). Interior area within old-growth patches is about 50,739 acres under existing conditions, and would decrease to a low of 42,032 acres (Alternative 4) to a high of 49,956 acres (Alternatives 3).

2.6.4. Issue 4: Subsistence

Consumption and subsistence use of the edible resources in the project area is not expected to change from existing conditions for all action alternatives. Presently, there is a low level of subsistence harvest due to the substantial distance of the project area from most user communities. However, there is the potential for new road access to increase subsistence harvesting of big game. There is not a significant possibility of a significant restriction on subsistence uses under any alternative.

2.6.5. Issue 5: Recreation and Scenery

The most substantial changes that would occur to recreation resources are the decreases in acres of Primitive ROS (see Glossary) and simultaneous increases in Roaded Modified ROS acres. Alternatives 2 and 4 would have the greatest impacts on the Primitive and Semi-Primitive experiences within the project area. Alternative 3 would have the least (Appendix I).

Five of the thirteen existing Recreation Places in the project area would be affected by the action alternatives. Noise impacts would be the greatest under alternatives 2 and 4. Alternative 3 would have the least impact because it would harvest the least amount of volume and only uses helicopter logging.

Visually, alternatives 2 and 4 would have the greatest impact and Alternative 3 would have the least overall impact. All alternatives would meet the visual quality objectives (VQO) adopted in the Forest Plan for the project area.

Implementation of alternatives 2, 4, 5, 6, and 7 would result in an increase in competition for recreation use and the recreation/tourism dollar in the project area if a camp is established in Little Lagoon. Alternative 3 would have less effect because it would use the established camp at Hobart Bay and logging activities would be of much shorter duration.

2.7. Mitigation Measures

The Forest Service uses mitigation and preventive measures in the planning and implementation of land management activities. The application of these measures begins during the planning and design phases of a project. They link to the overall Forest, Administrative Area, and Ranger District management direction and continue through all phases of subsequent forest management. The standards, guidelines, and direction contained in the Forest Plan, TTRA, Alaska Regional Guide, and applicable Forest Service manuals and handbooks have been used in the development of alternatives and design of harvest units and roads. Mitigation is described in detail in Appendix L.

2.7.1. Timber

Several silvicultural approaches have been developed for this project to mitigate concerns relative to tree species succession, wildlife habitat, cedar decline, tree infection, and windthrow. These concerns are mitigated through selection of regeneration methods that optimize natural disturbance regimes. The following problems have been analyzed for each unit. See unit cards for site specific mitigation (Appendix A).

Cedar decline is believed to result in a unidirectional succession that ultimately results in a climax community of bog or muskeg (Bormann 1989). This is caused by podzol formation, nutrient immobilization, and lack of soil disturbance. A technique to decrease cedar decline is deep mixing of the soil to restore soil productivity. For areas that have been identified with cedar decline, the proposed project would use deep mechanical disturbance (through windthrow) to bring mineral soils to the surface. Several areas have been identified where this technique can be applied. This approach is being applied under the adaptive management concept to mitigate the existing loss of cedar from podzol formation.

Increases in western hemlock regeneration and overstocked stands generally occur in logged areas of Southeast Alaska. Exposing mineral soils would provide a seedbed for Sitka spruce and Sitka alder. These new stands tend to have a rich understory flora that benefits wildlife. After the short-lived alder die out (40-80 years), the spruce is not likely to require thinning. Site productivity is increased since the alder fixes atmospheric nitrogen that is available for plant growth. Podzols are less likely to develop in these stands if this prescription is followed. Five units in the project area offer the greatest potential for successful regeneration response of spruce and alder.

Hemlock dwarf mistletoe (*Arceuthobium tsugense*) infects many western hemlock stands in the project area. Techniques to reduce dwarf mistletoe in new stands include clearcutting infected stands, insuring that infected trees are not remaining at unit perimeters to infect new stands, using larger units in infected stands to reduce the relative amount of area exposed to infected trees, using partial cut methods in areas without infected trees, cleaning heavily-infected stands after logging, and deferring cleaning of lightly-infected stands until precommercial thinning to allow this latter treatment as an opportunity to clear the stand of mistletoe.

Windthrow is the dominant natural disturbance mechanism in Southeast Alaska. The challenge of project design is to minimize the economic losses associated with windthrow while, at the same time, realizing some of the ecological benefits for wind as a disturbance mechanism. Windthrow was considered at the group level for sanitization salvage and group selection, and at the unit level for units designated as clearcut, clearcut with reserves, and shelterwood with reserves. Unit shape and orientation were modified to reduce likelihood of blowdown, except in areas where blowdown was preferred to allow ecological disturbance. Windthrow was considered both for avoidance and disturbance opportunities.

2.7.2. Marine

ATTF guidelines delineate the physical parameters that are desirable to construct and operate an LTF for the protection of marine resources. This includes locating an LTF where bark accumulation would have a low impact on marine resources. The guidelines include BMPs and mitigation measures that decrease environmental impacts from LTFs, log raft areas, and adjoining facilities. These guidelines include selecting a log entry system that represents the best practicable alternative which minimizes impacts from fill placement. Fill structures at the LTF site will be designed and constructed to avoid introducing fine sediments and organic matter into the water.

In-water construction, blasting, and filling will be timed to reduce impacts to marine and anadromous fisheries resources. Disposal of solid wastes will follow 18 Alaska Administrative Code (AAC) 60, which requires that solid waste be properly disposed of at an approved disposal site. The speed at which log bundles enter the water when a low-angle ramp system is used will be the slowest practicable speed achievable. The log transfer system and sort yard handling equipment will be operated and maintained to minimize the amount of petroleum and lubricating products from entering marine waters. All of the recommended marine protection measures above would be implemented for all action alternatives.

2.7.3. Wildlife

Mitigation measures for wildlife include preserving old-growth habitat and ensuring connectivity. Habitat preservation is accomplished through Old-Growth Habitat LUDs and protection of stream buffers, beach fringe, and estuary buffers. Silvicultural prescriptions include implementation of several measures favorable to some species of wildlife. These measures are slash retention, snag retention, green tree retention, and unit feathering. Construction and operational timing measures are also identified. Road closures are proposed under most alternatives to mitigate the effect of roads on wildlife.

2.7.4. Fish, Water Quality and Soils

BMPs are applied for the protection of fish, water quality, and soils in all units and roads for the project. These practices include modifying unit design to avoid very high mass movement areas, using partial to full-suspension logging systems in areas of high mass movement potential, utilizing no-cut buffers along Class III streams, requiring split-yarding and directional felling along selected Class IV streams to provide for stream bank and stream channel protection, and permitting no harvest within steep V-notch streams with high erosion potential. BMPs also include implementing measures to reduce surface erosion and drainage problems related to transportation including water barring and cross-draining roads, using appropriate stream crossing structure designs, seeding and fertilizing cut and fill slopes, locating and designing roads and landings for good drainage, dispersion of water; and to minimize erosion. Timing restrictions would be established for instream road construction activities to avoid impacts on fish populations.

Stream buffers are established for Class I, II, and III streams. Buffers exceed minimum requirements in areas where additional protection measures are needed, such as large floodplains, steep slopes, and areas of landslide potential.

2.7.5. Subsistence

Because most subsistence use involves harvesting fish and game, mitigation measures that protect or enhance fish and game resources will also protect and enhance subsistence activities. By placing units and roads away from beach and estuary fringe habitats and away from salmon bearing streams, mitigation measures were built into each of the alternatives considered in this EIS. Road closures proposed under some alternatives would mitigate some of the effects road access could have on subsistence uses.

2.7.6. Cultural Resources

Logging contractors and subcontractors would be informed of their responsibilities regarding findings relevant to cultural resources. Strict enforcement of the non-disclosure policy of cultural site locations would occur, as well as enforcement of the provisions of applicable laws.

2.7.7. Recreation and Scenery

Units are designed to mitigate potential visual impacts by incorporating components such as avoiding square corners and rigid geometry, avoiding thin screens of trees on ridgelines, following natural land forms with openings, avoiding long horizontal lines, having irregular clearing edges, and maintaining key viewsheds. For small boat users, the visual impacts would be most apparent in the Port Houghton viewshed where the view is already affected by the existing clearcuts on private land. Supporting facilities at the LTF would be screened by a buffer of shoreline trees of at least 100 feet wide, where practicable. None of the action alternatives propose units or roads in the areas with high or exceptional landscape character. Alternative silviculture methods that involve partial cutting are used to reduce visual impacts by softening the alteration to forest cover. Helicopter logging is also used to eliminate the need for roads which otherwise create the most significant and long-lasting visual impact.

2.8. Monitoring

Monitoring would be conducted to determine whether resource management objectives have been met. Monitoring results would be used to verify implementation and effectiveness of selected mitigation and protective measures in a timely manner. The monitoring plan recommended for this project is provided in Appendix E.

2.9. Identification of the Forest Service Preferred Alternative

The Forest Service has identified Alternative 5 as the Preferred Alternative. All of the alternatives will be examined before preparation of a Final EIS. Public comments will be taken into consideration, as well as additional information and analysis. Comments on the Preferred Alternative and the other alternatives in this Revised Draft EIS will be most useful if they focus on particular aspects of the alternatives that the reviewer either likes or dislikes. The final selected alternative may be the same as the Preferred Alternative, or a modified version, or an entirely different alternative.

Table 2-3
Port Houghton/Cape Fanshaw Alternative Summary

Item	1	2	3	4	5	6	7
Total Unit Acres:		5,171	550	6,224	3,706	951	3,489
Number of Units (Total 125):	0	100	14	124	65	25	76
Number of Unit Openings (Total 134):[1]	0	107	14	124	69	28	76
Average Acres/Unit:	0	52	39	50	57	38	46
Average MBF/Unit:	0	1,068	668	985	1,063	831	1,127
Total Net Sawlog MMBF:	0	106.8	9.4	122.1	69.1	20.8	85.7
Total Net + Utility (MMBF):	0	121.7	11.4	138.9	77.7	23.4	98.8
Average MBF/Acre:	0	22	21	21	20	22	26.5
Helicopter Portion MBF:	0	27,180	9,353	27,530	15,695	- -	- -
Helicopter Portion Acres:	0	1,338	550	2,206	899	- -	- -
Silvicultural Methods (% by acres)							
Clearcut & w/Reserves	0	58	60	55	57	58	88
Shelterwood w/Reserves	0	26	- -	27	20	42	12
Group Selection	0	1	40	5	2	- -	- -
Sanitation Salvage	0	15	- -	12	21	- -	- -
Overstory Removal	0	< 1	- -	- -	- -	- -	- -
Logging System (% by acres)							
Helicopter	0	32	100	33	39	- -	- -
Running Skyline	0	16	- -	20	12	29	30
Slackline	0	25	- -	22	21	18	30
Small Slackline	0	20	- -	18	19	44	30
Gravity Return	0	6	- -	6	8	9	8
Shovel	0	1	- -	1	1	- -	2
Highlead	0	< 1	- -	< 1	< 1	- -	< 1
Total Road Miles:	0	78.6	0.20	92.2	51.0	23.0	72.2
MBF/Mile Cable Yard:	0	978	- -	1,012	997	912	1,135
MBF/Mile Total Yard:	0	1,312	- -	1,307	1,289	912	1,135
Specified Road Miles:	0	64.2	0	74.1	40.7	19.4	59.6
MBF/Specified Mile Cable:	0	1,201	- -	1,224	1,245	1,062	1,361
MBF/Specified Mile Total:	0	1,612	- -	1,581	1,611	1,062	1,361

[1]Total unit openings are greater than the total number of units because some units were split into two or more parts because of stream buffers bisecting units.
[2]Road corridor width is greater than 50 feet and includes disturbance areas (ROW = right-of-way). ROW volume is not included in alternative totals.
Source: Jenkins 1998.

Table 2-4
Comparison of Environmental Consequences

Item	Alternative 1	2	3	4	5	6	7
Timber							
Species Composition of Harvest Acres (%)							
Western hemlock	0	63	40	62	58	67	65
Sitka spruce	0	17	21	17	16	17	17
Alaska yellow-cedar	0	13	1	14	17	11	14
Mountain hemlock	0	7	38	7	9	5	4
Marine							
Marine habitat filled (acres)	0	up to 0.2	0	up to 0.2	up to 0.2	up to 0.2	up to 0.2
Bark deposition/dispersion (acres)	0	up to 0.8	0	up to 0.8	up to 0.8	up to 0.8	up to 0.8
Little Lagoon LTF (MMBF)	0	94.8	0	110.3	57.1	20.8	85.7
Hobart Bay LTF (MMBF)	0	12.0	9.4	11.8	12.0	0	0
TES species effects	none	none	none	none	none	none	none
Wildlife Habitats (acres affected)							
Saltwater	0	< 1	0	< 1	< 1	< 1	< 1
Beach fringe	0	14	0	14	14	14	14
Scrub	0	< 1	< 1	< 1	<1	0	< 1
Forest volume strata low	0	785	85	1,288	563	303	623
Forest volume strata medium	0	2,510	261	2,818	1,840	258	1,523
Forest volume strata high	0	2,042	195	2,278	1,399	429	1,502
Bogs, fens, and peatlands	0	144	6	184	119	55	120
Alpine	0	1	0	1	< 1	< 1	< 1
Wildlife Carrying Capacities in number of individuals (percent decrease from existing conditions)							
Vancouver Canada goose	257	250 (3)	257 (0)	248 (4)	251 (2)	256 (< 1)	252 (2)
Brown creeper	4,156	3,897 (6)	4,146 (< 1)	3,879 (7)	4,028 (3)	4,110 (1)	3,956 (< 1)
Bald eagle	296	295 (< 1)	296 (0)	295 (< 1)	295 (< 1)	296 (0)	295 (< 1)
Hairy woodpecker	2,251	2,105 (6)	2,245 (< 1)	2,084 (7)	2,163 (4)	2,223 (1)	2,140 (5)
River otter	110 (0)	110 (0)	110 (0)	110 (0)	110 (0)	110 (0)	110 (0)
Marten	295	283 (4)	294 (< 1)	280 (5)	286 (3)	292 (1)	286 (3)
Sitka black-tailed deer	2,206	2,093 (5)	2,200 (< 1)	2,075 (6)	2,130 (3)	2,183 (1)	2,115 (4)
Mountain goat	312	309 (1)	311 (< 1)	308 (1)	309 (1)	312 (0)	311 (< 1)
Red squirrel	107,071	103,520 (3)	106,770 (< 1)	102,937 (4)	105,010 (2)	106,238 (1)	104,125 (3)
Red-breasted sapsucker	14,995	14,286 (5)	14,928 (< 1)	14,140 (6)	14,522 (3)	14,826 (1)	14,405 (4)
Black bear	278	260 (6)	278 (0)	258 (7)	262 (6)	271 (3)	260 (6)

Table 2-4 (continued)
Comparison of Environmental Consequences

Item	Alternative 1	2	3	4	5	6	7
Biodiversity							
Number of old-growth patches	108	279	113	310	246	153	247
Average old-growth patch size (acres)	818	297	777	264	343	571	343
Maximum old-growth patch size (acres)	56,316	50,823	56,316	38,673	52,474	54,977	51,692
Interior area of old-growth forest (acres)	50,739	43,221	49,956	42,032	45,871	49,425	45,266
% of old-growth in patches > 100 acres	98	97	98	97	97	98	97
% of old-growth in patches > 1,000 acres	97	94	97	95	95	96	96
Fish/Water Quality							
Road construction miles in stream buffers	0	13.0	0	15.6	7.7	0.6	9.7
Number of road crossings over streams							
Class I/II	0	56	0	62	31	26	57
Class III	0	80	0	79	41	9	64
Area in high potential erosion class soils (acres)	0	1,528	121	1,707	1,073	341	1,208
Geology/Minerals/Soils							
Effects on mining claims	none	none	none	none	none	none	none
Total acres of soil disturbance	0	233	5	273	138	57	212
% road miles ≥ 60% slopes	0	< 1	0	< 1	< 1	< 1	< 1
Unit acrs on ≥ 72% slopes	0	12	6	12	6	< 1	6
Unit acres in wetlands	0	526	80	697	433	59	204
Road acres in wetlands	0	133	0	146	104	36	108
Floodplain crossing in acres	0	17	0	19	9	6	16
Unit acres in Soil hazard	0	1,451	121	1,618	1,024	318	1,138
Class III	0	77	0	89	49	23	70

Table 2-4 (continued)
Comparison of Environmental Consequences

	Alternative						
Item	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Subsistence							
Significant Possibility of a Significant Restriction							
Salmon, finfish, shellfish	no	no	no	no	no	no	no
Deer	no	no	no	no	no	no	no
Waterfowl	no	no	no	no	no	no	no
Harbor seals	no	no	no	no	no	no	no
Furbearers	no	no	no	no	no	no	no
Bear	no	no	no	no	no	no	no
Cultural Resources							
Overall risk to cultural resources	none	low	low	low	low	low	low
Resource sites potentially affected	none	none	none	none	none	none	none
Recreation Opportunity Spectrum - % of acreage on National Forest Lands							
Primitive	50	26	49	25	26	46	27
Semi-Primitive Non-Motorized	38	38	37	36	49	37	41
Semi-Primitive Motorized	12	14	12	13	12	12	14
Roaded Modified	0	22	2	26	13	5	18
Commercial Recreation/Tourism Use and Income Summary							
Range of total recreation/tourism dollars generated	$48,010-$72,250/yr.	$27,380-$39,650/yr 43-45% decrease	Same as 1	Same as 2	Same as 2	Same as 2	Same as 2
Range of numbers of people willing to pay for recreation/tourism experience	84-134/yr	68-102/yr 19-24% decrease	Same as 1	Same as 2	Same as 2	Same as 2	Same as 2
Average days of use by groups generated dollars	136/yr	84/yr 38% decrease	Same as 1	Same as 2	Same as 2	Same as 2	Same as 2

Legend (by Map No.) for Unit Numbering scheme for Figures 2-2 to 2-7

Map #	Actual Unit #	Alternative
261	Salvage Area	2, 4, 5
271	Salvage Area	2, 4, 5
291	Salvage Area	2, 4, 5
321	Group Sel. Area	4
322	Group Sel. Area	4
331	Group Sel. Area	4
332	Group Sel. Area	4
1	311140	2, 4, 5
2	381131	2, 3, 4, 5
3	381133	2, 3, 4, 5
4	311142	2, 4, 5
5	381199	2, 3, 4, 5
6	311144	2, 3, 4, 5
7	381136	2, 3, 4, 5
8	311146	2, 3, 4, 5
9	381135	2, 3, 4, 5
10	312143W	2, 3, 4, 5
11	312143E	2, 3, 4, 5
12	311145	2, 3, 4, 5
14	311141A	2, 4, 5
14	311141B	2, 4, 5
14	311141C	2, 4, 5
15	311199	2, 3, 4, 5
16	381138	2, 3, 4, 5
18	381140	2, 3, 4, 5
19	381139	2, 3, 4, 5
33	332050	2, 4, 5, 6, 7
35	332051	4
36	332054	4, 6, 7
37	332053	4, 6, 7
41	332052	4, 6
42	333078	4, 6, 7
45	321004	4
46	332056E	2, 4, 5, 6, 7
46	332056W	2, 4, 5, 6, 7
49	332058	4, 6, 7
51	321009E	2, 4, 7
51	332055	4, 6, 7
52	332059	2, 4, 6, 7
53	321008	2, 4, 7
54	321006	4, 7
55	322031	4
56	321009W	2, 4, 7
57	332067	2, 4, 6, 7
59	321007	4, 7
60	332069	2, 4, 6, 7
62	331045N	2, 4, 7
62	331045S	2, 4, 7
63	333081	2, 4, 5, 6, 7
64	332057	4, 6, 7
65	321010	4, 7
66	332070	2, 4, 6, 7
67	322032	2, 4, 7
69	332068	2, 4, 6, 7
70	321011	2, 4, 7
72	321013	2, 4
73	321012	2, 4, 7
74	332071	2, 4, 6, 7
75	332072	4, 6, 7
76	333083W	2, 4, 5, 6, 7
78	321016	2, 4, 7
79	322033	2, 4
81	322034	2, 4, 7
82	331046	2, 4, 7
83	322035	2, 4, 7
86	331047	2, 4, 7
87	332073	2, 4, 6, 7
88	321017	2, 4, 7
90	333084X	2, 4, 5, 6, 7
90	333084Y	2, 4, 5, 6, 7
90	333084Z	2, 4, 5, 6, 7
91	333085	2, 4, 5, 6, 7
92	331048	7
93	322039	2, 4, 5
94	322037	2, 4, 7
95	321019	2, 4
96	322036	2, 4, 7
99	332074	2, 4, 6, 7
104	321018	2, 4, 5
105	331188C	2, 4, 7
105	331188H	2, 4
106	321199	2, 4, 7
108	322041	2, 4,,7
109	321022	2, 4
110	322040	2, 4, 5, 7
111	333086	2, 4, 5, 6, 7
112	331049	2, 4, 6
113	331187	2, 4
115	321023	2, 4
116	321197	2, 4, 5
117	333093	4
118	29198	2, 4, 5, 6, 7
120	322042	2, 4, 7
121	321025	2, 4, 5, 7
124	29107	2, 4, 5
125	29101	2, 4, 5, 7
127	322043	2, 4
128	321024	2, 4, 5, 7
131	29106	2, 4, 5, 7
132	33301	4, 7
133	322044	2, 4, 7
134	29111	2, 4, 5, 7
137	29102	2, 4, 5, 7
140	321027	2, 4, 5, 7
141	321026	2, 4, 5, 7
142	29103	2, 4, 5, 7
144	29105	2, 4, 5, 7
145	29126	4, 7
146	29104	2, 4, 5, 7
147	321028E	2, 4, 5, 7
147	321028W	2, 4, 5, 7
148	321029	2, 4, 5, 7
151	27102	2, 4, 5, 7
153	27105	2, 4, 5, 7
155	29112	2, 4, 5, 7
156	29125	4
157	321030	2, 4, 5, 7
159	26102	2, 4, 5, 7
160	27107	2, 4, 5, 7
161	29117	2, 4, 5
163	27108	2, 4, 5, 7
164	26103	2, 4, 5, 7
165	27113	2, 4, 5, 7
166	29127N	4, 7
166	29127S	4, 7
167	29113	2, 4, 5, 7
168	29119	2,,4, 5
169	27109	2, 4, 5, 7
170	27110	2, 4, 5, 7
171	29120	2, 4, 5
172	29121	2, 4, 5, 7
173	29122	2, 4, 5
174	29123	2, 4, 5
177	29130	4

Legend (by Unit No.) for Unit Numbering Scheme for Figures 2-2 to 2-7

Actual Unit #	Map #	Alternative	Actual Unit #	Map #	Alternative	Actual Unit #	Map #	Alternative
Salvage Area	261	2, 4, 5	321011	70	2, 4, 7	332069	60	2, 4, 6, 7
Salvage Area	271	2, 4, 5	321012	73	2, 4, 7	332070	66	2, 4, 6, 7
Salvage Area	291	2, 4, 5	321013	72	2, 4	332071	74	2, 4, 6, 7
Group Sel. Area	321	4	321016	78	2, 4, 7	332072	75	4, 6, 7
Group Sel. Area	321	4	321017	88	2, 4, 7	332073	87	2, 4, 6, 7
Group Sel. Area	322	4	321018	104	2, 4, 5	332074	99	2, 4, 6, 7
Group Sel. Area	331	4						
Group Sel. Area	332	4	321019	95	2, 4	33301	132	4, 7
26102	159	2, 4, 5, 7	321022	109	2, 4	333078	42	4, 6, 7
26103	164	2, 4, 5, 7	321023	115	2, 4	333081	63	2, 4, 5, 6, 7
27102	151	2, 4, 5, 7	321024	128	2, 4, 5, 7	333083W	76	2, 4, 5, 6, 7
27105	153	2, 4, 5, 7	321025	121	2, 4, 5, 7	333084X	90	2, 4, 5, 6, 7
27107	160	2, 4, 5, 7	321026	141	2, 4, 5, 7	333084Y	90	2, 4, 5, 6, 7
27108	163	2, 4, 5, 7	321027	140	2, 4, 5, 7	333084Z	90	2, 4, 5, 6, 7
27109	169	2, 4, 5, 7	321028E	147	2, 4, 5, 7	333085	91	2, 4, 5, 6, 7
27110	170	2, 4, 5, 7	321028W	147	2, 4, 5, 7	333086	111	2, 4, 5, 6, 7
27113	165	2, 4, 5, 7	321029	148	2, 4, 5, 7	333093	117	4
29101	125	2, 4, 5, 7	321030	157	2, 4, 5, 7	381131	2	2, 3, 4, 5
29102	137	2, 4, 5, 7	321197	116	2, 4, 5	381133	3	2, 3, 4, 5
29103	142	2, 4, 5, 7	321199	106	2, 4, 7	381135	9	2, 3, 4, 5
29104	146	2, 4, 5, 7	322031	55	4	381136	7	2, 3, 4, 5
29105	144	2, 4, 5, 7	322032	67	2, 4, 7	381138	16	2, 3, 4, 5
29106	131	2, 4, 5, 7	322033	79	2, 4	381139	19	2, 3, 4, 5
29107	124	2, 4, 5	322034	81	2, 4, 7	381140	18	2, 3, 4, 5
29111	134	2, 4, 5, 7	322035	83	2, 4, 7	381199	5	2, 3, 4, 5
29112	155	2, 4, 5, 7	322036	96	2, 4, 7			
29113	167	2, 4, 5, 7	322037	94	2, 4, 7			
29117	161	2, 4, 5	322039	93	2, 4, 5			
29119	168	2, 4, 5	322040	110	2, 4, 5, 7			
29120	171	2, 4, 5	322041	108	2, 4, 7			
19121	172	2, 4, 5, 7	322042	120	2, 4, 7			
29122	173	2, 4, 5	322043	127	2, 4			
29123	174	2, 4, 5	322044	133	2, 4, 7			
29125	156	4	331045N	62	2, 4, 7			
29126	145	4, 7	331045S	62	2, 4, 7			
29127N	166	4, 7	331046	82	2, 4, 7			
29127S	166	4, 7	331047	86	2, 4, 7			
29130	177	4	331048	92	7			
29198	118	2, 4, 5, 6, 7	331049	112	2, 4, 6			
311140	1	2, 4, 5	331087	113	2, 4			
311141A	14	2, 4, 5	331188C	105	2, 4, 7			
311141B	14	2, 4, 5	331188H	105	2, 4			
311141C	14	2, 4, 5	332050	33	2, 4, 5, 6			
311142	4	2, 4, 5	332051	35	4			
311144	6	2, 3, 4, 5	332052	41	4, 6			
311145	12	2, 3, 4, 5	332053	37	4, 6, 7			
311146	8	2, 3, 4, 5	332054	36	4, 6, 7			
311199	15	2, 3, 4, 5	332055	51	4, 6, 7			
312143E	11	2, 3, 4, 5	332056E	46	2, 4, 5, 6			
312143W	10	2, 3, 4, 5	332056W	46	2, 4, 5, 6, 7			
321004	45	4	332057	64	4, 6, 7			
321006	54	4, 7	332058	49	4, 6, 7			
321007	59	4, 7,2, 4, 7	332059	52	2, 4, 6, 7			
321008	53	2, 4, 7	332067	57	2, 4, 6, 7			
321009E	61	2, 4, 7	332068	69	2, 4, 6, 7			
321009W	56	2, 4, 7						
321010	65	4, 7						

Chapter 3

Affected Environment

Chapter 3

3. Affected Environment

This chapter provides information about the existing environment of the Port Houghton/Cape Fanshaw project area that may be affected by implementing any of the alternatives described in Chapter 2. Discussions include aspects of the physical, biological, cultural, economic, and social environments that may be affected. This information is used in Chapter 4 to evaluate the effects of changes in the environment under the various project alternatives for the proposed timber harvest. Areas within the Port Houghton/Cape Fanshaw project area are designated by management decisions made in the Forest Plan, to be managed for resource use and development (e.g., timber harvest) and for other amenities. Resource use and development will necessarily alter the environment for both the short term and the long term.

The Port Houghton/Cape Fanshaw project area contains a total of 143,667 acres encompassing six VCUs on the Chatham Area of the Tongass National Forest (VCUs 79-84) and five VCUs on the Stikine Area (VCUs 85-89). Of this total: 136,906 acres are National Forest. There are 3,842 acres owned by Goldbelt, Inc.; 2,919 acres owned by the State of Alaska; and 587 acres of National Forest lands that are classified as Imposed Use Restriction Area (Figure 1-2). These latter acres of National Forest land, which represent the Cape Fanshaw Natural Area, are administratively unavailable and restricted from consideration for harvest activities.

Most of the 3,842 acres of land within the project area that are owned by Goldbelt, Inc. have been logged or are expected to be logged in the near future. The land exchanges between Goldbelt, Inc. and the Forest Service, beginning in 1979, have involved both subsurface and surface conveyance, and rock and road easements. The most recent land exchange occurred in April 1994, when 2,595 acres were conveyed to Goldbelt, Inc. by the Forest Service. Of these, 780 acres are within the project area. The EIS analysis, when considering project effects to natural resources, considers all Goldbelt, Inc. land in the project area as clearcut habitat for existing conditions.

The 2,919 acres of Alaska state-selected land located along the northwestern shoreline of Cape Fanshaw have not been developed or altered by the State. No plans for development in this area have been publicly disclosed, although plans for a marine park have been suggested for the state-selected land near Robert Islands and a timber sale has been suggested for the other State lands.

Lands managed by the Forest Service in the project area total 136,906 acres; of these, 48,044 acres are within the Stikine Area managed by the Petersburg Ranger District, and 88,862 acres are within the Chatham Area managed by the Juneau Ranger District.

The project area is composed largely of saltwater shorelines, steep forested terrain, mountain tops, and broad river valleys. Some valleys end in estuaries such as Sandborn Canal. Other valleys are V-notch drainages, some with scenic waterfalls. A LUD II area (northeast portion of VCU 79) established by the TTRA borders the eastern periphery of the project area surrounding the Port Houghton Salt Chuck. Several islands occur offshore of the project area. These islands vary in size from a small vertical outcrop of rocks with a mature stand of trees (such as the Haystack) to large forested islands (such as Whitney Island).

3.1. Timber

The net total National Forest System land area of 134,261 acres contains 16,685 acres of non-forest land (12 percent) and 34,174 acres of non-productive forest land (25 percent). To be considered productive forest land, an area must be capable of producing 20 cubic feet of timber per acre per year. The resulting productive forest land base of 83,402 acres, is classified into three volume strata: low, medium and high (Table 3-1). Lands within the three volume strata contain more than eight MBF per acre in trees of merchantable size.

Table 3-1
Average Timber Volumes Per Acre by Volume Strata

Chatham Area Strata	Sawtimber[1] (MBF/Acre)	Utility (MBF/Acre)	Total (MBF/Acre)
Low	10.0	2.9	12.9
Medium	18.1	5.2	23.2
High	29.7	8.6	38.3
Stikine Area Strata			
Low	22.0	3.7	25.7
Medium	27.4	5.3	32.7
High	30.2	6.4	36.6

[1]Bureau Long Log Scale
Source: Jenkins 1998.

The 83,402 acres of productive forest land contain 35,883 acres that are unsuitable for harvest activities due to their location in old growth LUDs, beach and estuary buffers, TTRA and other riparian buffers, eagle nest buffers, the Cape Fanshaw Natural Area, and other areas off limits to timber harvest. Approximately 173 acres of second-growth stands in the project area are suitable productive forest land, but are not available for harvest as the trees are not of merchantable size. Subtracting these acres from the productive forest land base leaves 47,346 acres of suitable forest land available for timber harvest activities (Table 3-2).

3.1.1. Timber Volume

The silvicultural walk-through stand examinations in the summer of 1994 were conducted on all proposed harvest units. The field observations and measurements were used to refine the GIS database to more accurately calculate the area of timber stand types throughout Management Areas C14 and S01. The 47,346 acres of suitable and available land area are summarized by VCU and volume strata in Table 3-3.

3.1.2. Timber Composition

Timber in the project area is comprised of western hemlock (*Tsuga heterophylla*) (64 percent), Sitka spruce (*Picea stichensis*) (15 percent), Alaska yellow cedar (*Chamaecyparis nootkatensis*) (14 percent), mountain hemlock (*Tsuga mertensiana*) (6 percent), and other non-commercial species, including shore pine (*Pinus contorta*) and red alder (*Alnus rubra*) (<1 percent). Western hemlock is proportionate by volume class, whereas most Sitka spruce occurs in the high volume strata. By comparison, Alaska yellow cedar mostly occurs in the low volume strata.

Most of the land in the Port Houghton/Cape Fanshaw project area (outside of land owned by Goldbelt, Inc.) has not been previously harvested or disturbed. Some scattered harvest of timber occurred more than 50 years ago on areas totaling less than 200 acres. Overall, forests in the project area are mature or over-mature climax plant communities and are considered old-growth forests.

3.1.3. Forest Condition

The following paragraphs describe the agents of greatest concern observed during field investigations.

Hemlock dwarf mistletoe is present throughout the Port Houghton/Cape Fanshaw project area. This parasitic plant reduces the vigor and growth rate of western hemlock. Infection rates are variable for individual stands. The most heavily infected areas occur along the Sandborn Canal, and southward, higher into the Sandborn River watershed. Twenty-seven percent of all sampled stands have high concentrations of mistletoe infection.

Alaska yellow cedar decline was observed to some degree wherever Alaska yellow cedar occurs in the project area. It is most noticeable throughout the Stikine Area

Table 3-2

Acreage Adjustments in the Determination of Suitable Available Forest Land

Chatham Area

	Productive Forest Land Not Suitable For Harvest					Suitable and Suitable Available Total Forest Land				
VCU	Old Growth LUDs	TTRA[1] Buffers	Estuary Buffers	Soil Stability Hazard	Eagle Nest Buffers	Unsuitable	Productive	Suitable	Unavailable	Suitable Available
79	7,537	1,031	137	1,767	16	10,488	22,265	11,777	13	11,764
80	627	198	--	582	7	1,414	3,313	1,899	80	1,819
81	188	140	--	123	--	451	1,601	1,150	4	1,147
82	1,382	840	7	761	--	2,990	9,230	6,240	66	6,174
83	989	857	125	438	15	2,424	7,674	5,250	4	5,246
84	5,740	337	--	825	--	6,902	9,806	2,904	6	2,898
Subtotal:[2]	16,463	3,402	270	4,496	38	24,669	53,889	29,220	173	29,047
% Total	68%	60%	48%	84%	39%	70%	69%	65%		

Stikine Area

	Productive Forest Land Not Suitable For Harvest					Total Forest Land				
VCU	Old Growth LUDs	TTRA[1] Buffers	Estuary Buffers	Soil Stability Hazard	Eagle Nest Buffers	Unsuitable	Productive	Suitable	Unavailable	Suitable Available
85	2,803[1]	--	--	--	--	--	--	--	--	--
86	2,219	228	54	--	2	2,503	4,517	2,014	--	2,014
87	1.218	905	59	472	2	2,656	8,845	6,188	--	6,188
88	--	221	44	185	13	463	2,591	2,128	--	2,128
89	1,521	876	135	214	43	2,789	10,758	7,969	--	7,969
Subtotal:[2]	7,761	2,231	293	871	59	11,214	29,513	18,299	--	18,299
% Total	32%	40%	52%	16%	61%	31%	35%	39%		

Total Project Area

TOTALS:[2]	24,224	5,633	563	5,367	97	35,883	83,402	47,519	173	47,346

[1]Includes beach buffer not counted as Estuary.
[2]Totals may not add due to rounding.
Source: Jenkins 1998.

Table 3-3
Suitable Available Acres by Volume Strata and VCU.

	Acres by Volume Strata				
VCU	High	Medium	Low	Total	% Area
Chatham Area					
79	4,765	4,984	2,014	11,763	40
80	756	883	179	1,818	6
81	239	587	321	1,147	4
82	2,194	2,533	1,446	6,173	21
83	1,906	1,730	1,610	5,246	18
84	1,180	1,104	615	2,899	10
Subtotal	**11,040**	**11,821**	**6,185**	**29,046**	**100**
% Area	38	41	21	100	
Stikine Area					
85	--	--	--	--	0
86	376	1,025	614	2,015	11
87	1,565	3,119	1,504	6,188	34
88	830	1,082	216	2,128	12
89	2,270	3,696	2,002	7,969	44
Subtotal	**5,040**	**8,922**	**4,337**	**18,299**	**100**
% Area	28	49	24	100	
TOTAL	**16,081**	**20,743**	**10,522**	**47,346**	**100**
% Area	34	44	22	100	

Source: Jenkins 1998.

and on the lower (toe) portions of slopes in the Chatham Area. The cause of Alaska yellow cedar decline is associated with poorly drained soils (Hennon et al. 1990). Seven percent of sample stands have significant levels of decline.

General decay, including stem and root decay, is probably the single greatest cause of disease-related timber volume loss in the project area. It is estimated to be as high as 25 percent of the gross volume. Mountain and western hemlock are more susceptible to decay than other species in the project area. The level of decay occurs at a relatively higher proportion for stands in VCUs 79, 80, and 81, where the species composition has a higher proportion of mountain hemlock. In addition, porcupine damage to hemlock trees, with resulting decay, was noted throughout the project area.

Windthrow occurs as groups of trees or individual trees are uprooted by the force of high winds. It is estimated that 22 percent of sampled stands have a high risk of windthrow.

3.1.4. Site Productivity

Knowledge of productivity is important in predicting future yields and to assist forest managers in setting silvicultural priorities. The site index is used as an indicator of the productivity of a particular forest site. The site index is based on the relationship of the measured height and age of dominant trees in the stand. Site tree measurements were collected in each volume strata by VCU. The high volume strata averages the highest site index, and the low strata the lowest site index.

3.1.5. Past Harvesting

Within the project area, the earliest record of commercial logging activity dates to 1948 when about 300 MBF of Sitka spruce was logged from 162 acres at Horton Point near Cape Fanshaw. A small 7-acre patch at Steamboat Bay was logged in 1951, and other small patches (under 20-acre size) were logged in 1952 at Russian Cove and along the shoreline of Port Houghton. Harvest began on the Goldbelt, Inc. lands in the 1980's and is expected that all commercial forest on existing areas of ownership will be harvested in the near future.

3.1.6. Timber Industry Economics

Presently, the timber industry faces an uncertain future and overall employment is projected to decrease. This is in contrast to the 1980s when the number of logging jobs grew by more than 80 percent and demand was high. High prices kept operations profitable, and the market allowed harvest and production levels to nearly double during this decade. The future health of the timber industry in Southeast Alaska is closely tied to international markets, particularly Asian markets. The supply of raw materials and the market for finished products are the critical factors affecting the future of the industry (Alaska Department of Labor 1991).

Most of Alaska's future timber harvest activity is expected to occur within the Tongass National Forest. Where some harvestable timber exists on other federal and on state lands, harvest from these areas is relatively minor. Alaska Native regional and village corporations own most of the private timber base. These corporations have harvested a large portion of their holdings, and logging is expected to decline as their timber resources diminish.

Timber production in Southeast Alaska from 1986 through 1995 has fluctuated from a low of 589 MMBF (1986) to a high of 1,014 MMBF (1989), with a yearly average of 787 MMBF and average annual gross revenues of 522 million dollars. This volume includes the Tongass National Forest, state lands, Bureau of Indian Affairs-administered lands, and private lands. Timber harvest on the Tongass National Forest for this time period ranges from a low of 221 MMBF in 1995 to a high of 471 MMBF in 1990, with an average annual volume of 349 MMBF. The 1995 harvest is the lowest since 1963. The Tongass National Forest contributed 44 percent of the total timber harvested in Southeast Alaska over this ten-year period, with most of the remaining timber coming from Native lands (USDA-FS

1997). Southeast Alaska timber production and revenue for the years 1986 through 1995 are displayed in Table 3-4.

3.1.6.1. Demand for Southeast Alaska Timber

Market demand will continue to be volatile as it was in the past (USDA-FS 1997). This uncertainty comes from a number of sources such as: the amount and reliability of timber supplies; rates of economic growth in key markets; changes in technology; preferences of consumers; and strength of competition (Brookes and Haynes 1997). Within the past few years, both long-term contracts were terminated and the pulp mills closed. More recently, however, sawmills that have been closed have reopened. The timber demand will continue to be tracked by Forest Service economists and as part of the report required by Section 706(a) of ANILCA.

3.1.6.2. Timber Sale Program

The Tongass National Forest independent timber sale program is divided into two components: open sales and Small Business Administration (SBA) set-aside sales. Under the SBA program, an annual target volume of 100 MMBF is to be set aside for offer to qualified small businesses in Southeast Alaska. All independent timber sales offered in fiscal year 1996 (89 MMBF) were SBA designated (USDA-FS 1997). At least 50 percent of the sawlog timber on a SBA set-aside sale must be manufactured by a firm with no more than 500 employees. In 1994, a total of 39 SBA mills were operating, with a total current use per year of 210 MMBF for all SBA mills in Southeast Alaska. Timber processed was primarily hemlock and spruce with lesser amounts of cedar. Total employees were 456, with most mills employing one to two workers and only eight mills employing more than ten workers (Alaska Lumbermen's Association 1994).

Sawmills in Southeast Alaska are located primarily in the southern region of the Panhandle on Prince of Wales Island, Ketchikan, and Wrangell (Alaska Lumbermen's Association 1994). The larger independent mills have traditionally focused on the manufacture of cants for the overseas market. The smaller SBA mills generally produce custom-cut building lumber, chips for pulping or landscape usage, cedar shakes or shingles for roofing materials, and music wood or special building novelty wood used primarily for gifts (Alaska Lumbermen's Association 1994).

3.1.6.3. Timber Industry Employment

Employment related to the timber industry in Southeast Alaska from 1990 to 1995 averaged 4,372 persons, with most involved in timber harvesting and processing jobs (Table 3-4). Of the direct employment, most jobs were in logging (54

Table 3-4

Southeast Alaska Timber Production, Revenue and Employment, 1981-1995

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Production (MMBF Roundwood Equivalent)[1]															
Log Exports	100	152	225	183	199	262	377	385	513	504	377	414	376	314	328
Lumber	178	156	116	101	107	83	105	130	153	188	161	159	153	121	72
Chip Exports	22	31	7	4	2	0	0	4	29	7	32	7	15	26	38
Pulp	280	224	212	287	192	243	252	289	320	299	271	318	222	165	154
Total	581	563	561	575	500	589	734	808	1,014	997	841	899	766	625	593
Real Gross Revenues (Million 1994 $)															
Log Exports	84	109	142	103	102	137	206	264	290	313	220	258	278	224	221
Lumber	99	95	68	46	45	33	44	65	84	98	85	77	96	81	59
Pulp	279	244	183	226	129	148	180	249	330	272	209	228	157	115	168
Chip Exports	9	10	2	0	0	0	0	0	4	2	8	2	4	8	15
Total	470	458	395	376	276	318	430	579	708	685	522	564	536	429	448
Employment (Average Annual)															
Logging[2]	1,047	991	1,010	946	1,004	1,239	1,545	1,981	2,113	2,144	1,554	1,415	1,344	1,177	1,185
Sawmills	605	540	429	395	363	331	375	468	478	500	604	538	447	515	301
Pulp	1,081	975	854	700	580	772	861	892	925	899	911	910	859	533	516
Total Direct	2,733	2,506	2,293	2,041	1,947	2,342	2,781	3,341	3,516	3,543	3,069	2,863	2,650	2,225	2,002
Indirect & Induced[3]	1,530	1,403	1,284	1,143	1,090	1,312	1,557	1,871	1,969	1,984	1,719	1,603	1,484	1,627	1,464
Total	**4,263**	**3,909**	**3,577**	**3,184**	**3,037**	**3,654**	**4,338**	**5,212**	**5,485**	**5,527**	**4,788**	**4,466**	**4,134**	**3,852**	**3,466**

[1]Roundwood equivalents calculated using log overrun and conversion facts found in Brooks and Haynes, 1994. Lumber unit values include revenues from the sale of mill residues for pulp production or chip export. To avoid double counting, receipts from the sale of mill residues were not reported for lumber gross revenue.

[2]Jobs related to logging operations, such as road construction, are counted as indirect employment.

[3]Two computer simulation models (IPASS and IMPLAN) were used to estimate indirect employment. The distinction between direct and indirect employment is a function of the Standard Industrial Classification (SIC) System used nationally for the collection and grouping of economic statistics. For purposes of this report, the wood products "industry" is defined as logging, sawmills, and pulp mills. Persons employed in these occupations are reported here as "direct" employment. "Indirect" employment refers to the persons employed in all businesses supporting operation of the wood products industry. For example, the owners of a sawmill may purchase goods and services (such as power or repair services) from local merchants thereby contributing to their sales volume and employment. Induced jobs are supported when employees of the wood products industry spend their take-home pay in local communities.

Source: USDA-FS 1997.

percent), followed by pulpmills (28 percent) and sawmills (18 percent). Changes in employment levels have historically been attributed to the value of the dollar, and the timber supply in the world market. Increases in employment since 1985 are due mainly to an increase in the export of unprocessed logs from the Native corporation harvest.

The closing of the Ketchikan Pulp Corporation pulpmill in March 1997, reduced Tongass timber harvest levels under the 1997 TLMP, decreased harvest of Native-owned timber, and a decline in Asian economies are all factors that either have or will contribute to reduced employment in the Southeast Alaska timber industry for 1998 and the near future.

3.2. Marine

Twenty potential LTF sites have been investigated within or adjacent to the Port Houghton/Cape Fanshaw project area for transporting logs from land to marine transportation (USFWS 1980, 1981, 1994; Elmore and Bowman 1994; McKenzie 1995; Boes 1996). This includes the Hobart Bay LTF site owned by the Goldbelt Native corporation and operated by ITT Rayonier.

Two sites by Robert Islands were eliminated from consideration because they are within a proposed State marine park. Eight additional potential LTF sites were eliminated from further consideration because they are in locations identified as supporting sensitive and/or commercial marine fauna and flora. One site in Fanshaw Bay was eliminated due to both the lack of timber resources within economic proximity to the site and the presence of a sand bar that greatly reduced the flushing ability within the bay. Similarly, a site in North Arm of Farragut Bay was eliminated because of poor flushing. A potential LTF site in Sandborn Canal was eliminated because of high public use and concern for the very high fish spawn up Sanborn Creek. Four sites located east of Sandborn Canal were eliminated because no timber harvest is planned in proximity to these sites and it is not feasible to construct a road to any of these sites from west of Sandborn Canal or from the north shore of Port Houghton. Two additional candidate sites were considered using aerial photographs; however, these locations did not afford enough shelter for LTF operations, lacked sufficiently deep water, and had less likely egress from an upland transportation system.

Little Lagoon and Hobart Bay have the only sites found suitable for the timber harvest being considered in this project. A total of six sites in and around Little

Lagoon have been investigated. Little Lagoon was selected for a bulkhead LTF in the 1983 Port Houghton environmental assessment (EA). The current site in Little Lagoon is located approximately 200 feet east of the original bulkhead site, and is proposed as a drive-down slide. A drive-down slide is preferred over a bulkhead facility because a drive-down slide is less expensive to construct and operate and is more conducive to small timber sales. Also described below are existing conditions for the Hobart Bay LTF site, which is an established facility used to transfer logs harvested from Goldbelt, Inc., land. The ATTF siting guidelines and a description of how the new site fulfills the recommendations of these guidelines is provided in Appendix K.

3.2.1. Little Lagoon LTF Physical and Biological Characteristics

The proposed Little Lagoon LTF site is located on the shore of Little Lagoon, some 2.3 miles northwest of the western shore of Sandborn Canal, on a rock promontory between two unnamed streams. Shoreline vegetation is within 30 feet of the high tide level and is comprised of an overstory of western hemlock and an understory of five-leaved bramble (*Rubus pedatus*), rusty menziesii (*Menziesia ferruginea*), bunchberry (*Cornus canadenis*), blueberry (*Vaccinium ovalifolium*), Sitka spruce, and western hemlock. Alder is interspersed between the shoreline and forested vegetation.

A relatively flat, sand delta at the mouth of an estuary fed by a Class III stream (Carpenter 1997) occurs east of the proposed site. Offshore from this LTF site, two subsurface rock pinnacles (Little Rock and Big Rock) are exposed, or nearly exposed, at extreme low tides. The far eastern portion of the Little Lagoon LTF site consists of a relatively flat sand bench that grades into a steep boulder and bedrock promontory to the west. With the exception of the sandflat area at the far eastern end of the LTF site, the intertidal portion of the Little Lagoon LTF is quite steep and composed of bedrock and large- to medium-sized boulders. The beach slope is approximately 22 percent, and it continues into the subtidal area where the substrate changes from bedrock and boulders, to cobble, gravel, sand, mud, and shell debris.

The marine organisms identified at this LTF site are typical of patterns of zonation observed along the northern Pacific coast (Kozloff 1973). Fauna typical of the lower intertidal zones include sea cucumbers and seastars (*Leptasterias hexactis, Evasterias troschelii, Pisaster ochraceus*) that occur below +4 feet MLLW.

Hardshell clams (*Macoma secta*, *M. nasuta*, *Tresus nuttalli*, *T. capax*, *Clinocardium nuttalli*) and serpulid polychaete tube worms are the dominant subtidal fauna along the eastern portion of this LTF site. Brown kelps (*Laminaria saccharina*, *L. groenlandica*), which are the dominant macroalgae from 0 to -60 feet MLLW, are attached to bedrock and boulder. Univalves, attached to boulders and bedrock, and hermit crabs (*Pagurus* spp.), found in the crevices and on the faces of boulders, are the dominant fauna in the central and western portion of the LTF site.

One bald eagle (*Haliaectus leucocephalus*) nest site is located about 250 feet southwest of the proposed LTF site, as reported by the USFWS in 1996. This is an inactive nest, which was field verified in 1995. A variance from the interagency agreement regarding a 330-foot habitat management zone around bald eagle nest trees has been obtained. Distinct river otter (*Lutra canadensis*) runways and burrows also occur near the LTF site. Other wildlife species observed near the site include the red squirrel (*Tamiasciurus hudsonicus*) and various songbirds.

3.2.2. Hobart Bay LTF Physical and Biological Characteristics

The existing Hobart Bay LTF is located on the west side of a peninsula forming the southwest portion of Hobart Bay. This bay is located approximately 4 miles north of Port Houghton. This site is on private land owned by the Goldbelt, Inc. This LTF will be utilized for the resource activities planned on the North Shore of Port Houghton. Currently, there are cost share agreements between the Forest Service and Goldbelt, Inc. for use of the LTF and the road systems accessing the proposed units on the North Shore of Port Houghton.

This site has been active since the late 1980s and approximately 350 MMBF has been transferred to the water. This site drops off to deep water near shore and good flushing action has been documented (Boes 1996). Approximately 2.3 acres of bark deposit on the seafloor has been documented.

The subtidal macroalgae consists of *Lamanaria*, *Macrosystus*, brown algae, and green algae. Sea cucumber (*Parastichopus californicus*), welk (*Plicifusus kroeyeri*), sea star (*Pycnopodia helianthoides*), kelp greenling (*Hexagrammos decagrammus*), plumose anemone (*Metridium senile*), green urchin, horse clams (*Tresus capax*), and the starry flounder (*Platichthys stellatus*) were among a few of the animals noted during the dive transects.

3.2.3. Marine Fisheries Near and Within the Project Area

In the Port Houghton/Cape Fanshaw project area, several species of marine fish are available for commercial fisheries. These species include salmon (pink, chum, coho, sockeye, and chinook), other finfish (Pacific herring, halibut, sablefish (*Anoplopoma fimbria*), flounder (*Platichthys stellatus*), sole), shellfish (coon stripe shrimp, spot shrimp, snail, crab [dungeness, red tanner, king], scallop), and miscellaneous species (sea urchin, and sea cucumber) (McKenzie 1995a; Good 1995a).

3.2.3.1. Salmon

Two types of salmon fisheries are common in the project area: trolling and purse seining. Trolling data (except for a recently created experimental fishery in late May and June targeting hatchery king salmon) is reported by district; thus, there are no subdistrict catch reports for 110-34 and very limited catch reports for 110-31 (the subdistricts that include the project area). Seining is reported by subdistrict. Port Houghton is within subdistrict 110-34 and the northern portion of Cape Fanshaw is within subdistrict 110-31 which expands west into the center of Stephen's Passage and north to Point Astley. Port Houghton bound fish are primarily caught in District 10 which is the area described below for total catches (ADF&G 1994a).

Results of salmon purse-seining in the vicinity of Port Houghton (District 10) have been tabulated since 1960 (ADF&G 1994a). Pink salmon is the primary species caught, and chinook represents the salmon species with the fewest individuals caught (less than 4,000 annually over the past 30 years). Sockeye salmon are also a relatively uncommon catch. Over the past 30 years, less than 23,000 sockeye are harvested annually. Coho harvests are similar to sockeye, except that in 1994 more than 55,000 coho were harvested (1982 was also a high year with about 36,000 coho salmon harvested). Chum salmon are harvested more often than chinook, sockeye, and coho but much less than pink salmon. Highest catches for pink salmon were in 1994 when more than 1 million fish were harvested in District 10. This year also represented the maximum harvest for chinook salmon at 141,252 fish.

Total pink salmon production from Port Houghton varies from year to year and is dependent upon the cyclical nature of the species. Pink salmon in Southeast Alaska are generally on an odd/even year cycle. Prior to 1989, the largest returns occurred on odd years. Since that time the returns have shifted to the largest occurring on even years. Pink salmon also show long-term cycles of 10-20 years. The 1970's were an example of low return years, and the late 80'-early 90's are examples to peaks in the cycle. The long-term cycle is a factor of ocean conditions/survival independent of terminal harvest management. Total production from Port Houghton has varied from 200,000 in low years to probably over 2 million in peak return years. Escapement and catch must be added together to give a more accurate index of production. Catches in 110-34 (Port Houghton) reflect only a minimal estimate of catch. Catches in 110-31 must also be factored in because vessels may fish in multiple statistical areas but report the catch as in either 110 or possibly from another statistical area. Also, an unknown number of Port Houghton fish may be caught in corridor fisheries in upper Chatham Straight. These also need to be factored into the Port Houghton production (ADF&G 1996a).

Total salmon harvested by purse seining in District 10 ranged from 821 fish in 1980 to over 7 million fish in 1994. Over the past three years, the purse seine catch was about 268,000 fish in 1993 and about 12,000 fish in 1995. Opening dates have varied widely over the years depending on the number of fish projected available for harvest. Other information is available for hand trolling, power trolling, and purse seining either within the project area or including a larger area than the project area (ADF&G 1994a).

Considering the 1994 ex-vessel price of pink salmon at $0.21 per pound and total catch of 7,268,792 fish (purse seine only), (3.75 lbs average weight per fish), the total value of pink salmon for purse seining in Port Houghton is approximately $5.7 million.

3.2.3.2. Other Finfish

Commercial harvest data for groundfish catch in the vicinity of Port Houghton was obtained for 1995 (most recent year complete information is available). The total catch was 2,141,356 lbs. A total of 311 vessels were involved and the fish species most frequently harvested was Pacific cod representing 68 percent of total harvests. Other species harvested include demersal rockfish, other rockfish, polluck, sablefish, flounder, other groundfish, and lingcod (ADF&G 1996c). Halibut harvest is not broken down into smaller areas, and therefore harvest for Port Houghton is included for the overall catch in ocean waters that include all areas east and west of Admiralty Island. For this larger area, 494,000 lbs of halibut were harvested commercially in 1994. Commercial harvest does not include sport fishing catch (International Pacific Halibut Commission 1996).

The USFWS completed one trawl with a 12-feet otter trawl at the northern end of Sandborn Canal in May 1981 to document finfish present in the Port Houghton project area (USFWS 1981). Catch results indicate that coon stripe shrimp, starry flounder (*Platichthys stellatus*), yellowfin sole (*Limanda aspera*), lyre crab (*Hyas lyratus*), and brachiopods are dominant.

Comments received from the public during the scoping meetings indicate that some halibut fishing occurs at the Rusty River in the Salt Chuck, near the Lighthouse Reserve, throughout Port Houghton, and near the entrance to Sandborn Canal. Additional information from the public indicates that herring seiners and halibut (*Hippoglossus stenoleps*) and Pacific cod (*Gadus macrocephalus*) longliners use marine waters adjacent to the proposed Port Houghton/Cape Fanshaw project area.

3.2.3.3. Pacific Herring

The presence of Pacific herring (*Clupea harengus pallasi*) in the project area has been documented by ADF&G as early as the 1970s. Over the next 20 years, aerial surveys by ADF&G for Pacific herring spawn in the project area were sporadic and on an opportunistic basis (ADF&G 1994a). In the late 1980s and 1990s, more systematic surveys were conducted. Although there are probably many locations in the project area where herring have spawned over the last 20 years, locations of known herring spawn areas recorded by ADF&G occur along the shoreline from Point Hobart to north of Walter Island. Other documented winter Pacific herring spawn areas (USDA-FS 1983a; ADF&G 1994a) near the Little Lagoon LTF site occur along the southern shore of Port Houghton about 1 mile east of the Little Lagoon LTF site, about 2.5 miles east of the Little Lagoon LTF site, about 1.5 miles west of the Little Lagoon LTF site, and about 0.5 miles west of the mouth of Sandborn Canal (see Appendix K). No herring spawn has been documented at the site proposed for an LTF in Little Lagoon. First and last seasonal dates of observed spawning from 1985 to 1998 indicate that spawning occurs between mid-April and early May with peak spawning in late April and early May. An average of 11.3 nautical miles of herring spawn have been documented in the Port Houghton and Hobart Bay areas between 1992 and 1998 (ADF&G 1998).

Only commercial operations for food and bait Pacific herring fisheries are permitted in Port Houghton, and these fisheries have been limited (ADF&G 1994a). Fishing is allowed when the spawning stock exceeds the minimum threshold level of 2,000 tons in Port Houghton. The fishery has been opened at various times since the 1991-1992 season with an average harvest of 117 tons. The largest herring stock in southeastern Alaska (Sitka) has a minimum threshold level of 7,500 tons. The ex-vessel price of herring per pound fluctuated from $0.68 to $0.14 between 1977 and 1998.

Herring that spawn in the inside waters of Southeast Alaska (where Port Houghton is located) have lower survival rates than herring that spawn in outer coastal spawning locations, such as Sitka. Most of the herring in the Port Houghton project area mature and begin to spawn at around 4 years of age. The fishery in Port Houghton is presently supported by fish that are approximately 7 years old, and the stock has been slightly over the threshold level for the last 4 years. Humpback whales that regularly occur in Port Houghton during the summer months are believed to feed primarily on the herring present.

3.2.3.4. Shellfish and Other Invertebrates

Commercial harvest information for shrimp and crab is also available. The number of shellfish permits in the vicinity of the project area during 1994 includes 65 permits for Juneau, 20 permits for Kake, 260 permits for Petersburg, and 162 permits for Wrangell.

Information obtained surrounds the project area and a large area of Frederick Sound near Port Houghton (Table 3-5). Most of the crab catch is dungeness crab with smaller amounts of tanner and king crab. About half as many pounds of shrimp are caught as dungeness crab (ADF&G 1994a). Shrimpers, dungeness, and king crabbers use the marine waters adjacent to the project area from Storm Island to Point Roberts (letter dated October 16, 1994 from Gerry Merrigan). In addition, crabbers use Fanshaw Bay, an area north of Whitney Island to Roberts Islands, Sandborn Canal, and North Arm. In recent years, commercial fishing has extended into the Salt Chuck (letter dated October 20, 1994 from LaVern Beier).

Table 3-5
Commercial Harvest (in lbs) by Species Group from Waters at Point Vandeput to Point Hobart for Past 20 Seasons

Species[1]	Number Seasons	High Range	Low Range	Average: 20 Years	Average: Last 10 Years	Average: Last 5 Years
Shrimp[2]	15	229,208	12,202	68,584	94,701	158,498
King Crab[2,3]	20	315,546	11,014	151,356	111,201	19,973
Tanner Crab[2]	19	148,248	5,034	58,780	41,933	44,619
Dungeness Crab	20	133,601	19,907	133,601	226,587	301,293

[1] All species exhibit variable annual survival and recruitment which affect harvests. Other fishing opportunities and ex-vessel price variations also affect harvests.
[2] King, tanner, and some shrimp fisheries are managed with harvest rate strategies. In these cases, harvests are not representative of total stock abundance.
[3] The red and blue king crab fishery in this area was closed from 1985/86 through 1992/93 seasons.
Source: ADF&G IFDB, February 15, 1995 and Gunther 1995b.

Commercial and recreational crab pot sets have been observed in Port Houghton, and others were seen within Sandborn Canal and west of the proposed Little Lagoon LTF. The USFWS set four dungeness crab pots and one tanner crab

(*Chionoecetes tanneri*) pot near the central portion of Sandborn Canal (USFWS 1981). Tanner crab was the most abundant species captured; while king crab (*Paralithodes camtschatica*), red rock crab (*Cancer productus*), dungeness crab, and starry flounder were also present.

Low densities ($<1/m^2$) of dungeness crab were observed during underwater investigations at the LTF sites in the summer 1994. The closest crab pots observed near the proposed Little Lagoon LTF was 1 mile west (USFWS 1994).

Dungeness crab peak mating occurs during the summer and early fall months in nearshore waters. Fertilization takes place in the fall at which time the eggs are extruded and become attached to the female's abdomen. Ovigerous females aggregate and overwinter from early fall through the first part of April in fine to coarse sand below the shelf break at about -20 feet MLLW. Hatching occurs between late April to the early June. The first 90 to 120 days after hatching are spent as free-floating planktonic larvae. Larvae metamorphose and settle to the bottom in nearshore and offshore waters in late August and early September. Large concentrations of juvenile crabs have not been observed in nearshore waters in Southeast Alaska, and movements and habitat use by juvenile crabs are not well documented.

Shrimp pot sets have been documented by ADF&G along the northern shore of Port Houghton approximately 2 miles northeast of Walter Island (ADF&G, personal communication 1994). The USFWS set commercial shrimp pots in deep water (60 to 70 fathoms) along the north shore of Port Houghton in 1981, as part of their survey of potential LTF sites (USFWS 1981). Snail (*Colus jordani*) and spot shrimp (*Pandalus platyceros*) dominated the catch.

Pandalid shrimp species mate in August and September. Females extrude eggs in October and November and carry the eggs through winter. Hatching occurs from February through May. After hatching, the larvae float in the plankton until they metamorphose to the juvenile stage in midsummer and sink to the bottom.

Written comments from individuals and agencies provide additional information on commercial shellfish resources in the project area. A large commercially unharvested scallop (*Chlamys* spp.) bed occurs in Sandborn Canal, along with other species such as sea urchins (*Strongylocentrotus* spp.) and sea cucumbers (*Stichopus californicus, Cucumaria* spp.). This bed could be harvested as new fisheries develop in Southeast Alaska. Shrimpers and dungeness and king crabbers use the marine waters adjacent to the proposed Port Houghton/Cape Fanshaw project area from Storm Island to Point Roberts. In addition, crabbers use Fanshaw Bay, an area north of Whitney Island to Roberts Island, Sandborn Canal, North Arm, and the Salt Chuck.

3.3. Wildlife

The Port Houghton/Cape Fanshaw project area contains two WAAs as designated by ADF&G (Figure 3-1). These include WAA 2927, in the Chatham Area which includes VCU 78 (part of the Tracy Arm-Fords Terror Wilderness Area) outside and northeast of the project area, and WAA 1601 which is fully contained in the Stikine portion of the project area.

3.3.1. Management Indicator Species

This section describes the results of the habitat capability models for the MIS species, as well as the habitat components required by each species. Field survey results and information on the presence of species in the project area as described during the public scoping comment period for this EIS are also presented. MIS models are run by WAA. WAAs are an ADF&G administrative designation that includes one or more VCUs used for wildlife analysis and to regulate wildlife populations. Note that WAA 2927 (the Chatham portion of the project area) also includes the adjacent wilderness area northeast of the project area (Figure 3-1) which results in a higher carrying capacity estimate for most species than if the MIS models only included the project area. Inclusion of the wilderness area adds 56,221 acres to the existing Chatham portion of the project area which is 90,717 acres for a total acreage of 146,938 acres in WAA 2927. WAA 1601 is 52,950 acres.

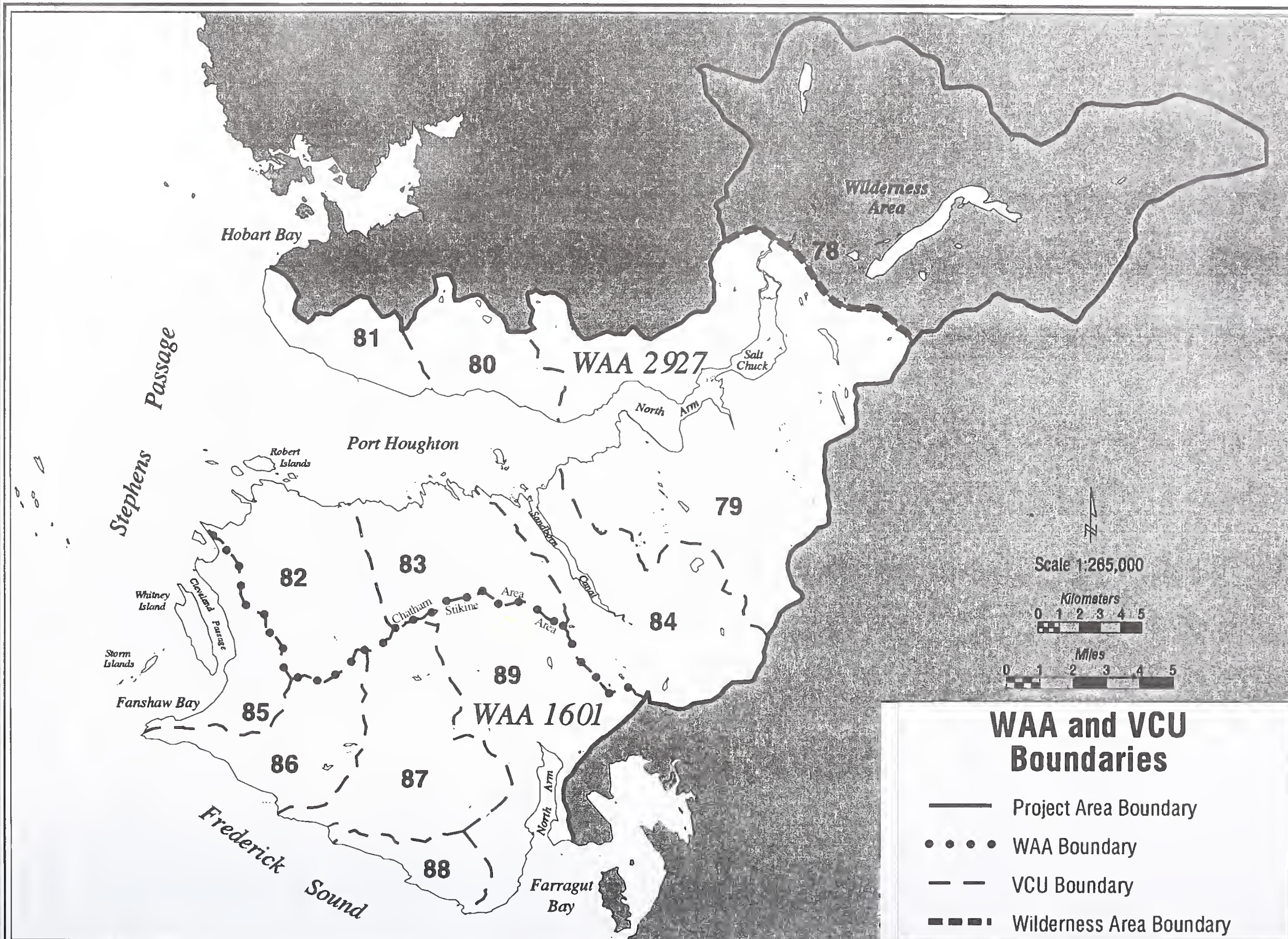
3.3.1.1. Sitka Black-tailed Deer

The Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) model evaluates deer winter range because winter is assumed to have the most limiting habitat components for deer populations (Suring et al. 1995). Deer in Southeast Alaska occur at the northern extent of their natural range and are limited by deep, persistent snowfall (Wallmo 1981). The amount of snowfall in areas of Southeast Alaska strongly influences the ability to support deer, as increasing snow depth makes deer survival more difficult. Predation by wolves can have a strong influence on deer populations, particularly during severe winters.

The habitat capability model for Sitka black-tailed deer in Southeast Alaska uses several factors to predict deer habitat suitability. These elements include forest successional stage, snow depth, elevation, overstory species composition, aspect, volume class, predation, and riparian locations.

Figure 3-1

Port Houghton/Cape Fanshaw Project Area, Wildlife Analysis Areas, and Value Comparison Units



Prepared by Parametrix, Inc. File: waavcu.gra Date: June 10, 1998

The deer model with predation was used to predict deer habitat capability within the project area. The predation component consists of estimating wolf presence and its predatory influence on deer populations. Model results show no deer habitat capability and a habitat suitability index (HSI) of 0 in VCUs 79 and 84 due to the high snow level conditions in these areas. Of the remaining project area, most areas have an unfavorable rating (HSI ≤ 0.3), except high-elevation alpine areas, which are rated as unsuitable (Table 3-6). Model analyses show the carrying capacity is 2,467 deer considering predation (Table 3-7). Using model predictions, the presence of wolves does not have a large effect on deer habitat capability (less than 10 percent of total carrying capacity), except that several areas are downgraded to lesser value habitat, and there is no high value Sitka black-tailed deer habitat in the Port Houghton/Cape Fanshaw project area. The primary reason that deer do not occur in large numbers in the Port Houghton/Cape Fanshaw project area is probably due to snow depth in conjunction with the presence of wolves.

During the summer months of the 1994 field season, infrequent deer sightings and pellet groups were observed. Tracks were most frequently recorded in riparian areas. ADF&G reported that deer pellet group transects were established on Robert Islands and on the mainland near Negro Creek in 1989; they found that pellet group densities were very low. The agency states that mainland deer densities throughout Southeast Alaska are low. Densities in WAA 2927 are particularly so because of the northerly exposure of most of the WAA and the average annual snowfall. The agency believes that a higher deer density in WAA 1601 occurs due to a more moderate snowfall and southerly exposure (ADF&G public scoping letter received October 1994).

Other deer surveys conducted jointly by the USDA-FS and ADF&G include a survey comprised of three deer pellet transects (in 1994) within VCU 89 and WAA 1601 commencing at the western shoreline of Farragut Bay and the northern shoreline of North Arm (Blatt 1994a). Surveys were along a perpendicular line to the shoreline terminating 1 to 2 miles inland. A total of seven deer pellet groups were found in 314 plots (a mean pellet group count of 0.02). ADF&G surveyed VCU 82 (WAA 2927) near Negro Creek in 1989 with a mean pellet group count of 0.21. Using 1.0 deer pellet per transect equal to 32 deer per mile^2 (Kirchoff 1993a), then the deer density is 6.7 deer per mile^2 in the area sampled. In comparison, mean pellet group counts for the entire Southeast Alaska deer transects (including all historical surveys) ranged from 0.01 to 3.59. Although no statistical analyses were conducted from these transects, most of the 93 surveyed areas had higher mean pellet group counts than the Negro Creek area.The

Table 3-6

MIS Species Estimates of Current Habitat Capability (Acres) in the Port Houghton/Cape Fanshaw Project Area

	Unsuitable HSI=0		Unfavorable $0<HSI\leq 0.3$		Marginal $0.3<HSI<0.7$		Suitable $0.7\leq HSI<1$	
	WAA 2927[1]	WAA 1601	WAA 2927	WAA 1601	WAA 2927	WAA 1601	WAA 1917	WAA 1601
Sitka black-tailed deer with predation	124,771	8,745	24,075	33,435	1,435	7,404	--	--
Mountain goat	83,895	44,631	52,770	3,718	11,901	23	1,358	1,180
Black bear	38,655	290	18,019	1,993	50,144	20,969	43,106	26,300
Marten	57,365	2,308	42,489	19,051	7,718	6,760	39,709	21,465
River otter	141,517	44,556	788	1,045	--	--	7,620	3,950
Bald eagle	142,174	45,586	128	15	2,100	1,818	5,522	2,132
Red squirrel	57,064	2,325	44,565	18,983	46,518	28,118	1,778	125
Vancouver Canada goose	106,741	21,566	24,276	6,575	17,655	14,536	1,255	6,874
Red-breasted sapsucker	60,244	2,408	41,446	18,953	21,493	3,844	26,743	24,347
Hairy woodpecker	101,689	21,360	13,684	13,743	13,059	10,604	21,493	3,844
Brown creeper	115,373	35,103	13,059	10,604	--	--	21,493	3,844

[1]Numbers for WAA 2927 include VCU 78 which is outside the project area.
Source: Gunther 1995a

Table 3-7
MIS Carrying Capacities (Number of Individuals) Estimated by Habitat Capability Models

MIS Species	WAA 2927	WAA 1601
Sitka black-tailed deer	517	1,640
Mountain goat	282	30
Black bear	187	91
Marten	188	105
River otter	72	38
Bald eagle	203	93
Red squirrel	71,063	36,008
Vancouver Canada goose	127	130
Red-breasted sapsucker	9,322	5,673
Hairy woodpecker	1,603	647
Brown creeper	3,420	736

Source: Gunther 1995a

ADF&G developed deer population objectives for Sitka black-tailed deer in Southeast Alaska based on historical, current, and future predicted hunting demand; habitat capability; and sustainable harvest rate (ADF&G 1992). ADF&G's population objective for WAA 2927 was that no net loss of deer occur, to ensure population viability.

The agency stated that, for WAA 2927, deer habitat quality is poor, land is steep, and predators (black and brown bears and wolves) are present throughout the area. Hunter demand in WAA 2927 is unknown although, from 1987 to 1996, nineteen deer were recorded as harvested in WAA 2927.

ADF&G allowed a 25 percent reduction for its population objective for WAA 1601 (ADF&G 1992). Hunter demand is unknown for this WAA but there have been five deer reported harvested in WAA 1601 from 1987 to 1996.

The Forest Plan objective for deer, where deer are the primary prey species for wolves, is to provide sufficient deer habitat capability to first maintain sustainable wolf populations, and then to consider meeting estimated human deer harvest demands. Sufficient deer habitat capability to maintain sustainable wolf populations is estimated at 17 deer/mile^2. Current habitat capability in the project area is less than 17 deer/mile^2. The project area is not in an area where deer are considered the primary prey species for wolves. The primary big game prey species of wolves on the mainland is thought to be mountain goat (*Oreamnos americanus*) (Robus 1994).

3.3.1.2. Mountain Goat

The mountain goat is a species that ADF&G considers to be of special concern in the Port Houghton/Cape Fanshaw project vicinity. ADF&G (1994c) believes that goats can be impacted by logging activities and improved human access, including logging camps and roads. ADF&G is opposed to cutting of any goat winter range, and the agency recommends identification of winter range and mitigation to prevent impacts.

Mountain goats typically use alpine and subalpine habitats for summer foraging, but they descend into forested areas for winter forage (Fox et al. 1989). In southeastern Alaska, mountain goats typically have year-round home ranges between 4 to 8 mile^2, although some individuals have ranges as large as 35 mile^2 (Fox et al. 1989). Winter-use areas are usually much smaller than summer areas. Mean distances between summer and winter ranges have been recorded as 1.4 miles for females and 1.8 miles for males. Areas actually used within the home ranges tended to be associated with patches of steep, rugged terrain, and daily movements were often very small. The longest moves were made by males during the rutting season and could involve travel across forested valley bottoms.

Mountain goats are susceptible to predation by several large carnivores, but the wolf is the only one likely to be important (Fox et al. 1989). The goats' primary strategy for predator avoidance is to escape in steep and broken terrain. Escape terrain is defined as a slope of 50° or greater and broken up with outcrops. Throughout the year, goats spend about 90 percent of their time within 1,300 feet of escape terrain, and in the winter, they are within 820 feet of escape terrain about 95 percent of the time (Fox et al. 1989).

Results of the goat habitat modelling for the Port Houghton/Cape Fanshaw project area show mountain goat habitat occurring in high-elevation areas with no definitive corridors between most areas, except near the Port Houghton Salt Chuck. The carrying capacity derived from the mountain goat model is 310 individuals (Table 3-7). Of the mountain goat habitat available, most is considered unsuitable and unfavorable based on the HSI index (Table 3-6) but is intermixed with small pockets of either marginal or suitable habitat.

During a mountain goat survey in the Port Houghton/Cape Fanshaw area during 1994, fifty-one goats were located on Dahlgren, Jamestown, and Washington peaks. All of these sightings were above the tree line in alpine meadows or on snow or rock, and all goats were close to escape terrain. In addition to these sightings, several other reports of mountain goats were submitted by other members of the project team. One of the helicopter pilots observed 15 goats on Dahlgren Peak, above unit 27105 (153). One group of mountain goat pellets was found near the south end of unit 27103 (158). Evidence of mountain goats was also found in bogs, fens, and peatlands near unit 29115 (150). Mountain goat pellets were also found in unit 322044 (133). Field surveys for mountain goat travel corridors between Dahlgren and Jamestown peaks were also conducted in 1995 and 1996 by the Forest Service and ADF&G in the vicinity of planned unit and roads. No goat travel corridors were located, but one big game corridor that traveled through muskegs and crossed road 44001 at a ridgetop had the potential for goat use.

It is likely that the goats on the Fanshaw Peninsula (Dahlgren, Jamestown, and Saranac) move between the peaks. Goat movements between the Fanshaw peaks and the President's range are probably extremely rare if they occur at all. The subpopulation on the peaks closest to Fanshaw Bay is isolated from other populations and is highly susceptible to over-population or extirpation.

Public scoping comments received from the ADF&G for this EIS (October 1994) state that there are several discrete populations of mountain goats in the project area. In the north shore of Port Houghton between Alice Lake and the peak with the Triplet C bench mark, 43 goats were seen by ADF&G. The agency believes that the number seen is typically 50 percent of the total population. Therefore, ADF&G estimates that 80-90 goats occur on these peaks and winter in the medium- to high-volume old-growth timber on the slopes between the mountain and shoreline.

ADF&G states that the population of goats in the President's Range (including Washington, Lincoln and Grant peaks) was surveyed in 1989, with 48 goats observed. A Forest Service survey in 1994 resulted in 50 goats observed in this area. ADF&G states that the valley between Washington and Lincoln peaks is likely winter range for these goats, as well as the Sandborn Creek valley. Additional mountain goat populations in the project area occur on Fanshaw Peninsula and at Dahlgren and Jamestown peaks. In 1981 Forest Service biologist Joe Doerr observed goats in the Saranac-Tangent range. He observed 29 goats occupying the Tangent Peak-Saranac Peak Ridge, Jamestown, and Dahlgren peaks. Mountain goats also occur on Triplett Peak in the North Shore area. An ADF&G

survey team observed 25-30 goats in this area during June 1995. Harvest of mountain goats taken from the project area from 1986 to 1996 (most recent year available) includes a total of 17 goats.

3.3.1.3. Black Bear

The habitat capability model developed for the black bear (*Ursus americanus*) uses several factors to determine the most suitable habitat (Suring et al. 1988). These factors vary by season and include forest type (with highest preferences for low- to mid-volume forests; bogs, fens, and peatlands; and subalpine). Avalanche slopes are preferred in spring. Riparian habitats and stream channel types conducive to high salmon production are preferred during late summer and fall.

Black bear observation and sign occurred throughout the project area, although bears appeared to be most plentiful near the Sandborn Canal. The habitat capability model for the project area shows that most of the project area is either suitable or marginal for black bear (Table 3-6). Carrying capacity is estimated at 278 bear (Table 3-7). Model estimates included a 2-mile buffer area on the roads in Goldbelt, Inc. lands to illustrate potential increases in human-related mortality associated with roads. Hunters and guides have reported a higher than usual percentage of cinnamon color phase black bears in the Port Houghton area (public scoping comment received during public scoping meetings in September 1994 and public scoping letters received from the public and ADF&G), and the average annual total bear harvest since 1988 is between five and six bears.

3.3.1.4. Brown Bear

Brown bears (*Ursus middendorffi*) are not abundant within the project area. The brown bear habitat capability model does not map brown bear habitat because a portion of the model reviews historical sightings of bears and identifies no suitable habitat if few or no sightings occurred. However, two individuals are believed to reside near Farragut Bay and one bear is believed to reside near the southern drainage (Glenn Creek) of Port Houghton North Arm (comments received from the public during Port Houghton/Cape Fanshaw public scoping meetings September 1994). Brown bear distribution in the project area is limited. It is also believed that subadult bears occasionally wander in the area in search of a territory.

3.3.1.5. Marten

The distribution of marten (*Martes americana*) is determined primarily by the availability of suitable canopy cover and the presence of prey during the winter months (Simon 1980). Since timber volume is correlated with canopy cover, volume is used as a predictor of suitable marten habitat for determining habitat capability (Suring et al. 1992). Additional predictor factors used are stand class size, low-elevation, and nearness to water. For the Port Houghton/Cape Fanshaw project area, high-elevation areas are considered unsuitable marten habitat, presumably due to snow depth and lack of cover. Suitable habitat occurs along the shorelines of both saltwater and freshwater. Overall, the project area has a mixture of suitable, marginal, unfavorable, and unsuitable habitat (Table 3-6) with most of the area being unsuitable. Carrying capacity is estimated as 371 individuals (Table 3-7). Marten scat was observed during field surveys in units 333086 (111) and 321017 (88).

3.3.1.6. River Otter

The factors used in the habitat capability model for estimating river otter (*Lontra canadensis*) suitability include presence of productive old-growth, absence of clearcuts, and presence of Class I and II streams that produce fish for prey. For the Port Houghton/Cape Fanshaw project area, river otter habitat is restricted to the shoreline of saltwater/shoreline interface with some additional habitat upstream of Class I streams. As a result, most of the project area is unsuitable (Table 3-6). Carrying capacity is estimated at 97 river otter in the project area (Table 3-7). River otter burrows and dens were observed throughout the coastal shorelines of the project area.

3.3.1.7. Bald Eagle

The habitat capability model for the bald eagle in the Port Houghton/Cape Fanshaw project area shows suitable habitat along the project area coastline and marginal habitat along Sandborn Canal, although most of the area is unsuitable (Table 3-6). Carrying capacity is estimated as 263 individuals (Table 3-7). Bald eagles and their nest sites were observed frequently along the shoreline by the 1994 field crew, but no bald eagle nests were observed inland. The bald eagle nest site map developed by the USFWS for the project area during 1993 field surveys closely approximated the observations of bald eagles by the field crew. Bald eagle nests were typically observed ½ mile apart along the north and south shores of Port Houghton. Some scattered nests were observed along the shoreline of Sandborn Canal nearest Port Houghton. Since 1979, the USFWS has observed 186 nest sites along the shoreline of Port Houghton, Sandborn Canal, and the outer shoreline of Cape Fanshaw. State-selected lands include 42 nest sites. Goldbelt, Inc. lands include 29 nest sites and the remaining nests are on National

Forest lands in the project area. About 40-50 percent of these nests are active each year. About 20 percent of the nests are now gone mostly from natural losses.

3.3.1.8. Red Squirrel

Optimum red squirrel habitat is considered old-growth Sitka spruce forest in Southeast Alaska (Suring 1988a). Western hemlock and cedar forests provide lesser food resources. Most of the project area is either marginal or unfavorable habitat for red squirrels, with small pockets of suitable habitat (Table 3-6). Carrying capacity is estimated at 106,273 individuals (Table 3-7). Red squirrels were observed in most all unit and road locations in the project area.

3.3.1.9. Vancouver Canada Goose

The habitat capability model for the Vancouver Canada goose (*Branta canadensis fulva*) uses several factors to determine habitat suitability (Doyle et al. 1988). Favorable habitat conditions used by the model include the presence of old-growth forest; nearness to intertidal estuarine habitat; abundance of blueberry, skunk cabbage, or huckleberry; wet conditions; proximity to rivers, lakes and/or salt water; and lack of roads. From results of the habitat capability models for the Vancouver Canada goose, most of the project area is considered unsuitable habitat (Table 3-6). Carrying capacity is estimated as 276 individuals (Table 3-7). The most favorable areas occur in the southern portion of the project area where extensive tracts of wet conditions intermixed with old-growth forest occur. Vancouver Canada geese were infrequently seen in or near harvest units including units 29101 (125), 29130 (177), 333081 (63), 333090 (84), 341103 (135), and 341109 (149). During field investigations conducted for the Port Houghton EA (USDA-FS 1983a), the prime Canada goose nesting habitat was identified as a 16-acre unnamed lake located between Sandborn Canal and Farragut Bay North Arm. The lake flows into North Arm Creek.

3.3.1.10. Red-breasted Sapsucker

Red-breasted sapsucker (*Sphyrapicus ruber*) abundance has been observed to be greatest in low-volume, old-growth western hemlock and Sitka spruce stands with large trees (Hughes 1985). The habitat capability model developed for this species is based entirely on breeding habitat factors, particularly timber volume (Suring 1988b), and reflects the red-breasted sapsucker's preference for low-volume, old-growth stands by rating these areas the highest suitability. Low suitability is identified as mid- to high-volume stands, subalpine, hardwoods, and managed forest stands. Red-breasted sapsuckers were observed throughout the project area. Habitat capability results for the red-breasted sapsucker show slightly more marginal and suitable habitat (57 percent) than unsuitable and unfavorable habitat (Table 3-6). Carrying capacity is estimated at 14,867 individuals (Table 3-7).

3.3.1.11. Hairy Woodpecker

Habitat preference of hairy woodpeckers (*Picoides villosus*) in the Tongass National Forest is described as old-growth stands of western hemlock and Sitka spruce with a volume of 30 MBF or greater (Hughes 1985). Hairy woodpeckers forage in clearcuts, second growth, and nonforested habitats only in the summer. The habitat capability model developed for the hairy woodpecker for winter habitat is thus limited to the presence of high-volume old-growth timber and the absence of clearcuts, nonforest, second growth, and hardwoods (Suring 1988c).

Hairy woodpeckers were infrequently observed and heard in the project area by large stream riparian corridors. The habitat capability model for the Port Houghton project area identifies most of the project area as unfavorable or unsuitable habitat (Table 3-6). Carrying capacity is estimated at 2,230 individuals (Table 3-7). Suitable habitat occurs along Sandborn Canal, along some shoreline areas, and along some Class I unnamed streams.

3.3.1.12. Brown Creeper

The habitat capability model developed for the brown creeper (*Certhia familiaris*) identifies suitable habitat as old-growth coniferous forest of 30 MBF or greater. Lesser value or unsuitable habitat is of lower volume or consists of timber-managed areas, hardwoods, subalpine, and nonforested areas (Suring 1988d). Brown creepers were seen and heard as an uncommon species in the Port Houghton project area. Maximum densities are expected to occur in high-volume timber stands near the outlet of Sandborn Canal and some Class I streams with adjacent high volume timber. However, most of the project area is considered unfavorable or unsuitable habitat (Table 3-6). Carrying capacity for the brown creeper is estimated at 10,651 individuals (Table 3-7).

3.3.2. Other Wildlife

3.3.2.1. Moose

Moose (*Alces*) are believed to have occurred in the project area since the early 1970s (public comment from a big game hunting guide using the area). Moose and their sign were observed by the field survey crew and have been reported to occur in the project area by many of the tourists frequenting the area. Moose pellet counts were conducted near North Arm and the western shoreline of

Farragut Bay in 1994 (Blatt 1994a). A total of 17 pellet groups were observed in 314 plots (0.054 pellet groups per plot).

Moose have been hunted in the project area. Harvest data indicate that, from historical annual data (1988-1993), one moose is taken from the project area by Petersburg residents each year, except in 1986, when one moose was harvested by a Hobart Bay resident. Recent harvest records indicate two bulls were taken by Petersburg residents in 1993, and three bulls were taken by Petersburg residents in 1994. One bull was also taken by an Anchorage resident in 1994. The Port Houghton EA for a proposed timber sale in the project area (USDA-FS 1983a) states that moose are present at low densities in the project area, and that the TLMP identified the Farragut Bay North Arm drainage as a candidate area for moose management. However, the EA also stated that riparian stands of willow and cottonwood, the preferred moose habitat, were absent from the project area. From field surveys for the proposed harvest, moose pellets were frequently observed throughout the project area, and moose are considered to have higher populations than historically reported. During public scoping, the ADF&G stated that more hunting of moose is occurring.

3.3.2.2. Neotropical Migratory Birds

Songbird surveys were conducted in the project area during the 1994 field season. Fourteen species were identified during the surveys, and an additional 52 bird species were seen during other field studies conducted for the project. Most songbirds observed were resident species. The most common neotropical migratory birds from results of the songbird surveys included rufous hummingbird, Hammond's flycatcher, Pacific-slope flycatcher, hermit thrush, varied thrush, and Townsend's warbler. All species were observed in old-growth forest habitat.

3.3.2.3. Marbled Murrelet

The marbled murrelet (*Brachyramphus marmoratus*) was recently listed as a threatened species in Washington, Oregon, and California where dramatic population declines have occurred over the past several decades. Loss of old-growth forest nesting habitat, gill-net fishing, and oil spills have been implicated as the major threats to the survival of these populations (Stein and Miller 1992). In Alaska, marbled murrelets are still relatively abundant. Piatt and Ford (1993) recently estimated the Southeast Alaska breeding population at 96,200. As elsewhere, loss of nesting habitat due to timber harvest is perceived as a major threat to the continued health of this population.

Field surveys conducted in the project area occurred in summer 1994. Thirty-two proposed harvest units were surveyed for murrelets with detections recorded at 23 units (72 percent). Unit detections ranged between 0 and 107 birds with a total of 241 murrelets observed over all surveyed units. In addition, marbled murrelets were surveyed along six nearshore marine transects. The lowest densities occurred along the shoreline of Port Houghton, and the highest densities occurred in the protected waters of Sandborn Canal and Salt Chuck. The high-density estuarine areas (Sandborn Canal and Salt Chuck) provide good foraging habitat, and serve as travel corridor gateways between inland nesting stands and foraging areas.

3.3.2.4. Gray Wolf

The distribution of the gray wolf depends on the abundance and availability of prey, the presence of roads, and the competition for prey with other predators (Suring and DeGayner 1988). Preferred prey species are large ungulates such as Sitka black-tailed deer, moose, and mountain goat. Beaver (*Castor canadensis*) are also preyed on when larger mammals are not available. Human hunting of wolves may be a secondary limiting factor.

As a result of the wolf's dependency on populations of their prey species, the location and abundance of the wolf in the Port Houghton/Cape Fanshaw project area is dependent on the overall abundance of moose, deer, and mountain goat. Moose occur throughout the project area in low numbers (as observed from scat and tracks), most of the project area is unsuitable or unfavorable for deer, and mountain goat distribution is limited to high-elevation areas.

The habitat capability model for wolves estimates that nine wolves could occupy the area. Wolves were seen from aerial surveys and were heard at night during the marbled murrelet surveys. Observations were infrequent, but wolves were heard and seen, and scat observed during field investigations. One wolf den was located on the northshore of Port Houghton. Wolf sign and/or observations were additionally recorded at Rabbit Cove, on Washington Peak, on the shoreline of Port Houghton Salt Chuck, on Goldbelt, Inc. lands, and near proposed road 8491.

3.3.2.5. Marine Mammals

Sightings of marine mammals by the Port Houghton interdisciplinary team occurred during summer 1994 field surveys. A total of five marine mammals were observed by the interdisciplinary project team during summer 1994 (humpback whale [*Magaptera novaengliae*], Steller sea lion, harbor seal [*Phoca* *vitulina*], Pacific white-sided dolphin [*Lagenorhynchus obliquidens*], and minke whale [*Balaenoptera acutorostrata*]). All sightings occurred in Port Houghton from June to August 1994. All animals observed were feeding, breeching, sounding, and/or swimming. No breeding activity was observed.

Written comments received during the Port Houghton/Cape Fanshaw public scoping comment period additionally indicate that false killer whales (*Pseudorca crassidens*) visit Sandborn Canal and killer whales (*Orcinus orca*) frequent the area feeding on the abundant salmon. Comment letters from the Port Houghton EA (USDA-FS 1983a) discuss the importance and presence of humpback whales in Port Houghton. Humpback whales and Steller sea lions are discussed in Section 3.5.

<u>Minke Whale</u> - The minke whale (*Balaenoptera acutorostrata*) is protected under the Marine Mammal Protection Act (MMPA) by the NMFS. The species is not considered to be abundant in the eastern Pacific Ocean, except in Alaskan waters. Minke whales are present in Alaskan waters primarily in the summer to feed and then migrate to sub-tropic areas in the winter to mate and bear calves. This species is both pelagic and common in bays and shallow coastal waters. They feed in the summer on a variety of schooling fish and zooplankton. Two sightings of minke whales occurred in the Port Houghton area during summer 1994.

<u>Harbor Seal</u> - The harbor seal, protected under the MMPA, is listed as Species of Special Concern by the State of Alaska. The harbor seal is not considered to be a highly migratory species but it makes local seasonal movements in response to prey distribution. The population is considered to be stable throughout most of its range but is declining at some sites (i.e., Muir Inlet) in Alaska (Sease 1992). Comprehensive counts of harbor seals in Southeast Alaska indicated that about 7,000 to 10,000 animals occurred in the Glacier Bay area, and near Sitka and Ketchikan in the 1980s. Recent (1993) surveys of harbor seals in Southeast Alaska from Dixon Entrance to Icy Cape indicate a maximum count of 22,447 animals (Loughlin 1994).

A number of harbor seal haul-out sites are within the project area. Harbor seal haul-out sites occur on an island in the Salt Chuck, at the mouth of Sandborn Canal, on Rabbit and Walter islands, at the mouth of Port Houghton at Robert and Foot islands, south of the mouth of Port Houghton in Steamboat Bay, and north-east of the South Arm of Farragut Bay at Francis Anchorage (ADF&G 1994c).

3.3.3. Biodiversity

Biological diversity (or biodiversity) has typically been defined to include the variety of life in an area, including genetic composition, richness of species, distribution and abundance of ecosystems and communities, and the processes by which all living things interact with one another and their environment (McCabe and Pank 1994). Biodiversity includes the type, distribution, and abundance of organisms in biological communities, as well as the structure and function of associated ecosystems. Biodiversity considerations encompass several levels of biological organization including landscape ecology, community and ecosystem ecology, population ecology, and population genetics.

The ecosystem most at risk by resource management in the Port Houghton/Cape Fanshaw project area is the old-growth forest ecosystem. It is estimated that invertebrate biota, creatures essential to ecosystem function through such processes as nitrogen fixation and decomposition, may represent over 90 percent of the species diversity of old-growth forests in the Pacific Northwest (Franklin 1993). The most conceivable way to address conservation of these and other elements of biodiversity is by using a landscape-based strategy. It is assumed that if a functional and interconnected old-growth ecosystem is maintained across the Forest, then the closely associated components and ecological processes will also be maintained (USDA-FS 1997a).

3.3.3.1. Old-Growth Conservation Strategy

The Forest Plan contains an integrated old-growth ecosystem conservation strategy consisting of two basic components: (1) a forest-wide reserve network, and (2) a matrix management strategy. This represents a fundamental coarse filter approach to addressing wildlife viability and the conservation of biodiversity.

The forest-wide reserve network protects the integrity of the old-growth forest. The reserve network includes a system of large, medium, and small old-growth reserves allocated to the Old-Growth Habitat LUD, and full protection of all islands less than 1,000 acres in size. The reserve network also includes all other non-development LUDs. These include Wilderness, Legislated LUD II, Wild River, Remote and Semi-Remote Recreation, Research Natural Area, Municipal Watershed, and all other LUDs that essentially maintain the integrity of the old-growth ecosystem. Within the Port Houghton/Cape Fanshaw project area, there are seven areas that are part of the Forest-wide reserve network. See Figure 1-3 for the locations of Old-Growth Habitat and other non-development LUDs.

<u>Sandborn Canal - VCUs 79 and 84</u> - This area reserve includes Sandborn Canal and the south shore of Port Houghton between Sandborn Canal and the Salt Chuck, providing a protected corridor that extends to the Tracy Arm-Fords Terror Wilderness. This area is a total of 17,413 acres with approximately 85 percent of the area consisting of productive old-growth forest.

Cape Fanshaw - VCUs 82, 85 and 86 - This area is a total of 9,802 acres with approximately 60 percent of the area consisting of productive old-growth forest. This area includes the Cape Fanshaw RNA. An adjacent area of undeveloped State land, consisting of 1,423 acres, adds to the size of this old-growth block. The adjacent State land contributes to the function of this reserve by maintaining connectivity of old-growth between the federal land and the beach fringe along the Cape.

North Arm Farragut Bay - VCU 89 - This area consists of 2,358 acres with approximately 65 percent of the area consisting of productive old-growth forest. The location protects the head of the Bay, takes advantage of beach and estuary buffers, and maintains multiple-use opportunities elsewhere in the VCU.

VCU 87 - This area consists of 1,811 acres with approximately 67 percent of the area consisting of productive old-growth forest. The location allows the incorporation of sufficient old-growth forest to meet the objectives of the old-growth strategy and contributes to connectivity along the southern end of the Cape Fanshaw Peninsula.

Negro Creek - VCUs 82 and 83 - This area consists of 1,937 acres with approximately 80 percent of the area consisting of productive old-growth forest. An adjacent area of undeveloped State land, consisting of 872 acres, adds to the size of this old-growth block and contributes to connectivity between blocks of old growth. The location takes advantage of the beach buffer, contributes to connectivity between the Sandborn and Cape Fanshaw old-growth blocks, and protects the lower reaches of three important salmon streams.

VCU 80 - This area consists of 683 acres with approximately 91 percent of the area consisting of productive old-growth forest. The location allows the incorporation of sufficient old-growth forest to meet the objectives of the old-growth strategy, contributes to connectivity along the northern shore of Port Houghton, and maintains multiple-use opportunities elsewhere in the VCU.

VCU 81 - This area consists of 628 acres with approximately 63 percent of the area consisting of productive old-growth forest. The location allows the incorporation of sufficient old-growth forest to meet the objectives of the old-growth strategy and maintains multiple-use opportunities elsewhere in the VCU.

A comparison of small old-growth reserves in the project area with Forest Plan requirements by VCU is provided in Table 3-8. The old-growth reserves and connectivity within the project area were discussed with representatives from the Forest Plan interagency implementation team in September and October 1997.

Under existing conditions, there are more acres of productive old-growth for all VCUs than required in the Forest Plan; although some reserves are smaller than the reserves required in the Forest Plan.

The Matrix Management Strategy - The second component of the old-growth habitat conservation strategy is management of the matrix, e.g., the lands with LUD allocations where commercial timber harvest may occur. Within the matrix, components of the old-growth ecosystem are maintained by standards and guidelines to protect important areas and provide old-growth forest habitat connectivity. Some management protections within the matrix are spatially explicit, such as the 1,000-foot beach and estuary fringe, and the riparian buffers for maintaining the integrity of the aquatic and riparian ecosystems. Other forest-wide standards and guidelines preclude or significantly limit timber harvest in areas of high hazard soils, steep slopes, karst terrain, visually sensitive travel routes and use areas, and in timber stands technically not feasible to harvest.

Table 3-8

Acres of Small Old-Growth Reserves in the Project Area Compared to Forest Plan Requirements by VCU

VCU	Forest Plan Small Reserve Requirements	Mapped Small Reserves in Project Area	Forest Plan POG[1] Requirements	POG[1] Mapped in Project Area	Extra Project Area POG[1] Compared to Forest Plan Requirements
79	6930	6894	3465	4609	1144
80	972	683	486	620	134
81	407	599	204	395	191
82	2030	1599	1015	1420	405
83	1694	1280	847	976	129
84	2718	1648	1359	1547	188
85	0	0	0	0	0
86	0	0	0	0	0
87	2266	1811	1133	1218	85
88	0	0	0	0	0
89	2792	2358	1396	1520	124

[1]Productive Old Growth
Source: Weber 1998

3.3.3.2. Connectivity

Connectivity is a measure of the extent to which the landscape pattern of the old-growth ecosystem provides for biological and ecological flows to sustain old-growth associated animals and plant species across the Tongass National Forest and Southeast Alaska. Connectivity is an important component of the old-growth habitat conservation strategy. Beach and riparian LUDs, which function as corridors, were established in the Forest Plan that will provide significant habitat connectivity. In some cases, habitat reserves were enlarged, minimizing dispersal distances between reserves. In addition, standards and guidelines that govern management of the matrix outside reserves (including beach and riparian buffers) contribute to retaining substantial old-growth forest component to provide connectivity.

In the Port Houghton/Cape Fanshaw project area, most of the Old-Growth Habitat LUDs are connected along the shoreline by Scenic Viewshed LUDs, which extend beyond the 1000-foot beach buffer. Scenic Viewshed LUDs will contribute significantly to habitat connectivity within the project area (see Figure 1-3). Scenic Viewshed LUDs will be dominated by late-successional stages and timber harvest units will typically be small and affect only a small percentage of the seen area. The locations of Old-Growth Habitat, Scenic Viewshed LUDs, and the Research Natural Area LUD provide connectivity around the outside perimeter of the project area, mostly along the coastline, from the Tracy Arm-Fords Terror Wilderness to the Farragut River Semi-Remote Recreation area. Old-growth habitat within the project area is further connected by riparian buffers, over-steepened slopes, and other areas unsuitable for timber harvest that ensure an old-growth forest component across the landscape.

3.4. Threatened, Endangered, Candidate, and Sensitive Species

3.4.1. Plants

The Tongass National Forest-wide standards and guidelines require identification of threatened, endangered, and sensitive plant species, and consideration of management activities that avoid or minimize impacts to these species. An evaluation of the Port Houghton/Cape Fanshaw project area was conducted to identify these species that may occur in the project area.

No plants listed as threatened, endangered, or proposed for this status are expected to occur in the project area. Twenty-two vascular plants are designated as sensitive in the Alaska Region by the Forest Service. Based on the distribution of these plants and the types of habitats that occur in the Cape Fanshaw, Port

Houghton vicinity, nineteen of these species could occur in the project area. One species, *Poa laxiflora* (loose-flowered bluegrass), has been previously documented as occurring in the project area.

Botanical surveys for all sensitive species potentially present in the project area were conducted in forest, muskeg, riparian, estuary, beach, aquatic, and alpine plant communities. Surveys were concentrated in areas where forest management activities (including harvest units, roads, sort yards, and log transfer facilities) are planned. A total of 145 plant species were identified in the project area. A Forest Service sensitive plant (*Poa laxiflora*) was observed in the Sandborn Canal estuary, where it was previously reported. No other sensitive plants were seen in the project area.

3.4.2. Fish

There are no threatened, endangered, proposed or sensitive fish species in the project area.

3.4.3. Wildlife

3.4.3.1. American Peregrine Falcon

The American peregrine falcon (*Falco peregrinus anatum*) may seasonally occur in the project area. The endangered American peregrine falcon migrates along the coasts of Alaska to and from its South American wintering grounds (Ambrose and Riddle 1988). Consequently, the species could pass through the Port Houghton/Cape Fanshaw vicinity during migration. Use of this area by migratory peregrines is unknown, but it is likely that some migrating peregrines follow shorebirds and other potential prey along the Cape Fanshaw and Port Houghton coastline.

3.4.3.2. Humpback Whale

The humpback whale (*Megaptera novaeangliae*), which is an endangered species protected under the Endangered Species Act (ESA), is also on the State of Alaska's Endangered Species list. Their population in the North Pacific is estimated to be between 1,113 and 1,701 animals; this is believed to be from 7 to 11 percent of pre-whaling numbers (Baker and Herman 1987). Humpback whales are the most abundant endangered whale that occur in Southeast Alaskan waters, and Baker et al. (1985) estimate that up to 300 to 350 individuals occur in summer and fall. Humpback whales feed in the summer, and migrate south of Southeast Alaska in the fall to mate and bear calves. Humpback whales are known to concentrate at the mouth of Port Houghton and in Stephen's Passage during the summer and fall (ADF&G 1994c). The Sitka Conservation Society indicated that Frederick Sound is an important humpback whale feeding area (public scoping comment letter dated October 31, 1994). Humpback whales were sighted 14 times in the Port Houghton area by the interdisciplinary team in June 1994, and sightings continued throughout the summer. It is not known if these were 14 different individuals or repeat sightings of the same individuals, although a group of six animals was sighted on June 11, 1994 southwest of Rabbit Island. A frequent turnover of humpback whales occurs because the whale distribution in the area is constantly changing (Baker and Herman 1987). Humpback whales in the Port Houghton area are presumably feeding on schools of Pacific sand lance (*Ammodytes hexapterus*) and herring that move into and through the area in spring and summer.

3.4.3.3. Steller Sea Lion

The Steller sea lion (*Eumetopias jubata*) is a federally-listed threatened species protected under the ESA, and listed as a Species of Special Concern by the State of Alaska. The distribution and migration of the Steller sea lion is limited to the North Pacific Ocean. The species ranges from southern California north through the Gulf of Alaska, the Bering Sea, and the Aleutian Islands. Population surveys since 1990 indicate a continuing population decline, and modelling efforts by NMFS indicate that if the decline continues, the Steller sea lion population could be reduced to levels approaching extinction within 100 years (NMFS 1994). The species typically inhabits exposed coastal areas in summer and moves to more protected inland passages and bays in winter (Arndt et al. 1987). Sunset Island, located in Stephens Passage, is the closest federally designated critical habitat to the Port Houghton/Cape Fanshaw project area (ADF&G, personal communication 1994). Another closer haul out is Sail Island located 8 miles west of the entrance to Port Houghton. Other Steller sea lion haul out and concentration areas occur northwest of Frederick Sound on The Brothers and Round islands, in Farragut Bay, and along the shoreline north of Cape Fanshaw and west of Sandborn Canal. As many as 200 sea lions have been reported in the Port Houghton Salt Chuck during the summer months; they are believed to feed on the sockeye salmon run in Rusty River (ADF&G 1994c). The USFWS observed 12 Steller sea lions by the North Point LTF site during winter 1994.

3.4.3.4. Peale's Peregrine Falcon

Peale's peregrine falcon (*Falco peregrinus peali*), which is a Forest Service sensitive species, is a year-round resident in coastal regions of the Aleutians, the Gulf of Alaska, and the outer coast of Southeast Alaska (Ambrose et al. 1988). Very little information is available on breeding populations of this species in Southeast Alaska, although one survey of 1,068 miles of coastline south of

Yakutat found 36 occupied nest territories (Ambrose et al. 1988). An estimated 600 pairs of Peale's peregrines occur in Alaska with more than 140 territories from the Kenai Peninsula south (Ambrose et al. 1988).

No peregrine falcons were observed during field data collection at Port Houghton/Cape Fanshaw. Some suitable cliff nesting habitat is present along the shore of Port Houghton and Cape Fanshaw, but most of the coastline is comprised of forested slopes that provide few or no adequate nesting platforms. Some suitable nest sites might be available on the alpine cliffs of Dahlgren, Jamestown, and Washington peaks, but these sites are far from the better foraging areas along the coast.

3.4.3.5. Trumpeter Swan

The trumpeter swan (*Cygnus buccinator*) is a Forest Service sensitive species that breeds in the forest wetlands, rivers, and lakes of Alaska, and generally winters along the estuaries and open-water lakes of southcentral and Southeast Alaska (Belrose 1980; Armstrong 1990). Prominent wintering concentrations in Southeast Alaska have been found on Prince of Wales Island (Belrose 1980) and Blind Slough near Petersburg (Armstrong 1990; Walsh 1992) where they are often in association with the tundra swan.

The USFWS observed three trumpeter swans close to the Sandborn Canal during February 1996. Residents of Farragut Bay reported 30 to 40 swans winter each year in that estuary, and winter swan surveys conducted jointly by the USDA-FS and USFWS in the Stikine Area since 1990 have reported small groups of swans using the Farragut River Valley (9 and 3 in 1991 and 1992, respectively).

3.4.3.6. Northern Goshawk

The northern goshawk (*Accipiter gentilis*) is a Forest Service sensitive species. The Queen Charlotte goshawk, the subspecies endemic to Southeast Alaska, has especially been a focus of concern because of its low natural densities, restricted distribution, and the perception that intensive timber harvest in the region has reduced goshawk habitat capability (Crocker-Bedford 1994). Goshawks are generally associated with mature or old-growth forests, and the loss of breeding and wintering habitat associated with timber harvest may be a threat to goshawk populations (Titus et al. 1994). A radio- telemetry study of goshawks in Southeast Alaska found that almost 90 percent of relocations were in old-growth forests, and only about 10 percent were in second-growth forest or other habitats (Titus et al. 1994). About 92 percent of relocations were in productive old-growth forest.

Only about 1 percent of relocations were in noncommercial or nonforest habitat. Home range sizes calculated in the same study showed wide variability. During the breeding season, male home ranges varied from 1,800-47,955 acres, and female home ranges varied from 675-275,300 acres. Results for females showed extremely high variation because two of the eight females during the study abandoned their territory during the fledgling dependency period.

Observations of northern goshawks and nest locations in the Port Houghton/Cape Fanshaw project area occurred during summer 1994. Two confirmed and one probable nest with nestlings or fledglings were located, and goshawks were seen or heard in 18 of the proposed units. Goshawk pellets were collected at two of the nest sites. Analysis of these pellets found remains of Steller's jay (*Cyanocitta stelleri*), small birds (junco or warbler size), and small rodents (probably red squirrel, based on sizes of bones, incisors, and molars).

Since the goshawk nests were field verified in 1994, additional surveys by ADF&G and the Forest Service in 1995 and 1996 have resulted in no confirmation of goshawk use of the previously identified nest sites. However, a pair of goshawks was believed to be present in the vicinity of the Negro Creek nest during a 1995 survey by ADF&G, and a new goshawk nest was identified by ADF&G in 1996 near the Cat Creek nest observed in 1994.

In addition, during 1994, the adult female at one of the nest sites (Cat Creek) was captured and fitted with a radio-collar by the ADF&G. This bird was relocated nine times during July and August, at distances ranging to nearly 5 miles from the nest. A home range of 6,688 acres was calculated based on these relocations. Kenward (1987) recommends a sample size of 30 relocations as a standard for accurately estimating home range size.

3.4.3.7. Osprey

The osprey (*Pandion haliaetus*) is a species that is a Forest Service sensitive species and considered of special concern by the Alaska Natural Heritage Program (ANHP). It feeds almost exclusively on fish, and its distribution is limited to coastal areas or large lakes and rivers (Ehrlich et al. 1988). Ospreys nest at the tops of snags or live trees, usually over water or near water (Terres 1980). Ospreys are subject to piracy by bald eagles, and they are not usually found where bald eagles are common. In Alaska, osprey breeding distribution is limited to a few scattered pairs except for a cluster of 20 to 30 pairs near Tetlin Lake (Hughes 1985; Poole 1989). No real concentrations have been found in Southeast Alaska, although multiple pairs have been found at Thomas Bay and on Kupreanof Island. Both areas are relatively close (<20 miles) to the project area (Blatt 1994b).

No ospreys were observed during the field work in the Port Houghton/Cape Fanshaw vicinity. The habitat would appear to be suitable, with extensive coastline, numerous trees and snags close to the water, and abundant fish. However, there are many bald eagles in the vicinity, with nesting pairs about every ½ mile along the coastline, and eagles could be a competition to ospreys.

3.5. Fish and Water Quality

The project area is divided into 32 watersheds as shown on Figure 3-2. Some of these watersheds incorporate several small adjacent watersheds (i.e., separate and distinct drainage areas) to facilitate the evaluations. For reference, each of these watersheds is assigned a three-digit number. Intensive stream surveys were not conducted in watersheds where timber harvesting and road construction are not proposed under any alternatives (e.g., the Rusty River and Glen Creek watersheds at Port Houghton Salt Chuck). The Rusty River and Glen Creek watersheds were not included in the unit pool, in part, due to their importance for salmon production, including sockeye and possibly chinook salmon.

Field investigation and aerial photography analysis resulted in identifying 94 miles of Class I (anadromous fish such as coho salmon) streams, 129.9 miles of Class II (resident fish such as cutthroat trout) streams, 244.3 miles of Class III (no fish) streams, and 69.3 miles of Class IV streams within the project area (Table 3-9). Class I streams and lakes have anadromous or adfluvial fish habitat; high quality resident fish habitat, or habitat above migration barriers known to be reasonable enhancement opportunities for anadromous fish. Adfluvial fish are species or populations of fish that do not go to sea, but live in lakes, and enter streams to spawn. Class II streams and lakes have resident fish populations where no anadromous fish occur, and otherwise do not meet Class I criteria. Class III streams have no fish populations, but 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 a bankfull width greater than 5 feet and are often incised into the surrounding hillslope. Class IV streams are 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 are generally shallowly incised into the surrounding hillslope. The Class IV streams mileage reported in Table 3-9 applies only to those streams inventoried by field work in blocks of timber identified as potential timber harvest units. Therefore, the Class IV stream mileage is not indicative of the density of Class IV streams throughout the entire project area.

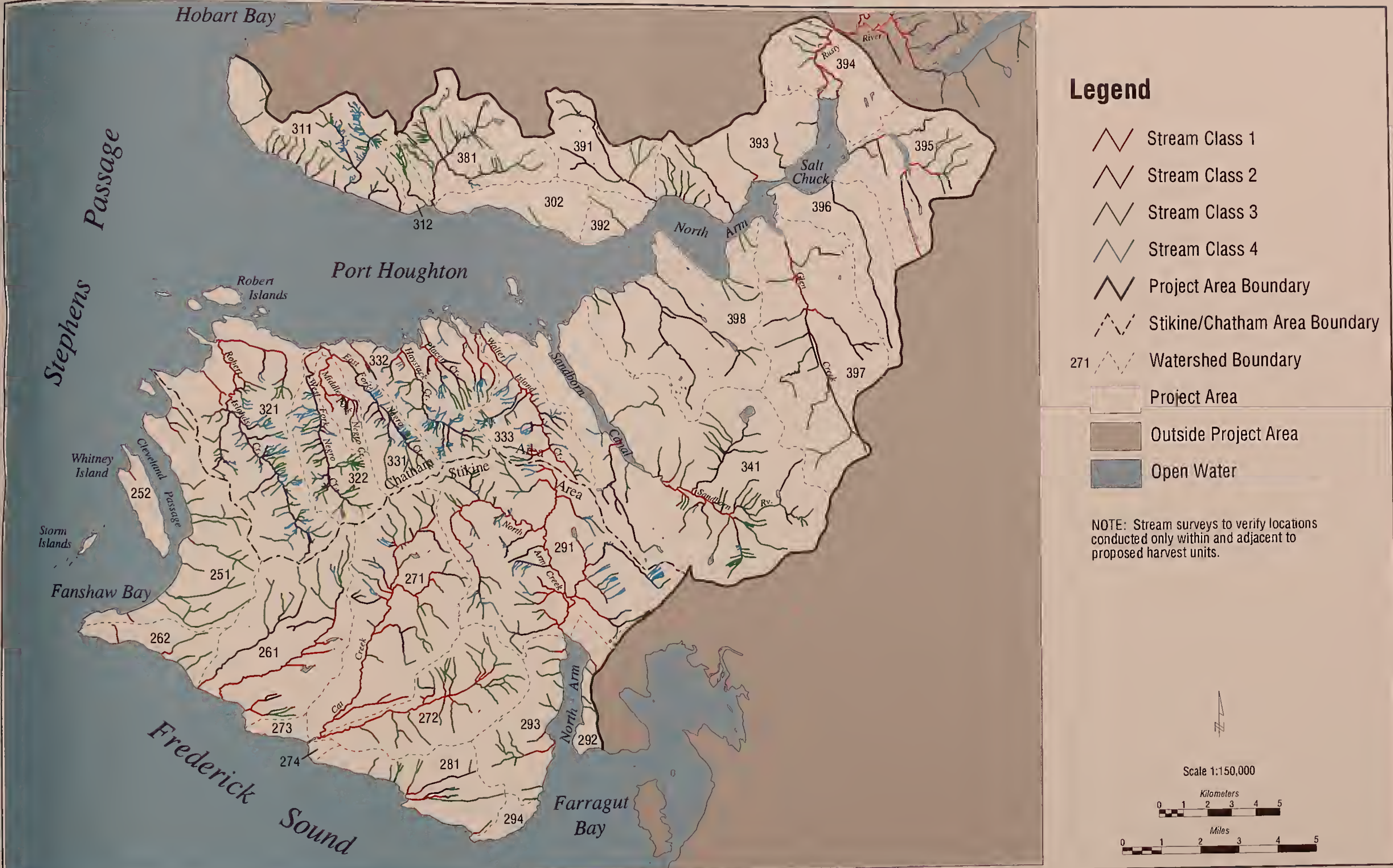
Table 3-9

Area, Stream Density, and Stream Length by Stream Class in the Port Houghton/Cape Fanshaw Project Area

Watershed #	Stream Name	Area		Stream Length (miles)	Stream Density (mi/mi^2)	Stream Length By Class			
		Acres	mi^2			Class I	Class II	Class III	Class IV
252	Whitney Island Creeks	862.05	1.35	0.27	4.99	0.27			
261	Unnamed Creeks	6987.49	10.92	23.95	0.46	7.70	6.17	9.32	0.76
262	Unnamed Creeks	1494.86	2.34	3.18	0.73	0.87		2.31	
271	Cat Creek	8666.31	13.54	34.57	0.39	14.23	5.32	12.68	2.34
272	South Fork Cat Creek	5171.06	8.08	23.38	0.35	7.66	0.29	15.43	
273	No Streams	393.73	0.62	0.00	0.00				
274	No Streams	149.70	0.23	0.00	0.00				
281	Unnamed Creeks	3266.57	5.10	10.37	0.49	1.92	2.43	6.02	
291	North Arm Creek	12237.72	19.12	61.93	0.31	19.66	11.02	18.78	12.47
292	Unnamed Creeks	1000.52	1.56	1.50	1.04	0.22		1.28	
293	Unnamed Creeks	3349.15	5.23	9.09	0.58	1.47		7.62	
294	No Streams	537.02	0.84	0.00	0.00				
302	Unnamed Creek	2027.50	3.17	0.58	5.46			0.58	
311	Unnamed Creeks	4880.02	7.63	29.31	0.26	0.05	6.66	14.92	7.68
312	Unnamed Creek	567.24	0.89	3.86	0.23	0.02	0.55	3.23	0.06
321	Robert Island Creek	8337.91	13.03	49.41	0.26	5.91	13.55	17.52	12.43
322	West Fork Negro Creek	2995.48	4.68	24.17	0.19	0.62	6.67	11.78	5.10
331a	Middle Fork Negro Creek	1013.83	1.58	5.91	0.27	3.08	1.41	1.02	0.40
331b	East Fork Negro Creek	2331.49	3.64	17.59	0.21	0.78	6.04	5.71	5.06
332	Haystack and Placer Creeks	5017.03	7.84	39.97	0.20	6.94	8.62	12.04	12.37
333	Walter Island Creek	3526.73	5.51	24.73	0.22	6.42	4.44	5.41	8.46
341	Sandbom Creek	17290.55	27.02	46.24	0.58	4.32	12.10	28.61	1.21
381	Unnamed Creek	4825.23	7.54	23.01	0.33	0.01	7.20	14.82	0.98
391	Unnamed Creek	3049.87	4.77	9.58	0.50		5.31	4.27	
392	Unnamed Creek	1034.45	1.62	1.33	1.22		0.36	0.97	
393	Unnamed Creek	4976.86	7.78	11.63	0.67	0.58	2.41	8.64	
394	Rusty River	4035.05	6.30	7.47	0.84	4.07	0.34	3.06	
395	Unnamed Creek	5748.31	8.98	13.33	0.67	3.29	5.01	5.03	
396	Unnamed Creek	3567.94	5.57	4.86	1.15		4.86		
397	Glen Creek	10059.67	15.72	21.26	0.74	2.73	10.51	8.02	
398	Unnamed Creek	8335.34	13.02	17.79	0.73		8.38	9.41	
	TOTALS	143099.30	223.59	537.35	2.40	94.01	129.86	244.16	69.32

Figure 3-2

Watersheds in the Port Houghton/Cape Fanshaw Project Area



Prepared by Parametrix, Inc. File: strmclsml.gra Date: July 14, 1998

Channel type GIS data was updated in 1995, 1996 and 1997. Channel types are summarized by process group in Table 3-10. A process group is a combination of similar channel types based on major differences in landform, gradient, and channel shapes. Process groups reflect the long-term interaction of landform, geology, climate, and riparian vegetation. Process groups also characterize the basic interrelationships between the runoff, sediment transport, and vegetation patterns along stream banks.

Table 3-10
Distribution of Stream Miles by Process Group

Process Group	Stream Miles
Alluvial fan	8.0
Estuary	2.1
Floodplain	29.5
Glacial outwash	0.8
Large contained	16.8
Moderate gradient contained	37.2
Moderate gradient mixed control	54.2
Palustrine	6.5
Lake segments	1.8

Source: Good 1998.

Most stream miles in the project area are in the High Gradient Contained process group, predominantly deeply incised mountain slope channels. Other common channel-type process groups are Moderate Gradient Mixed Control, Moderate Gradient Contained, and Floodplain. The distribution of stream miles among process groups is similar in the project area to that reported for mapped channels throughout the Tongass National Forest (Paustian et al. 1992).

Stream reach inventories and channel stability evaluations (SRI/CSEs) resulted in 76 stream reaches that are rated as "good," 89 reaches that are rated as "fair," and four reaches that are rated as "poor." These ratings indicate the resistance of the stream channels and banks to hydraulic forces and the capacity of the stream to adjust and recover from potential changes in stream flow and/or increases in sediment production (Good 1995a). The watershed determined to be the most sensitive by the SRI/CSE procedure is the East Fork Negro Creek (Watershed 331b).

Alaska Water Quality Standards establish maximum stream temperatures between 55.4 and 59°F for growth and propagation of fish, shellfish, and other aquatic life and wildlife. Temperatures should not exceed 68°F at any time. Stream water temperatures recorded by field personnel within or near potential timber harvest units ranged from 46 to 60°F. These measurements were taken under a variety of weather conditions during different times of day throughout the June to September 1994 field season. Water temperatures exceeding 58°F were measured in the Sandborn River watershed. Only in the East Fork Negro Creek and Walter Island Creek watersheds were there no measured water temperatures above 55.4°F, during summer 1994.

Most of the streams in the project area are used by resident fish, primarily cutthroat trout. Several species of anadromous fish are present in major streams and the lower reaches of numerous small streams. ADF&G peak escapement surveys of the Sandborn River indicate pink salmon (*Oncorhynchus gorbuscha*) production has ranged up to 116,500 (1985) and 153,000 (1971) fish, with lesser numbers of chum salmon (*Oncorhynchus keta*), coho salmon (*Oncorhynchus kisutch*), and sockeye salmon (ADF&G 1994d). Total escapement for pink salmon may be as high as 382,000 in some years. Steelhead trout are also known to use the river. Other productive salmon streams in the project area are Negro and Robert Islands creeks. The ADF&G Anadromous Stream Catalog lists Haystack Creek, Placer Creek, and Walters Island Creek among other streams used by pink salmon and chum salmon.

Fish and water resource data and field observations for the 13 watersheds containing potential harvest units are summarized in the following sections.

3.5.1. Watershed 261 Unnamed Creeks

Watershed 261 is located in the southwest corner of the project area within the Stikine Area. The largest of three third-order streams is located in the center of the watershed and drains tributaries where adjacent potential timber harvest units are located. Stream order categorizes stream size, where headwater streams are designated first-order, two first-order streams combine to form a second-order stream, two second order streams combine to form a third-order stream, and so forth. These tributaries are high-gradient contained-channels that drain steep hillsides in the northern corner of the watershed. These Class III streams feed into Class II streams at lower elevations. The three primary drainages run directly to saltwater providing 7.7 miles of Class I streams and 6.2 miles of Class II streams. One reach survey was conducted in a Class III tributary in the headwaters of the largest unnamed stream in the watershed. The water was clear, and evidence of natural sedimentation was minimal.

Cutthroat trout were observed in Class II streams in the northern corner of the watershed near potential timber harvest units. No anadromous fish escapement data are available for this watershed (ADF&G 1994d). Evidence of past slope failures are apparent and are a common characteristic in areas of high-gradient, deeply incised channel types. Downstream channels are generally stable.

3.5.2. Watershed 271 Cat Creek

Watershed 271 is located on the Stikine side of the project area. Cat Creek is a relatively large (i.e., fifth order) Class I stream branching into several Class II and III tributaries in the northern portion of the watershed where the proposed harvest units are located. Tributaries in the northwest portion of the watershed drain steep slopes and are predominantly of the high-gradient contained-channel type process group. These tributaries drain into moderate-gradient Class I and II streams. Streams in the eastern portion of the watershed are moderate in gradient. Cat Creek is the second largest watershed on the Stikine side of the project area. It contains 14.2 miles of Class I, 5.3 miles of Class II, and 12.7 miles of Class III streams.

Several waterfalls approximately one mile upstream from the mouth of Cat Creek prevent anadromous fish migration to 13 miles of suitable habitat upstream. The feasibility of providing anadromous fish passage will be assessed in the future. The portion of the main stem channel above the barrier is designated Class I because of its high value resident fish habitat.

The shallow banks adjacent to Class I and II streams are bordered by wide floodplains. These floodplains contain numerous small meandering channels with pools that provide suitable rearing habitat for salmonid fish. Cutthroat trout occur in the upper reaches of two Class II streams located in the northwest corner of the watershed.

Channel substrate was generally comprised of 20 percent or less in the sand and finer particles, and embeddedness was no more than 25 percent at any reach survey location, indicating that natural sedimentation rates are relatively low near proposed harvest units.

3.5.3. Watershed 291 North Arm Creek

Watershed 291 is the largest watershed on the Stikine side of the project area. North Arm Creek, a fourth-order stream, extends approximately 0.25 mile upstream from the estuary as a Class I stream before two waterfall barriers block anadromous fish migration. Because of the close access to the barrier site from

Farragut Bay, there is a potential for anadromous fish habitat enhancement. Fish pass construction has the potential to open an additional 19.7 miles of Class I habitat to anadromous fish. Class II streams extend for approximately 11 miles. The feasibility of providing anadromous fish passage will be assessed in the future. The main stem channel above the barrier is designated as Class I due to high value resident fish habitat.

The watershed's extensive network of streams provides 3.9 miles of floodplain Class I fish habitat, including the middle and upper reaches of the west branch. However, numerous cascades and waterfalls in the lower reaches of the west branch prevent this area from being accessible to anadromous fish. Blasting steps in the lower falls on the main stem of North Arm Creek or creating a fish ladder by other means may be an opportunity to open several miles of habitat on the main creek and lower tributaries to anadromous use. No anadromous fish escapement data are available for this watershed (ADF&G 1994d).

Channel and bank stability varies within the watershed. Tributaries in the northwest portion of the watershed, where the terrain is steep, have deeply incised v-notches. Bank failures and undercutting were observed in these areas. Stream reaches in the central and eastern portions of the watershed are not as deeply incised, and exhibit less evidence of bank failures. The relatively stable channels and banks of the larger streams in the watershed are primarily comprised of large angular boulders and cobbles.

3.5.4. Watershed 311 Unnamed Creeks

Watershed 311 is located near the western portion of Goldbelt, Inc. land near the mouth of Port Houghton. Nearly all of the adjacent Goldbelt, Inc. land has been harvested.

The watershed includes several small first-order streams and one second-order stream that drain directly into saltwater, in addition to the main third-order stream. All of the proposed timber harvest units in this watershed are located in the drainage of the third-order stream. Waterfalls that are prevalent in this area prevent the migration of anadromous fish in all but the lower reaches of streams. A bedrock cascade approximately 200 yds upstream from the mouth prevents further upstream migration of anadromous fish. Although no fish were observed, and permanent barriers exist within and downstream of the project area, suitable habitat exists for resident fish on some stream reaches. Those stream reaches, totalling 6.7 miles, have been designated for protection as Class II fish streams until additional sampling verifies the absence of fish. No anadromous fish escapement data are available for this watershed (ADF&G 1994d).

The streams in the watershed are incised to bedrock, with numerous waterfalls. The upper banks are predominantly long steep slopes with limited vegetation. Bedrock forms stable stream banks along many stream reaches, but where soils overlay the bedrock, evidence of slope failure is common.

3.5.5. Watershed 312 Unnamed Creeks

Watershed 312 is located on the north slope of Port Houghton and is predominantly owned by Goldbelt, Inc. Nearly all Goldbelt, Inc. land has been harvested. This 567-acre watershed rises from sea level to 2,300 feet Most of the streams are Class III high-gradient contained-channels, totalling 3.2 miles. However, there is a Class II section of alluvial fan and moderate-gradient mixed-control channels that provide 0.6 mile of resident fish habitat.

3.5.6. Watershed 321 Robert Islands Creek

Watershed 321 is located north of Cape Fanshaw on the Chatham side of the project area. The watershed has three primary streams that flow directly into saltwater: North Fork Robert Islands Creek, the main fork of Robert Islands Creek, and a small unnamed stream.

The tributaries in the headwaters of North Fork Robert Islands Creek drain high-gradient slopes. These streams are generally Class III high-gradient contained-channel types within deeply incised v-notched canyons. The main stem from approximately 200 feet to 500 feet elevation is dominated by a Moderate Gradient Mixed Control and a Moderate Gradient Contained channel types. Stream gradients greater than 15 percent and the presence of waterfalls limit anadromous fish passage between 200 and 300 feet elevations in the Moderate Gradient Contained section. The main stem stream below 200 feet elevation alternates between Floodplain and a Moderate Gradient Contained channel types.

The upper reaches of the main stem of Robert Islands Creek are moderate-gradient contained-channels with both temporary and permanent fish passage barriers. Steep slopes in this area are drained by high-gradient, deeply incised Class II and III tributaries that flow into a deeply incised moderate-gradient main channel. The middle section extending from 200 feet to 600 feet in elevation and approximately 3 miles in length is a Class II low-gradient Large Contained channel. The Class II streams are separated from the Class I downstream waters by a series of waterfalls occurring at approximately 100 to 200 feet elevation. Below these falls, the channel has a lower gradient and is not as contained by valley slopes.

The Class I reaches of both the North Fork and main Robert Islands creeks provide approximately 6 miles of accessible riffle/pool habitat with abundant spawning gravel. There are also 13.5 miles of high-quality habitat for resident trout upstream from passage barriers. ADF&G peak escapement surveys identified from 50 to 20,400 pink salmon between 1964 and 1994, with numbers greater than or equal to 10,000 each of the past six years (ADF&G 1994d). Chum peak escapement has ranged from 50 to 1,700 between 1968 and 1993, and coho are also produced.

3.5.7. Watershed 322 West Fork of Negro Creek

Watershed 322 is located immediately east of Watershed 321. This 2,995-acre area is drained by the West Fork of Negro Creek.

West Fork Negro Creek, a third-order stream, is the larger of the three Negro Creek drainages. It flows from south to north providing approximately 6.7 miles of Class II and 0.6 mile of Class I habitat. The headwaters of the creek are characterized as Class III, high-gradient narrow-channel types that are incised to bedrock. Falls and steep cascades are common along the main channel. Several large barriers, including a 30-feet waterfall less than one mile from its mouth, limit access by anadromous fish. The main channel is fed by high-gradient shallow creeks that drain upland muskeg areas. As the West Fork flows north, it changes from a Moderate Gradient Mixed Control channel to a low gradient Large Contained channel. The lower reaches of West Fork Negro Creek meander in a wide floodplain through forested lowlands. Windfall and debris jams are present, but not as common as in the upper regions.

3.5.8. Watershed 331a Middle Fork Negro Creek

Middle Fork Negro Creek, a second-order stream, provides over three miles of Class I anadromous fish habitat. The lower reaches of the Middle Fork are of the moderate-gradient contained-channel types, the middle and the upper reaches are moderate- to high-gradient contained-channel types. Drainage basin area equals 1,014 acres.

Coho salmon and Dolly Varden trout (*Salvelinus malma*) were observed in the lower Class I reaches of both the West and Middle Forks of Negro Creek. As the gradient increases and minor barriers appear, suitable spawning and rearing habitat for coho salmon also declines. Small low-gradient tributaries draining adjacent muskeg areas provide additional rearing areas. The upper reaches of the West Fork offer moderately productive habitat for Dolly Varden and cutthroat trout. ADF&G peak escapement surveys for the entire Negro Creek system are summarized for Watershed 331.

A field procedure for characterizing particle size distribution was adapted from methodologies developed by Bevenger and King (1995). The percent of fines 4 mm and smaller found in all forks of Negro Creek using this procedure ranged from 5 to 11 percent. These percentages are well below any threshold of concern.

3.5.9. Watershed 331b East Fork Negro Creek

Watershed 331b, drained by the East Fork Negro Creek, is the second largest of the three Negro Creek basins at 2,331 acres. Only 0.8 miles of Class I fish habitat in the East Fork are available due to a 6-feet waterfall barrier, at an elevation of approximately 150 feet Approximately 6 miles of resident fish habitat occur above the barrier. In 1986, the Forest Service attempted to modify the falls to provide anadromous fish passage. The efforts were not successful, although there could be additional work in the future.

The East Fork has two major tributaries that drain most of Watershed 331b. The headwaters are high-gradient contained-channel types. These channels are relatively straight and show evidence of substantial mass wasting, bank cutting, pool filling, and deposition. Small temporary barriers are common where logs or boulders become lodged and trap gravel and debris. The upper main stem reach, between 400 and 600 feet elevation, is moderate in gradient. Tributaries of the upper watershed are generally high-gradient contained streams. The middle reach, from 200 feet to 400 feet elevation, consists of a Floodplain channel flowing into a low gradient Large Contaned channel followed by a transition to a Moderate Gradient Contained channel at approximately 300 feet elevation. The lower reach meanders through low-gradient muskeg lowlands.

The lower East Fork Negro Creek provides suitable habitat for the spawning and rearing of anadromous fish. The tributaries meandering through muskegs adjacent to the main channel provide additional rearing habitat. The visually estimated percentages of fines and sand at the East Fork Negro Creek watershed reach survey locations ranged from less than 10 to 50 percent, and embeddedness ranged from 30 to 70 percent in pool habitats. ADF&G peak escapement surveys indicate pink salmon production for the entire Negro Creek drainage has ranged from 650 to 40,000 fish between 1962 and 1994, with numbers greater than or equal to 15,000 each of the past three years (ADF&G 1994d). Chum peak escapement has ranged from 6 to 2,800 between 1968 and 1993 (2,800 in 1993), and coho are also produced. Peak escapement data are not separated for the three forks of Negro Creek included in watersheds 322 and 331.

3.5.10. Watershed 332 Haystack Creek, Placer Creek and Unnamed Creeks

Watershed 332 is centrally located in the project area. This 5,017-acre watershed is a combination of eight first- to third-order drainages that enter Port Houghton between Negro Creek and Walter Island Creek. Most of Watershed 332 is drained by Haystack Creek, the longest of the streams, and Placer Creek. Five of the six smaller creeks are previously unmapped streams that were located during field reconnaissance, two of which flow into Little Lagoon, a proposed LTF site.

Watershed 332 streams provide 6.9 miles of Class I habitat, 8.6 miles of Class II, and 12.0 miles of Class III habitat. Generally, the upper reaches of each drainage are High Gradient Contained channel types, the middle reaches are Moderate Gradient Contained, and the lower reaches are Moderate Gradient Mixed Control and low-gradient meandering Floodplain channels adjacent to muskeg areas. A landslide approximately one mile upstream from the mouth of Haystack Creek blocks fish passage, and habitat for anadromous fish upstream from the barrier is limited. The small tributaries of the upper reaches of the watershed generally have high-gradient, deeply incised, straight channels. The small tributaries of the lower watershed are low-gradient, meandering palustrine and floodplain channels. Removal of a minor log jam barrier on a tributary of lower Placer Creek would open approximately 1,000 feet of suitable anadromous fish habitat.

Favorable habitat for anadromous fish occurs in the lower to middle reaches of most streams in the watershed, particularly the Moderate Gradient Contained or Mixed Control channel types. Evidence of natural sedimentation was more prevalent in Placer Creek, Little Lagoon, and other streams in the watershed compared to Haystack Creek.

ADF&G peak salmon escapement survey data are available for three streams within Watershed 332 (ADF&G 1994d). Estimates for Haystack Creek (referred to in the survey as the 1st west of Negro Creek) range from 200 to 6,700 pink salmon annually between 1970 and 1994. The peak count for chum salmon is only available for two years: 137 in 1972 and 4 in 1982. Estimates for Placer Creek pink salmon range from 100 to 7,000 fish annually between 1968 and 1994. Data were also available for one of the unnamed streams, referred to as 2nd west of Sandborn Canal, ranging from 100 to 2,000 pink salmon annually between 1975 and 1994.

Stream stability is of concern, primarily in the upper reaches of Haystack Creek and Placer Creek where slopes are steep. Evidence of slope failures are common in the lower reaches of these tributaries and in the main channels where steep side slopes are undercut and collapse during high flows. Channels in the lower portion of the watershed are low-gradient and not as contained by valley slopes. These channels experience occasional flooding and moderate cutting and pool filling, but they are generally much more stable than the upstream reaches.

3.5.11. Watershed 333 Walter Island Creek

Watershed 333 lies west of Sandborn Canal and is 3,527 acres in area. This watershed has a unique feature for the Chatham side of the project area: a wide muskeg valley that extends nearly its entire length. Walter Island Creek and its tributaries provide 6.4 miles of Class I habitat, 4.4 miles of Class II and 5.4 miles of Class III. The upper main stem is a low-gradient meandering FP channel with a predominantly fine sand substrate. The bank vegetation exhibits evidence of frequent flooding, and abundant large woody debris provides instream cover. In the lower section, the gradient increases and the MC channel flows in a straight course to its mouth. Tributaries on both sides of the main channel offer additional fish habitat in their lower reaches, but have boulder and bedrock waterfalls in their upper reaches that limit fish migration.

As stated above, this stream system provides 6.4 miles of highly productive Class I spawning and rearing habitat. Spawning pink salmon were observed during field surveys. Many of the lower reaches of tributaries are accessible to anadromous fish during low- as well as high-water conditions. ADF&G peak escapement surveys indicate pink salmon production has ranged from 70 to 3,000 fish between 1968 and 1994, with the greatest number occurring in 1994 (ADF&G 1994d). Chum peak escapement data are only available for 1993 when the peak count was 100.

Streams in this watershed generally exhibit greater bank and channel stability relative to other drainages in the project area. The main channel of Walter Island Creek experiences moderate cutting and pool filling, and appears to be in equilibrium with respect to erosion and deposition. The degree of natural sedimentation is highly variable. High-gradient reaches have virtually no fines or sand and zero percent embeddedness. More typically, the main channel is dominated by up to 90 percent sand substrate, and is 90 percent embedded where it meanders through a broad muskeg floodplain. Similarly, the substrate composition and embeddedness in tributaries is highly variable and reflects areas of channel cutting and sediment deposition. The water in many muskeg channels is tainted brown due to the high tannin component.

3.5.12. Watershed 341 Sandborn Canal

Watershed 341 is the largest watershed in the project area, encompassing 17,291 acres. The Sandborn River and its tributaries provide important spawning and rearing habitat for anadromous fish. The watershed ranges in elevation from sea level at Sandborn Canal to 4,000 feet at its highest point. Four streams drain into Sandborn Canal, including Sandborn River, a large third-order stream at the head of the canal. Two additional second-order streams flow north into the head of the canal and one high-gradient second-order stream enters the central part of the canal from the east.

Sandborn River and its tributaries provide approximately 4.3 miles of highly productive Class I anadromous fish habitat. The lower reaches are low-gradient estuarine and floodplain channels that meander through adjacent grasses and muskegs. Within the estuary, Sandborn River is braided into two or more channels separated by islands. Numerous small first-order tributaries within the estuary provide excellent rearing habitat for juvenile coho salmon. There is also a first-order tributary with 0.4 miles of Class I habitat that enters Sandborn River in the estuary. Upstream from the estuary, the Sandborn River has two main forks with low-gradient floodplain Class I habitat in the lower reaches. Multiple high-waterfall barriers and steep gradients in the middle and upper watershed limit opportunities for enhancing anadromous fish use.

The North Fork of Sandborn River drains a lake at approximately 2,300 feet elevation. A 60-foot waterfall is located immediately below the lake. The central reaches of the stream are fed by several Class III streams that generally exhibit high-gradient, moderately to deeply incised channel types. The stream follows a high-gradient Class III channel until it becomes wider and less steep near the confluence with the South Fork. Many waterfall and cascade barriers occur along this fork making it inaccessible to migrating anadromous fish. Embeddedness is highest (60 percent) in the lower reaches of the East Fork and tributaries of the lower Sandborn River. These lower tributaries drain relatively unstable slopes that have naturally high rates of erosion and sedimentation.

The upper main stem of Sandborn River has several major branches, two of which have a headwater lake. The eastern lake outlet is a High Gradient Contained, deeply incised channel that has numerous fish passage barriers. No harvest units are proposed along this branch. The south lake outlet is a High Gradient Contained channel type that is also inaccessible to anadromous fish. The upper reaches of Sandborn River and its tributaries provide limited fish habitat for resident trout. These reaches typically have high-gradient channels with numerous waterfall and cascade barriers that limit fish migration. Evidence of erosion and slope failures is common.

Lower Sandborn River is one of the most productive anadromous fish streams in the project area, second only to the Rusty River. Pink salmon were observed in late summer, returning to spawn in the lower reaches. ADF&G peak escapement surveys indicate pink salmon production has ranged from 1,030 to 105,000 fish between 1960 and 1994, with annual peak counts exceeding 14,000 every year since 1978 (ADF&G 1994d). Chum peak escapement data have ranged from 50 to 26,000 between 1960 and 1994. Coho salmon (500 in 1981 peak escapement survey) and Dolly Varden are also produced, and 1 to 5 sockeye salmon were reported in the 1978 and 1977 surveys. The State's anadromous stream catalogue indicates the Sandborn River contains steelhead (ADF&G 1993), and the Forest Service observed one mature adult steelhead (*Salmo gairdneri*) in the lower river in the spring of 1994 (Martin 1994).

An opportunity for anadromous fish habitat enhancement exists on an unnamed stream that flows into Sandborn Canal from the west (Unnamed Creek #1).

Removal of a large debris jam located 190 yds upstream from the estuary would open approximately 3.5 miles of Class II habitat upstream, including suitable spawning areas for pink salmon.

3.5.13. Watershed 381 Unnamed Creek

Watershed 381 is drained by a third-order stream that has three major forks. Several lakes are located in the headwaters of the middle and north forks, including Alice Lake. The three forks converge in the center of the watershed on Goldbelt, Inc. land. This 4,825-acre watershed ranges in elevation from sea level to 4,000 feet, and includes some of the steepest terrain in the project area.

The three main forks of the unnamed creek drop 2,000 feet in elevation in approximately three miles. Much of this elevation drop is by waterfalls. These natural barriers prevent fish from migrating upstream through the Goldbelt, Inc. lands to the project area. The first high waterfall is only 100 yds from the estuary. No fish were observed in the project area portion of the watershed; thus, all streams in the vicinity of proposed logging units were judged to be Class II until additional sampling verifies fish absence. Channels are commonly cut to bedrock with loose cobbles and boulders that indicate frequent scouring and deposition. The upper reaches of streams in the watershed have relatively stable channels and banks comprised primarily of bedrock, large cobbles, and boulders. The lower reaches of streams in the watershed are deeply incised and have extremely steep banks with high potential for erosion and mass wasting. No anadromous fish escapement data were available for this watershed (ADF&G 1994d).

3.5.14. Watershed 398 Unnamed Creek

Watershed 398 is located east of Sandborn Canal and southwest of North Point. Water is drained from the area by ten unnamed creeks that flow into Port Houghton and its North Arm: one third-order stream, one second-order stream, and eight first-order streams. Stream reaches of the watershed are predominantly high-gradient contained-channel types with many steep cascades and waterfalls. These conditions prevent access by anadromous fish. However, due to the presence of resident cutthroat trout in upper reaches of the third-order stream, it is designated Class II.

Anadromous fish have access only to short reaches at the mouth of the streams. Resident cutthroat trout were observed in the upper reaches of the west fork of the largest drainage. No anadromous fish escapement data were available for this watershed (ADF&G 1994d). The one second order stream also contains Class II habitat based on channel types. In total the watershed contains 8.4 miles of Class II and 9.4 miles of Class III streams.

Stream channels in the upper reaches of the watershed are commonly incised to bedrock and are thus relatively stable. The channels in lower reaches of the watershed are less stable, as evidenced by recent deposition behind log and debris jams. Stream banks in many reaches throughout the watershed exhibit evidence of moderate mass wasting of the upper banks and stream cutting of the lower banks.

3.6. Subsistence

Subsistence resources are an integral part of rural Southeast Alaskan lifestyle. Section 810, Title VIII, of the ANILCA states that the director of a federal agency which has primary jurisdiction over public lands must evaluate the effects that economic and consumptive use of those lands has on subsistence needs. Only Alaskans living in communities designated rural by the Federal Subsistence Board are given priority to harvest subsistence resources. ANILCA defines subsistence as:

> ...the customary and traditional uses by rural Alaskan 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 nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade (ANILCA, 16 USC 3113 p. 390).

Gathering and sharing subsistence resources is a focal point of rural life in Southeast Alaska. One in three households obtains at least half the food it consumes from its own harvest activities (Kruse and Muth 1990). Gathering and consumption of subsistence resources is important regardless of household income: subsistence harvest activity does not decrease in response to an increase in household income (Kruse and Muth 1990).

Sharing is an important component of subsistence, involving distribution of resources throughout families, the community, and in some instances, between communities (Kruse and Muth 1990). Through subsistence harvest, consumption, sharing, and exchange, residents of rural Alaska can express traditional and cultural beliefs by demonstrating the willingness to participate in the gathering of renewable subsistence resources.

3.6.1. Communities Using the Project Area for Subsistence

3.6.1.1. Petersburg/Kupreanof

Petersburg is located on Mitkof Island, approximately 30 miles southeast of the project area. The town developed around a single cannery started in 1900 by a Norwegian immigrant named Peter Buschmann. Commercial fishing is still economically important to Petersburg. Large-scale logging was introduced to the area in the 1960s and timber became economically important to the community. Since the 1970s, the government has become the second largest employment sector. Construction, retail sales, and tourism are also important to the local economy.

The community of Kupreanof is located directly across Wrangell Narrows from Petersburg. It has a population of 24 people and travel to and from the city is by boat. Public services are limited. Most residents find employment, purchase goods, and attend school in Petersburg (USDA Forest Service 1997c).

Tlingit tribes occupied the Petersburg area before European contact. The Stikine Tlingit established a summer fishing camp on the north end of Mitkof Island. As Europeans settled Petersburg and the community flourished, the Tlingit community became a stable component of the town. In 1990, 10.4 percent of the population of Petersburg was Alaskan Native. The population of Petersburg is 3,350 residents.

Petersburg/Kupreanof residents actively harvest and consume subsistence resources. The annual harvest of subsistence resources for all areas is 200 pounds per capita, or 31 percent of the household meat supply (Table 3-11). Ninety-four percent of Petersburg households harvest wild resources. The resources most harvested are salmon, deer, and finfish other than salmon (Table 3-12). Other resources used include moose, mountain goat, marine invertebrates, and edible plants and berries (ADF&G Division of Subsistence 1992a).

Petersburg residents obtain most of their resources from the Tongass National Forest outside of the project area. Petersburg residents that do hunt in the Port Houghton/Cape Fanshaw project area use North Fanshaw, areas around the Port Houghton Salt Chuck, and land near Cape Fanshaw and Farragut Bay (figures supporting subsistence are in Appendix F). Ten deer were harvested in the project area by Petersburg residents between 1987 and 1996 (Table 3-13). Most of the Petersburg harvest occurs near Fanshaw Bay (Appendix F).

Table 3-11
Community Subsistence Harvest and Use Information

Community[1]	Population[2]	U.S. Census Median 1990 Household Income[2]	1987 Average lbs per Capita Harvest[2]	Percent Household Meat Supply[3]
Kake	700	35,875	158.59	22
Petersburg/Kupreanof	3,230	49,318	200.29	31
Wrangell	2,479	37,538	164.27	23

[1]Information for Hobart Bay is not available.
[2]ADF&G Division of Subsistence (1992).
[3]Kruse and Muth 1990.
Source: Boyle 1995

Table 3-12
Pounds Per Capita Harvest of Subsistence Resources in 1987

Community[1]	Salmon	Deer	Other Game[2]	Finfish	Harbor Seal	Marine Invertebrates
Petersburg/ Kupreanof	38.9	43.9	18.9	40.41	0	23.6
Wrangell	23.4	20.4	16.9	38.6	7.0	32.7
Kake	24.3	38.6	0	25.6	24.5	14.6

[1]Hobart Bay information is not available.
[2]Other game includes black bear, moose, and mountain goat.
Source: ADF&G Division of Subsistence (1992).

Table 3-13
Number of Deer Harvested in the Port Houghton/Cape Fanshaw Project Area

Community	Southeast Alaska	(1987-1996 Harvest) WAA 1601[1]	WAA 2927[2]
Kake	1,349	0	0
Hobart Bay	127	0	14
Petersburg/Kupreanof	6,813	10	0
Wrangell	2,080	0	0

[1]WAA 1601 consists of VCUs 85, 86, 87, 88, and 89.
[2]WAA 2929 consists of VCUs 78, 79, 80, 81, 82, 83, and 84.
Source: ADF&G

Petersburg residents use Farragut Bay North Arm and Fanshaw Bay for salmon and other finfish harvest within the project area (Appendix F). Shellfish harvest is limited to shallow waters in Sandborn Canal, Farragut Bay North Arm, and Fanshaw Bay. Petersburg is the only community that reports harvesting waterfowl in the project area, using Farragut Bay, Sandborn Canal and the flats between Port Houghton North Arm and the Salt Chuck. Petersburg residents trap furbearing animals (river otter, mink, and marten) along the north and south shores of Port Houghton and the western edge of Farragut Bay North Arm. Petersburg residents historically harvest more marten from the project area than any other community, although recently Hobart Bay residents have trapped more marten (Table 3-14). Petersburg residents hunt moose in the North Fanshaw area and lands adjacent to the Port Houghton North Arm (Paul 1994). Mountain goat hunting by Petersburg residents occurs in the southeast portion of the project area near Farragut Bay (Appendix F), and north of the Port Houghton Salt Chuck. Petersburg residents hunt bear in Sandborn Canal and Fanshaw Bay.

Table 3-14
Number of Marten Harvested in the Port Houghton/Cape Fanshaw Project Area

Year	Community	Males	Females	VCU
1988	none reported			
1989	Petersburg	2	8	80
1989	Petersburg	6	0	84
1989	Wrangell	4	1	82
1990	Wrangell	5	0	82
1991	Juneau[1]	1	0	83
1991	Hobart Bay	2	3	81
1991	Petersburg	6	2	82
1992	Petersburg	3	2	82
1993	none reported			
1994	Hobart Bay	11	9	not given (WAA 2927)

[1]Juneau is not a rural community. Juneau information is included to show total marten harvest.
Source: Paul 1995

Petersburg residents share resources throughout the community. Historical data show that 86 percent of Petersburg households that harvest subsistence resources share these resources with other households, and 92 percent of households receive subsistence resources from other households. This distributes resources to households that may not directly harvest resources themselves. For example, although only 39 percent of Petersburg households harvest deer, nearly 70 percent consume this resource (ADF&G Division of Subsistence 1992b).

3.6.1.2. Wrangell

The community of Wrangell is located on the northern tip of Wrangell Island, 63 miles southeast of the project area. Situated near the mouth of the Stikine River, Wrangell was historically considered an important site for access to the mainland interior by the Stikine tribe of the Tlingit. In the late 1700s, British, Russian and American ships began arriving in the area. Early attempts at occupation and settlement were resisted by the powerful Stikine Tlingit. In 1836, the Russian-American company established a trading post on the Stikine River, with the Stikine Tlingit profiting as middlemen between the traders and interior fur gatherers. In the early 1860s, reports of gold in the region attracted prospectors and the post became a local center of commerce and transportation. Later, the American Army built Fort Wrangell on the Stikine River (Cohen 1989).

Residents began expanding the Wrangell economic base by establishing canneries and sawmills in the late 19th century. A sawmill, fish cannery, cabinet shops, and breweries were established by the early 20th century. Retail services account for the largest sector in the Wrangell economy (25.8 percent in 1987), followed by timber (15.9 percent), fishing (13.6 percent), utilities (13.7 percent), construction (9.9 percent), and trade (8 percent) (Betts et al. 1992).

The 1990 population estimate for Wrangell was 2,479 residents. In 1988, the population consisted of 55 percent Caucasian, 38 percent Native Alaskan, and 7 percent other people (ADF&G Division of Subsistence 1992b).

Subsistence resources are important to the community of Wrangell; 80 percent of households harvested subsistence resources in 1987 (ADF&G Division of Subsistence 1992b). The per capita harvest of all resources (for all areas) was 164 pounds (see Table 3-11), including marine invertebrates, salmon, other finfish, deer, seal, and plants and berries (see Table 3-12). Half of the deer harvested by Wrangell residents is obtained in areas near Wrangell Island, with the rest of the harvest spread over many areas. Deer harvest information indicates that no deer are harvested by Wrangell residents in the project area (see Table 3-13).

Subsistence salmon fishing is generally limited to waters close to Wrangell; fewer than ten percent of Wrangell households fish waters more than 20-25 miles from Wrangell (ADF&G Division of Subsistence 1992b). Fanshaw Bay and Farragut Bay are locations within the project area where salmon (Appendix F) and other finfish are harvested. The south end of Whitney Island is used for marine invertebrate collection and Fanshaw Bay is used for hunting seals. ADF&G marten harvest information indicates that Wrangell residents trap furbearers along the northwest shore of Cape Fanshaw.

In Wrangell, sharing of subsistence resources provides a distribution network among households which have varying degrees of involvement in harvesting these resources. In 1987, only 28 percent of households harvested deer while 63 percent used the resource. Ninety-five percent of Wrangell households use subsistence resources (ADF&G Division of Subsistence 1992b).

3.6.1.3. Kake

Kake is located about 21 miles from the project area, on the northwest coast of Kupreanof Island. The population of 700 people (1990), is comprised of 70 percent Native, 28 percent Caucasian, and 2 percent other peoples (ADF&G Division of Subsistence 1992b).

The current location of Kake was occupied from the early 1700s, and was used throughout the 1800s as a winter village for the people of surrounding settlements. After the United States purchased Alaska in 1867, the Kake Tlingit continued to live in their territory assuming that they were only allowing the settlers to use it (Firman and Bosworth 1990). This assumption led to confrontations with the military administration which culminated in the 1869 bombardment of three Kake villages by American ships. During the 1890s, Quakers founded a school in Kake, which was followed by a government school in 1905. Kake children were required to attend, resulting in the abandonment of surrounding villages (Firman and Bosworth 1990). In the late 1800s and early 1900s, canneries were established in Kake. Local timber harvest provided fish barrels and timber for related construction projects (Betts et al. 1992). In 1952, Kake was incorporated as a first class city. The passage of the ANILCA in 1971 resulted in the selection of incorporated Native lands (Firman and Bosworth 1990).

The Soderberg Logging Company constructed a logging camp in 1968 to harvest on National Forest Land, and in the 1980s the Kake Tribal Corporation began logging on tribal land. In the late 1980s and early 1990s, the community of Kake developed initiatives to expand the local commercial fishing industry and retain long-term employment income. In 1987, commercial fishing and retail services comprised the largest industries of the local economy. Transportation, logging, and utilities were also important (Firman and Bosworth 1990).

The Tongass Resource Use Cooperative Survey (TRUCS) data identify a high percentage of Kake households (91 percent) that harvest subsistence resources. In 1987, the per capita harvest was 159 lbs (see Table 3-11) including salmon, deer, other finfish, marine invertebrates, seals, and plants and berries (see Table 3-12). Marine resources comprise 85 percent of the per capita harvest in Kake (Betts et al. 1992). Kake residents use subsistence fishing gear as well as other fishing gear (Table 3-15). Kake residents identify North Fanshaw as an area of deer harvest (Appendix F), although ADF&G deer harvest information does not indicate any reported deer harvest from the project area by Kake residents between 1987 and 1994.

Table 3-15

Reported Salmon Catch by Kake, Petersburg, and Wrangell Residents

Community	Total Harvest (fish)	Number Caught with Subsistence Gear[1]
Kake	3,921	2,785
Petersburg/ Kupreanof	19,372	16,070
Wrangell	8,099	6,207

[1]Subsistence gear includes nets and lines, and rod and reel.
Note: Information for Hobart Bay is not available.
Source: ADF&G Community Profile Database, Harvest Year 1987.

Petersburg residents share resources throughout the community. Historical data show that 86 percent of Petersburg households that harvest subsistence resources share these resources with other households, and 92 percent of households receive subsistence resources from other households. This distributes resources to households that may not directly harvest resources themselves. For example, although only 39 percent of Petersburg households harvest deer, nearly 70 percent consume this resource (ADF&G Division of Subsistence 1992b).

The sharing and exchange of subsistence resources among relatives and friends in Kake occurs within 97 percent of households. In 1987, 66 percent of households surveyed reported sharing resources, and 91 percent reported receiving resources (ADF&G Division of Subsistence 1992b).

3.6.1.4. Hobart Bay

The community of Hobart Bay is located on the south shore of Hobart Bay 5 miles north of the project area. The population of Hobart Bay fluctuates from a winter population of approximately 12 to 100 people in the summer (Dwyer 1994). Ethnicity statistics are not available for Hobart Bay. The unincorporated community of Hobart Bay was established in 1981 as a logging community operated by Goldbelt, Inc., which contracts Rayonier International Forest Products for harvesting and shipping operations. The community is expected to operate until at least 2001. Timber harvest, road building, and supporting services are the only employment sources in Hobart Bay (Dwyer 1994).

Hobart Bay is not included in the TRUCS database, and hunting and trapping are not allowed on Goldbelt lands. Hobart Bay residents harvest subsistence resources in the northern portion of Port Houghton, which is easily accessed by existing logging roads. During public scoping meetings for the Port Houghton/Cape Fanshaw EIS, residents of Hobart Bay reported harvesting deer from lands around Sandborn Canal and north of Port Houghton (Appendix F). The waters of the Port Houghton Salt Chuck, Sandborn Canal, and northwest Port Houghton are identified as salmon and other finfish harvest areas. Hobart Bay residents trap marten (a furbearer) along the northwest shore of Port Houghton. Hobart Bay residents also report harvesting mountain goat and bear.

3.6.2. Resources Harvested in the Project Area

3.6.2.1. Salmon

Salmon constitute 21 percent of all subsistence resources harvested in Southeast Alaska (Kruse and Muth 1990). Within the Port Houghton/Cape Fanshaw project area, salmon are harvested by residents of Wrangell, Petersburg, and Hobart Bay (Appendix F). Fanshaw and Farragut Bays are preferred by Petersburg and Wrangell residents, whereas Hobart Bay residents use Sandborn Canal, the Port Houghton Salt Chuck, and the northwest portion of Port Houghton (Port Houghton/Cape Fanshaw EIS scoping meeting on September 25, 1994).

3.6.2.2. Deer

Coastal and adjacent lowland elevations near Farragut Bay, Fanshaw Bay, North Fanshaw, Sandborn Canal and the Port Houghton Salt Chuck are identified as locations within the project area where deer hunting occurs (Appendix F). A review of ADF&G Southeast Alaska Deer Harvest summary tables indicates that Hobart Bay and Petersburg are the primary deer hunting communities, and that

Kake and Wrangell residents did not report any recent hunting in the area. Hobart Bay residents harvested all the deer reported in WAA 2927 from 1987 to 1995, and Petersburg hunters obtained 100 percent of all deer reported for WAA 1601 during the same period (see Table 3-13). From 1987 to 1996, the project area accounted for 13 percent of deer harvested by Hobart Bay and less than one percent of the deer harvested by Petersburg residents (ADF&G Division of Subsistence 1997). From 1991 through 1996, five deer were harvested from the project area.

Different data collection methods may account for the discrepancies in deer harvest information. TRUCS data are based on surveys designed to indicate where resources are harvested rather than the level of harvest. The ADF&G data are survey responses that do not differentiate between subsistence and non-subsistence harvest. The ADF&G information may more accurately reflect current use.

3.6.2.3. Finfish and Shellfish

Finfish (including halibut, herring, cod, rockfish, eulachon, and trout) account for 24 percent of the total subsistence harvest in Southeast Alaska. The most commonly harvested finfish other than salmon is halibut, which is harvested by 48 percent of all households (Kruse and Muth 1990). Fanshaw and Farragut Bays are used by Petersburg and Wrangell residents, while Hobart Bay residents harvest finfish in Port Houghton (Appendix F).

Shellfish (including clams, crab, and shrimp) account for 16 percent of the total subsistence harvest in Southeast Alaska (Kruse and Muth 1990). Residents of Wrangell and Petersburg harvest shellfish in Farragut Bay, Fanshaw Bay, and Sandborn Canal (Appendix F).

3.6.2.4. Waterfowl

Fewer than one percent of the subsistence resources consumed in Southeast Alaska are waterfowl (Kruse and Muth 1990). Petersburg residents indicate that they hunt waterfowl in the project area (Appendix F) using the flats in the Port Houghton Salt Chuck Sandborn Canal and Farragut Bay (Smythe 1988; Doerr 1995).

3.6.2.5. Harbor Seals

The harbor seal accounts for 3 percent of all subsistence resources harvested in Southeast Alaska (Kruse and Muth 1990). Wrangell is the only community that identifies seal harvest areas within the project area (Appendix F), though areas closer to Wrangell are preferred (ADF&G Division of Subsistence 1992b). Only Native Americans are allowed to harvest seals. Harbor seals are harvested from Fanshaw Bay.

3.6.2.6. Furbearers

The coastal areas of the Fanshaw Peninsula and Farragut Bay are locations where furbearers (river otter, mink, and marten) are trapped (Appendix F). Furbearers are trapped for pelts rather than consumption, and households do not exchange pelts (ADF&G Division of Subsistence 1992b).

3.6.2.7. Moose

Moose hunting has occurred in the project area. Moose populations are believed to be increasing in the project area and more hunters are targeting moose. Current regulations allow harvest of one bull moose per year. Most of the moose hunters are from Petersburg (Paul 1994). Moose hunting occurs in North Fanshaw and lands adjacent to the Port Houghton North Arm (Paul 1994). Up until 1992, only one bull per year was taken by Petersburg residents (except 1989 when a Wrangell resident harvested a moose). From 1993 to 1996, a total of ten bulls were taken. Anchorage residents have harvested two bulls from the project area.

3.6.2.8. Mountain Goat

An additional resource not identified through the TRUCS surveys includes mountain goat. The mountainous terrain at the head of Farragut Bay and North of the Port Houghton Salt Chuck are areas used by Petersburg residents to harvest mountain goats (Smythe 1988, Paul 1995), though less than one percent of Petersburg households harvest mountain goat (ADF&G 1992). Hobart Bay residents have used the alpine area of Mt. Triplet for mountain goat hunting (comments from the Hobart Bay public scoping meeting 9/25/94). A total of nine mountain goats were harvested from 1986 to 1989. No goats were harvested from 1990 to 1992. In 1993, three billies were taken by three Juneau hunters, and in 1994 one billy and one nanny were taken by one Juneau resident and one nonresident. In 1995, three mountain goats were harvested by Hobart Bay residents. Of these 17 goats, nine goats were taken by the subsistence communities of Hobart Bay, Petersburg, and Klawock.

3.7. Recreation

The Port Houghton shoreline is a mixture of rocky shoreline areas, with small sandy beaches distributed throughout the area. A waterfall, accessible by boat from Port Houghton, can be found along the northern shoreline. The entrance to the Salt Chuck provides visitors on boats with a striking experience as the water moves close to a vertical rock wall while the boat navigates the S-shaped entrance with shallow submerged reefs. The Frederick Sound shoreline from Farragut Bay to Cape Fanshaw provides a long, exposed beach with expansive views to the south. The shoreline between Cape Fanshaw and the entrance to Port Houghton includes a series of shoreline areas that have a more intimate feel to them because of the nearness of islands located just offshore. A long, sandy beach just north of Cape Fanshaw looks out on the Storm Islands. The rocky Cleveland Passage shoreline offers views across a narrow water body to a forested Whitney Island. Further north, the Steamboat Bay shoreline forms a "U" around Foot Island.

The Alaska Marine Highway ferries travel through Frederick Sound, and passengers can view portions of the project area. Smaller recreational boats also use Frederick Sound for north-south travel, and as a destination for whale watching.

The Port Houghton/Cape Fanshaw project area provides an opportunity to pursue recreational activities in a natural setting. A number of dispersed campsites and anchorages are distributed throughout the project area, but there are no developed recreational facilities, such as cabins or campgrounds, maintained by the Forest Service. The project area can be seen by recreational boats in Frederick Sound and Stephens Passage. The major features of the area are its natural landscape, and fish and wildlife populations for hunting and fishing.

3.7.1. Access and Use

The Port Houghton/Cape Fanshaw project area is approximately 30 miles north and west of Petersburg, about 30 miles east of Kake, and about 80 miles south of Juneau. The area is accessible only by boat, helicopter, or float plane.

The Forest Service uses a concept called "Home Range" when considering the amount of use occurring in an area because day and weekend trips can easily be done within this distance. The highest recreation use happens within a radius of 15-30 miles from the community. This circle is the "Home Range" of the community. The Port Houghton/Cape Fanshaw area is neither in the Petersburg, Kake, or the Juneau "Home Range."

3.7.2. Recreational Opportunities

The Forest Service inventoried existing recreational opportunities on the Tongass National Forest using the ROS (see Glossary). This ROS classification creates a structure for defining recreational experiences and opportunities. Three of the seven ROS classes in the Tongass National Forest exist in the project area (Table 3-16 and Appendix I).

Primitive (P) and semi-primitive non-motorized (SPNM) recreational experiences include a sense of being out in the forest by yourself, or with a few people in your group. Essential to this experience is the knowledge that there are no campgrounds, motorized vehicles, or roads in the area. Eighty-eight percent of the project area acreage falls within these two ROS categories.

Table 3-16
ROS Acreage within the Project Area[1]

ROS Class	Total Acreage
Primitive	68,411
Semi-primitive Nonmotorized	51,993
Semi-primitive Motorized	16,419
TOTAL	**136,823**

[1]Tongass National Forest Lands only.
Source: Nelson, 1998

The Primitive area extends from the peaks in the interior portion of the project area, east around the Salt Chuck. There are also two isolated Primitive areas in the high peaks on the north boundary of the project area. The semi-primitive non-motorized area extends west from the Salt Chuck on both the north and south sides of Port Houghton, around the Sandborn Canal, and around Cape Fanshaw to Farragut Bay North Arm (Appendix I).

The area classified as semi-primitive motorized (SPM) in the project area is essentially the whole shoreline area from Farragut Bay North Arm around Cape Fanshaw to the Salt Chuck. This area also includes the small islands such as Robert and Whitney, and Storm Islands in the western portion of the project area. The SPM classification denotes an area that offers a predominately natural environment with a high probability of experiencing solitude, but the presence of motorized vehicles is not uncommon. In this specific instance, the area is essentially natural, but boats are seen and heard in Farragut Bay, Frederick Sound, Stephens Passage, and Port Houghton.

3.7.3. Recreational Places and Sites

Recreational places are geographic areas where recreation is known or thought to occur, and recreational sites are specific locations where features such as overnight anchorages or dispersed camping sites have been located.

Presently, 19 recreational places and 20 recreational sites have been identified in the project area (Table 3-17 and Appendix I). There are no developed recreational facilities, such as cabins or maintained trails, in the project area. The Forest Service has identified 13 anchorages and 5 dispersed camping sites in the project area. The anchorages are distributed throughout the project area from Farragut Bay North Arm, around Cape Fanshaw and along the south shore of Port Houghton, into the Sandborn Canal, and into the Salt Chuck at the east end of Port Houghton. The majority of dispersed camping sites are near the Sandborn Canal and the Salt Chuck.

3.7.4. Recreation Activities

Most of the recreation activities in the Port Houghton/Cape Fanshaw area appear to be dispersed along the southern shoreline of Port Houghton, in Sandborn Canal, and the Salt Chuck. Popular activities in the area include viewing scenery and wildlife, boating, dispersed camping, big game hunting, and hiking. Whales have been seen in Port Houghton, and bears are a relatively common sight along the shoreline. Seals have a rookery in the Salt Chuck.

Bear hunting occurs in the spring along the shoreline, and in the fall on creeks with anadromous fish runs. This includes subsistence, recreational, and guided bear hunts. The project area WAA 2927 ranked fourth of the 81 WAAs from 1971 to 1994 for total number of guided bear hunts, although the total number of bears harvested was lower than most other areas. As a result, the project area had the highest proportion of guided compared to total bear hunt kills. The project area was also used for guided hunts more than any other area on the mainland of southeast Alaska.

Bear, goat, deer, waterfowl, and moose hunting occurs in the project area. The project area allows for optimum views of big game, and is reputed to be one of the best places on the mainland for sighting big game from Cape Fanshaw to Skagway. Recreational fishing opportunities are primarily for salmon and halibut but also include shellfish in Port Houghton. Salmon fishing occurs in Sandborn Canal and associated tributaries, as well as Negro Creek, Glen Creek, and the Rusty River in the Salt Chuck. The Rusty River and Glen Creek have salmon runs that provide preferred recreational fishing opportunities. The Rusty River is the only stream in the project area known to have a significant sockeye run.

Table 3-17
Recreation Places and Sites within the Project Area

Recreation Places Number Local Name ROS, Acreage	Sites
Pt. Houghton	
33500.01 & .02 Alice Lake and North Shore Upland Primitive (1,163 acres) Semi-primitive Nonmotorized (5,568 acres)	None
33005.01 South Shore East of Sandborn Canal Semi-Primitive Motorized (74 acres)	Anchorages
33006.01 & .02 Glen River Estuary Semi-primitive Motorized (198 acres) Semi-primitive Nonmotorized (430 acres)	Anchorages
33007.01 Salt Chuck Northwest Shoreline Semi-primitive Motorized (253 acres) campsites	Anchorages Dispersed Campsites
33008.01 & .02 Salt Chuck Estuary & Uplands Primitive (10,268 acres) Semi-primitive Motorized (293 acres)	Anchorages Dispersed Campsites
33009.01 Salt Chuck East Shoreline Island Semi-primitive Motorized (2 acres)	Anchorages Dispersed Campsites
33012.01 Northshore Beach Semi-primitive Motorized (74 acres)	None

Table 3-17 (continued)

Recreation Places and Sites within the Project Area

Recreation Places Number Local Name ROS, Acreage	Sites
33013.01 & .02 Sandborn Canal & South Shore Uplands Semi-primitive Non-motorized (18,453 acres) Semi-primitive Motorized (1,662 acres)	Anchorages Dispersed Campsites
33016.01 Rabbit Island and Walter Island Semi-primitive Motorized (66 acres)	Dispersed Campsites
33017.01 Little Lagoons Semi-primitive Motorized (45 acres)	None
33018.01 Southwest Shore Semi-primitive Motorized (807 acres)	Anchorages
33019.01 Stephens Passage Fort Point Semi-primitive Nonmotorized (18,779 acres)	Dispersed Campsites
Cape Fanshaw	
21028.01 & .02 Jamestown & Tangent Peaks Primitive (5,806 acres) Semi-primitive Nonmotorized (3,134 acres)	Anchorages

[1] Tongass National Forest Lands only.
Source: Nelson 1998.

Many boats were observed traveling through the Frederick Sound/Stephens Passage area, and some recreational boats were seen anchored inside of Whitney Island. Most boats seen in Port Houghton were commercial fishing boats. The lack of recreational boats seen in Port Houghton may also be due to the absence of reliable detailed information on current nautical charts for the area.

3.7.5. Roadless Areas

The Roadless Area Inventory was completed for the TLMP revision (1991) to identify areas eligible for wilderness designation. To qualify, an area has to be contiguous for 5,000 acres. The project area includes portions of two roadless areas: Roadless Area 201 (Fanshaw 48,751 acres) and Roadless Area 308 (Windham-Port Houghton 165,876 acres).

3.7.6. Recreation and Tourism Industry Use

During fall 1994, a recreational survey was conducted to determine use of the project area by tourists. A questionnaire was sent to 69 individuals and groups, including all outfitters and guides having special use permits in the project area. Four written responses were received and 13 groups were additionally reached by phone. Most use of the area was by small boat, although some helicopter and float plane flights occur throughout the year. The number of tourists per boat operator that selected the Port Houghton/Cape Fanshaw project area ranges from one to 101, depending on vessel size. The larger vessels generally do not travel inside Port Houghton.

The 1996 Chatham Management Area Outfitter & Guide Actual Use Report (Schaefer 1997) reported eight permitted guides reported use in the Port Houghton/Cape Fanshaw areas. This report include information on all guides throughout the Tongass National Forest. With these numbers, some conclusions can be drawn as far as commercial recreation use of the project area. The Forest Service estimates two clients per big game trip and four to six per sightseeing trip as shown below:

- eight guides (two big game, six sightseeing),
- 14 trips (four big game, ten sightseeing),
- 31 nights of group use (14 big game, 17 sightseeing), and
- 48-68 people on the trips.

Table 3-18 provides the number of nights and the recreation/tourism dollars generated in 1996 by Forest Service permitted guides in the Port Houghton/Cape Fanshaw project area.

Table 3-18
1996 Recreational Guide Use in the Port Houghton/Cape Fanshaw Project Area

Activity	Time Expended	Cost
Big Game	14 nights	$22,400-$28,000/yr
Sightseeing	17 nights	$17,000-$30,600/yr
Total	37 nights	$39,400-$58,600/yr

Source: Nelson 1998

Only one charter flight company, located in Petersburg, is flying clients into the Port Houghton/Cape Fanshaw project area. An average of 15 flights per year occur into the area with each flight carrying two to four people per trip for hunting activities. Clients are hunting primarily bear and moose in the Sandborn Canal and the Salt Chuck/Rusty River areas. Roughly 40 percent of the flights are to Sandborn Canal for bear hunting. A trapline operation is run from Robert Islands using another six flights a year in the winter. The cost of the flights range from $140 to $650 round trip, generating a range of income from $8,610 to $13,650.

Table 3-19 combines known recreational use in the project area to reflect the recreation/tourism dollars and recreation use generated. These numbers were obtained from 1993 and 1996 records.

Table 3-19
Commercial Recreation/Tourism Use and Income Summary for the Port Houghton/Cape Fanshaw Project Area

Activity	Cost/Use Estimate
Range of total recreation/tourism dollars generated	$48,010-$72,250/year
Range of number of people willing to pay for recreation/tourism experience	84-134/year
Average days of use by groups generating dollars	136/year

Source: Nelson 1998.

3.8. Scenic Quality

Because of public concern about the quality of the visual environment, the "visual landscape" has been established as a basic resource of the land, and receives consideration along with the other forest resources.

3.8.1. Adopted Visual Quality Objectives

The Forest Plan established visual resource management goals to be implemented in each LUD of the Port Houghton project area (Table 3-20). These goals are referred to as adopted VQOs, and are derived from a combination of two factors:

- whether the area can be seen from a Visual Priority Travel Route and Use Area (Forest Plan, Appendix F); and,
- and the distance between the area being viewed and the viewer (also known as the "distance zones" -- foreground, middleground, and background).

Table 3-20
Adopted Visual Quality Objectives by Distance Zone and LUD

	Adopted VQO (as seen from a Visual Priority Travel Route and Use Area)			
Land Use Designation	**Foreground**	**Middleground**	**Background**	**Not seen from Visual Priority Travel Route**
Old Growth Habitat	Retention	Retention	Retention	Retention
Modified Landscape	Partial Retention	Modification	Modification	Maximum Modification
Timber Production	Modification	Maximum Modification	Maximum Modification	Maximum Modification
Scenic Viewshed	Retention	Partial Retention	Partial Retention	Maximum Modification

Source: 1997 TLMP

3.8.1.1. Visual Priority Travel Routes and Use Areas

The Forest Plan identified priority viewpoints from which scenery will be emphasized. Viewpoints (either travel routes or use areas) are used to assess the existing visual condition of any given project area and to develop project designs that will be consistent with the adopted VQOs for each land use designation. The Alaska Marine Highway Travel Route in Frederick Sound and Stephens Passage, the Saltwater Use Area in Farragut Bay, and the Small Boat Routes in Port Houghton, Sanborn Canal, and Salt Chuck are Visual Priority Travel Routes and Use areas that are used to assess the Port Houghton project area.

3.8.1.2. Visual Quality Objectives

VQOs are described as four different degrees of landscape alteration:

Retention (R) - Provides for management activities which are not visually evident. Activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc., should not be evident.

Partial Retention (PR) - Provides for management activities to remain visually subordinate to the characteristic landscape. Activities may repeat form, line, color, or texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, etc., remain visually subordinate to the characteristic landscape.

Modification (M) - Management activities may visually dominate the characteristic landscape. However, activities of vegetative and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type.

Maximum Modification (MM) - Management activities of vegetative and land form alterations may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area or character type. When viewed as foreground or middleground, they may not appear to completely borrow from naturally established form, line, color, or texture. Alterations may also be out of scale or contain detail which is incongruent with natural occurrences.

3.8.2. Summary of Current Visual Condition by VCU

The visual environment of the Port Houghton/Cape Fanshaw project area and Forest Plan direction related to visual resource management is summarized as follows:

3.8.2.1. VCU 79, Salt Chuck

This VCU is highly scenic, with an interesting diversity of towering cliffs, small islands and tidal rapids. No timber has been harvested inside the VCU. The VCU is visible from the Visual Priority Route in Port Houghton and Salt Chuck.

The Forest Plan designates the VCU to the following LUD's: Timber Production with an adopted VQO of Maximum Modification, Old Growth Reserve with an adopted VQO of Retention, and Scenic Viewshed with an adopted VQO of Retention and Partial Retention.

3.8.2.2. VCU 80, Alice Lake

This VCU lies along the North Shore of Port Houghton. It adjoins heavily harvested private land, so the overall effect is one of high levels of visual impact, even though the Forest Service land is unharvested. The VCU is visible from the small boat route in Port Houghton and the Alaska Marine Highway route in Stephens Passage.

The Forest Plan designates this VCU to the following LUDs: Timber Production with an adopted VQO of Maximum Modification, and Old Growth Reserve with an adopted VQO of Retention.

3.8.2.3. VCU 81, Port Houghton

This VCU encompasses the North Shore of Port Houghton near its entrance from Stephen's Passage. It is directly above an area of intensive harvest on private land, so the overall effect is one of high levels of visual impact, even though the Forest Service land is unharvested. The VCU is visible from the Visual Priority Route in Port Houghton and the Alaska Marine Highway route in Stephens Passage. The Forest Plan designates this VCU to the following LUDs: Timber Production with an adopted VQO of Maximum Modification, Old Growth Reserve with an adopted VQO of Retention, and Scenic Viewshed with an adopted VQO of Partial Retention.

3.8.2.4. VCU 82, Negro Creek

This VCU contains the south shore of the entrance to Port Houghton and a large upland area to the south. Large portions are visible from the Alaska Marine Highway route in Stephens Passage, and the priority travel route in Port Houghton. There is no previous harvest in this VCU.

The Forest Plan designates this VCU to the following LUDs: Timber Production with an adopted VQO of Maximum Modification, Old Growth Reserve with an adopted VQO of Retention, and Scenic Viewshed with an adopted VQO of Retention and Partial Retention.

3.8.2.5. VCU 83, Port Houghton

This VCU is situated along the south shore Port Houghton. It includes an area of small islands and reefs, Little Lagoon, and a large upland area to the south. A portion is visible from the Alaska Marine Highway route in Stephens Passage, and the priority travel route in Port Houghton. There is no previous harvest in this VCU.

The Forest Plan designates this VCU to the following LUDs: Timber Production with an adopted VQO of Maximum Modification, Old Growth Reserve with an adopted VQO of Retention, and Scenic Viewshed with an adopted VQO of Retention and Partial Retention.

3.8.2.6. VCU 84, Sanborn Canal

This VCU includes the area surrounding Sanborn Canal and associated islands. It is seen from the priority travel route in Port Houghton and Sanborn Canal. There is no previous harvest in this VCU.

The Forest Plan designates this VCU entirely to the Old Growth Retention LUD.

3.8.2.7. VCU 85, Five Fingers

This VCU is situated at the confluence of Frederick Sound and Stephens Passage. It includes several associated islands. A large portion is visible from the Alaska Marine Highway route in Stephens Passage and Frederick Sound. There is no previous harvest in this VCU.

The Forest Plan designates this VCU to the following LUDs: Old Growth Reserve with an adopted VQO of Retention, Research Natural Area with an adopted VQO of Retention and Semi Remote Recreation with an adopted VQO of Partial Retention.

3.8.2.8. VCU 86, Fanshaw

This VCU is situated along Frederick Sound south of Cape Fanshaw. A large portion is visible from the Alaska Marine Highway route in Frederick Sound. There is no previous harvest in this VCU.

The Forest Plan designates this VCU to the following LUDs: Old Growth Reserve with an adopted VQO of Retention, Modified Landscape with an adopted VQO of Modification, and Scenic Viewshed with an adopted VQO of Retention and Partial Retention.

3.8.2.9. VCU 87, Cat

This VCU is situated along Frederick Sound south of Cape Fanshaw. A portion is visible from the Alaska Marine Highway route in Frederick Sound. There is no previous harvest in this VCU.

The Forest Plan designates this VCU to the following LUDs: Timber Production with an adopted VQO of Maximum Modification, Old Growth Reserve with an adopted VQO of Retention, Modified Landscape with an adopted VQO of Modification, and Scenic Viewshed with an adopted VQO of Retention and Partial Retention.

3.8.2.10. VCU 88, Tangent

This VCU is situated along Frederick Sound and Farragut Bay. A portion is visible from the Alaska Marine Highway route in Frederick Sound and the Visual Priority Travel Route in Farragut Bay. There is no previous harvest in this VCU.

The Forest Plan designates this VCU to the Scenic Viewshed with an adopted VQO of Retention and Partial Retention.

3.8.2.11. VCU 89, Bay Point

This VCU is situated along Farragut Bay. It is visible from the Visual Priority Travel Route in Farragut Bay. There is no previous harvest in this VCU.

The Forest Plan designates this VCU to the following LUD's: Timber Production with an adopted VQO of Maximum Modification, Old Growth Reserve with an adopted VQO of Retention, Modified Landscape with an adopted VQO of Modification, and Scenic Viewshed with an adopted VQO of Retention and Partial Retention.

3.9. Other Resource Considerations

3.9.1. Geology and Minerals

There are no active mining claims within the Port Houghton/Cape Fanshaw project area according to the records of the U.S. Bureau of Land Management (USBLM) and U.S. Bureau of Mines (USBOM). Two former mining claim areas, a stone quarry, and known exploration prospects occur within the project area.

Locatable minerals include metallic minerals (gold, copper, lead, etc.) and some varieties of non-metallic minerals (asbestos, mica, etc.). A review of the mineral assessment information, regional and site-specific geology, known mineral occurrences, and mining claims records in the Port Houghton/Cape Fanshaw project area indicates mineralization and mineral-bearing rocks are present, but limited known mineral potential data are available. Gold, copper, silver, and zinc are the primary metals discovered in the exploration prospect areas. Specific areas of high value/high development potential and locatable mineral deposits have not been identified within the project area. According to published geology and mineral potential reports (Brew et al. 1991; Coldwell 1989; and Berg 1984) rock units exist in the project area with the potential to contain epigenic vein, disseminated, and massive sulfide deposits. Berg (1984) judged the Cape Fanshaw area as possibly favorable for disseminated sulfide deposits, and the eastern portion of the project area to be possibly favorable for stratiform massive sulfide deposits.

The USBLM and USBOM state that there is no current information indicating that the project area contains valuable leasable mineral occurrences (such as oil, gas, oil shale, potassium and sodium-bearing minerals, geothermal resources, and coal). One stone quarry occurred in the project area. Salable minerals appear to be available and may be locally valuable as road-building material for the proposed timber harvest.

3.9.2. Karst Features

During field surveys for this project, an effort was made to examine rock types for karst features, wherever possible. In most forest and muskeg areas, the soil layers are too thick to allow easy observation of the underlying rocks. However, rocks are exposed on some steep slopes, in stream channels, and along the shoreline. Most rocks observed or specimens collected within the project area are metamorphic, including slate, schist, mica schist, phyllite, quartzite, serpentinite, and gneiss. A few granite specimens and one sandstone sample were collected.

No soluble rocks (limestone, dolomite, gypsum, or others) were found at any location, and there is no evidence of karst development or caves anywhere within the project boundaries. Likewise, there are no recent basalt flows that could contain lava caves, and there is no indication of sea cave development along the shoreline of Port Houghton.

3.9.3. Soils

Soil and its productivity are critical elements to the forest because they also affect the productivity of most other forest resources. Tree growth, wildlife, and fish habitat are often associated with soil productivity (the soil component of long-term site productivity), which is the inherent capacity of a soil to support the growth of specific plants or plant communities. Soil depth and internal drainage have a major influence on soil productivity in the Port Houghton area. Well-drained soils normally have the highest productivity.

In the project area, timber site productivity of mineral soils is anticipated to be from very high (on floodplains) to medium and high (on moderately well to well-drained soils) to lowest (in somewhat poorly to very poorly drained soils). Timber site productivity on poorly to very poorly drained organic soils, regardless of topographic elevation or exposure, is generally much lower than the productivity of mineral soils.

Most of the conifers that grow in this area have shallow rooting systems, and are susceptible to blow down, especially if the timber stand is located in an exposed area. The shallow rooting habits of trees may be due to lack of adequate soil thickness, shallow depth of bedrock, or availability of moisture in the surface soil layer.

Surface Erosion - Also known as sheet and rill erosion, this process is virtually nonexistent in unattended soil conditions under the forest canopy, because the forest floor is completely covered, either by living vegetation, or by a thick mat of organic material.

Mass Wasting - Mass failures, debris torrents, debris avalanches, etc. are all active in Southeast Alaska (Swanston 1971). They have occurred in undisturbed areas in the past and will continue in the future. Evidence of mass wasting was observed throughout the project area. The stability Class IV soil areas (see Glossary) often have evidence of old scars, and may have a few recent scars from debris avalanches, or debris torrents. Class III stability areas also exhibit evidence of old scars; however, they seldom have indications of recent slope failures.

Debris torrent and debris avalanche scars remain visible for many years, but evidence is reduced after the area has revegetated.

Most of the failures within the project area originated in the mid- to upper-slope positions, usually in the upper end of small drainages. While the initial surge of energy from these failures is very great, it dissipates rather quickly once the debris hits an area with flatter slopes timber or other obstacles. The debris torrent usually takes a fairly narrow path, and the effects are often limited to the immediate vicinity of the path itself. Occasionally, the debris may block a stream channel and create short-term sediment problems; however, there is minimal evidence of this occurring in the project area. In many of the stream channels within the project area, several areas exist where suspended sediment could settle out or become trapped behind woody debris. Other factors that should be considered are the distance from the point where the failure originates and the location where suspended sediment may create a problem, such as the mouth of the main streams. Mass wasting is a natural and continuing process that is very active within the project area.

The risk for mass failures increases significantly whenever a large storm front comes to the area and drops significant rain within a short time period. Soils that occur on steep or very steep slopes that become saturated during a storm event have a very high risk for failure. Most failures in the project area occurred during large storm events. There is no evidence of erosion in the muskeg areas. These organic soils have a very thick cover of forbs and shrubs, and the slopes are usually fairly gentle.

Soil stability in the Port Houghton/Cape Fanshaw project area was determined through aerial photograph review and field investigations. A soils hazard rating system was developed to identify the soils most sensitive to timber harvest and road construction, and to avoid these areas for road construction and timber harvest (see Soil Hazard Classes in the Glossary). A map illustrating the location of Class IV soils is provided in Appendix M.

The project area is primarily comprised of stability Class I and II soils (64 percent) with stability Class III and IV soils occurring on steeper portions of the project area (Table 3-21). Stability Class III soils (25,231 acres) occur on about twice as much land area as Class IV soils (13,757 acres), and comprise slightly less than 10 percent of the project area. Nonforested high-elevation lands occur on less than 10 percent of the project area. High-elevation nonforested land occurs primarily near Lincoln Peak and at the extreme northeast section of the project area.

Steep slopes (greater than 72 percent) occur on 13 percent of the project area. Steep slopes and very high mass movement hazard soils are generally within the same relative locations.

The South Fanshaw area (see project area map) does not contain as many acres of stability Class III and Class IV soils as does the Chatham Area. This may be due to the increased acres of poorly and very poorly drained soils and fewer acres of very steep slopes. Class IV soils comprise slightly less than four percent and Class III soils comprise 11 percent of South Fanshaw. There is a small area (less than one percent) of high-elevation non-forested land. Class III and IV soils occur near Jamestown Peak and the lower elevation mountains between Jamestown Peak and Farragut Bay including Tangent, Alaska, and Saranac peaks, as well as near Bay Point Knoll.

Table 3-21
Soil Hazard Class Acres within the Port Houghton/Cape Fanshaw Project Area[1]

VCU	Class I and II (Low - Med)	Class III (High)	Class IV (Very High)	Nonforested	Snow
79	18,227	10,262	5,456	5,606	1,258
80	2,645	1,123	938	1,252	0
81	1,838	238	424	0	0
82	8,973	2,566	1,241	6	0
83	7,992	1,815	698	287	0
84	6,838	4,062	3,038	2,362	1,070
85	5,173	914	242	0	0
86	8,352	119	10	0	0
87	11,774	1,444	1,128	35	0
88	2,624	679	201	0	0
89	14,741	1,871	274	0	0
TOTAL	89,177	25,093	13,649	9,548	2,328

[1]Not including Goldbelt, Inc. lands.
Source: Morton 1995a

The North Fanshaw area has high-elevation non-forested land that occurs near Dahlgren Peak. Class IV soils comprise about seven percent of this area, and

Class III soils occur on about twenty percent of this area. Most of the Class III soils occur at elevations below 1,500 feet Both Class III and Class IV soils occur in linear formations across North Fanshaw; however, the Class IV soils primarily occur in association with Dahlgren Peak.

The North Shore area has Class III soils primarily north of North Arm where all of the soils are either Class III or Class IV or are nonforested. Other areas of Class III or greater soils occur north and east of Goldbelt, Inc. lands. Approximately five percent of the area is comprised of high-elevation non-forested land. Class III soils comprise another thirty-five percent of the area, and Class IV soils comprise approximately thirty percent of the area. The largest percentage of sensitive lands occur in the eastern portion of this area.

The East Houghton area is the most complex of the entire project area, because there is such a wide range in elevations, and mountains are a dominant feature that affects both the soil and vegetation patterns. Approximately three percent of the area is snow covered most of the year, and another ten percent of the area is high-elevation and nonforested. Class IV soils comprise about seventeen percent of this area, and Class III soils comprise about thirty percent of this area. Class III and IV soils are associated with Washington and Lincoln peaks along the east side of Sandborn Canal. Another high-hazard area (Class III or greater) is south of the junction between North Arm and Salt Chuck. Areas of high-elevation nonforested lands are associated with Lincoln Peak.

3.9.4. Wetlands

Section 404(f)(1)(A) and (E) of the Federal Clean Water Act exempts silvicultural, timber harvesting, and related road construction activities from permit requirements for the discharge of dredge and fill material in wetlands. Executive Order 11990, as amended (42 U.S.C. 4321 et seq.), however, requires federal agencies having statutory authority and leadership over federal lands to avoid, to the extent possible, the short- and long-term adverse impacts associated with the destruction or modification of wetlands. Where feasible, direct or indirect support of new construction in wetlands must be avoided. Federal agencies are required to preserve or enhance the natural and beneficial values of wetlands in carrying out their responsibility to: (1) acquire, manage, and dispose of lands and facilities; (2) provide federally undertaken, financed, or assisted construction and improvements; and (3) conduct federal activities and programs affecting land use.

Wetlands within the Port Houghton/Cape Fanshaw project area were delineated using the Forest Service GIS database for soils and plant community types, and the 1987 Wetland Delineation Manual (Environmental Laboratory 1987). Wetlands are classified according to major vegetation types (Cowardin et al. 1979). The functional value of wetlands is evaluated using criteria identified by Reppert et al. (1979) and Adamus et al. (1987).

Large areas of the Port Houghton/Cape Fanshaw project area are wetlands or complexes of upland and wetland environments. Wetlands cover approximately 44,280 acres of the project area (Figure 3-3). Wetland types present include coniferous forested wetlands (palustrine forested), mixed forest/muskeg wetlands (palustrine forested/palustrine emergent), muskeg wetlands (palustrine emergent and palustrine scrub-shrub), estuarine wetlands (estuarine intertidal unconsolidated shore and estuarine intertidal emergent), alpine/subalpine wetlands (palustrine emergent and palustrine shrub-scrub), and open water (palustrine open water or lacustrine open water).

Alpine and subalpine wetlands occur above 1,500 feet These wetlands include a variety of upland/wetland mixed types, sedge meadows, muskegs, riparian areas, and poorly drained alpine meadows. They are typically dominated by dwarf shrubs, grasses, sedges, and various forbs. At lower elevations, dwarfed trees are also present. These wetlands typically provide limited wildlife habitat functions and varied hydrologic functions.

Below the 1,500-foot elevation, the dominant wetland types in the project area are muskeg and forested/muskeg mixed wetlands (9,720 and 10,020 acres, respectively). These wetlands cover extensive areas throughout the project area, typically occurring on level to gently sloping terrain where underlying soils have low permeabilities. Muskegs provide habitat to wildlife species not associated with old-growth forests, travel corridors for large mammals, and important hydrologic functions.

Coniferous forested wetlands cover approximately 6,320 acres of the project area. These wetlands are often found on gentle to moderate slopes on poorly drained soils or areas of groundwater discharge. Forested wetlands provide significant wildlife habitat functions and frequently function as areas of groundwater discharge.

Estuarine wetlands (1,420 acres) are located near the mouths of larger streams. These wetlands include mudflats exposed at low tides, areas of emergent salt-tolerant vegetation, and adjacent meadows (dominated by salt-intolerant plants) slightly above the elevation of high tides (Stone 1993). Estuarine wetlands provide significant wildlife habitat functions and export food resources to adjacent marine systems. Estuarine wetlands provide significant sedimentation functions.

Open water in the project area includes 34 lakes and ponds. These areas include small shallow ponds associated with palustrine wetlands, as well as larger lakes (up to 100 acres). Shoreline areas are classified as lacustrine or palustrine wetlands that are dominated by emergent, submerged, or floating aquatic plants. Lakes provide important sediment retention functions, hydrologic detention, aquatic habitat, and food export functions.

3.9.5. Floodplains

Executive Order 11988 directs federal agencies to lead and take action to the extent possible in preventing the long- and short-term adverse effects caused by occupying and modifying floodplains. Agencies are required to: (1) avoid the direct or indirect support of floodplain development whenever there are practicable alternatives; (2) evaluate the potential effects of any proposed action on floodplains; (3) ensure that planning programs and budget requests consider flood hazards and floodplain management; and (4) prescribe procedures to implement the policies and requirements of the Order.

Two parameters, stream order and stream gradient, were used to calculate approximate 100-year floodplain widths. The stream order parameter (Hynes 1970) integrates watershed area and discharge characteristics for watersheds having similar climate and geological characteristics. The stream gradient parameter is correlated to the water velocities and discharge capacity of stream channels. The floodplain model used for the project area considers floodplain widths as a function of stream order (watershed area) and stream gradient (discharge capacity) as described below:

Class A Floodplains (less than 25 feet wide) - includes all stream segments of first-order streams and second-order streams with gradients of 10 percent or more.

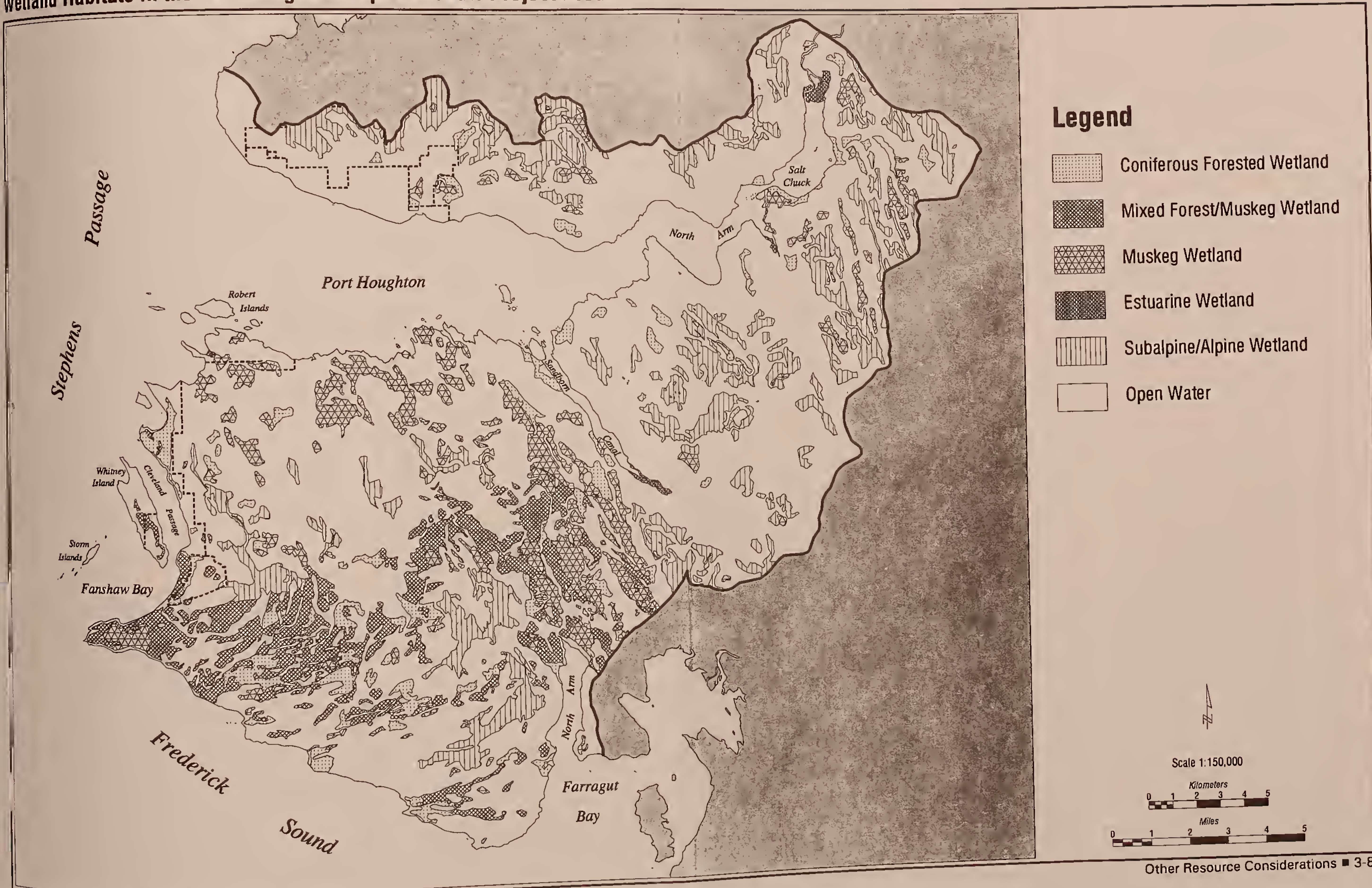
Class B Floodplains (25 feet up to 100 feet wide) - includes all second-order stream segments with a gradient of less than 10 percent.

Class C Floodplains (greater than 100 ft) - includes all third-order and higher streams.

Floodplains of all stream segments were determined using the Forest Service GIS database for the project area (streams and topography layers). GIS analysis was used to determine and map the floodplain class of each stream segment. Floodplains occur on 415 miles of streams within the project area. Most stream segments (295 miles or 71 percent) were classified as having Class A floodplains. Class B floodplains (between 25 and 100 ft) were mapped along portions of over 60 streams (52 miles or 13 percent of the total stream length). Class B floodplains occur on second-order streams with relatively gentle terrain. Most are near the headwaters of watersheds, at 500 feet elevation or above.
The floodplains of larger rivers and streams are classified as Class C floodplains (greater than 100 feet in width). In the Port Houghton/Cape Fanshaw project area, Class C floodplains occur on third-, and fourth-order streams at elevations

Figure 3-3

Wetland Habitats in the Port Houghton/Cape Fanshaw Project Area



Prepared by Parametrix, Inc. File: wetlands.gra Date: July 14, 1998

below 500 feet. Because these larger streams typically remain moderately incised, they have floodplains less than 200 feet in width.

3.9.6. Cultural Resources

Cultural resources represent evidence of past human activity, dating from the earliest maritime hunters and gatherers to occupy Southeast Alaska, to fishing, mining, fox farming, and lumbering activities in the 20th century. Non-renewable cultural resources include the physical remains of districts, sites, structures, buildings, and objects used by humans that have significance in prehistory or history. Other non-physical resources identified through ethnohistorical or oral history research may have traditional or spiritual significance for contemporary Native Americans. Cultural resources located in the Tongass National Forest encompass a wide variety of prehistoric and historic sites and artifacts that reflect nearly 10,000 years of human occupation and resource use. Information obtained through the study and analysis of these sites and objects, many of which constitute the only record of former cultural traditions, can be of importance in the reconstruction of past human responses and adaptations to environmental and social change.

For a site to be considered "historic," it must be more than 50 years old, unless it has exceptional national, state, or local significance. From a strictly legal standpoint, properties are historically significant if they qualify for inclusion in the National Register of Historic Places.

Prior to 1994, the Alaska Heritage Resource Survey (AHRS), maintained by the Alaska State Historic Preservation Officer (SHPO), listed seven prehistoric and historic period sites on Federally managed land within the project area. One of these sites, an unconfirmed petroglyph, has previously been determined by the SHPO as "not eligible" for the National Register of Historic Places (Dilliplane 1983). With the exception of this latter site, all of the previously listed AHRS sites were revisited during the 1994 cultural resource investigations. Further documentation of known sites in 1994 identified a previously unrecognized prehistoric site in Port Houghton (SUM 025) dating between about 3,500 to 1,000 B.P., at a location which had previously been recorded as only an historic cabin site. Also identified was a previously unrecognized shell midden deposit at Cape Fanshaw (SUM 024). Other previously known AHRS sites further documented in 1994 included a canoe run and historic cabin site (SUM 023), an historic fox farm district (SUM 020) comprised of four related AHRS sites, and a Native campsite and cache pit (SUM 026) which was radiocarbon dated to 250 + 30 B.P. (Cal. AD 1655).

Eighteen new AHRS sites and two AHRS historic districts were identified in the project area as a result of the 1994 cultural resource survey. A prehistoric shell midden deposit (SUM 065) dated to 1280 + 50 (Cal. AD 1145) was documented and a Native fish weir (SUM 055) dated to 110 + 40 (Cal. 1825-1835 or 1880-1915) was identified. A variety of historic sites representing early mining, trapping, and logging activities were identified in 1994. Structures and features associated with the Port Houghton Prospect (SUM 048), a copper mine worked prior to 1923, were documented at the head of Port Houghton. Two cabins were recorded at the Port Houghton Prospect and seven other cabin sites were documented for the first time in 1994 (SUM 021, 025, 044, 049, 052, 056, 057). Two groups of associated fox farm structures (SUM 050 and 051) were documented in 1994 as AHRS districts. One of these fox farm structures (SUM 051) is comprised of a primary fox farm residence (SUM 064) with three other related structures (SUM 061, 062, 063). On another island, two cabin sites (SUM 058 and 059) associated with fox farming activity (SUM 050) were recorded, along with a fox feeding station (SUM 060) and other related features. Historic log dumps (SUM 045 and 053) associated with evidence of past logging activity were also identified. Another historic site (SUM 054) with pilings in the intertidal zone may have been a stationary fish trap site operated in the early 1900s. No burials, associated funerary objects, or Native American sacred objects were located during the 1994 survey.

Other cultural resources on State of Alaska managed land adjacent to the project area include a prehistoric site at the entrance to Port Houghton (Davis 1985), the historic fishing industry town site at Fanshaw Bay, and two historic fox farm structures. In addition, culturally modified trees (CMTs), representing past Native use of the project area, are present along much of the coastline and on the larger islands. Springboard-notched stumps from historic logging activity are also common along much of the shore line in the project area.

A total of twenty-four cultural resource sites and two districts are now known to exist on Federal land in the Port Houghton/Cape Fanshaw project area (Table 3-22). The sites include Native campsites and shell midden deposits with the earliest known site occupied around 3,000 to 2,000 B.P. Evidence from the project area provides solid documentation of continued Native use of the project area for subsistence purposes up to the ethnographic present. The Port Houghton copper prospect is an important early mining site and several sites are related to early logging and fox farming activities in the project area. At present, no AHRS sites in the project area have been listed on the National Register of Historic Places. It is likely, however, that several sites within the project area are eligible for inclusion in the National Register of Historic Places.

Table 3-22
Cultural Resource Sites in the Port Houghton/Cape Fanshaw Project Area

Site	Description	Significance[1]	Integrity[2]	Eligibility[3]
SUM-020	Historic fox farm, CMTs	YES	YES	YES
SUM-021	Historic cabin, CMTs	NO	NO	NO
SUM-023	Canoe run, CMTs	YES	YES	YES
SUM-024	Historic Lighthouse Reserve, Midden, CMTs	YES	YES	YES
SUM-025	Historic cabin, prehistoric site, CMTs	YES	YES	YES
SUM-026	Prehistoric site, CMTs	NO	NO	NO
SUM-044	Historic cabin, CMTs	NO	NO	NO
SUM-045	Historic cabin, log dump	YES	YES	YES
SUM-048	Historic cabin and mine	YES	YES	YES
SUM-049	Historic cabin	NO	NO	NO
SUM-051	Historic fox farm district	YES	YES	YES
SUM-052	Historic cabin	NO	NO	NO
SUM-053	Historic cabin, log dump	YES	YES	YES
SUM-054	Historic pilings, skiff, midden, CMTs	NO	NO	NO
SUM-055	Prehistoric fish weir	YES	YES	YES
SUM-056	Historic tent platform	NO	NO	NO
SUM-057	Historic cabin	YES	YES	YES
SUM-062	Historic fox feeding station			
SUM-063	Historic fox farm log track	YES	YES	NO[4]
SUM-064	Historic fox farm residential complex	YES	YES	NO[4]
SUM-065	Shell midden	YES	YES	YES

[1]Site does/does not have historical significance according to National Register Criteria (36 CFR 60).
[2]Site does/does not have physical integrity (36 CFR 60).
[3]Site is/is not eligible for inclusion in the National Register.
[4]Site is a contributing element to a historic district.
Source: Bowers et al. 1995

Chapter 4

Environmental Consequences

Chapter 4

4. Environmental Consequences

This chapter describes the physical, biological, economic and social effects likely to result from implementing each of the alternatives. A summary of the consequences of each alternative is displayed in tables within Chapter 2. This information has been taken from more detailed reports that are in the planning record.

4.1. Timber

Timber sale activities would directly affect vegetation in the areas harvested. The short-term and most obvious effect would be the conversion of old-growth forest stands into young, early successional timber stands. The following discussion of direct and indirect environmental effects on vegetation is developed from concerns and issues expressed by the public and interdisciplinary team for the Port Houghton/Cape Fanshaw EIS.

4.1.1. Direct Effects

The acreage amount of harvest proposed, the percent of suitable and productive forest land the harvest acreage represents, and the percent of total land area for each of the action alternatives are summarized by VCU in Table 4-1. Suitable forest land includes only those lands that can be regenerated successfully, logged without causing irreversible soil damage, and are not withdrawn from timber production by regulations or administrative action. Historic harvest in the project area (outside of Goldbelt, Inc. lands) is essentially non-existent, occurring in various small patches, totaling less than 200 acres between 1948 and 1952.

4.1.1.1. Proposed Harvest by Silvicultural Method

The total acres by volume class and alternative for each prescribed silvicultural method are listed in Table 4-2. (See Glossary for silvicultural method descriptions.) Alternatives 2, 4 and 5 contain a 774 acre helicopter salvage area that retains approximately 50 percent of the current standing net scribner volume. Alternative 4 has both the helicopter salvage area (774 acres) and five group selection areas (315 acres), where 50 percent and 25 percent of the standing scribner volume would be recovered in this entry, respectively. Alternatives 6 and 7 have no helicopter yarding. Alternative 7 also has the highest proportion of prescribed clearcutting.

Table 4-1
Effect of Harvest in the Port Houghton/Cape Fanshaw Project Area by Suitable Forest Land (47,519 acres), Productive Forest Land (83,402 acres), and Total Land Area Available for Forest Service Management (134,261 acres[1]).

	% by area		Total			
Alternative	Chatham	Stikline	Proposed Harvest Acres[2]	Suitable Forest Land (%)[3]	Productive Forest Land (%)	Total Land Area Harvest (%)
2	61	39	5,171	10.9	6.2	3.9
3	100	0	550	1.2	0.6	0.4
4	62	38	6,225	13.1	7.4	4.6
5	45	55	3.706	7.8.	4.4	2.8
6	98	2	951	2.0	1.1	0.9
7	65	35	3,489	7.4	4.2	2.6

[1]Excluding the Cape Fanshaw Natural Area.
[2]Harvest acres do not include timbered road right-of-way acres outside of units.
[3]See the Glossary.
Source: Jenkins 1998.

Table 4-3 shows the proportion of acres in the high-volume strata for the project area and for the action alternatives. Volume strata is the current system in use under the Forest Plan. Removing timber for high-volume stands at a disproportionally high rate could result in an increase in the percent of an area in low-volume stands. This also increases the allowable sale quantity and timber production since the more productive sites start growing a new crop of trees sooner.

4.1.2. Indirect Effects

4.1.2.1. Plant Succession

The type of vegetation that succeeds timber harvesting is a concern to resource scientists and foresters. Regenerated stands created by timber harvesting would result in species and size class changes. There would also be wildlife and biodiversity effects, which are discussed in other sections of this chapter.

The Port Houghton/Cape Fanshaw project area is composed of overmature stands, which form a mosaic of patches of shrubs, tree saplings, and herbs alternating with patches of overmature timber. The physical structure of the old-growth understory and overstory is considered the most diverse of all stages of plant succession (Alaback 1982). Each stand renews itself through small windthrow events, creating small openings in which new trees and shrubs regenerate. The major timber species consist of western hemlock (*Tsuga heterophylla*), Sitka

Table 4-2

Silvicultural Method Acres by Volume Strata and Action Alternative for Harvest Units[1]

Silvicultural Method	Volume Strata Acres: High	Medium	Low	Subtotal Acres	Low Prod.	Non Forest	Total Acres	Total %
Alternative 2								
Clearcut & w/Reserves	1,249	1,360	334	2,942	28	3	2,973	57%
Shelterwood w/Reserves	555	511	259	1,324	9	0	1,334	26%
Group Selection	24	49	0	74			74	1%
Sanitation Salvage	153	496	124	773	1		774	15%
Overstory Removal	17			17			17	0%
TOTALS:	**1,998[2]**	**2,417**	**717**	**5,131**	**37**	**3**	**5,171**	**100%**
Alternative 3								
Clearcut & w/Reserves	118	171	37	327	3	0	330	60%
Group Selection	78	91	48	217	3		220	40%
TOTALS:	**196**	**262**	**85**	**544**	**6**	**0**	**550**	**100%**
Alternative 4								
Clearcut & w/Reserves	1,362	1,517	492	3,371	34	3	3,408	55%
Shelterwood w/Reserves	663	626	405	1,694	15	0	1,709	27%
Group Selection	29	80	188	297	18		315	5%
Sanitation Salvage	153	496	124	773	1		774	12%
Overstory Removal	17			17			17	0%
TOTALS:	**2,225**	**2,720**	**1,209**	**6,153**	**68**	**3**	**6,224**	**100%**
Alternative 5								
Clearcut & w/Reserves	920	934	238	2,093	24	2	2,119	57%
Shelterwood w/Reserves	277	299	158	734	5		740	20%
Group Selection	24	49	0	74			74	2%
Sanitation Salvage	153	496	124	773	1		774	21%
TOTALS:	**1,375**	**1,778**	**521**	**3,674**	**30**	**2**	**3,706**	**100%**
Alternative 6								
Clearcut & w/Reserves	292	154	96	542	6		548	58%
Shelterwood w/Reserves	119	88	189	396	7		404	42%
TOTALS:	**411**	**243**	**285**	**938**	**12**	**0**	**951**	**100%**
Alternative 7								
Clearcut & w/Reserves	1,256	1,314	463	3,033	27	1	3,070	88%
Shelterwood w/Reserves	196	134	98	428	0		428	12%
TOTALS:	**1,455**	**1,451**	**564**	**3,470**	**27**	**1**	**3,489**	**100%**

[1]Does not include road right-of-way acreage.
[2]Column totals do not always agree because of rounding.
Source: Jenkins 1998.

Table 4-3
Percentage Acres of High-Volume Strata for the Project Area and the Action Alternatives.

Area	% Volume Strata Acres
Project Area	34%
Alt. 2	39%
Alt. 3	36%
Alt. 4	36%
Alt. 5	37%
Alt. 6	43%
Alt. 7	42%

Source: Regan 1998.

spruce (*Picea stichensis*), Alaska yellow cedar (*Chamaecyparis nootkatensis*), and mountain hemlock (*Tsuga mertensiana*). Under Alternative 1, the project area would continue in this self-perpetuating stage. This would also apply to those areas not harvested under any alternative.

Timber harvest activities would primarily affect forested plant communities, with the exception of road construction and log storage/transfer facilities in non-forest areas. The most obvious effects from harvest on vegetation in the project area would be the conversion of old-growth forest stands into young, early successional timber stands. Second-growth stands would show less variability in tree diameter and height than the mature and overmature stands they would replace.

During the first five years following harvest, there would be a rapid establishment of tree species, shrubs, forbs, and grasses. Increased temperature and sunlight would stimulate the breakdown of organic material, increasing nutrient availability and vegetation growth. Species such as Alaska blueberry and red huckleberry would increase in productivity due to vigorous sprouting from underground stems (Alaback 1984). Other species of blueberry and huckleberry, salmonberry, and western hemlock would also respond positively to the removal of the tree canopy. Mosses, lichens, herbs, and shrubs that thrive best in the shade and protection of a mature overstory would be reduced in vigor and competitive ability. Because of the overstory removal, stands adjacent to the new openings would be more susceptible to windthrow. Understory development along the edge of adjacent timber stands would increase due to additional sunlight (edge effect).

Partially harvested areas would produce a different response in vegetation than clearcutting. Since Sitka spruce is the least shade-tolerant of the major timber species, Sitka spruce would likely comprise a smaller proportion of the regenerated stand when compared to those areas that would be clearcut (yellow-cedar is similar in shade tolerance to Sitka spruce). Western hemlock has a higher shade tolerance and would be more likely to survive under the shade of an overhead canopy. The amount of ground disturbance would influence the species composition following harvest. A clearcut harvest would likely cause the most ground disturbance of the various silvicultural systems. The mineral seedbed produced under these conditions favors Sitka spruce, as well as non-commercial species such as salmonberry and alder. Western hemlock has a greater ability than other tree species to develop seedlings on logs and other organic material, which allows this species to dominate in areas with little ground disturbance.

The NFMA requires that stands be adequately regenerated within five years of harvesting. Stands proposed for clearcut harvest in all action alternatives are expected to regenerate naturally. Hand planting of nursery grown seedlings would be prescribed for stands which cannot be certified as adequately stocked, or where species diversity and enhancement is desired.

Between years 5 and 20, Sitka spruce, western hemlock, and Alaska yellow cedar seedlings would grow into a young forest with an estimated 3,000 stems per acre (USDA-FS 1991). Understory production of woody-stemmed species is at its highest rate at this stage, especially in Vaccinium-dominated sites. Larger dead materials from the original stand would begin to decompose, and the stand edge stabilizes, resulting in less windthrow. These stands would now be considered for precommercial thinning (at approximately 20 years of age).

Between the ages of 20 and 80 years, trees would grow rapidly, averaging about one foot in height per year (Zaborski and Buyarski 1991). Tree crowns would close to form a dense canopy, which would result in a rapid reduction in understory biomass and an increase in dense moss. Stands could develop a two-layered canopy, with western hemlock in the lower tier. Canopy closure would occur more slowly in precommercially thinned sites. At age 80, growth would begin to slow as competition between trees increases.

In years 80 to 100, the stand would become mature. At age 100, tree heights would range from 75 to 130 feet and diameters range from 10 to 15 inches, depending on site productivity. Some trees would die, while others would become dominant in size. Wood decay and defect would become a more significant component of the standing timber volume. Moss would continue to dominate the understory, except in cases where the canopy has been opened to allow sufficient sunlight for herbaceous plants. This would be the normal rotation age, when a regenerated stand would be considered for harvest. For those stands to be managed for longer rotations, the above structural characteristics would continue into the later stages of the stand (120 to 140 years) with continued slow growth and occasional openings in the canopy from windthrow.

4.1.2.2. Forest Productivity and Health

The effect of harvest on productivity and forest health is a concern to foresters. Each action alternative would result in the conversion of unmanaged overmature stands, with a net growth near zero, to managed, more productive second growth stands with a significantly higher net growth. Overmature stands have lower forest floor temperatures than even-aged stands. As a result, organic matter decomposition is slower, which decreases the supply of available nutrients. Even-aged stands maintain growth at a higher level than mature and overmature stands (Harris and Farr 1974). Generally, volume yield will increase 150 percent on managed stands over the rotation.

Timber stands proposed for harvest in all action alternatives are beyond the age of maximum average annual growth of the stand. Overmature stands within the project area are at an equilibrium, where net growth of the younger trees is balanced by growth loss from the mortality of mature trees. These conditions would remain under Alternative 1, and in the unharvested old-growth timber stands of the action alternatives.

The open conditions created in clearcuts allow both Sitka spruce and western hemlock to regenerate rapidly. Depending on the soil type, amount of soil disturbance at regeneration, and age, even-aged stands usually contain from 10 to 75 percent spruce. Selective precommercial thinning would increase the proportion of spruce if western hemlock trees were thinned proportionally more than spruce.

Precommercial thinning of harvest stands would increase the amount of usable fiber, as growth would be concentrated on fewer stems. Merchantable sized logs would be produced in a shorter period of time, allowing the possibility of reducing the rotation age. Preliminary information (Alaback 1984) suggests that thinnings may enhance understory productivity in young (pre-canopy closure) stands, but there is no evidence to date that subsequent thinnings would increase the diversity of understory vegetation found in old-growth forests. Table 4-4 shows the total potential amount of planting and precommercial thinning by alternative.

Alternative 4 has the highest relative potential acres for planting at 16 percent of the total acres for the alternative, and Alternative 3, with no planting recommended, has the least. Most of the planting is recommended to maintain species diversity, specifically yellow-cedar, and enhancement. As for the amount of potential precommercial thinning, Alternative 3 has the least (180 acres), and Alternative 4 has the most acres (3,158 acres) recommended.

Table 4-4

Action Alternative Comparisons of Indirect Effects: Potential Planting and Precommercial Thinning Acres

	Total Harvest Acres[1]	Recommended Planting Acres (%)	Recommended Precommercial Thinning Acres (%)
Alternative 2	5171	910 (18)	2856 (55)
Alternative 3	550	0 (0)	180 (33)
Alternative 4	6224	1096 (18)	3158 (51)
Alternative 5	3706	778 (21)	1805 (49)
Alternative 6	951	86 (9)	628 (66)
Alternative 7	3498	872 (25)	2344 (67)

Source: Jenkins 1998.

Younger stands created as a result of harvesting would be relatively disease-free when compared to the overmature stands. Wood decay and defect would be less than in old-growth timber stands. Although dwarf mistletoe would not be eliminated through timber harvesting, the effect of this pathogen on tree growth is not expected to be critical to growth in young second-growth stands, as silvicultural treatment of mistletoe stands is a priority.

Alaska yellow cedar decline is associated with poorly drained, boggy conditions (USDA-FS 1985a). Widespread succession from forest to bog vegetation may be partly caused by podzol formation, nutrient immobilization, and lack of soil disturbance (Bormann and Sidle 1990). It is suggested that deep mixing of the soil could set back this succession and restore soil productivity. The uprooting of trees can be similar to subsoil plowing (Harris 1989). Soil disturbance is reduced when trees are harvested before they can be windthrown (Bormann and Sidle 1990). Clearcutting would reduce the occurrence of windthrow within harvest units, while potentially increasing windthrow along their perimeters. Retaining reserve trees would provide opportunity for windthrow, maintaining soil disturbance patterns within harvest units throughout the rotation. The process of decline may advance within clearcuts without reserve trees, while conversely, its progress may be set back by windthrow of retained trees.

Total yield per acre is expected to be higher in second-growth stands than in mature and overmature stands. In comparison to overmature stands, log quality would be lower, due to the higher proportion of volume in small diameter trees, and a smaller proportion of knot-free wood. Concurrently, there would be less wood decay in the second-growth stand.

Another significant indirect effect of harvest is the increased potential for windthrow of trees from bordering stands and residual trees within units. Table 4-5 shows the high windthrow risk unit acres for each action alternative.

Table 4-5
Windthrow Risk Area by Alternative

	Total Harvest Acres[1]	High Windthrow Risk Acres	Percent
Alternative 2	5171	924	18
Alternative 3	550	291	53
Alternative 4	6224	1049	17
Alternative 5	3706	463	12
Alternative 6	951	393	41
Alternative 7	3498	848	24

[1]Harvest acres do not include ROW acres.
Source: Jenkins 1998.

4.1.3. Timber Economics

4.1.3.1. Employment

Direct employment resulting from this timber sale was calculated using 5.44 jobs per million board feet of timber production. Indirect employment was calculated using 3.16 jobs per million board feet of timber production (Morse 1995). Total jobs to be supported from the proposed timber harvest range from 98 - 1,203 (Table 4-6). Average total jobs supported is 678, or 226 per year over a three-year harvest period. The income generated for each job was estimated using the average wage published in Alaska Department of Labor (1994) for the Technical Occupation Summary sector as $33,751 per year for direct jobs and the Retail Trade sector of $17,376 for indirect jobs. Total income ranges from $2.7 million to $33.4 million (Table 4-7). Labor and income are shown for the entire harvest. Harvest would occur over three or more years. Initially, the camp, roads and LTF would be constructed, followed by harvest, and then milling activities. The entire process from commencement to milling of the final log could occur up to 10 years.

4.1.3.2. Timber Sale Economics

An economic analysis provides a basis for comparison and ranking of the six action alternatives proposed for this project. In this analysis, the net value per MBF for each alternative is derived by subtracting all production costs, including an allowance for profit and risk from the pond value for timber to be harvested.

To account for market fluctuations, a mid-market appraisal was done for each action alternative. This analysis uses weighted average timber values from the first quarter of 1979 through the quarter the Notice of Intent is issued, and production costs in effect at the time of the Notice of Intent. As a further means of comparison and an indication of present conditions, an analysis using current quarter values and costs was also done using the SNAP III (Sale Network Area Planning) program.

Table 4-6
Employment Contributions to Regional Employment During Entire Operations

Alternative	Timber Volume (MMBF)	Direct Jobs	Indirect Jobs	Total
1	0	0	0	0
2	121.7	662	384	1,046
3	11.4	62	36	98
4	139.9	761	442	1,203
5	77.7	423	246	669
6	23.4	127	74	201
7	99.0	538	313	851

Source: Regan 1998.

Table 4-7
Total Income Contributed to Regional Income During Entire Operation

Alternative	Income Generated (million $)
1	NA
2	29.0
3	2.7
4	33.4
5	18.6
6	5.6
7	23.6

Source Regan 1998.

Table 4-8 summarizes the timber values and costs calculated for each alternative at Port Houghton. Pond log value is the end product selling value minus the manufacturing (mill) costs. It is the value of the log delivered to the mill pond less processing costs. Production costs are those incurred when transporting logs from the stump to the mill. Alternative 1, the no-action alternative, is not shown since there is no harvest. The alternative volume shown includes utility and an estimate of the road right-of-way volume that would be cut during road construction. The difference in net value between the alternatives can be attributed to three major factors including: (1) the ratio of road construction to volume, (2) the percentage of high-cost helicopter yarding, and (3) the percentage of higher value species, such as Alaska yellow cedar and Sitka spruce.

Table 4-8
Timber Values and Costs to an Operator of Average Efficiency

	Alternative					
	2	3	4	5	6	7
Mid-Market Analysis						
Total Volume (MBF)	121,693	11,350	137,874	77,684	23,408	98,847
Pond Log Value $/MBF	$352	$357	$342	$308	$368	$357
Logging Costs $/MBF	$208	$350	$202	$203	$232	$167
Road Costs $/MBF	$115	$111	$90	$114	$185	$107
SUBTOTAL COSTS	$323	$461	$292	$317	$417	$274
Conversion Return	$323	$461	$292	$317	$417	$274
60% Normal Profit & Risk	$29	($104)	$50	($9)	($49)	$83
NET STUMPAGE VALUE	($19)[1]	($152)	$0	($60)	($93)	$34
Snap III Analysis						
Pond Log Value $/MBF	$297	$297	$297	$297	$297	$297
Logging Costs $/MBF	$267	$367	$267	$280	$226	$241
Road Costs $/MBF	$106	$112	$97	$122	$195	$124
SUBTOTAL COSTS	$373	$479	$364	$402	$421	$365
Conversion Return	($76)	($152)	($67)	($105)	($124)	($68)
Normal Profit & Risk	$65	$65	$65	$65	$65	$65
NET STUMPAGE VALUE	($141)	($247)	($132)	($170)	($189)	($133)

[1]Numbers in parentheses are negative.
Source: Regan 1998.

Markets for Southeast Alaska timber and wood products normally experience increases and decreases, and the general tendency has been to increase in value at the rate of inflation, plus some real price increase. These values are the average for all the sellers of wood products; that is, they reflect the prices to the seller of average efficiency. Similarly, the cost for logging and processing the timber reflect the recent past experience of the operators of average efficiency. Despite the negative values of some alternatives, all sale offerings would be advertised no lower than regional minimum rates. The results of the mid-market appraisal and

SNAP III analysis are intended to be used for relative alternative comparisons, and not as definitive indications of net stumpage values for each alternative.

Alternatives 4 and 7 have the highest net stumpage values. Primarily, this is attributable to the reduction in development cost associated with larger volumes of timber to be harvested over an area with fewer road miles and/or less costly roads, and lower logging costs. The largest single cost is normally for the construction of specified roads. Road cost per mile would vary between alternatives, due to the difficulty of construction and the number of bridges and other structures in each alternative. Specified roads are estimated to have an average cost ranging from $144,000 to $207,000 per mile.

Alternative 7 has the lowest production costs (cost associated with harvesting timber) while Alternative 3 (high road reconstruction costs and all helicopter yarding) has the highest. For the SNAP III analysis, all action alternatives have a negative indicated net stumpage, reflecting the poor current timber market. Note that SNAP III uses normal profit and risk, rather than the 60 percent of normal used in the mid-market analysis.

4.1.4. Cumulative Effects

About half (49 percent) of the Port Houghton/Cape Fanshaw project area is designated by the Forest Plan for intensive development (Timber Production LUD) to promote industrial wood production. Another one quarter of the project area is assigned to moderate development LUDs (Scenic Viewshed and Modified Landscape). One additional timber sale project, totalling 35 MMBF, is also scheduled to occur on the Stikine side of the project area prior to 2010. Implementation of these sales would result in more younger timber stands over time. Roads for the proposed timber sale(s) would be used for future sales to access new areas proposed for harvest.

The project area is bordered by saltwater to the south and west, and by wilderness to the northeast. Hobart Bay, which is the first bay north of the project area, was part of the Native-selected lands and has been heavily harvested. Harvest activities are scheduled to be completed in the near future. The exact amount of harvest is unknown on these private lands but has been assumed for this EIS to be completely harvested under existing conditions, and would occur prior to harvest activities initiated for the proposed project. When the Goldbelt, Inc. harvest is complete, it is likely that more roads would be available for use by the Forest Service to harvest in the North Shore area and transport timber to the Hobart Bay LTF.

4.2. Marine

LTF sites generally consist of several facilities such as the log-entry system, log rafts, dock for float plane landing and boat storage, timber decking or scale yard, storage building, and logging camp. Two log-entry systems are being considered for the Little Lagoon LTF site in Port Houghton, although only one system would ultimately be selected. These log-entry systems are the low-angle ramp and/or slide and the bulkhead. The systems transfer logs from the land to water for rafting. The bulkhead system additionally has the ability to transfer logs to a barge. Logs can be transferred singly or in log bundles. A low-angle ramp with slide is best suited for the site as discussed in Chapter 2.

The Little Lagoon LTF site is the only new proposed site for the Port Houghton/Cape Fanshaw project area. The existing Hobart Bay LTF site, which is located on private land outside of the project area, would be utilized for any alternative proposing harvest on the North Shore of Port Houghton. The volume of timber transferred from each LTF site varies by alternative with most of the timber being transferred through the Little Lagoon site (Table 2-1). Logs may be sorted on land or in the water. For the proposed project, land-based scale and decking yards are available.

The primary use of log rafts or barges is to transfer logs from the logged area to a processing and/or scaling facility. For this project, tugboats would transfer the log rafts or barges from Port Houghton to a timber processing facility. At least two to three tugboats with rafts or barges would be expected to navigate Port Houghton on a weekly basis during the peak harvest period for the one or more timber sales that could result from this project.

Logging camps may be either land-based or on barges. The log camp would typically be in operation for six months a year - from May to October. Float planes, helicopters, and small boats would be associated with the log camp.

Most LTF sites are used intermittently; a site may be built for a specific harvest period, then after the harvest is completed, the lease may either be kept active for future timber harvests or allowed to terminate. The Little Lagoon LTF site would be available for future harvests in the project area.

4.2.1. Direct Effects

Physical effects from log dumping, sorting, and rafting would include bark and wood debris deposition, changes in marine substrate characteristics from bark accumulation, and loss of whole logs through sinkage. The extent of impacts from these activities would vary with the type of log entry system, water depth, substrate composition, log species handled, season and volume of the operation, and prevailing currents and circulation patterns (Duval and Slaney & Company 1980; Waldichuk 1979).

4.2.1.1. LTF Construction

The most direct physical effect on the substrate occurs during construction when intertidal and shallow subtidal habitat is filled for the LTF site. The extent of fill is dependent on the type of LTF system selected. Generally, approximately 60 horizontal linear ft of shoreline, and a vertical area from the Ordinary High Water (OHW) mark to about -5 ft Mean Lower Low Water (MLLW) would be filled for the LTF. However, the total area of shoreline filled from OHW to -5 ft MLLW is influenced by beach slope in the intertidal and shallow subtidal area. In general, construction of an LTF on gently sloping beaches would result in more marine habitat being filled than construction on steeply sloped beaches.

Alternatives 2 and 4 through 7 require the development of the Little Lagoon LTF site (0.11 to 0.15-acre fill) (Table 4-9). The bulkhead at Hobart Bay is an existing facility that was constructed in the late 1980s. An articulated logslide that rises and falls with the tides is attached to the bulkhead. The Hobart Bay LTF is used in Alternatives 2 thru 5.

Table 4-9
Intertidal and Shallow Subtidal Fill Area (Acres) by LTF and Type of Log-Entry System

LTF Site	Vertical Bulkhead	Low-Angle Ramp or Slide
Little Lagoon	0.15	0.11
Hobart Bay[1]	None	None

[1]Existing facility.
Source: McKenzie 1995b, Boes 1996.

4.2.1.2. Bark Deposition and Dispersion

Bark loss occurs during the transfer of logs from land to water. Bark is deposited in the intertidal area immediately below the log-entry system where currents disperse the bark over a greater area. The low-angle slide system moves logs from land to water on a slide at relatively low velocities resulting in some bark loss. Bulkhead systems result in less substrate disturbance and bark loss because a crane lifts the logs from land and deposits them into the water. Thus, low-angle slides have a higher bark loss rate than bulkhead systems. Schaumberg (1973) reported average bark losses of 17 percent for a low-angle slide and 7 percent for a bulkhead system. Bark can also be deposited when logs are sorted in the water. Bark falls off logs as the boat sorts the logs into different areas of the log raft. The bark initially falls immediately below the surface water; it is dispersed over time on the marine substrate by means of currents.

Water quality data information are not available for Port Houghton or the proposed LTF site. Indicators of current (e.g., observations of currents and evidence of siltation) and water quality, as well as the LTF's physical location relative to wave and fetch exposure, headlands, bars, spits, or artificial obstructions reducing circulation were used to determine potential impacts to marine resources from LTF operations. The proposed LTF site is located in an area where currents were estimated at up to 1.5 knots. There are no physical barriers that affect circulation or tidal exchange at the LTF site. These features should minimize impacts to marine resources by dispersing sunken or floating wood debris.

The greatest estimated area of bark deposition and dispersion would occur at the Little Lagoon LTF site, if a low-angle slide is constructed (Table 4-10). In addition, miscellaneous bark deposition would occur in smaller amounts directly below log rafts. Results of previous studies (Conlan 1977; Shultz and Berg 1976; Pease 1974) indicate that bark and wood deposits occur at both active and abandoned LTF sites, indicating that bark remains underwater at LTFs for long periods of time following LTF closure. The depth of bark accumulation could be variable, ranging from scattered deposits of decomposing wood and bark debris within depressions to accumulations several feet deep.

A bark depth survey was done at the existing Hobart Bay LTF during May 1996. The site exhibits good flushing action. Currently, the bark zone of deposit is approximately 2.29 acres (Boes 1996).

Table 4-10

Estimated Area (acres) of Bark Deposition and Dispersion at the LTF Sites[1]

LTF Site	Transfer System	Area of Bark Deposition	Area of Bark Dispersion
Little Lagoon	low-angle slide[2]	0.17	0.83
	bulkhead	0.11	0.52
Hobart Bay	bulkhead	2.29	3.39

[1]The estimated area of bark dispersion was evaluated for the project area by using reported quantitative values (from the literature) at active and abandoned LTFs in Alaska and British Columbia. The reported estimates were compared based on timber type and volumes transported, water current information (if known), and years of LTF operation. Literature reviewed included Conlan (1977), Pease (1974), and Shultz and Berg (1976). These articles represent the most recent information on this subject.
[2]Log entry into the water using a low-angle slide system typically results in more bark deposition.
Source: McKenzie 1995b, Boes 1996..

A correlation between the size and volume of bark deposits, the amount of timber transferred, and years since the LTF has operated has been shown to be important at inactive LTFs evaluated in Southeast Alaska (Freese et al. 1988). Pease (1974) reported bark deposits from 24 to 35 inches deep at a ten-year-old active site and 2 to 3 inches deep in a one-year-old LTF site. Bark was dispersed at an approximately 180-foot radius from the point where the log bundles entered the water. The radius of dispersed bark was reduced to a 45- to 70-foot radius at LTF sites abandoned for several years. Conlan (1977) reports thicker deposits occurring in the immediate proximity to the dumps (LTFs), and thinning with increasing distance from the LTF sites. Pease (1974) and Ellis (1970) report that slow bark debris dispersion could occur in areas with poor water circulation.

Although attempts were made to obtain water current data for Port Houghton, no water current data was available. The bark dispersion area could increase if strong water currents frequently occur in the vicinity of the LTF sites; as the depth of bark deposits is expected to decrease with increasing current speeds.

Comparatively, in areas with relatively slow water currents and low water exchange volumes, the depth of bark deposits is expected to remain relatively unaltered, and the bark dispersion area is not expected to exceed estimated areas (Table 4-10).

4.2.1.3. Marine Flora and Fauna

The most substantial biological impacts to marine flora and fauna caused by the construction and operation of LTFs are (1) the direct loss of plants and animals within the fill area of log-entry systems, and (2) a reduction in plant and animal communities in bark deposition sites below log-entry systems and log rafts.

The greatest impact projected to marine macroalgae communities in the vicinity of LTF sites would be elimination of macroalgae in the fill area and a decrease in marine community diversity from shading directly below log rafts. The amount of macroalgae eliminated from filling intertidal and shallow subtidal habitat would depend on the density of macroalgae within the fill footprint. Decreased light intensity under log rafts reduces primary productivity and growth, eventually leading to the loss of macroalgae and rooted marine plants. Ellis (1980) reported a marked decrease in plant abundance caused by shading at a log-raft area in Hanus Bay, Southeast Alaska. The effect of shading for the proposed project is based on the size of the log-raft area and number of LTF sites planned. Log-raft areas are likely to be of similar size at the Little Lagoon LTF site regardless of which action alternative is implemented. Log raft shading of approximately 0.2 acre at the Little Lagoon LTF site is expected. If a floating log camps is utilized, approximately 0.11 acre of marine habitat would be shaded.

Other impacts to macroalgae and rooted marine plant communities would occur from bark and wood debris covering plant communities (Table 4-10). Log dumping and bark loss into marine substrates result in a shifting, unstable environment that is harmful to marine plants both in overall abundance and species richness (Shultz and Berg 1976; Duval and Slaney & Company 1980).

The depth of bark deposits in marine waters may have the greatest impact on changes in faunal abundance, species richness, and community structure. A marine area having a minimum bark depth of 1 to 2 inches would result in changes in species distribution and numbers, and the effect of bark deposits may last for several decades (Karau 1975; Pearson 1972; Robinson-Wilson and Jackson 1983). Bark depth is generally greater in log dumping areas than at log rafting areas, and therefore is controlled by timber volume transferred at LTF sites. A marine area, having at least 2 inches of bark accumulation, may occur at the Little Lagoon LTF site, irrespective of which action alternative using the site is implemented. An estimated 0.11 to 0.17-acre of bark deposits (Table 4-10) would accumulate.

4.2.1.4. Salmonids

Initial screening criteria to identify potential LTF sites included out migrating juvenile salmon and returning adult salmon milling areas. The proposed LTF site in Little Lagoon is located in an area without salmonid fish bearing streams. The surrounding water column at LTF sites lacking deep water and/or no or restricted tidal exchange and that accumulate bark could become oxygen depleted and affect adult fish swimming speed and metabolism (Laevastu and Hayes 1985). The Little Lagoon LTF is located on a rock promontory shoreline exposed to moderate to long fetch and tidal currents. The depth of the LTF is considered moderate with slopes ranging from 2:1 to about 4:1 from 0 feet MLLW to about -30 feet MLLW. The water depth and exposure of this LTF site would minimize potential bark accumulation, rotting of wood debris, and oxygen depletion. Therefore, no adverse effects to salmon are expected.

Out migrating juvenile coho salmon do not generally stay in estuaries for more than one to two days before moving offshore into deeper water. Juvenile coho salmon are not expected to be affected in areas that potentially accumulate bark.

4.2.1.5. Herring Spawn Areas

The herring spawn grounds (Appendix K) located 3,168 feet northeast of the Little Lagoon LTF site would not be impacted because bark and wood debris are not expected to disperse greater than 180 feet from the LTF site. However, some variability occurs year-to-year in herring spawn locations. The wood and bark debris that would reach this herring spawn site is similar to natural detritus deposition that occurs on a daily basis. The location of a large rock pinnacle about 280 feet northeast of the Little Lagoon LTF site is likely also to prevent bark debris from dispersing towards this herring spawn area.

4.2.1.6. Shellfish

Impacts to commercial and recreational densities of dungeness crabs are not expected because bark and wood debris would not disperse greater than 180 feet from the LTF sites. No disturbance to shellfish mating and brooding habitat is expected during project construction if in-water work does not occur from August through March.

4.2.1.7. Marine Mammals

LTF operations and the transport of log rafts or barges through Port Houghton could potentially disturb feeding whales, dolphins, porpoises, and harbor seals. The Little Lagoon LTF site is located within 2 miles of known foraging areas near the mouth of Sandborn Canal. Harbor seal haulout sites are located northwest of the mouth of Sandborn Canal about 2 miles from the Little Lagoon LTF site. Marine mammals would be unaffected by timber operations in Port Houghton North Arm, the Salt Chuck, Fanshaw Bay, and Farragut Bay because no timber harvest is planned in these areas. The increase in boat traffic in Stephens Passage and Frederick Sound would be insignificant for marine mammals due to the large area of saltwater and the existing boat traffic. Commercial and recreational boating traffic also occur in the project vicinity primarily during summer months. Movement of whales and use of haulout areas by harbor seals or Steller sea lions are not anticipated to be obstructed under any of the proposed action alternatives.

4.2.1.8. Water Chemistry

Impacts to marine resources from changes in water chemical properties are not anticipated because the LTF sites are located next to deep water, in areas exposed to a moderate to long fetch, in areas that receive currents, and in areas without restrictions to tidal exchange. Significant adverse effects to marine organisms at the LTF sites are not anticipated because of the tidal mixing and dilution rates expected at the LTF sites. Compliance with Section 401 water quality certification under the Clean Water Act would also minimize chemical impacts to marine organisms and habitat.

Adverse effects to marine resources could occur from changes in water chemical properties due to leachates from wood and bark debris that enter the water during log dumping. However, no chemical effects to fauna are expected from the proposed harvest. Adequate tidal flushing should preclude high concentrations of leachates from developing in the project area (Levy et al. 1982).

4.2.1.9. Commercial Fishing Industry

Current standards and guidelines for timber harvest activities are expected to limit adverse effects on fish habitat and fish populations. Jobs in the fishing industry are not expected to change due to implementing any of the project alternatives. Fishers are likely to continue to utilize the project area for commercial fishing unless or until fishing harvest declines are greater than declines reported elsewhere. At that time, fishers would move their operations elsewhere. However, this would occur even under the no-action alternative. Fish population declines are already anticipated due to the change in direction of the subarctic boundary current (USDA-FS 1995b). No decline in fish populations would be expected from the proposed timber harvest. A potential impact that could occur from the presence of a logging camp at Port Houghton is competition between the commercial fishers and logging camp personnel. Competition could result from camp employees electing to harvest both fish and shellfish as a commercial resource or accidentally disturbing fishing lines or traps of other commercial fishers. Increased sport fishing by logging camp employees is likely to occur, but is not expected to result in loss of fishing opportunity and income to the existing commercial fishers who utilize Port Houghton but reside outside the project area.

4.2.2. Indirect Effects

Indirect effects associated with LTF construction and operation include the introduction of debris into nearshore waters. This debris would consist of log bundling and rafting straps; bottles, cans, and other refuse; spilled petroleum products from vehicle and boat operations or maintenance; and domestic sewage produced by camps located in the shoreline area. Fuel oil spills from LTFs are generally not common, but could occur and result in contamination of local waters. Most oil-spills are small and occur during fueling operations. Discharge of domestic sewage from temporary log camps could occur and increase the biological oxygen demand (BOD) of receiving waters. However, the effects of sewage discharge are generally localized, short-term, and insignificant (Duval and Slaney & Company 1980). Incidental refuse could be inadvertently disposed of in marine waters at the logging camp and during log entry into the water.

4.2.3. Cumulative Effects

No existing or abandoned LTFs occur in the Port Houghton/Cape Fanshaw project area, and there are no plans at this time for additional LTFs following this timber sale. The Hobart Bay LTF site is located outside of the project area and is operated by Goldbelt, Inc. From 4.3 to 12.5, MMBF would be transported through the Hobart Bay LTF site under Alternatives 2, 3, 4, and 5.

The construction and operation of an LTF site in Port Houghton would be the first major in-water development activity for the project area and could result in more cumulative effects over the project area on marine resources and habitats. The additional sale planned in the project area would likely increase the use and/or timing of the LTF site identified for the Port Houghton/Cape Fanshaw project area. Bark and wood debris would accumulate at the site. Dispersion of wood and bark could result in impacts to marine resources that move through and use the LTF area. The Little Lagoon LTF site would be maintained over the long-term.

4.3. Wildlife

4.3.1. Direct and Indirect Effects

The proposed harvest of old-growth timber in the project area would have an effect on old-growth dependent wildlife. As proposed in the silvicultural prescriptions for each harvest unit, some units would be only partially harvested; i.e., harvested at less than 100 percent. This analysis assumes that disturbance to wildlife would occur in all unit and road areas planned for construction (Table 4-11).

Table 4-11
Maximum Disturbance Acreage Projected from Timber Harvest

	Alternative					
Areas to be Harvested	2	3	4	5	6	7
Units	5,170	550	6,224	3,706	951	3,489
Roads	291	0	326	192	93	270
LTFs[1]	16	0	16	16	16	16
Total	**5,478**	**550**	**6,566**	**3,915**	**1,060**	**3,775**

[1]Includes roads and scale yards in the vicinity of the LTF, but does not include camps because either a land-based or floating camp may be selected by the timber sale operator.
Source: Gunther 1998.

4.3.1.1. Management Indicator Species (MIS)

Predicted effects to MIS species, based on results from the habitat capability model estimates using timber harvest and road plans for each action alternative, are discussed below. The MIS analysis for the project area includes two WAAs: WAA 1601 (the Stikine portion of the project area) and WAA 2927 (the Chatham portion of the project area) as shown in Figure 3-1. Note that WAA 2927 additionally includes VCUs 78 and 888, a wilderness area northeast of the project area, which adds 56,221 acres to the analysis. The Chatham Area portion of the project area is 90,717 acres. Adding VCUs 78 and 888 results in a total MIS analysis area for WAA 2927 of 146,938 acres. WAA 1601 consists of 52,950 acres.

The MIS analysis shown in this EIS is for clearcut conditions directly following timber harvest. The MIS models, as currently written, do not estimate carrying capacity or habitat suitability for partial harvests. In addition, the proposed harvest is increasingly complex because timber volume remaining varies in increments from 0 to 75 percent, which each species would respond to in a unique manner. Some MIS species may accept and adapt to partial harvests over time, although the immediate response may be direct avoidance due to human disturbance and extent of slash (logging debris). The slash may inhibit movement by larger animals because it prevents escape from predators. Smaller animals can use the slash as escape cover. As the slash decomposes, an opposite response would be expected. Larger animals can more rapidly escape from predators and smaller animals may lose the cover previously afforded by the slash.

For the MIS models, the larger salvage and group selection areas (where harvest would represent 25 percent of timber volume) were included or excluded based on known species responses to partial harvests during the critical time periods for which the models are based. For example, the open-canopy forest created by group selection methods is not believed to be of value in intercepting snow, and would discourage deer use during the critical winter months. Therefore, group selection and salvage areas were included in the MIS analysis for deer. This would result in the group selection and salvage areas having a negative effect on deer carrying capacity and habitat suitability. Alternatively, red-breasted sapsuckers have been found to be twice as abundant in low-volume old-growth stands as in mid-volume stands (Hughes 1995). Group and salvage areas were therefore not included in the model. This would result in group and salvage areas not having a negative effect, but also not having a positive effect.

Because of the complexity of the proposed timber harvest, in terms of amount of volume removed and type of logging system planned, the MIS effects analysis should only be viewed as a relative measure of the effects of the alternatives on wildlife habitat, not as a direct estimate of changes in carrying capacity or actual populations. Actual population numbers of a species can vary widely from year to year as a result of many factors other than optimum habitat potential. These models have not had extensive field testing and the numbers projected for each species serve as rough benchmarks to compare impacts among alternatives.

Furthermore, as forest regeneration commences and a second-growth forest emerges, each MIS species would respond in a unique manner for each of the several types of harvests planned in the project area. Species response is also dependent on conditions within a stand and whether closed second-growth stands are thinned to allow adequate understory development, a condition vital to some wildlife species. An MIS analysis of how each species responds to these conditions following regeneration is not possible because of the numerous factors that the models currently do not include and the unknowns regarding future stand conditions.

Sitka Black-Tailed Deer - Timber harvest in the project area would reduce the Sitka black-tailed deer carrying capacity up to 13 percent in an individual WAA (Table 4-12) using the 1997 deer model. No high-value habitat occurs for deer, but marginal habitat would decrease and unfavorable habitat would increase (Appendix H). Both WAA 2927 and 1601 would have carrying capacities greater than 500 deer, the minimum recommended by ADF&G to achieve deer population objectives, except under Alternative 4. The model projects a carrying capacity following timber harvest of 493 deer under Alternative 4 in WAA 2927. Projecting the effects of canopy closure that would occur 25 to 30 years after clearcutting, the habitat capability in WAA 2927 would also likely be less than 500 deer for Alternatives 2 and 7. Although the model assumes all timber harvest is accomplished by clearcutting, Alternatives 2, 4, and 7 actually project between 55 and 88 percent of the planned harvest would be clearcut (Table 2-3). Combining the WAAs for an overall project area effect (see Table 2-4) results in overall decreases in carrying capacity ranging from less than one percent to six percent for the action alternatives.

No or few additional hunters are expected to use the project area, despite the increased access from roads, because of the low deer density and existing low hunting success on mainland areas. Under some alternatives, roads are planned to be closed after timber harvest, which would minimize the hunter increase access roads might otherwise cause. Hunting impacts from the logging camp may be similar to present levels with the Hobart Bay logging camp which is projected to close by 2001. However, the logging camp could remain open if more timber is purchased or acquired through a land exchange for harvesting.

No harvest is planned on Robert Island or the southwestern portion of Cape Fanshaw, which have historically been cited as having the largest antlered deer in Southeast Alaska.

Mountain Goat - Following timber harvest, the carrying capacity for mountain goats would be expected to change in WAAs 1601 and 2927 by up to two goats (Table 4-12). The overall project area effect is a one percent or less decrease in carrying capacity (see Table 2-4). The decrease in carrying capacity is projected to occur because of increased road density and the loss of wintering foraging areas. Removal of old-growth forest decreases available forage and lowers the quality of goat wintering sites when snowpacks are present (Fox and Schoen 1989). Another impact to mountain goats from road construction is the potential for increased human access leading to increased legal harvest, disturbance, and illegal harvest (Quaedvlieg et al. 1973; Foster 1977; Phelps et al. 1983). The increased roads may attract more hunters to the area, although the distance from user communities, and the lack of connecting mainland roads, would continue to limit hunter interest. An additional impact to mountain goats is aircraft noise from float planes and helicopters used during the timber harvest. ADF&G (1996b) has commented that harvest in unit 29121 (172) could cause this type of impact, which would occur over a two- to four-week period.

Table 4-12

MIS Carrying Capacities (by Numbers of Individuals) in the Port Houghton/Cape Fanshaw Project Area[1]

Species	Alternative 1[2]		Alternative 2		Alternative 3		Alternative 4	
	WAA 2927	WAA 1601	WAA 2927	WAA 1601	WAA 2927	WAA 1601	WAA 2927	WAA 1601
Sitka black-tailed deer[3,4]	566	1,640	503(11)[5]	1,590(3)	560(1)	1,640(0)	493(13)	1,582(4)
Mountain goat	282	30	281(0)	28(7)	281(0)	30(0)	280(1)	28(7)
Black bear	187	91	178(5)	82(10)	187(0)	91(0)	176(6)	82(10)
Marten[6]	190	105	183(4)	100(5)	189(1)	105(0)	181(5)	99(6)
River otter	72	38	72(0)	38(0)	72(0)	38(0)	72(0)	38(0)
Bald eagle	203	93	203(0)	92(1)	203(0)	93(0)	203(0)	92(1)
Red squirrel	71,063	36,008	68,447(4)	35,073(3)	70,762(0)	36,008(0)	68,125(4)	34,812(3)
Vancouver Canada goose	127	130	124(2)	126(3)	127(0)	130(0)	123(3)	125(4)
Red-breasted sapsucker	9,322	5,673	8,856(5)	5,430(4)	9,255(1)	5,673(0)	8,774(6)	5,366(5)
Hairy woodpecker	1,603	648	1,510(6)	595(8)	1,597(0)	648(0)	1,497(7)	587(9)
Brown creeper	3,420	736	3,222(6)	675(8)	3,410(0)	736(0)	3,211(6)	668(9)

Species	Alternative 5		Alternative 6		Alternative 7	
	WAA 2927	WAA 1601	WAA 2927	WAA 1601	WAA 2927	WAA1601
Sitka black-tailed deer	540(5)	1,590(3)	544(4)	1,639(0)	510(10)	1,605(2)
Mountain goat	281(0)	28(7)	282(0)	30(0)	282(0)	29(3)
Black bear	179(4)	83(9)	182(3)	89(2)	178(5)	82(10)
Marten	186(2)	100(5)	187(2)	105(0)	184(3)	102(3)
River otter	72(0)	38(0)	72(0)	38(0)	72(0)	38(0)
Bald eagle	203(0)	92(1)	203(0)	93(0)	203(0)	92(1)
Red squirrel	69,937(2)	35,073(3)	70,242(1)	35,996(0)	68,981(3)	35,144(2)
Vancouver Canada goose	125(2)	126(3)	126(1)	130(0)	125(2)	127(2)
Red-breasted sapsucker	9,092(2)	5,430(4)	9,155(2)	5,671(0)	8,948(4)	5,457(4)
Hairy woodpecker	1,568(2)	595(8)	1,576(2)	647(0)	1,526(5)	614(5)
Brown creeper	3,353(2)	675(8)	3,376(1)	734(0)	3,264(5)	692(6)

Units close to suitable mountain goat areas include unit 381140 (18), directly north of suitable goat habitat on the North Shore of Port Houghton. This unit occurs in Alternatives 2, 3, 4, and 5. However, unit 381140 (18) is planned for helicopter logging, which would avoid increased access to suitable goat habitat. Existing Goldbelt, Inc. roads currently terminate 1.2 miles from suitable mountain goat habitat. However, with the expected Goldbelt, Inc. harvest of a recent land exchange (Interim Conveyance No. 1583 dated April 28, 1994) between the Forest Service and Goldbelt, Inc., roads planned in Easement No. 5 would be 0.75 mile from suitable mountain goat habitat.

Jamestown Peak and Dahlgren Peak are suitable mountain goat habitat areas. Road 6130 would traverse directly across (east to west) any mountain goat travel corridor (north to south) between the two peaks. Road 6130 is within 0.2 mile of suitable mountain goat habitat. This road section does not occur in Alternatives 3 and 6, but occurs in all other action alternatives. Alternatives 2, 4, 5, and 7 have similar levels of timber harvest in the area between Dahlgren and Jamestown peaks.

Suitable mountain goat habitat also occurs directly east of Sandborn Canal, south and west of Washington and Lincoln Peaks, in VCU 79, and near Saranac and Man-of-War peaks. No timber harvest or roads are near these mountain goat areas nor would access be improved for hunting, over the existing boat and floodplain access.

The existing goat carrying capacity is 282 goats in WAA 2927 and 30 goats in WAA 1601. The minimum viable goat population is estimated to be 50 goats (Suring et al. 1993). Goats are vulnerable to human disturbance and road construction that may disrupt important travel corridors needed for dispersal and reproduction. Declines in goat populations have been previously observed in areas of increased human disturbance and road construction, even when habitat loss did not occur (Quaedvlieg et al. 1973; Foster 1977; Phelps et al. 1983). Helicopters near mountain goat foraging areas are also believed to negatively effect mountain goat habitat use (Chadwick 1974). Suring et al. (1993) recommend that viable populations of mountain goat are supported through identifying winter habitat during project planning and maintaining 100 percent of the habitat capability in these areas as described by the mountain goat habitat capability model.

For discrete populations of greater than 50 animals, Suring et al. (1993) recommend that potential habitat capability is maintained to support at least 50 animals. For the proposed project, suitable habitat would be reduced by zero (Alternative 3) to 487 (Alternative 4) acres, and marginal habitat would be increased by zero (Alternative 3) to 448 (Alternative 4) acres (Appendix H). Thus, the suitable habitat that is lost is mostly altered to marginal habitat. No units or roads occur in suitable habitat under any of the alternatives; however, suitable habitat is reduced due to the use of the 2-mile road buffer in the habitat capability model that is used to account for human-induced disturbance. Within this two-mile road buffer, HSI values are reduced by 20 percent. Suitable habitat that is affected by this road buffer is primarily near Dahlgren Peak.The existing modeled carrying capacity in WAA 1601 is almost half of the recommended minimum of 50 goats needed for viable populations. However, this recommendation could also be interpreted based on the number of mountain goats known to occur in a specified area. The number of mountain goats that occur at each mountain peak or range in the project area is difficult to estimate, but if the surveys represent 50 percent of the adult population, then the known peaks that support mountain goats in the project area are likely to have at least 50 goats (Gunther 1995c), except for Dahlgren Peak. The highest number of goats observed on this peak is 22 goats (summer 1994). Assuming the 22 goats observed represent 50 percent of the total population, then 44 goats occur on this peak.

Black Bear - Carrying capacity for black bear would decrease by up to 20 bear (WAAs combined) or up to 7 percent for the action alternatives (Table 2-4). The decrease in carrying capacity and habitat value is primarily due to the loss of mature tree cover which is considered second only to food in determining the suitability of an area for black bears (Landers et al. 1979). The alternative least favorable to black bear is Alternative 4, while Alternatives 3 would have the least affect considering changes in total carrying capacity (Table 4-12). Combining the WAAs for an overall project area effect (Table 2-4) results in overall decreases in carrying capacity ranging from zero to 7 percent for the action alternatives.

Black bears typically forage near the brushy understory cover provided by open-canopy mature-to old-growth forest stands (Schwartz and Franzman 1983). Most plants preferred by bear occur in large openings, but bear do not move far from the cover provided by mature and old-growth forests when foraging. Thus, only the periphery of open areas, including clearcuts, would be used by foraging bear. Group selection and salvage areas, where a 25-50 percent cut is planned, are expected to be used by bear, and the slash remaining following cutting could provide good den sites, although slash could obstruct ambulatory movement by young black bears and prevent escape from predators.

More black bear are successfully hunted in the project area than any other big game species. In addition to subsistence hunting, recreational hunting of black bear by out-of-state hunters is of importance. Many of these tourists hunt in the project area because of its remoteness and lack of development or human presence (public scoping comments received in October 1994). Some of these tourists may be deterred from returning to the project area once timber harvest is initiated. Alternatively, other hunters who previously did not use the project area because of its lack of roads may be attracted to hunting bear in the project area once roads are constructed. The more open character of the harvest units and roads would provide better viewing opportunities of bear that forage near unit openings than would the closed canopy forest. Logging camp residents for the proposed harvest may also hunt bear.

Brown Bears - The proposed timber harvest is not located in areas where brown bears have historically been sighted; i.e. the Glenn Creek Watershed and Farragut Bay vicinity. No impacts to this species are expected.

Marten - Loss of old-growth forests from timber harvest would decrease marten carrying capacity from 0 to 6 percent in each WAA (Table 4-12). Alternative 4 would have the greatest impact and Alternative 3 would have the least impact of the action alternatives. Marten are not believed to forage or breed in the salvage or group selection areas even if only 25 percent of the area is harvested. Marten avoid conifer forests with less than a 30 percent canopy cover, and they rarely move more than 30 ft into treeless meadows (Spencer et al. 1983). Hargis and McCullough (1984) state that openings up to 440 feet may be crossed by marten if scattered islands of trees are available. Group selection areas for this timber harvest would also be expected to be crossed by marten, but they would not consider these areas suitable habitat. The overall project area effect by combining WAAs (see Table 2-4) is that marten carrying capacity decreases from less than one percent to five percent dependent on action alternative.

The increase in roads may cause an increase in trapping for marten, although most hunting of marten is within 500 feet of a shoreline that is easily accessible by boat and travel on foot. It is possible that, with the increased road density, each hunter would have the opportunity to hunt more efficiently and trap more marten. However, the road closures that are proposed under some alternatives would mitigate some of the negative effects of increased road density.

River Otter - Suitable habitat and carrying capacity for the river otter is expected to be similar to existing conditions for all action alternatives (Table 4-12 and Table 2-4). Most river otter activity occurs within 100 feet of the shoreline and all alternatives propose activities 1,000 feet or more from the shoreline, except for the LTF in Little Lagoon. River otters that use the Little Lagoon LTF site would either be lost or displaced by construction and operation of the facility. The LTF area is very small in total acreage used and is not enough to affect overall carrying capacity.

Bald Eagle - An interagency agreement (#89-010) between the USDA-FS and USFWS provides for protection of a 330-foot-radius habitat management zone around each bald eagle nest tree. The agreement also requires timing restrictions on blasting within 0.5 mile of known nests and helicopter flights within 0.25 mile of active nests. Harvest activities are planned within 330 feet of one inactive bald eagle nest at the Little Lagoon site for the proposed project. A variance has been obtained from the USFWS. Exclusive of the proposed LTF site, no units or roads are within 1,000 ft of a shoreline or estuary.

Other potential impacts to bald eagles may result from human noise and disturbance. This could occur primarily at the LTF sites since no harvest units are near existing nests. Potential disturbance from a floating or land-based camp would depend on the proximity to active nests. Recreational disturbance also disturbs eagles through: (1) altering the distribution of eagles, (2) disrupting nest-attentiveness patterns, (3) causing abandonment of breeding territories, (4) reducing productivity, and (5) affecting foraging (Knight and Skagen 1986). McGarigal et al. (1991) determined that recreational boating has the potential for significantly influencing foraging patterns of eagles. It is thus important to locate human activity away from bald eagle nests.

The habitat capability model for bald eagles shows no differences in bald eagle carrying capacities from existing conditions for Alternatives 3 and 6 (Table 4-12 and Table 2-4), while a loss in carrying capacity of one bald eagle is predicted for Alternatives 2, 4, 5, and 7 within WAA 1601 (Table 4-12). The losses of suitable habitat predicted by the model (Appendix H) occur in inland areas not known to support bald eagle nests.

Red Squirrel - The proposed timber harvest would decrease the carrying capacity for red squirrel from zero (Alternatives 3) to 4 percent (Alternative 4) within each WAA (Table 4-12). The overall project area effect is a 4 percent or less decrease in carrying capacity for all action alternatives (Table 2-4). The reduction in carrying capacity is due to the harvest of old-growth forest. The distance between remnant trees in partial-cut units, as well as the decreased cone supply may be of less habitat value than a closed canopy old-growth forest, although red squirrels would be expected to continue to use and breed in these areas.

Vancouver Canada Goose - Vancouver Canada geese nest in or near old-growth forests that are in proximity to open water. The Vancouver Canada goose habitat capability model uses the GIS soils layer and distance to water as the primary indicators of habitat suitability in the project area. For the proposed Port Houghton/Cape Fanshaw harvest, carrying capacity decreases by zero to 4 percent in each WAA with greater decreases expected in WAA 1601 (Table 4-12). The overall project area effect ranges from zero (Alternative 3) to a 4 percent decrease (Alternative 4) in carrying capacity for the action alternatives (Table 2-4).

Stream buffers generally protect geese from habitat loss. No harvest units are within 500 feet of lakes larger than or equal to 50 acres in the project area. Units are also a minimum of 200 feet from lakes smaller than 50 acres. Thus, a significant portion of goose habitat is not proposed for timber harvest in any alternative. A loss of nesting habitat would occur where roads cross streams adjacent to old-growth forest, and at forest edges near bogs, fens, and peatlands.

Red-breasted Sapsucker - Unlike hairy woodpeckers, red-breasted sapsuckers prefer low-volume old-growth forests. The habitat capability model predicts a decrease in the red-breasted sapsucker carrying capacity of zero to 6 percent for each WAA in the action alternatives (Table 4-12). The overall project area effect is a 6 percent or less decrease in carrying capacity for all action alternatives (Table 2-4).

The model has not been formulated to account for partial harvests; therefore, it predicts less habitat suitability than would occur in areas that would be only partially cut with an open-canopy forest remaining. The red-breasted sapsucker is considered an important contributor of cavity nests for animals that cannot build but do nest in cavities (secondary cavity nesters). Retaining forest structure in cut areas is of benefit to red-breasted sapsuckers because they forage in live trees and nest in trees that are either alive or recently dead (Bull et al. 1986). Thus, preservation of live trees in clearcuts, rather than snags, is of value to this species. The harvest practice of unit feathering (retaining trees near the clearcut periphery) would create open-canopy forest conditions and is of value to this species.

Hairy Woodpecker - The hairy woodpecker habitat capability model predicts loss of zero to 9 percent of the hairy woodpecker carrying capacity within each WAA (Table 4-12). The overall project area effect is a less than one percent to 9 percent decrease in carrying capacity dependent on the action alternative (Table 2-4).

Hairy woodpeckers may use partial-cut areas for foraging summer habitat, but they do not use these areas as winter habitat which the habitat capability model utilizes to predict habitat suitability for this species. Hairy woodpeckers will use scattered live or dead trees in or adjacent to clearcuts for foraging, but these trees do not provide suitable habitat during the winter months (Dickson et al. 1983). The species is not expected to use group or salvage areas as winter habitat.

Brown Creeper - Timber harvest alternatives would decrease brown creeper carrying capacity by zero to 9 percent within each WAA (Table 4-12). The overall project area effect is from less than one percent to a 7 percent decrease in carrying capacity dependent on the action alternative (Table 2-4). Impacts to the brown creeper are due to their dependence on old-growth trees for nesting and foraging. Alternative silviculture resulting in partial harvests is not expected to benefit this species (Suring 1988d), but the brown creeper would be expected to continue using those areas.

4.3.1.2. Other Wildlife

Gray Wolf - Carrying capacity for the Alexander Archipelago gray wolf for each WAA does not change under any of the action alternatives (Table 4-13). These results are difficult to interpret because too few wolves inhabit the project area. For a loss of one entire wolf to occur in a WAA, the decrease in habitat capability would need to be 25 percent. Primary wolf prey (deer, mountain goat, and moose) are predicted to have a carrying capacity decrease of 1 to 6 percent, but this decrease is not significant enough to decrease the overall wolf carrying capacity by more than one-fifth of a wolf for any WAA.

Table 4-13
Estimated Wolf Carrying Capacity (Number of Individuals) by Alternative

	Alternative						
	1	2	3	4	5	6	7
WAA 1601	5.20	5.06	5.20	5.03	5.06	5.24	5.11
WAA 2927	2.41	2.27	2.51	2.23	2.43	2.45	2.30
TOTAL	**7.61**	**7.33**	**7.71**	**7.26**	**7.49**	**7.69**	**7.41**

Source: Gunther 1998.

Timber harvest affects wolf populations by reducing the carrying capacity of its primary prey species (deer, mountain goats, and moose), and by increasing hunter access through road construction. This latter effect results in increased wolf mortality through hunting and vehicular deaths. Human-caused mortality is believed to be the most important mortality factor for wolves in Alaska (Ballard et al. 1987). The human harvest rate of Southeast Alaska wolves was estimated at 14.6 percent in 1988-89 (Morgan 1990 in Kirchoff 1993b), much of this along logging roads. Road densities proposed in the harvest alternatives range from 0.44 mile/mile^2 (Alternative 4) to zero mile/mile^2 (Alternative 3); these densities are below the critical threshold of 0.90 mile/mile^2 presented by Kirchoff (1993b) and Forest Plan standards and guidelines of 0.70 to 1.00 mile/mile^2 to sustain viable populations in areas where roads are contributing to excessive mortality of wolves. Consequently, while the proposed harvest activities and associated roading could affect wolf mortality and presence in the project area, these activities would probably not preclude wolf use of the area, especially since large tracts of the project area (e.g., Salt Chuck and Sandborn Canal) would remain unroaded. The primary factor that would affect wolves in the project area is whether hunters would use motorized vehicles to hunt the larger mammals. Over time, however, continued road construction for future sales could result in an impact on wolf presence. With such a low population in the project area (based on habitat modeling), road construction and use could affect wolf viability. Road management objectives that prescribe road closures would mitigate the effects of roads on wolves.

However, wolves can also be directly affected from timber harvest through loss of dens. One wolf den was located in the project area but no activities are planned within 1,200 ft of the den, which is consistent with the Forest Plan and should be sufficient to protect the den.

Marbled Murrelet - Marbled murrelets occur throughout the project area, and differences between the number seen and heard during terrestrial surveys at the varying harvest units could be attributed to differing weather conditions, seasonal timing, or real differences in density. Surveys on saltwater in the vicinity of the project area, indicated a distinct foraging preference by murrelets for Sandborn Canal and Port Houghton Salt Chuck.

Any harvest of old-growth timber, the preferred nesting habitat for marbled murrelets, may have an impact on the local breeding population due to loss of potential nesting habitat. Potential impacts for this proposed timber harvest have been decreased by minimizing the total harvest to between less than 1 percent to 5 percent of the entire project area and avoiding some of the large blocks of productive old-growth timber through concentrating harvest location. All proposed harvest alternatives could likely impact local murrelet populations in the vicinity of the harvest. Alternatives 3 and 6 probably have the least overall impact based on volume and distribution. Alternative 4 has the highest volume of old-growth harvest. Little or no harvest would occur in the Sandborn River watershed where, presumably, murrelet numbers are high based on water survey data in the Sandborn Canal.

Cumulative effects for marbled murrelets would be similar to northern goshawks in that populations could decline in areas where old-growth forest is harvested. Marbled murrelets may not be as sensitive to old-growth loss as goshawks because more marbled murrelets are known to occur than northern goshawks; estuaries and protected riparian areas could provide nesting areas for marbled murrelets that may not be used by northern goshawks because the latter species has considerably larger territorial requirements, and marbled murrelet use of old-growth forests may be more predictable and easier to monitor (pre-dawn surveys) than northern goshawks. However, this species is primarily dependent on old-growth forests, and any decrease in old-growth forests could result in a decrease in marbled murrelet populations.

<u>Moose</u> - Any effects to moose from timber harvest are projected to occur from human disturbance, hunting, and an increase in available forage. Studies at nearby Thomas Bay indicate that moose use clearcuts three times more heavily than old growth. Other studies have found that moose often increase several fold following fire and logging. Wintering habitat considered to be of importance to moose (forested habitat below 1,500 elevation, mid to high timber volume, and slopes of less than 75 percent [Blatt personal communication 1995]) would be impacted from timber harvest. Moose in the project area are wary and quick to move away from human disturbance. Timber harvest and road construction may increase daily movement away from harvesting activities. The presence of new roads in the project area could potentially attract more moose hunters, and the two moose per year successfully hunted historically in the project area may increase.

Alternative 3 would have the least potential effect on moose because of the amount of timber harvest proposed, the lack of road construction, and the relatively short time it would take to harvest the volume. The relative effects of the other action alternatives would be proportional to the amount of harvest and miles of road construction proposed. Alternatives that propose road closures after timber harvest would have some of the potential effects of roads, human disturbance, and hunting mitigated.

Neotropical Migratory Birds - Timber harvest and its impact on neotropical migratory birds has been recently reviewed by Thompson et al. (1995) and by others conducting these studies in forests throughout the United States (Martin and Finch 1995). Most studies concluded that neotropical migratory birds who utilize forests would not occur in clearcuts, although some species may occur in partially cut areas.

Predators associated with forest edges may also negatively impact the number of neotropical migratory birds that occur in these areas. Recommendations to minimize impacts are to preserve large areas for breeding and foraging habitats. Neotropical migratory birds that would be most impacted in the project area include the Townsend's warbler which nests in the upper limbs of old-growth trees. Other species affected would include flycatchers and thrushes.

In Southeast Alaska, there are fewer species of neotropical migratory birds that are impacted by timber harvest because there are altogether fewer forest species at higher latitudes in North America and many of the songbirds that do occur in Southeast Alaska do not necessarily migrate to the tropics. Several species are residents and other species may only migrate to the continental United States. Predation at the forest edge could occur from crows, but these birds generally occur along shoreline areas in Southeast Alaska and do not venture into interior old-growth areas. Increased predation on neotropical migratory birds is not believed to be a major effect from timber harvest.

Marine Mammals - At least 17 species of marine mammals, outside of TES species, may occur in marine waters surrounding the project area as described in Chapter 3. Direct effects are not anticipated to occur, although indirect effects may include temporary noise and barge/boat traffic related to the timber sale. Effects are expected to be insignificant, lasting for less than an hour, as a boat travels through feeding areas. None of these marine mammals are known to breed in the vicinity of the project area.

4.3.1.3. Biodiversity

Old-Growth and Fragmentation - Productive old-growth forest represents 35 percent of the Port Houghton/Cape Fanshaw project area. Depending on alternative, between 1 and 7 percent of the 88,298 acres of coniferous old-growth forest present in the project area would be impacted. Old-growth forest is naturally fragmented and interspersed among various vegetation types, particularly bogs, fens, and peatlands. The proposed action alternatives result in additional fragmentation of high-volume old-growth forests. Under these alternatives, the maximum patch size is reduced from about 56,316 acres (existing conditions) to between 38,673 (Alternative 4) and 54,977 (Alternative 6) acres (Table 4-14). There would be no reduction under Alternatives 1 and 3.

Table 4-14
Characteristics of Old-growth Forests Stands for the Port Houghton/Cape Fanshaw EIS Alternatives

Alternative	Number of Patches	Average Size (Acres)	Maximum Size (Acres)	Total Area (Acres)	Interior Area (Acres)	Percent in Patches > 100 Acres	Percent in Patches > 1,000 Acres
1[1]	108	818	56,316	88,298	50,739	98%	97%
2	279	297	50,823	82,961	43,221	97%	94%
3	113	777	56,316	87,757	49,956	98%	97%
4	310	264	38,673	81,915	42,032	97%	95%
5	246	343	52,474	84,492	45,871	97%	95%
6	153	571	54,977	87,308	49,425	98%	96%
7	247	343	51,692	84,650	45,266	97%	96%

[1]Alternative 1 is the no-action alternative and represents existing conditions.
Source: Kelley 1998.

Changes to old-growth acreages by project alternative are presented in Table 4-14. As a result of timber harvest, the number of patches would more than double under some alternatives with an average patch size of 53 percent of existing conditions. The maximum patch size would be reduced by up to 31 percent. Interior areas would be reduced by up to 17 percent. The analysis of old-growth habitat considers productive old-growth stands because productive old-growth forests contain a nearly continuous, dense, deep-crowned canopy, that is especially important to forest-dwelling wildlife species sensitive to forest disturbance and edge conditions. These species would include the Pacific-slope flycatcher, northern flying squirrel, Sitka black-tailed deer, marten, fisher, wolverine, and mountain goat.

Based on assessments of the habitat relationships of 116 bird species that occur in forested areas of Southeast Alaska, old growth is ranked as the most important breeding habitat for 41 bird species, and the most important feeding habitat for 21 bird species (Sidle 1985). Reductions in old-growth forests would thus result in loss of habitat for these species. For wildlife that are not dependent on old-growth, other habitats, including successional habitats ranging from the shrub/forb stage through young sawtimber stages, would continue to support these species (Sidle 1985; Della Sala et al. 1993). Bird species diversity within successional habitats is often less than that within old-growth habitats; however, pole-sized and riparian sapling/shrub successional stages can have greater bird species diversity than old-growth stands (Sidle 1985).

Populations of several bird species are likely to increase in successional stands following harvest because successional stands may provide preferred feeding and breeding habitat conditions. Species which would likely increase within successional stands include rufous hummingbird, winter wren, American robin, orange-crowned warbler, MacGillivary's warbler, Wilson's warbler, fox sparrow, and dark-eyed junco (Sidle 1985; Brown et al. 1993).

Under all action alternatives, 94 to 97 percent of old-growth forest would be distributed in patches greater than 1,000 acres (Figure 4-1 and Table 4-13), and provide habitat to old-growth dependent wildlife. Fragmentation of patches greater than 5,000 acres to patches between 1,000 and 5,000 acres would occur under all action alternatives (Figure 4-1). Fragmentation of large old-growth patches has the greatest potential to affect wildlife species with large home ranges (>5,000 acres) (Table 4-15) because, following harvest, fewer large patches would exist. Species with smaller home ranges would continue to find suitable habitat in the numerous small- to medium-sized patches. For animals with large home ranges, Alternative 6 maintains the most acreage in contiguous old-growth patches greater than 5,000 acres. Alternatives 2 and 4 maintain the least acreage in patches of contiguous old-growth forest in excess of 5,000 acres.

Table 4-15
Wildlife and Patch Size Relationships

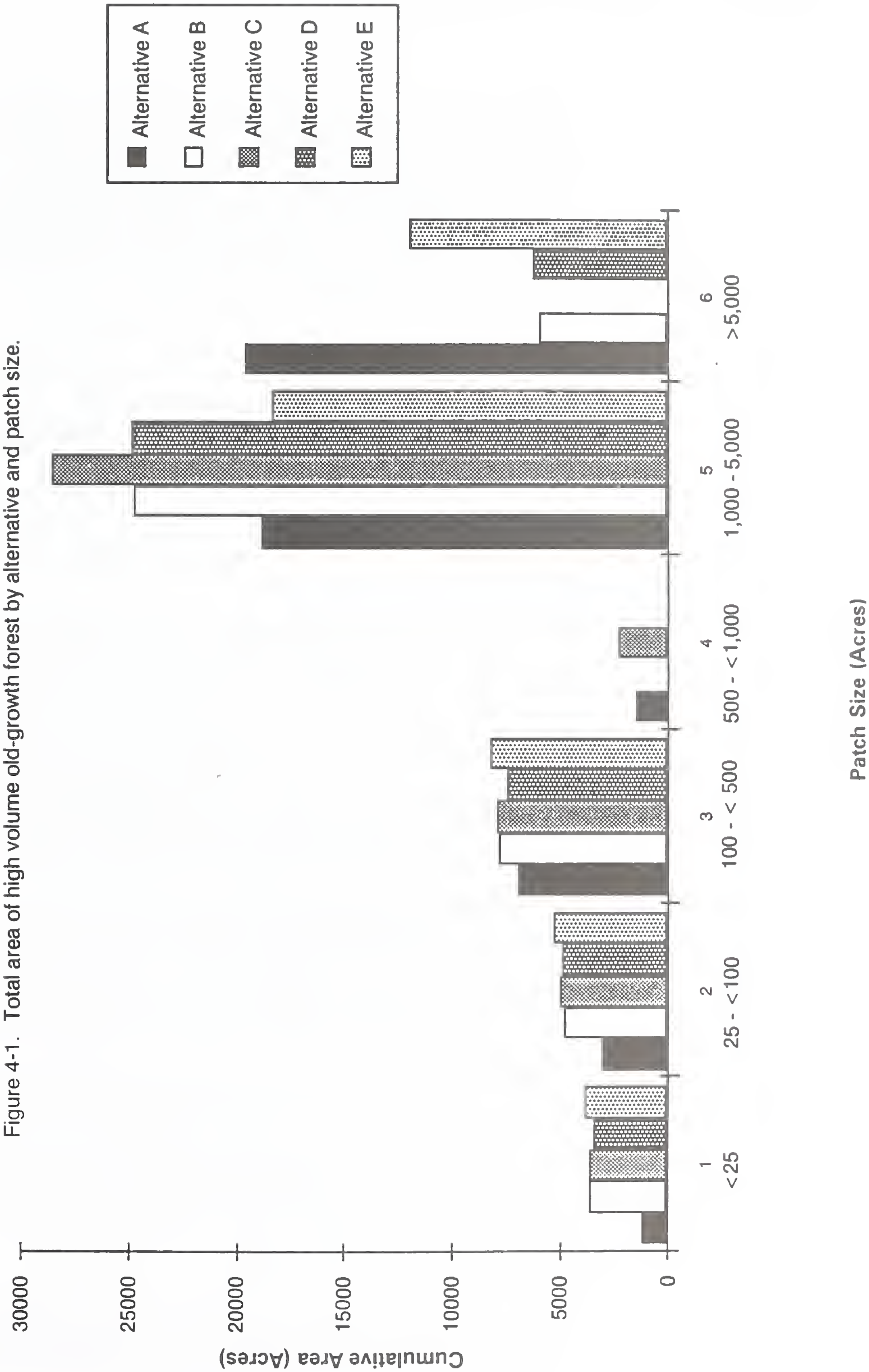
Patch Size (acres)	Wildlife that Typically Utilize Patches of Each Size[1]
0-25	Hammond's flycatcher, Pacific-slope flycatcher, Stellar's jay, chestnut-backed chickadee, brown creeper, golden-crowned kinglet, Swainson's thrush, dark-eyed junco, pine siskin, red-breasted sapsucker, beaver, voles, red squirrel
25-100	hairy woodpecker, varied thrush, ermine, weasel, northern flying squirrel, northern saw-whet owl, three-toed woodpecker
100-500	bald eagle, sharp-shinned hawk, porcupine, northern pygmy owl, red fox, Sitka black-tailed deer, red-tailed hawk
1,000-5,000	great horned owl, short eared owl, mountain goat, great blue heron, marten
5,000-10,000	northern goshawk, common raven, fisher, boreal owl, river otter
>10,000	black bear, brown bear, gray wolf, moose

[1]Based on home ranges, territories, and relative densities of terrestrial birds and mammals that use old-growth forests as primary breeding habitat (USDA-FS 1985a; Della Sala et al. 1993). Note that individual home ranges vary dependent on location, disturbance, and other on-site conditions.

Source: Kelley 1995b.

The increased fragmentation of high-volume old-growth forests results in an increase in edge habitat and a subsequent reduction in interior habitat. The amount of edge versus interior habitat is often difficult to quantify for a variety of reasons (Payne and Bryant 1994), but if edge habitat is assumed to be about a

Figure 4-1. Total area of high volume old-growth forest by alternative and patch size.



330-ft perimeter around patches, then the interior habitat of productive old-growth forests is reduced approximately 2 to 17 percent, from a total of 50,739 acres for all old-growth forests in the project area to between 42,032 and 49,956 acres, depending on action alternative. Since edge habitat may be unsuitable for old-growth-dependent wildlife species (such as goshawk, sharp-shinned hawk, and marten), the increase in edge between high-volume old-growth forests and other habitat types is likely to reduce habitat suitability for these wildlife species within smaller old-growth patches.

While the harvest and fragmentation of existing large irregular old-growth patches would occur under all action alternatives, much of the remaining old-growth patches are expected to continue to function as wildlife habitat and as corridors that facilitate the movement or dispersal of wildlife that depend on old growth. Following implementation of any alternative, productive old-growth forests would continue to be well distributed through much of the non-alpine portions of the project area. A large percentage of this forest would continue to occur in large patches greater than 1,000 acres and provide habitat for old-growth-dependent wildlife.

<u>Old-Growth Conservation Strategy</u> - The Forest Plan (USDA-FS 1997a) has identified areas of old-growth forest in the Port Houghton/Cape Fanshaw project area as part of a forest-wide old-growth habitat reserve network. This forest-wide old-growth habitat reserve network includes areas to be preserved throughout the Tongass National Forest for ecosystem diversity and wildlife viability. These areas have not been harvested or roaded, and would provide the old-growth habitat required by species sensitive to habitat fragmentation, having small populations, or requiring large areas of old-growth forest. No units or roads in any alternative occur in these old-growth forest reserves in the project area.

<u>Connectivity</u> - An aspect of the old-growth habitat reserve network is habitat connectivity between the reserves. Habitat connectivity refers to a continuous strip of older forest between each reserve so that species can readily travel among reserves. Habitat connectivity may allow the movement of some species, like northern flying squirrels, and is a desired condition of reserve design.

No timber harvest is planned in 1,000 foot beach and estuary buffers under any alternative. The Little Lagoon LTF is located between two estuaries approximately 4 miles northwest of the western shore of Sandborn Canal. This LTF would be constructed for all action alternatives except Alternative 3. Unit 332050 (33) also occurs between these two estuaries that are less than one mile apart. This unit is near the LTF site, and would be used as a rock source for all action alternatives. Noise impacts to adjacent estuaries could result from harvest and rock withdrawal within this unit.

Streamside buffers on either side of Class I, II, and III streams allow for wildlife movement along freshwater corridors in the vicinity of harvest units.

Most alpine areas would remain unaffected by the timber harvest. However, movement between some alpine areas could be affected, specifically movements between the Fanshaw Range, Dahlgren Peak, and Jamestown Peak. Alternatives 2, 4, 5, and 7 have units and roads between the Fanshaw Range, Dahlgren Peak, and Jamestown Peak that may deter some wildlife movement. Alternatives 2, 4, and 5 include RMOs that call for closing roads after the timber sales to eliminate the potential for wildlife encounters with vehicles. These measures should reduce the effect the roads may have on movement between the alpine areas.

4.3.1.4. Log Transfer Facilities and Associated Scale and Decking Yards and Camps

No unique and/or uncommon wildlife species were observed in the vicinity of the LTF site and associated facilities during field surveys. No direct impacts or loss of bald eagle nests or foraging areas are expected to occur to this species. A variance from the USFWS has been obtained for the inactive bald eagle nest within 250 ft of the Little Lagoon site. Human disturbance to the nest site near the LTF site is possible, and measures to minimize these effects are provided in the Mitigation section (Section 2.7). An MIS species expected to be displaced in the vicinity of the LTF site is the river otter whose burrows and runways were observed.

4.3.1.5. Road Construction and Closure

Road construction and use can decrease wildlife presence through: (1) loss of old-growth, (2) noise, (3) human disturbance during construction, and (4) fragmentation of old-growth forests. Roads can result in excessive hunter and trapper exploitation. Some action alternatives include provisions for road closures in specific areas to minimize road impacts on species sensitive to roads. (See Appendix C for RMOs). The construction of roads also results in wildlife species becoming more vulnerable to predation, particularly from wolves who can use roads to more silently approach their prey. The presence of roads can decrease wildlife cover, especially for big game to effectively hide from hunters and predators.

4.3.1.6. Construction and Operation Timing

No adverse effects from construction and operations are expected. Construction and human presence in roaded and harvested areas near goshawk and great blue heron nests will be avoided during the active nesting season as prescribed in the Forest Plan.

Noise affects wildlife through increasing their overall stress levels and through altogether avoidance of areas with high unpredictable noise levels. This is due to the inability to hear conspecifics and other wildlife species. For example, songbirds generally do not occur adjacent to high velocity streams because their songs cannot be heard by others. High noise levels also prevent most wildlife species from hearing prey or predator movements. Thus, the forest adjacent to harvest and LTF areas would not be expected to be utilized by wildlife during timber sale operations, resulting in a short-term negative effect. Following timber sale operations, wildlife would be expected to return to the adjacent forest and clearcut areas.

4.3.2. Cumulative Effects

Cumulative effects resulting from implementation of a Port Houghton/Cape Fanshaw action alternative and other management activities through the year 2010 were examined. Previous timber harvest has occurred on Goldbelt, Inc. lands located along the northwest shore of Port Houghton. These harvests have likely resulted in local reductions of many old-growth associated wildlife populations. However, for this analysis, it was assumed that no past timber harvest in the project area occurred that has significantly affected the biodiversity conditions in unharvested portions of the project area. This assumption is justified because the North Shore of Port Houghton is relatively isolated from the Cape Fanshaw areas by Port Houghton and by mountains, cliffs, and steep slopes that occur along the perimeter of Port Houghton.

The Forest Service has one planned harvest in the project area beyond that considered for the action alternatives discussed in this EIS up to the year 2010. This harvest, with a total timber volume of 25 MMBF, would result in an increase in the number of old-growth patches in the project area, a decrease in the average patch size and the maximum patch size, and increased fragmentation of most habitats due to roads. Wildlife habitat and associated wildlife populations within the project area may be influenced by the result of multiple management options to remove timber and conduct other development activities in the project area, and the combined or synergistic effects of habitat loss in adjacent areas. However, several important watersheds and drainages would not be entered for timber harvest. Preservation of these drainages would allow for continued wildlife use as presently occurs. These old-growth forests would help ensure viability of important old-growth wildlife species and provide a network of wildlife corridors for wildlife movement and genetic interspersion among separate populations. Figure 1-3 shows the location of old-growth forest reserves that occur in the project area under the new Forest Plan.

Current information is that Goldbelt, Inc. will have completed all practicable harvest on their private lands in a few years. Complete harvest of Goldbelt, Inc. lands has been assumed as existing conditions for all action alternatives, and therefore has already been included for all MIS habitat capability models.

The future harvests planned in the project area would affect all wildlife species associated with old-growth forest. Their populations would decrease based on territory size requirements, overall abundance, and adaptability to partial harvests. Wildlife corridors may be affected, which would decrease opportunities for genetic dispersion. Increased human activities may deter wildlife use due to noise, roads, and construction activities that could frighten wildlife from high human use areas. Most vulnerable could be isolated wildlife populations that may be sensitive to human activities and roads. For this project area, the most sensitive species would be the mountain goat.

4.4. Threatened, Endangered, and Sensitive Species

The following analysis is detailed in a Biological Evaluation prepared in compliance with requirements of the Endangered Species Act of 1973, as amended, and Forest Service TES plant and animal species policy (FSM 2670).

4.4.1. Direct and Indirect Effects

4.4.1.1. Plants

There is only one known occurrence of a TES species in the project area. This plant is a Forest Service sensitive plant, *Poa laxiflora*, known to occur in estuarine wetlands along the Sandborn Canal (Kelley 1995c). No timber harvest activities or project impacts are proposed in this estuary, or within the 1,000-ft buffer of this estuary. No other impacts would occur to TES plant species, as no other species were observed to occur in the project area in the vicinity of units or roads. No indirect or cumulative effects are expected to result to TES plants.

4.4.1.2. Fish

No threatened, endangered, or candidate fish species occur in the project area, and no effects to these species are projected.

4.4.1.3. Wildlife

<u>Peale's Peregrine Falcon</u> - Because peregrine falcons are not known to nest within the project area, the proposed timber harvest would not have any effect on this species. If the species were to occur in the project area in the future, coastal cliff areas (where this species is likely to nest) are protected within beach fringe areas, and alpine habitat (where this species may also nest) is not proposed for harvest.

<u>Trumpeter Swan</u> - Trumpeter swans may use estuaries and lakes in the project area. No timber harvest is planned in these habitats; thus, impacts to this species would not occur under any action alternative.

<u>Northern Goshawk - Impacts to the Overall Population</u> - Timber harvest could affect the goshawk population that breeds and forages in the project area. Three nests are known to occur in the project area and there are four additional locations in the project area where three or more separate goshawk sightings occurred. This suggests the presence of four or more nesting territories. In addition, it

should be understood that surveys for goshawks were largely conducted where units or roads are planned.

Timber harvest would reduce old-growth forest under each action alternative. Considering all land in the project area and remaining acres of productive old growth, the harvest would reduce the amount of productive old-growth forest to represent 60 to 64 percent of the entire project area, depending on alternative. Currently 65 percent of the project area is productive old-growth forest.

Analyses done in support of the Forest Plan conclude that there is a high likelihood of maintaining well distributed goshawk populations across the forest (USDA-FS 1997b). Because all of the alternatives are consistent with the Forest Plan, no significant adverse effects to the goshawk population are expected under any alternative.

<u>Impacts to Specific Nests</u> - Two confirmed goshawk nest sites (Cat Creek and Sandborn Canal) and one probable nest site (Negro Creek) have been located in the project area. These nests have been considered on a case-by-case basis, with a specific evaluation of the habitat in the environment of each nest. Goshawks may or may not reuse nest sites in subsequent years, although new nests usually occur within 30 acres of previous nests. No harvest units occur within 100 acres of any located nest site considering the closest 100-acres of old-growth forest (productive old growth) surrounding the nest sites.

During timber sale layout, the location of the three goshawk nest sites would be verified to ensure compliance with applicable standards and guidelines. Table 4-16 lists the closest roads and units to the three nests and the alternatives they occur in.

Impacts to other not yet located goshawk nests could occur in areas planned for harvest. Every effort will be taken to locate goshawk nests during timber sale layout, and, if located, goshawk standards and guidelines will be applied.

The overall objective to protect goshawks has been to avoid impacts in the project area considering the unit and road pool. Total productive old-growth forest would be reduced from representing 65 to 60-64 percent of the entire project area. Cumulative effects to goshawks (considering past, present, and future harvests) are that, over time, the project area would have less old-growth forest to support breeding pairs and fewer pairs would likely nest in the project area. Based on continued harvest plans, goshawk populations would likely decline in areas of timber harvest. However, the Forest Plan strategy of preserving old-growth forest in old-growth reserves and other non-development LUDs is expected to maintain population viability.

Table 4-16
Closest Units and Roads to Goshawk Nests[1]

Nest Site		Nearest Harvest	Alternatives[3]
Cat Creek Nest (confirmed)	Nearest Unit	271807 (160)[2] which is 2,140 ft from nest	2, 4, 5
		331049 (112) which is > 2 mi. from nest	6
		27107 (160) which is 3,285 ft from nest	7
	Nearest Road	6130 which is 4,225 ft from nest	2, 4, 5, 7
		8497 which is > 2 mi from nest	6
Negro Creek Nest (probable)	Nearest Unit	321008 (53) which is 2,420 ft from nest	2
		321909[4] which is 1,650 ft from nest	4
		322039 (93) which is 8,500 ft from nest	5
		332067 (57) which is > 2 mi from nest	6
		321006 (54) which is 1,860 ft from nest	7
	Nearest Road	8495 which is 1,915 ft from nest	2, 4, 7
		8498[5] which is 8,990 ft from nest	5
		84953 which is > 2 mi from nest	6
Sandburn Nest (confirmed)	Nearest Unit	333086 (111) which is 3,885 ft from nest	2, 5, 6, 7
		333093 (117) which is 2,460 ft from nest	4
	Nearest Road	8496 which is 3,845 ft from nest	2, 5, 6, 7
		8494 which is 2,540 ft	4

[1]No units or roads are within the closest 100 acres of old-growth habitat of any nest site.
[2]Salvage area.
[3]All nests are greater than 2 miles from Alternative 3 which occurs entirely on the North Shore.
[4]Group selection area.
Source: Gunther 1998.

Osprey - Osprey have not been observed in the project area. With the large population of bald eagles inhabiting the shoreline of Port Houghton, it is unlikely that osprey would migrate into the project area in the future. Thus, no impacts are projected.

4.4.1.4. Marine Mammals

Humpback Whale - The operation of LTFs could potentially impact humpback whales through disturbance. Marine mammals generally avoid LTF sites and adjacent areas due to human activity and noise during log transport. Humpback whales generally do not occur in shallow water where LTF sites are located because they require deep water to feed. Disturbances would be limited to boat or barge traffic occurring in known feeding areas such as the mouth of Sandborn Canal.

Steller Sea Lion - Steller sea lions are not known to haul out in significant numbers or breed in the project area. Nearest critical haul out sites are Sunset and Sail islands which are 9.6 miles and 8.6 miles, respectively, from the entrance to Port Houghton. More Steller sea lions would be expected to occur in the project area in the fall through spring months since they migrate to the outer coast during the summer months to breed. Hoover (1988), in her comprehensive species account on management recommendations for Steller sea lions, did not directly mention activities associated with logging as a conservation issue with this species. Two management issues, disturbance and environmental contamination, have historically arisen with proposed timber harvest activities. Disturbance concerns have focused on impacts to haulouts and rookeries, none of which occur in the project area. More likely, potential disturbance to local Steller sea lion populations in the project area may result from: (1) increased boat activity associated with log-transport in Port Houghton; (2) increased boat activity, both commercial and recreational, associated with logging camp sites; and (3) increased float plane and helicopter activity associated with the logging camp sites. However, these types of disturbance have not been shown to have long-term detrimental impacts on sea lions (Calkins and Pitcher 1982), and the harvest activity would occur when most adults are breeding on the outer coastal islands.

4.4.2. Cumulative Effects

The proposed harvest involves potential direct effects to some species but no direct effects to threatened or endangered species. The assessment of cumulative impacts are that these species could decline in the project area. However, the project area does not represent a large percentage of these species' ranges or populations and does not represent an ecologically essential portion of the species' range. In addition, the Forest Plan includes an old-growth conservation strategy that preserves a network of old growth across the Tongass National Forest to maintain wildlife population viability.

The project area does involve some species with low population numbers or reproductive capacity (northern goshawk and gray wolf). For the northern goshawk, the proposed harvest may create long-term adverse conditions by reducing available habitat. Indirect cumulative effects could occur to the humpback whale and Steller sea lion through human disturbance in marine waters which is occurring elsewhere through increased tourist, sport fishing, and commercial boating activity. Increased timber harvest, in addition to the Port Houghton/Cape Fanshaw timber sale(s), would result in less habitat available for these TES species. However, all applicable standards and guidelines for the protection of TES species would be followed for all timber sales in the project area.

4.5. Fish and Water Quality

The overall objective of this section is to identify and analyze the effects of timber harvest alternatives on fisheries and water resources in the Port Houghton/Cape Fanshaw project area. The analysis addresses potential changes in hydrology, water quality, sedimentation, and fish passage. Included are comparisons of the relative magnitudes of effects that could occur under proposed timber harvest alternatives. Quantitative analyses were conducted, where possible, to estimate potential impacts to water quality and to assess risks to beneficial uses (primarily fish habitat). Water quality standards and protected beneficial uses (e.g., the growth and propagation of fish) are determined by the State of Alaska. Analysis of effects on marine resources, including commercial fisheries, are addressed in the Marine section of this chapter.

Fisheries and water quality concerns were incorporated in the development of each timber harvest alternative. There are no timber harvest or road construction activities planned for the Rusty River and Glen Creek watersheds that drain into the Salt Chuck at the east end of Port Houghton, in part because of critical anadromous fish habitat in this area. The Sandborn River watershed was also avoided because of its importance as a highly productive salmon fishery. Throughout the project area, no roads or harvest units were planned in areas where they would likely cause landslides.

4.5.1. Direct and Indirect Effects

4.5.1.1. Hydrology

Forest practices are known to affect the magnitude and timing of stream flows. Removing vegetation by timber harvesting results in increased runoff to streams due to decreases in both rainfall interception and transpiration (Harr 1989). Rainfall interception is rain that lands on plants and evaporates before reaching the ground. Transpiration results from water uptake by plants. The reduction in interception and transpiration following logging also results in greater summer soil moisture and a consequent increase in summer low flows, that may benefit fish productivity in some streams. One Southeast Alaska study found significant increases in low flows after 35 percent of the area was clearcut in the Staney Creek watershed (Bartos 1989). Wetter soils can also result in greater peak stream flows during fall rain storms; because less water is lost to infiltration, more is available for runoff (Harr 1989).

Generally, the greater the proportion of the watershed that is logged, the greater the increase in annual water yield. There have been few studies of streamflow responses to timber harvest in Southeast Alaska. The Forest Plan suggests a threshold of concern when a watershed exceeds 20 percent of its area in second-growth forest younger than 30 years (USDA-FS 1997b, Appendix J). None of the alternatives propose this level of harvest on National Forest lands (Table 4-17). See Section 4.5.3 for a discussion of watersheds that include timber harvest on Goldbelt land.

Mid-slope roads with cutslopes and drainage ditches may contribute higher than natural flows and sediment loads to downstream anadromous fish habitat. Road crossings of dynamic or high stream power channels (e.g., alluvial fans or large, high gradient streams) present a continuous maintenance concern for as long as the structure is in place. Jones and Grant (1996) demonstrated that road construction combined with patch clearcutting ranging from 10 to 25 percent of the basin area produced significant, long-term increases in peak discharges in small and large basins in the western Cascades. The major mechanism responsible for the change in peak discharges is increased drainage efficiency due to roads rather than to changes in water storage due to vegetation storage. Changes to stream geomorphology and ecology may include more frequent inundation of the riparian zone, more rapid turnover of riparian zone vegetation, and increased transport of woody debris and sediment. However these changes are difficult to discriminate since stream channels are annually subjected to fluctuations of two orders of magnitude in peak discharges (Jones and Grant 1996). Several alternatives propose at least 10 percent timber harvest and roads in some watersheds, with the West Negro Creek watershed having the greatest percentage cut under several alternatives (Table 4-17). In addition, watersheds 311, 312, and 381 contain large portions of Goldbelt, Inc. land that have already been harvested. When added to the existing private harvest, the proposed timber harvest in these watersheds may lead to significant, long-term increases in peak flow.

Changes that may result from increased peak flows include alteration of stream geomorphology and ecology, more rapid turnover of riparian zone vegetation, and increased transport of woody debris and sediment (Grant 1996).

If harvest activities have covered enough of a given watershed to increase peak flows, corresponding increases in bed load movement are also likely to occur (WBFP 1994). If the frequency and amount of bed load movement is increased over the natural range of variation, fish habitat can be significantly affected. Using appropriate mitigation measures (BMPs) during implementation of the project would decrease the risk of adverse impacts.

Table 4-17

Areas and Percentages of Proposed Timber Harvest and Roads Per Watershed for Each Action Alternative

		Alternative 2				Alternative 3				Alternative 4			
	Total Watershed	Harvest Area		Road Area		Harvest Area		Road Area		Harvest Area		Road Area	
Watershed	Area (ac)	(ac)	(%)	(ac)	(%)	(ac)	(%)	(ac)	(%)	(ac)	(%)	(ac)	(%)
261	6,990	305	4	17	0	0	0	0	0	305	4	16	0
271	8,670	836	10	30	0	0	0	0	0	836	10	29	0
291	12,240	888	7	74	1	0	0	0	0	1,235	10	118	1
302	2,030	8	0	0	0	8	0	0	0	8	0	0	0
311[1]	4,880	376	8	41	1	251	5	0	0	376	8	17	0
312[1]	570	22	4	0	0	22	4	0	0	22	4	0	0
321	8,340	1,020	12	83	1	0	0	0	0	1,204	14	88	1
322	4,070	556	14	42	1	0	0	0	0	682	17	47	1
331	2,280	212	9	19	1	0	0	0	0	253	11	19	1
332	5,020	399	8	57	1	0	0	0	0	631	13	74	1
333	3,530	280	8	30	1	0	0	0	0	375	11	40	1
341	17,290	0	0	0	0	0	0	0	0	28	0	3	0
381[1]	4,830	269	6	0	0	269	6	0	0	269	6	0	0
398	8,340	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**89,080**	**5,171**	**6**	**393**	**0**	**550**	**1**	**0**	**0**	**6,224**	**7**	**451**	**1**

		Alternative 5				Alternative 6				Alternative 7			
	Total Watershed	Harvest Area		Road Area		Harvest Area		Road Area		Harvest Area		Road Area	
Watershed	area (ac)	(ac)	(%)	(ac)	(%)	(ac)	(%)	(ac)	(%)	(ac)	(%)	(ac)	(%)
261	6,990	305	4	17	0	0	0	0	0	117	2	17	0
271	8,670	836	10	31	0	0	0	0	0	429	5	33	0
291	12,240	888	7	74	1	19	0	0	0	660	5	84	1
302	2,030	8	0	0	0	0	0	0	0	0	0	0	0
311[1]	4,880	376	8	40	1	0	0	0	0	0	0	0	0
312[2]	570	22	4	0	0	0	0	0	0	0	0	0	0
321	8,340	573	7	37	0	0	0	0	0	774	9	68	1
322	4,070	97	2	8	0	0	0	0	0	432	11	39	1
331	2,280	0	0	0	0	40	2	1	0	220	10	19	1
332	5,020	52	1	18	0	570	11	70	1	536	11	67	1
333	3,530	280	8	33	1	322	9	39	1	322	9	39	1
341	17,290	0	0	0	0	0	0	0	0	0	0	0	0
381[3]	4,830	269	6	0	0	0	0	0	0	0	0	0	0
398	8,340	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**89,080**	**3,706**	**4**	**258**	**0**	**951**	**1**	**110**	**0**	**3,489**	**4**	**366**	**0**

[1]Total watershed area includes Goldbelt land but harvest area only reflects harvest on National Forest lands (see Cumulative Effects Section 4.5.3).

Source: Good 1998.

4.5.1.2. Water Quality

Potential effects on water quality from forest practices are generally limited to increased vegetative debris, increased sediment and turbidity, increased stream temperatures, and resulting oxygen reduction in streams. Other potential inputs that could affect water quality include fuel, oil and grease spills; effluent from sanitary facilities; and fertilizer from erosion control on forest road cutslopes.

Vegetative Debris - Timber harvest would not occur within 100 feet of any Class I or Class II stream. Class I and II stream RMA buffers established in the Forest Plan equal or exceed the 100-foot minimum buffer required by the TTRA. Forest Plan RMA buffers also include Class III streams. In addition, for Class I, II, and III streams, the area within one site-potential tree height would be managed to provide a windfirm zone for the RMA. Because of the RMA buffers and windfirm management zones, the differences between alternatives, with respect to introducing vegetative debris to streams, are considered negligible.

Stream Temperature and Dissolved Oxygen - Due to the implementation of the RMAs and windfirm management zones on Class I, II, and III streams, temperature and dissolved oxygen impacts should be minimized. All riparian areas would be buffered. For Class III streams, this will encompass the stream sideslopes up to the slope break. A windfirm management zone equal to one site-potential tree height in width would be in addition to the RMA buffer. Some timber harvest may be allowable in this windfirm zone. RMAs and windfirm management zones would retain stream shading critical to maintaining stream temperatures, and minimize the potential for oxygen depletion from small vegetative debris entering streams.

4.5.1.3. Sedimentation and Turbidity

Sedimentation is the deposition of eroded material, in this case, on the stream bottom. Sedimentation occurs naturally in Southeast Alaska, primarily through landslides induced by heavy rainfall on steep slopes with unstable soils (ADEC 1990). Timber harvesting and roads may increase erosion in several ways: (1) mass wasting (e.g., landslides) caused by road building; (2) erosion of materials exposed during road construction, use, and maintenance; (3) landslides caused by harvesting timber from steep slopes; (4) surface erosion of hillslopes disturbed during logging; and (5) disturbance of streambanks and stream channels, including bridge and culvert crossings. Depending on water velocity, sediment particles smaller than one millimeter generally are carried in suspension and contribute to turbidity (i.e., reduced clarity) of the water. Sediments are deposited on the stream bottom in areas of slow water as high flows subside.

State of Alaska water quality standards have been established for sediment and turbidity for the protection of beneficial uses, including the growth and propagation of fish, shellfish and other aquatic life. The standards prescribe that the percent accumulation of fine sediment (0.1 to 4.0 mm particle size) in the gravel beds of waters used by anadromous or resident fish for spawning may not be increased more than 5 percent by weight over natural conditions, and in no case may fine sediment in these waters exceed a maximum of 30 percent by weight. Further, turbidity shall not exceed 25 nephelometric turbidity units (NTU) over natural conditions in streams, and shall not exceed 5 NTU over natural conditions in lakes. The ADEC, at its discretion, grants short-term variances from the standards for one time, temporary activities that are nonpoint sources of water pollution.

Increased stream sedimentation is typically the greatest impact of timber harvest activities on water resources. In addition to water quality degradation, the adverse effects of excessive sediment on aquatic habitat and fish are well documented. Fine sediment can cover streambeds and fill interstitial gravel spaces, reduce interstitial dissolved oxygen, impede fish egg development, reduce fry size, impede fry emergence, cover and hide food sources, reduce plant and invertebrate productivity, slow the growth rates of fish, abrade fish gills, and cause fish avoidance of affected waters (ADEC 1990). High levels of sediment can reduce the size of pools, disrupt spawning areas, and cause hydrologic changes.

<u>Road Erosion Sediment</u> - In addition to practices designed to minimize road erosion and mass wasting, sedimentation can be reduced by limiting the delivery of eroded sediment to streams. BMPs (such as installing additional cross-drains near stream crossings to direct run-off to filter areas rather than directly into streams) would be used on a site-specific basis to minimize erosion and sedimentation from drainage control systems (BMP 14.9). Once logging is completed in a watershed, temporary roads are closed, and revegetation of cutslopes and fill slopes are complete, annual sediment yields from roads are not expected to result in detectable impacts to water quality and fisheries.

Erosion from roads is often the most significant contributor of fine-grained sediments to streams. Unlike surface erosion from exposed hillslopes where revegetation usually occurs within a few years, road surfaces can continue to produce fine sediments over the life of the road, especially when used by log trucks (WFPB 1994). However, truck traffic in the project area would be limited after the timber harvesting has been completed. The amount of sediment produced from the driving surface of a forest road is determined by the amount and type of traffic, construction materials and methods, and the design of the drainage system.

Approaches that would be used to limit sediment yield include additional monitoring, suspending log hauling during wet weather, increasing road surfacing standards and maintenance, and additional cross drains and filter windrows near stream crossings. Grass seeding and fertilizing would be implemented along all roads to increase the vegetative ground cover density on cutslopes and fillslopes thereby reducing erosion. Where road cutslopes encounter thick glacial till soils that are difficult to revegetate, structural or biotechnical slope stabilization may be effectively used to limit erosion (Gray and Leiser 1982).

Hillslope Erosion - Although road erosion has the greatest potential to generate increases in fine sediment loading to streams, sediment may also originate from hillslope erosion and mass wasting (e.g., landslides). The potential for surface erosion from hillslopes is primarily a function of soil characteristics, the steepness of the terrain, storm intensity, and the vegetation cover (WFPB 1994). Soils on steep slopes that are comprised of easily detached material are the most likely to erode when compacted, or be exposed by vegetation removal during logging. However, erosion problems from improperly conducted logging practices can also occur on more gentle slopes. Erosion caused by yarding and other activities can be a major short-term source of sedimentation (ADEC 1990).

The relative potential for hillslope erosion impacts in project area watersheds was evaluated for each action alternative by examining the areas of timber harvest proposed in areas with high potential erosion class soils (Soil Stability Class III - see Glossary). No more than 7 percent of any watershed is proposed for timber harvest on high potential erosion class soils under any alternative. With all watersheds combined, the percentage of watershed area with timber harvest proposed for high potential erosion class soils ranges from 0 to 3 percent for action alternatives. These differences between alternatives with respect to potential hillslope erosion are considered negligible.

In addition to mitigation measures and Forest Plan standards and guidelines (USDA-FS 1997a) for road erosion, the Soil and Water Conservation Handbook describes BMPs for timber management that address hillslope erosion. For example, the use of yarding systems that minimize ground disturbance (e.g., helicopter and skyline systems) in areas sensitive to erosion. Implementation of these BMPs and revegetation of disturbed areas are expected to be successful in preventing significant adverse impacts to water resources and fisheries from hillslope erosion under all of the proposed alternatives.

Mass Wasting - Mass wasting is a natural watershed process that may be accelerated by forest management activities. Shallow-rapid landslides and debris flows are two naturally occurring forms of mass wasting in the Port Houghton/Cape Fanshaw project area that affect water resources. Landslides that reach streams can introduce large volumes of soil, rock and debris. In some cases, a debris flow carries large amounts of sediment and debris downstream, scouring stream channels and streambanks along the way.

Shallow-rapid landslides commonly occur on steep slopes where soil overlies a more cohesive material. Susceptibility of an area to landslides is affected by steepness of slope, saturation of soil, and loss of root strength (WFPB 1994). Increased soil moisture and reduced root strength from logging potentially increase the occurrence of landslides. Road construction can also increase landslide frequency by oversteepening cutslopes, adding weight to high stability hazard slopes, and concentrating and directing runoff to these slopes. One evaluation of landslides in Southeast Alaska found that the frequency of landslide occurrence per unit area increased three-fold in logged areas compared to unlogged areas

(Swanston 1989). However, most of the increase is small slides that do not reach active streams (ADEC 1990). Much of the eroded material from landslides is stored on slopes, with the remainder entering steep V-notch channels for a period of time before reaching fish-bearing streams and valley bottoms (Swanston and Marion 1991).

Debris flows triggered by landslides or road washouts have the potential to deposit large volumes of sediment and debris in lower gradient, fish-bearing streams. Sedimentation and damage to fish habitat can extend several miles below the point of initiation. Where landslides and debris flows are deposited in narrow valley floors, temporary dams are often created that eventually result in dam-break floods (WFPB 1990). These extreme floods can be many times greater in peak flow than normal runoff floods and can cause extensive erosion of valley walls and channel sedimentation.

The primary mitigation for the increased risks of mass wasting is to avoid disturbance of unstable slopes, particularly Class IV slope stability hazard areas. Additional BMPs to minimize mass wasting include designing roads with balanced cuts and fills to reduce the amount of excavation and size of fills in unstable areas, full bench construction to minimize fills, end hauling of excavation material to minimize fills, control of blasting operations in landslide areas, designing drainage facilities to direct concentrated flows away from unstable slopes, minimizing clearing widths, and revegetating slopes as soon as possible.

The potential for mass wasting impacts to water resources was evaluated by comparing the area of timber harvest and road miles on Soil Hazard Class III and Class IV slopes between alternatives by watershed (as shown in Section 4.9.2) (USDA-FS 1991). The occurrence of mass wasting could significantly increase from timber harvesting or road construction on Class IV soils; however, all alternatives avoid roads in Class IV areas. Several alternatives show a small number of harvest unit acres in Class IV areas. This is due mainly to slight inaccuracies in the mapping of units and Class IV soils. Class IV soils would be avoided during the layout and harvesting phases. The probability of mass wasting is less for Class III areas, and very little risk of increased mass wasting is associated with Class I or II areas.

Timber harvest alternatives vary in the total amount of harvest and roads proposed for soil hazard Class III areas. Of the six action alternatives, Alternative 4 has the highest harvest and road acres in Class III soils (1,707 acres total). Alternative 2 has 1,528 acres, followed by Alternative 7 with 1,208 acres and Alternative 5 with 1,073 acres. Alternatives 3 and 6 have the least activities planned in Class III soils with only 121 and 341 acres, respectively (see Table 2-4).

<u>Other Sources of Sedimentation</u> - Road washouts can cause significant downstream channel erosion and sedimentation. To minimize this risk, all culverts at stream crossings would be sized using statistical flood frequency calculations, and then

cross checked in the field to confirm flood calculations are reasonable. At minimum, all culverts would be sized to pass a flood that occurs only once in 50 years.

Destabilization of streambanks resulting from harvesting trees up to the banks can be a major long-term source of erosion and sedimentation (ADEC 1990). Destabilization occurs when the living root structures that bind bank materials together decay after trees are cut. Streambank erosion resulting from harvesting trees up to the banks will not be a factor due to the designed RMAs, which are no-harvest buffers, and the additional windfirm management zones which do allow for some timber harvest.

Class I streams and Class II streams that flow directly into Class I streams require the establishment of 100-foot TTRA buffer strips along each side of the stream course. As stated above, the establishment of the Forest Plan mandated RMAs, which exceed the TTRA 100-foot minimum for many channel types, and the additional windfirm management zones would protect these streams and Class III streams. Implementation of the Forest Plan standards and guidelines for RMA and windfirm zones should also reduce the blowdown hazard. As a result, sedimentation from bank disturbance, due to blowdown, would be reduced along stream courses. The buffer strips also serve as a filter for other possible sedimentation sources that may occur.

4.5.1.4. Other Water Quality Impacts

Short-term impacts to water quality from petroleum product spills, fertilizers, or sanitary effluent are possible under any of the action alternatives during timber harvesting. Petroleum products may enter streams during equipment refueling, storage spills, or vehicle accidents. Seeding and fertilizing road cutslopes and fill slopes may allow fertilizer to enter streams. Sanitation facilities for forest workers can result in increased nutrient loading to streams. If not properly maintained, sanitation facilities can present a risk to human health from pathogenic bacteria. Under normal operating conditions, water quality impacts from petroleum spills, fertilizer and sanitary effluent are expected to be minimal, and water quality standards would not be exceeded.

The amount of activity proposed in different watersheds dictates the differences between alternatives in their potential for these other water quality impacts to occur. The watersheds with the higher levels of harvest and road acres would incur the higher risk. Table 4-17 provides the level of harvest activity for each action alternative. Alternative 4 would have the greatest risk, Alternative 3 the least.

Specific BMPs are recommended to protect against contamination of surface waters from spills of petroleum products and other hazardous substances and to properly manage sanitary facilities. Implementation of these BMPs is expected to prevent contamination of surface water resources from spills or sanitary facilities.

Should an oil spill or other hazardous substance accident occur, corrective action would be taken to minimize any damage (USDA-FS 1993e).

4.5.1.5. Fish Passage

The Forest Plan directs that fish passage be maintained, restored or improved through Class I stream crossing structures. Juvenile coho salmon were selected as the design species for Class I streams. For Class II streams, the Forest Plan directs that "the intent is to provide passage of resident fish in all Class II streams, but occasionally it is not feasible to protect short sections of habitat and passage will be restricted." Dolly Varden char, rainbow trout and/or cutthroat trout juveniles (greater than one-year old) are the design species for Class II streams.

Additional direction on Class I and II streams is provided by the Supplemental Memorandum of Understanding (SMOU) No. 1 between the ADF&G and the Forest Service, Alaska Region (March 1998) regarding fish habitat and passage. The SMOU commits the Forest Service and ADF&G to a process for Notification of Instream Activity, design review, concurrence on plans and specifications, and monitoring of instream activities.

On fish streams, culverts are appropriate for small, low-gradient streams (less than 2 percent stream gradient) that have a low risk of sediment or debris accumulation. Bridges or bottomless arch culverts should be used for larger or higher gradient fish streams where channel constriction, deposition of sediment or debris, channel scour, or stream velocity may hinder fish passage. These conditions can limit fish migration through the structure and reduce the availability of upstream habitat.

The proper use and design of culverts and bridges would effectively mitigate any potential fish passage problems at road/stream crossings. The USDA-FS Aquatic Habitat Management Handbook (under revision) contains prescriptions for fish passage at Class I and II stream crossings, and the Soil and Water Conservation Handbook BMPs specify additional criteria for the design and installation of bridges and culverts. If culverts and bridges are constructed and maintained according to these criteria, then fish passage at road/stream crossings should not be impaired.

The total number of Class I and II stream crossings proposed in the project area was compared between alternatives as an indicator of the relative potential for fish passage impediments (Table 4-18). Alternative 4 has the most crossings (62) of Class I and II streams combined. Alternatives 2 and 7 are approximately equal with 56 and 57 combined Class I and II crossings, respectively. The least impact occurs with Alternative 3 which does not include road crossings.

Table 4-18
Road Crossings by Stream Class for Each Alternative

	Total Crossings for Project Area						
Total Road Crossings	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Class I	0	19	0	23	16	12	23
Class II	0	37	0	39	15	14	34
Class III	0	80	0	79	41	9	64
Total Crossings	0	136	0	141	72	35	121
High Maintenance Crossings							
Alluvial Fans	0	1	0	1	1	0	1
High Gradient	0	17	0	17	16	3	11
Total Crossings	0	18	0	17	17	3	12

Source: Kellier 1998.

Some road crossings on highly active channel types present a maintenance concern due to the stream dynamics. Alluvial fan channels (AF) are very active, often shifting their course across the alluvial fan landform on a yearly basis. This channel shifting coupled with heavy bedload transport can produce a maintenance problem for culverts. Low-angle road dips are sometimes better suited for permanent roads crossing alluvial fans. Deeply incised high-gradient channels (HC6) are also bedload and debris transport systems. Culverts on these channels are a long-term maintenance concern for permanent roads. For these reasons, extracting the culvert after the log hauling offers better resource protection in the long term. Alternatives 2, 4, and 5 are about equal considering the number of high maintenance crossings (17-18). Alternative 3 does not have new road construction.

4.5.1.6. Riparian Management Area Impacts

Harvest unit boundaries are outside the RMAs. Windfirm management zones allow for some harvest but are designed to protect the RMA edge from windthrow. Therefore, no impacts to the riparian management area from harvest units is anticipated. However, there are road corridors through the RMAs (Table 4-19). Road corridors would remove the riparian vegetation, and fill over any riparian soils. The values reported in Table 4-19 include all riparian areas crossed by roads for all channel types.

The total road miles proposed within RMAs ranges from zero in Alternatives 1 and 3, to 15.6 miles in Alternative 4. These roads would occupy from zero to 1.5 percent of the total project area RMA.

See Section 4.9.5, Floodplains, for more information on the environmental consequences of roads in the riparian area.

Table 4-19
Roads in RMAs for the Port Houghton/Cape Fanshaw Project Area[1]

	Miles	Road Acres[2]	Percent of Total RMA in Project Area Covered by Roads.
Alt 1	0.0	0.0	0.0
Alt 2	13.0	82.9	1.3
Alt 3	0.0	0.0	0.0
Alt 4	15.6	94.5	1.5
Alt 5	7.7	46.4	0.7
Alt 6	0.6	3.7	0.1
Alt 7	9.7	59.0	0.9

[1]There are 6,171.93 RMA acres within watersheds with proposed harvest
[2]Road acres based on a road corridor of 50 feet, which is equivalent to 6.06 acres/mile.
Source: Kelliher 1998.

4.5.2. Anadromous Fish Habitat Assessment Recommendations

Tongass National Forest staff prepared a report to Congress regarding an assessment of anadromous fish habitat in the Tongass National Forest (USDA-FS 1995b). The objective of this report was to determine the effectiveness of Forest Service salmon and steelhead habitat protection on the Tongass National Forest and determine whether additional protection is needed. The recommendations of this report were for consideration in development of the Forest Plan. All recommendations that were then carried forth in the Forest Plan and apply to the Port Houghton/Cape Fanshaw project area have been included in the field work and analysis for this revised DEIS. The Forest Plan standards and guidelines meet or exceed the recommendations of the report.

4.5.3. Cumulative Effects

Disturbances within a watershed from timber harvest units and roads can be individually small, but may collectively result in larger basin-wide disturbances, or cumulative effects. In some watersheds, cumulative effects may potentially lead to increased erosion, changes in hydrology, and reduction in aquatic habitat capability. Cumulative effects in the project area watersheds were examined through the year 2010. The Port Houghton/Cape Fanshaw timber sale(s) would occur over a period of several years and be completed by 2010. One other timber sale could also occur prior to 2010. There is a low risk of these cumulative watershed effects in the project area. With the exception of Goldbelt, Inc. lands on the north side of Port Houghton, the timber harvesting and roads proposed under the alternatives described in this report would be the first significant management activities in the project area.

The highest potential risk of cumulative effects are in watersheds 311, 312, and 381. Cumulative harvest levels may exceed 20 percent. Goldbelt, Inc. has harvested approximately 15 percent of Watershed 381 (4825 acres). Additional logging of 6 percent of the drainage area is proposed under alternatives 2, 3, 4, and 5. In Watershed 311, Goldbelt, Inc. harvest is about 51 percent of the area. However, in the affected third-order Class II subwatershed of approximately 2,080 acres, existing harvest is estimated to be 230 acres (11 percent). An additional 376 acres (18 percent) is planned under alternatives 2, 4, and 5. In Alternative 3 this subwatershed would have an additional 251 acres harvest (13 percent). For Watershed 312, Goldbelt, Inc. harvest is estimated at 83 percent, an additional 4 percent is proposed in alternatives 2, 3, 4, and 5. All of the proposed harvest units in watersheds 381 and 312 would be helicopter logged.

Mitigating factors for cumulative effects associated with proposed timber harvest activities in the North Shore watersheds include:

- low road density,
- new road construction would occur on stable soils,
- helicopter harvest would minimize erosion,
- Forest Service roads would be put to bed following completion of the timber sale, and
- no future entries planned during this rotation.

A detailed watershed analysis for cumulative watershed effects in the North Shore watersheds was not undertaken because of the small size of these watersheds, steep stream courses, and barriers near sea level that limit productive fish habitat in these drainage basins (see Chapter 3 watershed descriptions).

4.6. Subsistence

4.6.1. ANILCA Section 810 Subsistence Evaluation Process

Section 810 of ANILCA requires a Federal agency, having jurisdiction over public lands in Alaska, to evaluate the potential effects of proposed land-use activities on subsistence uses and needs. Section 810 of ANILCA states:

In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such Federal agency:

- gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to Section 805;

- gives notice of, and holds, a hearing in the vicinity of the area involved; and

- determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands; (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition; and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources from such action.

Evaluation criteria used to assess the effects of the alternatives are: (1) changes in abundance or distribution of subsistence resources, (2) changes in access to subsistence resources, and (3) changes in competition from non-subsistence users for those resources. The evaluation determines whether subsistence uses within the analysis area or portions of the area may be significantly restricted by any of the proposed action alternatives. Using the information gathered from the TRUCS, comments from ANILCA 810 Subsistence Hearings, and other relevant cultural and socioeconomic sources, the Forest Service makes distinct Findings by alternative and by resource category, whether there may be a significant restriction of subsistence use. The resource categories evaluated are deer, wildlife, fish, other foods, and timber.

4.6.2. Direct and Indirect Effects

4.6.2.1. Subsistence Use Area

The portions of the project area primarily used for subsistence are saltwater and terrestrial areas near the shoreline (Boyle 1995), excepting for deer and bear where hunters have harvested these big game species up to five miles inland from the shoreline in the Farragut Bay North Arm area. The rural communities utilizing the subsistence use areas in the vicinity of Port Houghton harvest a variety of wildlife resources. The unit and road pool was initially designed to avoid most subsistence use areas. Portions of subsistence use areas that are affected primarily occur near the shoreline between Sandborn Canal and state-selected land for all alternatives.

4.6.2.2. Resources Harvested

Deer - Subsistence deer hunting areas occur in the project area, with the largest harvest areas south of Port Houghton North Arm and Salt Chuck, along the west shoreline of Fanshaw Bay, and in the vicinity of Farragut Bay North Arm (Appendix F). Communities that hunt deer for subsistence are Hobart Bay and Petersburg. Several deer harvest areas are near or within proposed units (Table 4-20). These areas include the south shoreline of Port Houghton, the northwest portion of Cape Fanshaw, the area north of Farragut Bay North Arm, and the southwestern periphery of the deer hunting area near Salt Chuck.

Table 4-20
Units Located Within Historical Subsistence Deer Harvest Areas[1]

Unit	Acres Affected by Alternative					
	2	3	4	5	6	7
29127N (166)			6.4			6.4
29127S (166)			59.9			59.9
29130 (177)			56.5			
321006 (54)			38.5			28.4
321007 (59)			25.9			15.8
321008 (53)	13.5		13.5			13.5
321024 (128)	2.3		2.3	2.3		2.3
321026 (141)	62.5		62.5	62.5		62.6
321027 (140)	1.5		1.5	1.5		
321028E (147)	19.5		19.5	19.5		19.5
321028W (147)	24.5		24.5	24.5		24.6
321030 (157)	87.8		87.8	87.8		58.6
321908 (321)			0.1			
321909 (321)			2.2			
322031 (55)			1.1			
322910 (322)			13.4			
332050 (33)	4.5		4.5	4.5	4.5	4.5
332051 (35)			12.6			
332052 (41)			12.6		12.6	
332053 (37)			1.5		1.5	1.5
332067 (57)	5.3		5.3		5.3	5.3
TOTAL	**221.4**	**0**	**452.1**	**202.6**	**23.9**	**302.9**

[1]Total unit acreage is shown although, for some units, less than the entire unit is within a deer subsistence use area. Units with less than 5 acres within a subsistence use area are not shown above but include Units 321015 (85), 321024 (128), 312027 (140), 332053 (37), 333067 (57). In addition, portions of 321 and 322 group selection areas are in deer subsistence use areas.
Source: Gunther 1998.

Access. Deer hunters generally access the project area via boat travel and hunt generally within 3 miles of the shoreline. Travel to the high-elevation hunting areas occurs southeast of Port Houghton Salt Chuck through use of float planes to Glory and Farragut Lakes. These modes of access would remain available following implementation of all alternatives, and additional access to some interior historical use areas would occur for the action alternatives through road construction. Additional access would primarily occur at the south shoreline of Port Houghton through the development of an LTF site and road construction. The Little Lagoon LTF site and associated road would allow for more efficient access into the subsistence use area associated with the south shoreline of Port Houghton.

Competition. It is unlikely that the increased roads in the project area would attract more sports hunters to the area because hunting success has been historically low in the project area (Gunther 1995a), and deer mainland populations are typically lower than island populations due to the increased winter snow levels. The effort needed to travel to the project area coupled with the low probability of a successful hunt are expected to continue to deter hunters from utilizing the area outside of hunters from a logging camp. Fay and Thomas (1986) state that, when deer populations are high near a community, most of the community deer harvest occurs within 30 miles of that community. Fewer hunters engage in deer hunting when they must travel greater distances. The number of active deer hunters declines where deer are not locally abundant. However, it is possible, that with a future decline in the number of deer near communities, outlying rural areas, such as the Port Houghton/Cape Fanshaw project area, may become increasingly used for hunting. This additional use beyond the expected increase in hunting over time would increase competition. Effects would be expected to be similar for all alternatives.

All communities reporting deer harvest are considered rural. There have been no reports of deer being harvested by residents from nonrural communities. Thus, there is no comparison provided of rural versus nonrural deer harvest. Increased hunting could occur by residents of the logging camp for this harvest. However, based on the few deer observed in the project area during field investigation and the lack of personal refrigeration, few hunters from the logging camp are expected to utilize the project as a subsistence deer area.

Deer Abundance or Distribution. A total of 24 deer were reported harvested in the project area from 1987 to 1996 with an annual average harvest of three deer (Boyle 1995). Fourteen of these deer were harvested by Hobart Bay residents. The deer population needed to support deer harvest is the number of deer harvested multiplied by 10 which assumes a 10 percent sustainable harvest of the deer population (Flynn and Suring 1989). Three deer harvested each year multiplied by 10 is 30 deer needed for annual sustainable harvest in the project area. Personnel from the logging camp for the proposed project would be expected to also harvest deer. The amount of harvest would be expected to be similar to the Hobart Bay logging camp. This could increase the number of deer needed to support the harvest to a total of 60 deer (assuming a 10 percent sustainable harvest). In addition, if current demand is increased by up to 2 percent per year for the next 40 years following harvest, the annual demand would be 19.5 deer multiplied by 10 equals 198 deer, which is 9 percent of the existing deer habitat capability (2,206 deer) in the project area.

Implementation of the action alternatives would result in a loss of 1 to 13 percent (2,206 deer decreased to an average of 2,133 deer) of the deer habitat capability within a WAA for the project area (Gunther 1995c). Only one of the action alternatives would result in a decrease of the habitat capability to less than 500 deer in any WAA, the minimum number that the ADF&G believes is needed in a WAA to maintain a viable population (ADF&G 1992). Alternative 4 would result in a habitat capability for 493 deer in WAA 2927 (the greatest decrease for any action alternative), which is slightly below the minimum number recommended.

The amount and success of hunting by the logging crew for this proposed timber harvest would be expected to be similar to historical harvests by the Hobart Bay logging crew, although hunting areas may be different. Residents of the logging camp would be expected to additionally harvest deer in the interior areas once roads are constructed, rather than only in the historical subsistence areas. Because of the new roads in the project area, deer harvest impacts may be spread out over a greater area than has historically occurred in the subsistence use areas located primarily near the shoreline. However, the lack of transportation for motorized land vehicles to the project area may limit the use of roads to hiking.

Summary of Findings for Deer. None of the action alternatives directly or indirectly are likely to cause a significant possibility of a significant restriction of subsistence use of Sitka black-tailed deer by the residents of the communities that harvest deer from the project area.

Salmon, Finfish, and Shellfish. Salmon, other finfish (including halibut, herring, cod, rockfish, eulachon, and trout), and shellfish account for 45 percent of all subsistence resources harvested in Southeast Alaska (Kruse and Muth 1990). Harvest of these resources occurs in similar saltwater locations surrounding the project area (Boyle 1995). Impacts from timber harvest to subsistence harvesting of these resources are expected to be similar, and therefore these resources are treated together.

The activities associated with the timber harvest may result in impacts on subsistence resource harvesting of fish and shellfish. These activities include construction and use of LTFs and maintaining a logging camp, as well as road construction and operation. The type of impacts that could result are primarily related to reduction of fish productivity or fish habitat. Each type of impact is discussed below.

Access. Salmon, finfish, and shellfish harvest in the project area occurs from boats in saltwater. Access to these areas would not be restricted through implementation of any of the alternatives. The proposed Little Lagoon LTF site is not located in an areas normally utilized for salmon, finfish, or shellfish harvesting. The small area occupied an LTF site (less than one acre) is not considered a significant restriction to subsistence resource harvesting.

Increased access to freshwater areas for fisheries harvest would occur through road construction. However, no subsistence salmon, finfish, or shellfish harvest has historically occurred in any inland area, except directly north of Farragut Bay North Arm. No roads are planned in this area. Thus, new access from road construction would not affect historical salmon, finfish, or shellfish harvest areas.

Competition. Under the no-action alternative (Alternative 1), subsistence harvest in the area could decline if the Hobart Bay logging camp (a logging camp that conducts subsistence harvest in the project area) closes in a few years when the existing forested areas of this private land holding are harvested. With the closure of this community; salmon, finfish, and shellfish harvesting may be confined to the areas west of Fanshaw Bay and south of Farragut Bay North Arm. However, recently Goldbelt, Inc. has requested additional land exchange areas from the Forest Service. If this requested exchange is granted, the logging community may remain in the area.

Increased competition for fish resources is not expected. The proposed timber harvest is not expected to draw more members of the user communities that currently harvest fish both recreationally and commercially in the project area mostly because of the distance between the project area and user communities. Fish harvesting by residents of the logging community for this harvest is likely to occur. The amount of harvest would be expected to be similar to that ongoing with the Hobart Bay logging camp. Based on the amount of salmon present in the project area, the harvest of salmon by residents of the logging camp is not expected to affect the total numbers of fish present or result in changes in the amount of catch from the historical users of the project area. Commercial fisheries harvest also occurs in the project area. There have been no historical remarks that the commercial fisheries harvest has affected subsistence fish harvest or vice versa. Competition among subsistence and commercial uses is not anticipated in the future, primarily because of the low level of subsistence use in the project area.

Fish Abundance or Distribution. Distributional changes and number of fish expected in the saltwater areas surrounding the project area following timber harvest can only be inferred through evaluation of several types of impacts that would occur to fish habitat and water quality. Salmon abundance in marine waters is predominantly dependent on seven factors: (1) number of salmon successfully hatched and reared in freshwater; (2) salmon survival at sea; (3) hatchery releases and their survival at sea; (4) fish harvest regulations; (5) weather; (6) number of fishers; and (7) successful returns to freshwater spawning habitats. In addition, the subarctic boundary current has a substantial influence on overall productivity in Southeast Alaska. Presently, there is a favorable current that typically has a cycle of 20-30 years. It is believed that the peak of this favorable current occurred in 1990, and that decreases in salmon and steelhead productivity could occur over the next 10-20 years (USDA-FS 1995b).

The proposed harvest could potentially affect salmon populations in saltwater areas by altering the number of salmon successfully hatched and reared in freshwater in the project area and, to a lesser degree, salmon survival at sea. The distributional changes and number of salmon expected to occur in the project area prior to, during, and following timber harvest can only be inferred through evaluation of the impacts to fish habitat and water quality. No method has yet been developed that can universally quantify the effects of hydrology and water quality changes in freshwater streams on the number of salmon successfully hatched and reared. Each alternative has the potential for adverse impacts to fisheries populations through degradation in fisheries habitat. The major effects are predicted to occur from sedimentation originating from roads. In addition, timber harvest planned in the watersheds of important anadromous fish streams with high fish escapement would likely affect more fish than harvest planned in areas having naturally lower fish escapement. Other impacts that may affect fisheries resources are increases in the frequency, duration, and volume of peak flows; amount of stream miles exposed to sunlight; turbidity; and increased water temperature.

Salmon survival at sea could potentially be affected by timber harvest either through water quality impacts or human disturbance which would be short-term and occurring at the time of timber harvest. All sediment generated from timber harvest and road construction that reaches stream courses could potentially reach saltwater. The extent and timing of sediment reaching saltwater is dependent on channel debris, water velocity, peak flow events, gradient, and other forces. The erosional environment at the mouths of streams and ocean currents where sediments are entering saltwater would determine the extent of sediment movement in saltwater. Although it may be impossible to determine the location and timing of sediment entering saltwater, locations receiving greater sediment loads can be described. The most significant impacts to the saltwater environment would occur at the mouths of streams and decreasing in distance from these areas. Estuaries with minimal gradients and low stream velocity that are protected from ocean currents would be more likely to experience sediment impacts compared to exposed shorelines with strong ocean currents. The majority of sediment deposition would occur in shallower slow-moving saltwater areas.

Noise and other human disturbances in the saltwater subsistence harvest areas would be short-term, occurring during construction and harvest, and would primarily affect the daily location of salmon within these areas.

Of the five fishing areas currently used for subsistence harvesting, one area (Salt Chuck) is distant from the proposed harvest for all action alternatives, and therefore would not be impacted by the proposed harvest. The four remaining areas are Fanshaw Bay, Port Houghton North Shore, North Arm Farragut Bay, and Sandborn Canal (Appendix F). The Sandborn Canal subsistence area for salmon, finfish, and shellfish is at the mouth of this canal distant from the Sandborn Canal estuary where freshwater initially comes within contact of saltwater. Thus, sedimentation effects to this subsistence area would more likely occur from adjacent streams that drain directly into Port Houghton, west of the subsistence use area. Shellfish and bottomfish could be displaced and avoid the area if sediments are transported into this area. As the sediments settle, shellfish and bottomfish would recolonize the area. Generally, the more distant the fishing area is from the source of sedimentation in saltwater, the more likely that the ocean currents would disperse sediments to a wider area with less impacts to a specific area. From present knowledge, there is no documentation of shellfish or bottomfish populations being adversely effected by sediments levels expected from timber harvest that would indicate that there is a significant possibility of a significant restriction on these resources.

If fishing success declines in the Sandborn Canal subsistence use area, fishers would be expected to continue to fish in other areas of Port Houghton. Differences among alternatives are not expected because the Little Lagoon LTF site is about one mile west of this subsistence use area. Thus, roads that contribute sedimentation into Port Houghton near the Little Lagoon LTF site would be used for all action alternatives. Presently, the Hobart Bay logging camp is the only known subsistence user of this subsistence area.

Alteration of fish abundance along the North Shore of Port Houghton (an additional subsistence harvesting area used by the Hobart Bay logging camp) is difficult to predict due to the existing harvest of Goldbelt, Inc. lands in this area. The proposed cutting for this project in the North Shore area (675 acres for Alternative 2, 550 acres for Alternative 3, and 675 acres for alternatives 4 and 5) represents an approximate 20 percent additional increase in timber harvest to the 3,842 acres of Goldbelt, Inc. land holdings which are currently being harvested in this area. Alternatives 2, 3, 4, and 5 could potentially increase sedimentation impacts to this fish harvesting area which is already impacted by Goldbelt, Inc. harvesting.

Most of the area used for fish harvesting near Fanshaw Bay occurs immediately west of the Cape Fanshaw shoreline. The shoreline portion of Fanshaw Bay has been identified as Alaska State-selected land, and no timber harvest is planned in this area. From present knowledge, there is no evidence that anticipated levels of sedimentation under any action alternative would cause a significant possibility of a significant restriction on subsistence use of fish resources in marine water.

Summary of Findings for Salmon, Finfish, and Shellfish. None of the action alternatives would affect access or competition among subsistence users for salmon and finfish harvest. Changes in abundance or distribution of salmon or finfish as a result of the proposed timber harvest is not expected to cause a significant possibility of a significant restriction on subsistence use.

<u>Waterfowl</u> - Petersburg is the only community historically known to hunt waterfowl in the project area, and residents state a preference for hunting waterfowl closer to home (Boyle 1995).

Access and Competition. Waterfowl are hunted in the Sandborn Canal, Salt Chuck, and Farragut Bay North Arm. Access to these areas would not be restricted by timber harvest. The presence of logging personnel for the proposed harvest who are residents of rural communities could result in increased subsistence harvest of waterfowl in historical waterfowl hunting areas. Human disturbance may also occur. However, logging would be expected to occur only during the months of May to October, and hunting pressure would only occur in the early fall months of September and October because most waterfowl depart the area during the summer months. Competition with Petersburg residents is not expected as hunting is at low levels (Boyle 1995).

Waterfowl Abundance or Distribution. Waterfowl hunting in the Salt Chuck and Sandborn Canal would not be affected by timber harvest. Subsistence harvest of waterfowl by Petersburg residents would not be considered to be restricted due to the expected continued presence of waterfowl within the Sandborn Canal and the low level of waterfowl harvest by Petersburg residents.

Summary of Findings for Waterfowl - Action alternatives are not expected to cause a significant possibility of a significant restriction of subsistence use of waterfowl by the communities that harvest waterfowl.

Harbor Seals - No restrictions on harbor seal harvest or changes in harbor seal populations are expected under any of the proposed alternatives. Fanshaw Bay is the only reported harvest area in the project area (Cohen 1989), and no timber harvest, road construction, or LTF construction would occur along the shoreline (Alaska State-selected land) of this bay, or any other area immediately adjacent to Cape Fanshaw under any alternative.

Summary of Findings for Harbor Seal. None of the action alternatives would affect access, competition or abundance and distribution of harbor seals in the areas used for subsistence hunting of harbor seals. There is not a significant possibility of a significant restriction of subsistence use of harbor seals in the project area.

Furbearers - **Access**. Trapping areas are generally accessed by boat. Access is not expected to increase from road development because preferred trapping areas are close to the shoreline. Access would remain available for furbearer trapping through implementation of all action alternatives.

Competition. The no-action alternative may result in a decrease in marten trapping if the Hobart Bay logging camp is no longer present after 1998. The camp previously harvested five marten on the North Shore of Port Houghton in 1991. Increased trapping could occur by the logging camp that would harvest timber for this project. Due to the low numbers of furbearers trapped historically, competition is not expected to increase.

Communities that have historically harvested marten include Petersburg, Wrangell, Hobart Bay, Petersburg, and Juneau. This latter community is nonrural, whereas all other communities are rural. Only one marten was trapped by a Juneau resident in 1991. Competition between rural and nonrural users is not believed to occur for marten.

Furbearer Abundance and Distribution. Historical subsistence furbearer trapping areas are provided in Appendix F. Most of the suitable habitat for marten and river otter in the project area occurs along the shorelines of both saltwater and freshwater, with the river otter habitat occurring primarily in shoreline areas (Gunther 1995a). No timber harvest or road construction is proposed within the 1,000 feet of beach and estuary fringe, and 100 feet of Class I and II stream buffers, excepting for LTF sites. Under the action alternatives, LTF and road associated construction would occur in beach fringe areas. Acres disturbed for LTF construction at Little Lagoon would be up to a maximum of 56 acres. This areas is considered suitable habitat for marten and river otter. All action alternatives on the south shore of Port Houghton would utilize the Little Lagoon LTF.

Of the 38,062 acres of suitable marten habitat in the project area, the loss of up to 56 acres (0.002 percent of the suitable habitat in the project area) for LTF construction would not affect overall density and distribution of marten for any action alternative.

Other historical furbearer trapping areas include the Port Houghton North Shore. Harvest units bordering these areas include units 381199 (5) and 381140 (18). Less than five acres of these units occur within subsistence furbearer trapping areas. This small amount of harvest in this historical use area should not effect the overall marten or river otter density in this portion of the project area.

The south and southwest shoreline of Port Houghton is also a historical use area. Up to 40 unit acres would be harvested in this historical use area by Alternative 4, 22 acres for Alternative 6, and the other action alternatives have no units affecting more than 6 acres of subsistence use areas (Table 4-21). Group selection areas also occur in this portion of the project area. A 25 percent harvest is planned in these areas with additional harvests planned over the next 120 years. Significant restrictions on subsistence harvesting as a result of harvest in this area are not expected to occur.

The action alternatives would alter the overall carrying capacity of 295 marten to 280-292 marten dependent on action alternative, a reduction of about 5 percent. The reduction of marten would decrease trapper success in that portion of the project area where harvest is planned. The number of animals trapped has never been reported as more than 10 animals annually from 1988 to 1993 (Paul 1995), and has typically been five or less marten. Considering harvest over eight years, the annual harvest averages six marten. The population needed to support six marten is 15 marten considering a 40 percent sustainable marten harvest (Flynn 1992).

Table 4-21
Unit Acres Located Near the South and Southwest Shoreline of Port Houghton Where Historical Furbearer Trapping has Occurred[1]

	Alternative					
Unit	2	3	4	5	6	7
332050 (33)	4.5		4.5	4.5	4.5	4.5
332051 (35)			12.6			
332052 (41)			5.9		5.9	
332053 (37)			4.2		4.2	4.2
332054 (36)			3.1		3.1	3.1
381139 (19)	4.6	4.6	4.6	4.6		
381140 (18)	4.7	4.7	4.7	4.7		
TOTAL	**13.8**	**9.3**	**39.6**	**13.8**	**17.7**	**11.8**

[1]Unit 332063 (44) has less than 5 acres in furbearer subsistence use areas. Portions of group selection areas (321, 322 and 332) are also within subsistence use trapping areas.
Source: Gunther 1998.

Considering a 2 percent harvest per year increase over the next 40 years following harvest, the total number of marten needed to support subsistence harvest would be 34 marten. There should be no concern that timber harvest would result in a significant possibility of a significant restriction of subsistence marten harvest.

The river otter carrying capacity of 97 river otters would not be altered by the action alternatives (Gunther 1995c). Because no one has ever reported harvesting river otter in the project area, no restrictions of subsistence use would occur.

Summary of Findings for Furbearers. None of the action alternatives would create a significant possibility of a significant restriction of subsistence use of furbearers by the residents for any of the communities that harvest furbearers through the reasonably foreseeable future.

<u>Moose</u> - Moose are a subsistence resource, although the TRUCS review did not include moose in the analysis. Moose hunting has occurred in the project area and effects to this resource in consideration of the potential for subsistence use is described below.

Access. Road construction in the project area could increase subsistence harvest of moose by facilitating access to freshwater riparian areas where moose primarily occur. No restriction in access due to timber harvest is projected.

Competition. The total number of moose successfully hunted in the project area is two moose per year by the communities of Hobart Bay and Petersburg. It is possible that road construction could attract new moose hunters to the project area that have not previously hunted in the area before. If the Hobart Bay logging community closes in 1998, then the number of moose hunters may decrease, but this may be offset by new hunters from the logging camp for this project. Although no habitat capability model has been developed for moose, it is believed that they are common in the project area. The field crew during 1994 saw considerable moose tracks but few, if any, moose during ambulatory surveys because of their quick response to depart the area upon the sound of humans. It is believed that there are too few moose in the project area at this time to attract more hunters and increased competition.

Moose Abundance and Distribution. Moose prefer willow and cottonwood habitats which generally do not occur in the project area. Other areas used by moose are old-growth forests within 300 feet of saltwater and large river areas. Beach fringe in the project area is within 1,000 feet of the shoreline and would not be harvested for any action alternative. No major rivers occur in the project area. Some harvesting would occur in the larger streams of the project area which include Cat Creek and Negro Creek. Alternative 6 would have the least amount of harvesting in these areas (40 acres) than the remaining action alternatives (535 acres to 1843 acres). However, a minimum of 100 feet of old growth habitat in Class I and II stream buffers would be protected for all action alternatives.

Moose also prefer south-facing slopes within the 500 to 1,000 feet. elevation level. South-facing slopes occur primarily in the southern portion of the project area near Cape Fanshaw, in the southeast drainage of Sandborn Canal, and along the northeast shoreline of the North Shore of Port Houghton. These areas are not planned for timber harvest. The action alternatives would result in the increased production of deciduous foliage in harvested areas due to increased sunlight. These conditions would occur up until secondary succession closes the forest canopy. Subsequently, foliage production would decrease. Food resources for moose would increase in the short term with more foliage produced, but would return to existing conditions or less than existing conditions when the overstory matures dependent on the amount of shade produced.

Summary of Findings for Moose. Considering the present low levels of moose harvest (two per year), the negligible loss of habitat, and the increase of foliage production following timber harvest which results in more favorable moose habitat; subsistence harvest of moose is not expected to be altered by the action alternatives. Implementation of the no-action alternative (Alternative 1) would also show no change or a decrease in subsistence hunting of moose. There is not a significant possibility of a significant restriction of subsistence moose hunting in the project area.

Mountain Goat - Mountain goat are a subsistence resource in the project area only for the communities of Haines, Klukwan, and Hoonah (Federal Subsistence Board 1996). Because none of these communities have harvested mountain goat from the project area, there will be no effect on subsistence use.

Summary of Findings for Mountain Goats. None of the action alternatives would create a significant possibility of a significant restriction of subsistence use of mountain goats by the residents of the communities for which mountain goats are considered a subsistence resource.

Black Bear - Black bear are hunted by both subsistence and sports hunters. Since 1986, 73 percent of the known harvest in the project area is by nonresidents that use a guide to hunt bear (Paul 1995). The remaining hunters are residents of Juneau (4 bear successfully hunted since 1986), Petersburg (2 bear), Hobart Bay (3 bear) and other non Southeast Alaska communities (2 bear). If the residents of rural Southeast Alaska that hunted bear in the project area considered their hunt a subsistence harvest, then this harvest would represent 12.5 percent (5 bears) of the entire bear harvest in the project area since 1986.

Access. Historical access to the project area for hunting bear for both subsistence and sports hunting includes boats and float planes followed by hiking into the forests and riparian areas where bears occur. These access routes would remain viable. Additional access to bear would be through roads, although historical subsistence areas do not occur in areas planned for extensive roading. However, new access could open up new areas for subsistence bear harvest.

Competition. Subsistence bear harvest from rural communities averages up to two bear per year (Boyle 1995). Annual nonsubsistence harvest is four bear. A carrying capacity of 278 black bear following implementation of any of the action alternatives is believed to be able to support a total annual harvest level of up to six bear including both subsistence and nonsubsistence hunters. Competition among rural subsistence and nonrural sports hunting is not expected to result from a decrease in the carrying capacity of 20-25 bear expected from the action alternatives. Even if sports hunting of bear increases as a result of road construction, the low bear harvest relative to the carrying capacity is not expected to decrease hunting success. Crew from the logging camp for the proposed harvest may also hunt bear, although the lack of personal refrigeration would likely limit interest. However, the new roads could attract new hunters to the area with similar impacts as described for deer.

Bear Abundance and Distribution. The no-action alternative (Alternative 1) would maintain the present status of subsistence use of black bear. Subsistence use could possibly diminish in the project area if the Hobart Bay logging camp closes, although camp residents have historically killed only one bear per year in a relatively small portion of the project area.

The carrying capacity of black bear is expected to decrease by 3 to 6 percent for all action alternatives in WAA 2927, and 2 to 10 percent in the carrying capacity for WAA 1601 (Table 4-12). For existing conditions, the carrying capacity is 278 bear which would decrease to 258 to 271 bear (combining WAAs) for all action alternatives (Table 2-4) (Gunther 1995c). The decrease in bear population in the Chatham Area would primarily occur outside the areas used for subsistence for alternatives 2, 3, 5, 6 and 7. Thus, bear abundance in the subsistence areas for these five alternatives would not be altered.

Harvest for Alternative 4 includes one area that has previously been used to hunt bear: North Fanshaw (Appendix F) (Boyle 1995). Group selection harvest is proposed for the low lying areas in North Fanshaw where bear hunting is reported, but would not substantially reduce habitat in this area. In these group selection units, approximately 25 percent of the unit acres would be harvested in patches of two acres or less in size, and yarded with a helicopter, minimizing road construction and human disturbance in this area. Bear movement and population density is not expected to be altered in these group selection cuts. Several studies have shown that, although black bear prefer a diversity of vegetation communities, with early successional stages providing good foraging sites, they will not forage far from cover provided by mature to old-growth forest stands (Erickson 1965; McCollum 1973; Barber 1983; Schwartz and Franzmann 1983). Females have been reported to forage not more than 330 feet from forested cover (Herrero 1978; Rogers 1977). The 2-acre patch cuts proposed for group selection areas should provide preferred habitat for black bears. Under Alternative 4, no timber harvest or road construction is proposed for any other subsistence bear hunting area. In summary, bear density is not expected to be substantially altered for this alternative in areas used for subsistence.

An additional effect of harvest on black bears is bear/human interactions and conflicts that predominantly occur in logging camps. Without mitigation practices, bears could be attracted to logging camp areas and consequently destroyed by logging personnel. The use of floating camp facilities can reduce the likelihood of conflict. Sanitary waste disposal is critical in both land based and floating logging camp facilities to minimize human/bear interaction. Additionally, human/bear interactions during timber harvest could result in negative encounters and the subsequent loss of bears.

Summary of Findings for Bear. None of the action alternatives would create a significant possibility of a significant restriction of subsistence use of bear by the residents of any of the communities that harvest bear for subsistence through the reasonably foreseeable future assuming that black bear harvest is monitored and regulated to prevent over harvesting.

4.6.2.3. Community Effects

Petersburg/Kupreanof - Petersburg/Kupreanof residents report accessing subsistence harvest areas in the project area by boat and floodplain. None of these transportation means would be affected by the proposed action alternatives, although roads would facilitate entry into the project area interior. Competition with logging camp personnel is not expected to occur for subsistence resources, primarily due to the current low harvest levels in the project area.

Wrangell - Based on the low subsistence use of the project area by Wrangell residents, none of the action alternatives are expected to restrict use of subsistence resources by these residents. Some subsistence use areas may have slightly decreased populations of subsistence resources from implementation of the action alternatives, although this change is not expected to significantly alter subsistence resources. Wrangell residents have also reported trapping furbearers on the south shore of Port Houghton where slight declines in marten populations are expected to occur following timber harvest for the action alternatives.

Kake - None of the action alternatives would substantially restrict the use of subsistence resources by Kake residents. Kake residents report harvesting only deer from the project area (Kruse and Frazier 1988), with no harvest between 1987-1992 (ADF&G 1992b).

Hobart Bay - Based on known existing land exchanges between Goldbelt, Inc. (the Native-owned corporation that manages the Hobart Bay logging camp and owns the private land where timber harvest is presently occurring in the project area) and the Forest Service, the Hobart Bay logging camp is scheduled to close by the end of 1997 (Dwyer, personal communication, 1994). Goldbelt, Inc. has recently requested an additional land exchange with the U.S. Forest Service. If this land exchange occurs, then the camp is likely to remain open beyond 1998.

The Hobart Bay land-based logging camp is located on the mainland directly north of Port Houghton. Residents conduct subsistence hunting and harvesting on Forest Service lands. Most hunting access initiated is by boat since almost all motor vehicles are company owned. However, few employees have boats at logging camps, and gas is an expensive commodity in remote areas. Because most employees only reside at the camp from May to October, and work long hours during the day with a work week typically from 6 to 7 days long; subsistence hunting is limited. In addition, many employees are single, eat and sleep at the bunk house, and have no personal refrigeration. As a result, subsistence harvest is primarily conducted by the considerably fewer individuals that remain at the camp throughout the year and have an established home site.

4.6.2.4. Access

Traditionally access to the Port Houghton/Cape Fanshaw project area has been limited to boat or floodplain. These modes of access would not be altered through implementation of the action alternatives. The construction of roads into the interior of the project area would allow motorized access and increase ease of entry to areas which previously were difficult to access. Road construction on the north shore of Port Houghton would increase the existing network of roads on the Goldbelt, Inc. lands. When harvest on Goldbelt, Inc. lands is completed, the logging camp at Goldbelt, Inc. is expected to be closed. Use of the road system following closure of the logging camp is unknown. Roads constructed on the south shore of Port Houghton would be accessible only through the LTFs. This would restrict road use to vehicles transported to the project area by boat, most likely off-road vehicles (ORVs) such as motorcycles and four-wheel vehicles. The Alaska Marine Highway System does not presently serve the project area.

Residents of subsistence communities have expressed concern that increased access from road construction would have an adverse effect by increasing competition among hunters for the resources (Petersburg public scoping meeting 9/27/94). The new roads in the project area would increase local forest interior access but the long distance between the project area and user communities would likely negate any additional use outside of the logging camps within the project area. It is believed that the current subsistence harvesters that utilize the project area are those interested in an isolated remote setting and non-motorized interior travel.

Motorized subsistence hunters generally utilize areas closer to their communities, as they are more interested in obtaining subsistence resources as quickly as motorized travel allows. However, if subsistence resources become depleted near communities, motorized travelers would need to travel further to obtain similar harvest levels.

The potential impact would be from motorized travel by residents of logging camps in the project vicinity. Impacts would be limited to big game that would be more accessible during and following harvest due to the new roads. If the use of motorized vehicles for harvesting big game is restricted, the impact should be substantially less.

4.6.2.5. Competition

The most likely source of increased competition for subsistence resources would come from the logging camp personnel associated with the proposed timber harvest. Based on historical and current subsistence use information from the Hobart Bay camp, logging camp personnel associated with this timber harvest would be expected to harvest deer, salmon, finfish, mountain goat, and black bear in or near the project area. Since most logging personnel would probably meet residency requirements and qualify as subsistence users except for goats, they would also have an opportunity to utilize the increased road access to interior portions of the project area, although private vehicle availability and use may be limited. Resource harvest by logging camp residents would only occur during the periods of active timber harvest and would discontinue after the sale is complete or during winter months. The primary limiting factor is that most residents of logging camps receive meals from caterers and do not have their own refrigeration, limiting most subsistence harvest to smaller foodstuffs that do not require long-term refrigeration or the expense of flying meat out. Harvest of large mammal resources occurs but is limited. Following harvest, there would be no long-term competition for subsistence resources from logging camp personnel.

Black bear is the only subsistence resource reported harvested in the project area by non-resident hunters. Public scoping comments from guides indicate that they use the Port Houghton/Cape Fanshaw project area for game hunting because of the undisturbed natural environment and abundant black bear. Timber harvest activities could reduce use of the project area by non-resident hunters and guides who seek a wilderness experience in an undisturbed setting. Increased competition from sport hunters is not anticipated. Rather, is it possible that sport hunter use of the project area could decrease.

4.6.2.6. Abundance and Distribution

The proposed timber harvest would decrease the amount of old-growth forest (low, medium and high-volume strata) by approximately 1 to 8 percent from existing conditions. Effects to most subsistence wildlife species are also expected to result in a similar decrease. The habitat capability models for MIS species predicted a similar decline in wildlife carrying capacity with most species having decreases of less than 10 percent, except for deer in WAA 292827 where the decrease is 13 percent for Alternative 4. Because the harvest levels of subsistence resources are low, the decrease in the carrying capacities and wildlife populations as a result of timber harvest is not expected to affect hunting success of terrestrial wildlife species.

4.6.3. Cumulative Effects

The analysis conducted for the proposed timber harvest assumed that all Goldbelt, Inc. lands are clearcut. One future harvest (volume of 25 MMBF) may occur in the project area through the year 2010. Beyond 2010, timber harvest plans are unknown. For those wildlife species whose habitat capabilities can be projected, subsistence and non subsistence harvest is obtainable for at least the next 40 years following harvest assuming a 2 percent increase in subsistence use each year. Additional analysis would need to be conducted for future sales to ensure no effects on subsistence resources, and this would be dependent on harvest location.

4.6.4. ANILCA Section 810 Resource Findings

4.6.4.1. Determinations

Section 810(a)(3) of ANILCA requires that, when a significant restriction may occur, determinations must be made in regard to whether:

- Such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of public lands;

- The proposed activity will involve the minimum amount of public lands necessary to accomplish the purposes of such use and occupancy, or other disposition;

- Reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting form such actions.

<u>Necessary, Consistent with Sound Management of Public Lands</u> - The alternatives proposed in the Port Houghton/Cape Fanshaw Revised DEIS have been examined to determine whether they are necessary, consistent with sound management of public lands. In this regard the National Forest Management Act of 1976, ANILCA, TTRA, Alaska Regional Guide, Forest Plan (1997), Alaska State Forest Practices Act, and the Alaska Coastal Zone Management Program have been considered.

ANILCA placed an emphasis on the maintenance of subsistence resources and lifestyles. However, the Act also provided for the Forest Service to make timber available for harvest from the Tongass National Forest. The TTRA directed the Forest Service to seek to provide a supply of Tongass timber to meet market demand. Demand for timber from the Tongass National Forest is expected to remain high for the foreseeable future (Morse 1995; Arrasmith 1995).

Analysis done in support of selecting the Port Houghton/Cape Fanshaw project area details the need for the timber volume identified in the proposed action for this project to help meet the three year timber supply goal for the Tongass National Forest (Appendix N).

The action alternatives presented here encompass six different approaches that would produce the resources that would best meet the needs of the American people, and help to achieve multiple use management objectives in the TLMP. All of the action alternatives involve some potential impact on subsistence uses. There is no alternative that would meet TLMP objectives and yet avoid all impacts. Therefore, based on the analysis of the information presented in this document on the proposed alternatives, these actions are necessary, consistent with the sound management of public lands.

<u>Amount of Public Land Necessary to Accomplish the Purpose of the Proposed Action</u> - Much of the Tongass National Forest is used by one or more rural communities for subsistence purposes. The areas of most subsistence use are the areas adjacent to existing road systems, the beach and estuary fringes, and areas in close proximity to communities. Within the project area, the extent and location of subsistence use areas preclude complete avoidance. Areas other than subsistence use areas that could be harvested may be limited by other resource concerns such as soil and water protection, high value wildlife habitat, economics, visual quality, or unit and road design. Effort was taken to protect the highest

value subsistence areas. For example, beach fringe and estuary are the highest use subsistence areas and minimal beach fringe and no estuary would be directly affected by road or harvest units under any of the proposed alternatives.

The impact of viable timber harvest projects always includes alteration of old-growth habitat, which in turn always reduces projected habitat capability for old-growth dependent subsistence species. It is not possible to lessen harvest in one area and concentrate it in another without impacting one or more rural communities' important subsistence use areas. In addition, harvestable populations of game species could not be maintained in a natural distribution across the Tongass National Forest if harvest were concentrated in specific areas. A well distributed population of species is also required by the Forest Service regulations implementing the National Forest Management Act.

Reasonable Steps to Minimize Adverse Impact Upon Subsistence Uses and Resources - Reasonable steps to minimize impacts on subsistence have been incorporated in development of the alternatives and project design criteria. Some alternatives were designed to address specific areas of concern expressed during scoping. During development of alternatives, an effort was made to minimize activities that could adversely impact important subsistence use areas and to avoid harvest in several areas currently used for subsistence.

Project design criteria called for locating roads and units outside of important subsistence use areas such as the beach fringe, estuary fringe, and riparian areas adjacent to salmon streams. An additional reasonable step being considered is closing roads to hunting with a motorized vehicle during timber harvest.

The Federal Subsistence Board may use its authority to prioritize the harvest of resources among rural residents when necessary to protect the resource. This type of action, as prescribed by ANILCA, Section 804, may be necessary to ensure the availability and adequate abundance of subsistence resources needed by the rural communities using the project area. The current subsistence resource population levels do not require restriction or prioritization of rural residents.

Final Revised DEIS Conclusions - The preliminary determination indicates that the effects of the action alternatives are unlikely to cause a significant possibility of a significant restriction in subsistence uses for communities that have historically taken resources from the project area.

The Record of Decision for the Port Houghton/Cape Fanshaw project will include a final finding regarding whether a significant restriction on subsistence uses may result from implementation of the selected alternative considering public comment on the Revised DEIS and testimony from the 810 subsistence hearings.

4.7. Recreation

This section analyzes the direct and indirect effects that timber harvesting and roads may have on recreational activities and opportunities in the Port Houghton/Cape Fanshaw project area.

4.7.1. Direct and Indirect Effects

4.7.1.1. Recreation Supply and Demand

The demand for outdoor recreation experiences is expected to continue to increase, primarily through an increased number of out-of-state tourists. Most of these tourists would see the Port Houghton/Cape Fanshaw project area on ferries and cruise ships, but would not visit the project area. Their view of the project area would be of units and roads near Cape Fanshaw rather than within Port Houghton or Farragut Bay. Among the action alternatives, Alternatives 3 and 6 have no harvesting proposed in the Cape Fanshaw area, Alternative 5 has the least amount of visual impact from harvesting, and alternatives 2 and 4 have the greatest amount.

Other tourists that visit the project area by small boat would primarily view and experience harvest effects at the north and south shore of Port Houghton, (west of Sandborn Canal), South Fanshaw, and Farragut Bay on portions of the project area that are within 2 miles of the shoreline. Most tourists would be expected to use the project area similar to historical use by recreationists. They would view the harvested areas and roads, and recreate near but not within these areas.

Among the action alternatives, Alternative 3 would have the least impact on viewing from small boats within two miles of the shoreline and Alternative 2 and 4 would have the highest impacts.

No campsites or anchorages would be eliminated due to timber harvest. Under the action alternatives, the existing recreational activities in the project area would continue but at a higher level of development. Alternative 3 would have the least impact on changing the level of development for the existing recreation activities because it has the lowest amount of acres harvested. Alternative 4 would have the greatest impact. Recreational fish and wildlife opportunities would be expected to be similar to existing conditions.

4.7.1.2. Recreational Opportunities

The Port Houghton/Cape Fanshaw project area is characterized by a natural landscape without human modification. The introduction of roads, harvest units, and LTFs into the project area would cause a decrease in primitive conditions and an increase in conditions associated with development. All of the action alternatives would increase the amount of roaded modified (RM) ROS areas and decrease the amount of primitive (P) areas. Table 4-22 shows the relative change in ROS class distribution for each of the proposed alternatives, and Appendix I includes the ROS maps for each alternative.

Table 4-22
Project Area Acreage by Recreation Opportunity Spectrum (ROS)

Class	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Primitive	68,411 (50%)	35,574 (26%)	67,042 (49%)	34,206 (25%)	35,574 (26%)	62,938 (46%)	36,943 (27%)
Semi-primitive Nonmotorized	51,993 (38%)	51,993 (38%)	50,625 (37%)	49,256 (36%)	67,043 (49%)	50,625 (37%)	56,097 (41%)
Semi-primitive Motorized	16,419 (12%)	19,155 (14%)	16,419 (12%)	17,787 (13%)	16,419 (12%)	16,419 (12%)	19,155 (14%)
Roaded Modified	0	30,101 (22%)	2,737 (2%)	35,574 (26%)	17,877 (13%)	6,841 (5%)	24,628 (18%)
TOTAL	**136,823 (100%)**	**136,823 (100%)**	**136,823 (100%)**	**136,823 (100%)**	**136,823 (100%)**	**136,823 (100%)**	**136,823 (100%)**

Source: Nelson 1998.

The recreation opportunities would continue the same throughout the project area but the experience would change. Instead of the highest percentage of the experiences being primitive, the same opportunities would occur in a more developed setting chiefly caused by the visual disturbance of roading and timber harvesting. Roading the area would improve recreation access to the area.

Alternative 4 would have the greatest impact to the Primitive/Semi-Primitive Non-Motorized recreation experience, becoming Roaded Modified. Alternative 3 would have the least impacts of the action alternatives.

No impacts would occur in the no-action alternative.

4.7.1.3. Recreation Places and Sites

Of thirteen existing Recreation Places in the project area, five would be affected by harvesting (Table 4-23). Alternatives 2 and 4 would have the greatest impacts to the Primitive and Semi-primitive Non-motorized Recreation Place experience in the project area. Alternative 3 would have the least impacts of the action alternatives (see Recreation maps, Appendix I).

Two new recreation places would be created in specific alternatives, the Little Lagoon road system and Negro Creek. The Little Lagoon road system would be developed in alternatives 2, 4, 5, 6, 7 based on the proposed road management objectives (RMOs) for those roads. One of the objectives is to maintain roads for recreation vehicle use. The proposed RMO for Alternative 7 would maintain the greatest amount of road for roaded recreation opportunities.

The Negro Creek Recreation Place would be created in Alternatives 5 and 6. Originally, the area was a portion of the South Shore Uplands Recreation Place. With the proposed harvesting, this area would be isolated but still large enough to maintain the same type of recreation opportunity and experience. Therefore, the area would be recognized as a Recreation Place.

4.7.1.4. Recreation Activities and Use

The existing recreational activities within the project area would not change. The recreation experience of the activities near the roading and harvesting would change from a natural landscape experience to a landscape experience with human use evident. Alternative 4 would have the greatest impact the recreation experience and Alternative 3 would have the least impacts of the action alternatives.

Most of the current recreational activity is by residents of the Hobart Bay logging camp located north of the project area. Much of the current recreation activity in the project area is sightseeing (scenery and wildlife), boating, dispersed camping and big game hunting.

The most substantial effects to recreation resources in the project area would occur during active timber harvest when road construction, LTF operations, and other harvest activities would adversely affect some recreation opportunities. The effect of harvest alternatives on recreation would also depend on the sensitivity of recreationists to visual change. People who now visit the area primarily because of its unmodified character may choose to recreate in other areas not affected by the harvest activity. Alternatives 2 and 4 would have the greatest visual impacts, and Alternative 6 would have the least impacts of the action alternatives.

Noise would increase as a result of timber harvest and associated activities. Animal and human disturbance from noise would be expected to occur within 1/2 mile of logging operations. Most human use of the project area primarily occurs on water in Port Houghton. Any noise heard by recreationists on water would likely be at LTF facilities. Travel on land by recreationists is generally restricted to about 1/2 mile of the shoreline outside of the hunting/trapping seasons. During the hunting season, hunters often travel extensively on land in pursuit of big game. These individuals would be most susceptible to hearing the timber operations.

Alternatives 2, 4, and 5 would have the greatest impacts from noise due to helicopter and heavy equipment logging on both the north and south shore of Port Houghton, as well as an active LTF at Little Lagoon. Alternative 3 would have the least impact from noise. This alternative proposes the least amount of harvest volume and proposes only have one mode of harvesting, helicoptering.

Table 4-23
Recreation Places Alternative Comparison of Changes to the Recreation Experience and Acreage Due to Proposed Road Management Objectives

	Alternatives						
Recreation Experience	1	2	3	4	5	6	7
33,500.01, Alice Lake							
Recreation Experience (ROS)	P[1]	P	P	P	P	P	P
Acreage Comparison (RMO)	1,164	799[2]	799[2]	799[2]	799[2]	1,164	1,164
33,500.02, North Shore Uplands							
ROS	SPNM[3]	SPNM	SPNM	SPNM	SPNM	SPNM	SPNM
Acreage Comparison	5,568	5,940[2]	5,940[2]	5,940[2]	5,940[2]	5,568	5,568
33,013.02, South Shore Uplands							
ROS	SPNM	SPNM	SPNM	SPNM	SPNM	SPNM	SPNM
Acreage Comparison	18,453	6,380[4]	18,453	6,380[4]	6,380[4]	6,380[4]	6,380[4]
33,018.02, Negro Creek							
ROS	None	None	None	None	SPNM	SPNM	None
Acreage Comparison	0	0	0	0	7,801[4]	5,586[4]	0
33,018.03, Little Lagoon Road System							
ROS	None	RM[5]	None	RM	RM	RM	RM
Acreage Comparison	0	1,591[4]	0	130[4]	277[4]	130[4]	6,376[4]
21,128.01, Jamestown Peak							
ROS	P	SPNM	P	SPNM	SPNM	P	SPNM
Acreage Comparison	5,806	7,792[6]	5,806	7,792[6]	7,792[6]	5,806	7,792[6]
21,128.02, Tangent Peak							
ROS	SPNM	None	SPNM	None	None	SPNM	None
Acreage Comparison	3,134	0[6]	3,134	0[6]	0[6]	3,134	0[6]

[1]P=Primitive
[2]For the Primitive Alice Lake Recreation Place, 372 acres would be converted to Semi-primitive Non-Motorized North Shore Uplands Recreation Place due to the proximity of the roading and harvesting near Alice Lake.
[3]SPNM=Semi-primitive Non-motorized
[4]A large portion of acreage would be converted from the South Shore Uplands Recreation Place (SPNM) into the Little Lagoon Road System (RM) and Negro Creek (SPNM) Recreation Places. These conversions would be due to the roading and harvesting on the Little Lagoon's Road system.
[5]RM=Roaded Modified
[6]The Primitive Recreation Place Jamestown Peak would be incorporated with the Tangent Peak Recreation Place, Semi-primitive Non-motorized due to the proximity of the roading and harvesting near Jamestown Peak.
Source: Nelson 1998.

The proposed logging camp at Little Lagoon could have 50-150 residents. These people would be competing for the same use areas as local and outfitter/guide users. A decline in historical use is very probable during the active sale period (ten years). Alternatives 2, 4, 5, and 7 would have the greatest impacts on competition for recreation use in the area because these alternatives have the highest volume to remove. Alternative 3 would have the least impact because it would use the established camp at Hobart Bay.

4.7.1.5. Roadless Areas

Parts of two Roadless Areas will be affected by all the action alternatives. None of the alternatives will eliminate either of these areas from the Roadless Inventory. Although portions of these two Roadless Areas would be modified, the remaining portions would still contain sufficient acreage to quality as roadless. Alternative 2 would have the greatest impacts on the existing Roadless Areas. Alternative 3 would have the least impacts. The roading and harvesting in alternatives 5 and 6 completely separates a portion of the Windham-Port Houghton Roadless Area. This new area is approximately 16,000 acres in both alternatives. Being over 5,000 acres qualifies it as a new Roadless Area.

4.7.1.6. Recreation and Tourism Industry Use

Among the action alternatives, Alternative 3 would have the least amount of impact on the recreation and tourism industry use of the area. It has the smallest amount of volume to be harvested and only the North Shore would be disturbed. Alternative 4 would have the greatest impact because it has the highest volume to be harvested.

The Sandborn Canal anchorage may be disturbed by noise in Alternative 7 because a unit is planned 2.5 miles from the anchorage near the ridge top connecting the Little Lagoon and Sandborn Canal drainages. Alternative 4 has a unit 5 miles from the anchorage that would not be seen but could also cause noise disturbance when harvesting occurs. The Roberts Island anchorage could be disturbed under alternatives 2, 4, and 7 because roads and harvest units are approximately two miles from the anchorage. Alternative 4 would have the greatest potential impact on the Roberts Island anchorage because it would harvest the largest amount of volume in the vicinity. Overall, the effects on use by residents or outfitter/guides of these anchorages is expected to be minimal.

With the residents of a logging camp in Little Lagoon (50-150 people) using the project area, there could be a decline of recreation/tourism dollars (Table 4-24), based on the following assumptions:

- Sightseeing outfitter/guide trips would decrease by fifty percent because of the impact of doubling the recreational use of Port Houghton and the visual disturbance of the timber harvest. Guides would not be able to provide a wildlands experience.

- Big game guided trips would decrease by 25 percent because of the higher local use for hunting area by logging camp residents.
- The private air carrier from Petersburg would see a decrease in flights (six) for big game hunting into Sandborn Canal. The existing hunting experience would no longer be available because of the Canal's relative closeness to Little Lagoon and potential use by logging camp residents.
- There would be a decrease of two more flights into the Port Houghton/Cape Fanshaw general area for big game hunting because of the increased number of people from the logging camp using the Salt Chuck and Glen River areas.
- The flights into Roberts Island would not be affected.
- The harvesting actions in Alternative 3 would have the same effect as Alternative 1.

4.7.2. Cumulative Effects

Timber harvest activities increase the proportion of roaded modified recreation opportunities, and reduce opportunities for semi-primitive and primitive recreation experiences. As harvest activities increase in previously unmodified areas, new opportunities for recreation activities associated with roads would expand. Recreationists seeking areas with natural settings and a high degree of solitude would be displaced to other areas in the National Forest. This displacement to other natural areas may result in increased use of those areas with more social encounters and less opportunity for solitude. The existing conditions for the project area include the assumption that all Goldbelt, Inc. lands would be harvested prior to implementation of the proposed timber harvest.

Table 4-24
Commercial Recreation/Tourism Use and Income Summary for the Port Houghton/Cape Fanshaw Project.

Activity	Cost/Use Estimate: Alternatives 1 and 3	Cost/Use Estimate: Alternatives 2, 4, 5, 6, and 7
Range of total recreation/tourism dollars generated	$48,010-$72,250/year	$27,380-$39,650/year
Range of numbers of people willing to pay for recreation/tourism experience	84-134/year	68-102/year
Average days of use by groups generating dollars	136/year	84/year

Source: Nelson 1998

4.8. Scenic Quality

The Forest Plan established Visual Quality Objectives (VQOs) for the project area. These adopted VQOs differ to a large extent from the inventoried VQOs which were the basis for the evaluation of effects in the 1995 Port Houghton/Cape Fanshaw Draft EIS. In addition, the shape of some harvest units analyzed in the 1995 Draft EIS have been changed to reduce visual impacts. Therefore, areas which did not meet the inventoried VQOs in the 1995 Draft EIS now meet the Forest Plan adopted VQOs.

Field observations and topographic map analysis were used to evaluate the impacts of the alternatives on the visual quality of the Port Houghton project area. All action alternatives would result in visual impacts of varying degrees, although the impacts are consistent with Forest Plan VQOs and standards and guidelines. The no-action alternative (Alternative 1) would result in no visual changes in the project area.

4.8.1. Direct and Indirect Effects

4.8.1.1. Little Lagoon LTF

The LTF at Little Lagoon has the potential to create a visual impact from the Port Houghton Small Boat Route. This development would likely not meet the adopted VQO of Retention in the foreground required in a Scenic Viewshed LUD; however, the Forest Plan provides for exceptions to meeting the adopted VQO in the case of some non-conforming developments, including LTFs (USDA-FS 1997a, p. 4-80).

4.8.1.2. Visual Recovery Rates

The potential for visual impact is greatest following timber harvest; stumps and debris, fresh road cuts and fills, and exposed boles and limbs of adjacent stands dominate the visual setting. By the fifth year of regeneration, the new forest is filling out, and low-lying vegetation, alder, and young trees begin to cover the stumps and exposed ground. From year 5 to 20, the young trees have become established, reaching a height of approximately 15 feet. After 20 years, the forest visitor would see a stand of spruce and hemlock, with some Alaska-cedar in the foreground. In the middle-ground, the contrast between the new forest and mature forest would be very obvious.

At the end of 50 years, the new forest would reach a height of approximately 50 feet. The canopy would be closing and the new forest would appear very dense. Toward the end of 80 years, the stand would reach 75 percent of its mature height. The canopy would appear full with crowns touching, allowing little sunlight to reach the forest floor and little understory vegetation. At 100 years, little visual difference would be noticed by the casual observer between the

100-year forest and an adjacent mature forest. Timber would reach approximately 100 feet in height and appear healthy, lush, and with full canopy.

4.8.1.3. Comparison of Impacts to Scenic Quality by Alternative

Each alternative presents a different combination of harvest units and silvicultural methods, creating varying levels of impact to the scenic quality of the area. The alternatives are ranked by descending level of visual impacts below:

Alternative 4 will result in the highest impacts due to the high density of harvest in areas visible from Visual Priority Travel Routes, especially in the Port Houghton viewshed.

Alternative 2 will have similar impacts to Alternative 4. The alternative has dense harvest patterns in the Port Houghton viewshed.

Alternative 7 will have slightly less impact than alternatives 2 and 4, due to the elimination of some higher elevation units.

Alternative 5 will have much less impacts to the Port Houghton viewshed than the alternatives listed above, due to the elimination of the most sensitive units. The impacts to the Farragut Bay viewsheds will be similar to above.

Alternative 6 will have slightly more impact to the Port Houghton viewshed than Alternative 5, but will have no impact to the Farragut Bay viewsheds.

Alternative 3 will have the least overall impact. Even though there is heavy harvest planned, it will be viewed in the context of the adjacent heavy harvest on the adjacent private lands, which will lessen the apparent contrast.

4.8.2. Cumulative Effects

Cumulative visual effects result from past and ongoing management activities, proposed activities, and activities that would occur with some certainty in the future. Other visual cumulative effects could include: (1) additional harvesting in the project area; (2) increased numbers of viewers resulting from development of a marine park at Robert Island and growth of tourism in Alaska (particularly whale watching); (3) increased numbers of viewers resulting from development of State-selected land at Whitney Island; and (4) increased recreational opportunities provided by new roads into previously inaccessible areas, resulting in increased numbers of viewers.

The existing clearcut on private land in the Mouth of Port Houghton and Port Houghton viewsheds is highly apparent. Additional harvest on remaining private land would enlarge the clearcut. Because of its large size and prominence, the disturbance created by the clearcut would continue to dominate the visual impression of the landscape even through the period of green up and regeneration (30 to 45 years).

Visual disturbance created by harvest and road construction activities on public land would contribute to cumulative visual effects. Though clearcut units would take as long as 30 to 45 years to return to a uniform appearance with the surrounding forest, the visual impacts created by the proposed alternatives would diminish much sooner. This is primarily the result of two factors: (1) small units distributed within a mature forest, and (2) a variety of silvicultural methods. The average size of seen units would be relatively small, less than 60 acres. Rather than concentrated in areas, the units would be distributed across the landscape. There is at least a quarter-mile and often a half-mile or greater buffer between adjacent units. A mosaic of color and texture would result from mature forest interspersed with units harvested under a variety of methods including clearcut, partial cut, group selection, overstory removal, and salvage. The mosaic would change over time as regeneration trees in harvest units mature, until uniformity with the surrounding forest is achieved.

The cumulative effects of increased numbers of viewers would heighten the visual sensitivity in all viewsheds within the project area. The Forest Service would consider updating the visual resource database to reflect any significant change in inventory conditions. In future proposed harvests, visual concerns may be greater.

4.9. Other Resource Considerations

4.9.1. Geology and Minerals

Access to the area for mining purposes would be enhanced by all action alternatives. However, no logging is planned at or near the existing mining claim areas in the project area. There is logging planned near an old stone quarry.

Port Houghton Copper and Louis Group Mineral Prospects - Mining activity at these prospects is unknown. No timber harvest activities for any action alternative are planned to occur in the vicinity of these prospects.

Islander Mineral Prospect and Former Trap Line #1 & #2 Lode Claims - The Islander mineral prospect and the Trap Line #1 and #2 lode claims occur on Alaska State-selected land. No timber harvest activities for any action alternative are planned in these areas.

Former Hecla Mining and Davidson Lode Claims - These former claims, which occur in areas distant from timber harvest or road construction for any action alternative, would not be affected by the proposed timber harvest.

Port Houghton Stone Producer - This stone producer would not be affected by the proposed timber harvest. The USBOM records do not indicate the type of stone, the amount of production, or the time period that stone this operation was active. The site is listed as a past producer.

Stone and rock would be needed for construction of LTF sites and roads. This material would be obtained from the project area. Alternative 3 would require the least amount of stone and rock because no permanent roads would be constructed for this alternative. The most stone and rock would be needed for Alternative 4, which proposes the most road construction. The stone and rock needed by the other alternatives is relative to the amount of road construction required.

Timber harvesting activities would provide access to undeveloped areas for exploration activity. However, according to the USBOM, the mineral potential of the project area is low. The USBLM and Alaska Division of Geological and Geophysical Surveys have not evaluated the mineral potential of the project area.

U.S. mining laws confer a statutory right to enter public lands to search for minerals. Access to mining claims would not be prevented by road management planning. Permits by the Forest Service are required for mineral exploration, mining, and prospecting. Road restrictions and entry into limited access areas typically require permits.

Exploration activity for undiscovered mineral resources, leasable minerals and salable or common variety minerals in the project area may increase because timber harvesting and road construction would provide access to less developed or undeveloped areas. If this occurs, exploration activity would provide more specific information on the local geologic units and associated type of mineral deposits that occur in the project area.

Long-term cumulative effects on mining claims would be increasing access and exposure for mineral exploration due to road construction and timber harvesting. If mining development occurs, road construction would facilitate market access.

4.9.2. Cave Resources

No cave resources were observed or are known to occur in the project area, and consequently, no impacts would occur to cave resources.

4.9.3. Soils

Soil Productivity - Timber harvest and road construction create soil disturbances that add to soil erosion already occurring naturally. Maintaining organic-rich topsoil layers is critical for long-term forest site productivity. Timber management activities influence soil productivity and soil nutrient content. The topsoil layer can be impacted by natural forces such as mass wasting and surface erosion, and man-made activities of severe yarding disturbance, road construction, and logging operations. These activities can adversely impact soil productivity by changes in surface runoff drainage patterns, soil saturation, soil compaction, soil permeability, and aeration. These can be mitigated by proper unit design, location, and yarding requirements. The objective is to maintain and protect the nutrient rich, organic surface horizons.

Generally, the more acres harvested and roads constructed, the greater the potential for soil disturbance and compaction or displacement. Logging systems also affect the amount of disturbance. The least amount of soil disturbance occurs when helicopter logging is implemented, and the greatest amount of soil disturbance occurs when high lead logging systems are implemented (Table 4-25). Skyline and high-lead logging methods used in Southeast Alaska require logs to be transported or yarded to transfer areas with suspension cables connected to towers. Depending on topography, the logs can be fully or partially suspended above the ground surface. If logs contact the ground surface, vegetation and soil disturbance can occur. For the Port Houghton/Cape Fanshaw action alternatives, Alternative 4 has the greatest anticipated amount of soil disturbance because no helicopter yarding is planned, while Alternative 3 has the least amount of soil disturbance because this alternative has the greatest amount of helicopter yarding planned. However, the soil disturbance differences among action alternatives are less than 10 percent, and the proportion of soil disturbance compared to total area harvested is between 1 and 6 percent.

Table 4-25
Predicted Acres of Soil Disturbance in Harvest Units by Action Alternative

Logging System	Percent Disturbance Associated with Logging System[1]	Alternative 2	3	4	5	6	7
Gravity Return	6	19	0	21	18	5	16
Helicopter	1	16	5	21	15	0	0
Running Skyline	6	51	0	73	26	17	63
Slackline	6	77	0	83	46	10	63
Small Slackline	6	63	0	67	42	25	63
Shovel	8	5	0	5	3	0	5
Highlead	12	2	0	3	2	0	2
TOTAL		**233**	**5**	**273**	**152**	**57**	**212**
Total Unit Acres		**5,171**	**550**	**6,224**	**3,706**	**951**	**3,489**
Soil Disturbance as % of Total Harvest		**4**	**1**	**4**	**4**	**6**	**6**

[1]Soil disturbance estimates are based on Landwehr (1992) and U.S. Forest Service (1993c) where (1) helicopter yarding systems result in minimal (1%) soil exposure, regardless of silvicultural system; (2) soil exposure with cable yarding and all silvicultural system results in 6% of the soil surface displaced or exposed within units; (3) shovel yarding system results in an acreage of 8% of the soil surface displaced within harvest units; and (4) the highlead system results in 12% soil disturbance. Uncut inclusions within units would be uncut with no soil disturbance.
Source: Gunther 1998.

<u>Soil Erosion</u> - Soil disturbance can occur from both natural and man-made causes. Natural causes include surface erosion and mass wasting. Man-made causes include road and landing construction, borrow source/rock quarry development, yarding disturbance, and log skid trails. Erosion is the transport of individual particles (surface erosion), or masses of soil and rock (mass wasting) by gravity, water, or a combination of both. Erosion and mass wasting are part of a natural,

ongoing process. Although both timber harvest and road construction activities disturb soils, road construction is the most significant cause of soil erosion and mass wasting. Roads commonly cut across slopes, with the uphill portion of the road cut being steeper than the natural slope (e.g., angle of repose). Depending on the method of road construction, soils and rock removed during construction are commonly placed on the downhill side of the road. This method causes over-steepening, increases the soil surcharge on the downhill slope, and exposes soils on the slope and roadway alignment. Road and quarry soil disturbance expected from the action alternatives show that the most disturbance would occur in Alternative 4 and the least would occur in Alternative 3 (Table 4-26). Again, these differences are due to the number of units planned for helicopter logging which decrease the amount of road required.

Table 4-26
Soil Disturbance Acreage from Road and Quarry Development[1]

	Alternative					
Disturbance Type	**2**	**3**	**4**	**5**	**6**	**7**
Road Disturbance	493.3	1.2	566.1	324.8	138.2	457.6
Quarry Disturbance	61.1	.2	70.1	40.2	17.1	56.6
TOTAL	**554.4**	**1.4**	**636.2**	**365.0**	**155.3**	**514.2**

[1]Roads displace an approximate 50 ft width of existing soils on both temporary and specified roads. Rock quarries disturb 1.5 acres of lands for every 2 miles of road.
Source: Gunther 1998.

Removing trees during timber harvest can cause indirect adverse impacts. Both clearcut and selective logging operations expose the adjacent remaining trees to wind-storm events. Trees in adjacent areas can be toppled with the tree root system intact, exposing underlying soils to erosion and increasing the erosion rate (Harris 1989).

Mass Wasting - Deeply incised (V-notch) channels are highly susceptible to mass movement. Outside of V-notch disturbance, human-induced landslides and mass wasting generally occur in areas of very high mass movement indices (identified in the Port Houghton/Cape Fanshaw project area as soil hazard Class IV), and with a less frequent probability in areas of soil hazard Class III soils. Six percent of the project area is identified as Class IV. No roads or units are planned in these areas; however, some planned units and roads are adjacent to these areas on slopes frequently rated as Class III. Tables 4-27 and 4-28 provide the amount of soils in each soil hazard class for units and roads, respectively. Alternative 4 has the greatest acreage of harvest units in Class III soils, whereas Alternative 3 has the lowest acreage in Class III soils, and is 93 percent less than Alternative 4. Alternatives 1 and 3 would not require new road construction. Of the alternatives which would require road construction, Alternative 4 has the most miles of road in Class III (14.7 miles), which is 10.9 miles more than Alternative 6, which has the lowest amount of Class III soils. Note that the relative percentages of Class III soils for the action alternatives are similar, ranging from 15 to 17 percent, except for Alternative 3 which would not require new road building.

Table 4-27
Amount of Harvest Acreage by Action Alternative Planned in Units by Soil Hazard Class

	Alternative					
Soil Hazard Class	2	3	4	5	6	7
I (Low)	472	388	472	471	0	0
II (Moderate)	3,234	28	4,114	2,197	633	2,344
III (High)	1,451	121	1,618	1,024	318	1,138
IV (Very High)	14	13	20	14	<1	7
TOTAL	**5,171**	**550**	**6,224**	**3,706**	**951**	**3,489**

Source: Gunther 1998.

Table 4-28
Miles of Road Construction Planned for Action Alternatives by Soil Hazard Class

	Alternative					
Soil Hazard Class	2	3	4	5	6	7
I (Low)	8.2	0	3.6	8.1	< 0.1	< 0.1
II (Moderate)	60.3	0	75.1	37.4	18.9	63.7
III (High)	12.8	0	14.7	8.1	3.8	11.7
IV (Very High)	< 0.1	0	< 0.1	0	0	0.1
TOTAL	**81.4**	**0**	**93.4**	**53.6**	**22.8**	**75.4**
Percent of Total in Hazard Class III Soils	**16**	**0**	**16**	**15**	**17**	**15**
Acres of Hazard Class III Soils	**77.6**	**0**	**89.1**	**49.1**	**23.0**	**70.1**

Source: Gunther 1998.

The long-term impact of timber harvest affects areas of steeper slopes. An increase in mass wasting events commonly occurs in Southeast Alaska, three to seven years following logging operations, apparently caused by the decomposition of tree roots and eventual loss of soil support (Swanston 1969). Mass wasting caused by loss of soil support is significantly higher on steeper slopes with relatively shallow soils over bedrock. Steep slopes were avoided for road construction to the extent possible (Table 4-29). For each alternative, areas with sideslopes of 60 percent or greater represent less than 1 percent of the total miles of roads planned. Alternatives 2 and 4 have the greatest amount of harvest units with 72 percent or greater slopes (Table 4-29). Alternative 6 has fewer acres on steep slopes than other action alternatives. The frequency of landslide occurrence in the area is difficult to predict; however, areas with a high potential for landslide occurrence were evaluated in the planning process and timber harvest was deferred in many of these areas during unit design, or these areas were designated for partial cutting.

Table 4-29
Roads and Timber Harvest Areas Located on Steep Slopes

Alternative	Road Miles with 60% or Greater Sideslopes	Percentage of Total Road Miles on Steep Slopes	Unit Acreage on 72% or Greater Slopes
2	0.05	< 1	12.2
3	0	0	6.2
4	0.05	< 1	12.2
5	< 0.01	< 1	6.2
6	0.05	< 1	0.4
7	0.05	< 1	5.6

Source: Gunther 1998.

Cumulative impacts from soil disturbance for this project and future sales include the loss of soil productivity over the short term, soil erosion, and increased mass wasting. As described above, mass wasting events are likely to occur 3.5 times more on managed than unmanaged undisturbed lands.

4.9.4. Wetlands

Per Executive Order 11990, wetlands shall be avoided to the extent possible to reduce the long- and short-term impacts associated with destruction or modification of wetlands, and to avoid direct and indirect support of new construction in wetlands wherever there is a practicable alternative.

Road construction and timber harvest would affect wetlands in the Port Houghton/Cape Fanshaw project area. The large percentage of the project area that is wetland (over 30 percent) and the wide distribution of wetlands throughout the project area make this resource impossible to avoid. A large percentage of commercial forest land area in the project area (up to 20 percent) is wetland, and this area represents an important component of available timber.

To minimize impacts to wetlands (BMP 12.5) forested wetlands of approximately 2 acres or greater in size were identified and removed from harvest units through GIS and photo analysis and field reconnaissance. This is also a directive of the Forest Plan.

The filling and disturbance of wetlands due to road construction are listed in Table 4-30. The amount of road construction within wetlands ranges from zero to 24 miles, impacting 0 to 146 acres of wetland, although the impact is less than one percent of all wetlands in the project area. For each alternative, the greatest amount of wetlands impacted by roads is typically in bogs, fens, peatlands, and mixed forest. No freshwater lakes or estuary wetlands would be filled for road construction, but up to about 32 acres of subalpine wetlands would be filled for road construction.

Road impacts to wetlands would result in loss of wetland functions due to filling and hydrologic alterations. The filling of wetlands for road construction results in a long-term loss, whereas hydrologic alterations may be temporary and occur during construction until drainage through and adjacent to the road is provided. If drainage is not adequate, wetland losses occur from lack of surface and subsurface flow. If road drainage is not impaired and BMPs are implemented during road construction, wetland habitat loss would be limited to only those wetlands directly under road fill.

The loss of functional performance (Morton 1995b) due to roads would be proportional to the area of wetland impacted. Due to the small area of wetlands impacted versus the large amount of wetlands present in the project area, the loss of these functions is of minor importance to the overall function of wetlands in the project area as a whole.

The total area impacted by timber harvest units located in wetlands varies from 59 acres (Alternative 6) to 697 acres (Alternative 4) (Table 4-31). These acreages represent up to about 10 percent of the total proposed harvest area, but only 0.2 to 2.6 percent of the total area of wetlands in the project area. The area of coniferous forested wetlands impacted, ranges from 4 acres (Alternative 6) to 361 acres (Alternative 4), or 0.1 to 5.8 percent of the total area of forested wetlands in the project area. Impacts to other wetland types occur on 0 to 3.9 percent of the total wetlands in the project area.

Timber harvest alternatives would potentially alter wetland functions. In forested wetlands, timber harvest would result in tree canopy removal and a change in habitat for forest dwelling species. Clearcut areas would revegetate with a variety of herbaceous plants, shrubs, and saplings. As forest vegetation develops and matures, the wildlife habitat functions of the wetlands would gradually be restored. The habitat value of non-forested wetland types would be less severely impacted by harvest because they would receive less disturbance and they contain structurally less complex communities which recover from disturbance more quickly than forests.

4.9.5. Floodplains

Per Executive Order 11988, floodplains shall be avoided to reduce the long- and short-term impacts to the extent possible, and avoid direct and indirect support of floodplain development wherever there is a practicable alternative. The high density of streams in the project area precludes avoiding all floodplains during timber harvest activities. Environmental consequences in floodplains are generally limited to road construction during which both direct and indirect impacts to

Table 4-30

Summary of Wetland Impacts Due to Road Construction by Action Alternative

Wetland Type	Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6		Alternative 7	
	Miles	Acres[1]	Miles	Acres	Miles	Acres	Miles	Acres	Miles	Acres	Miles	Acres
Coniferous Forest	1.8	11.0	0	0	2.6	15.9	1.2	7.1	0.2	0.9	1.5	9.1
Mixed Forest/Bogs, Fens, Peatlands	6.9	41.2	0	0	8.9	53.4	6.8	41.2	0	0	6.4	38.6
Bogs, Fens, Peatlands	8.2	48.9	0	0	9.9	59.0	4.7	28.0	5.1	31.0	8.3	49.7
Subalpine	5.3	31.8	0	0	2.9	17.4	4.6	27.7	0.7	4.1	1.8	11.0
TOTAL	**22.2**	**132.9**	**0**	**0**	**24.3**	**145.7**	**17.3**	**104.0**	**6.0**	**36.0**	**18.0**	**108.4**

[1]Assumes a 50-foot road right-of-way.
Source: Kelley 1998.

Table 4-31

Summary of Forested Wetlands Impacted by Proposed Units

Wetland Type	Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6		Alternative 7	
	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres
Coniferous Forested	4.6	290	0.7	44	5.8	361	4.0	250	0.1	4	1.3	81
Mixed Forest/Bogs, Fens, Peatlands	0.9	89	0	0	1.0	99	0.9	89	0	0	3.9	39
Bogs, Fens, Peatlands	0.6	60	< 0.1	3	1.6	150	0.2	23	0.4	39	0.5	52
Subalpine	0.5	87	0.2	33	0.5	87	0.4	71	0.1	16	0.2	32
TOTAL[1]	**1.4**	**526**	**0.2**	**80**	**2.6**	**697**	**1.4**	**433**	**0.2**	**59**	**0.8**	**204**

[1]Totals for percent are weighted by total area of all wetland types and thus are not additive.
Source: Kelley 1998.

Table 4-32
Acres of Floodplain Impacted by Project Alternative

Floodplain Class[1]	Alt 1 Acres[2]	Alt 2 Acres	Alt 3 Acres	Alt 4 Acres	Alt 5 Acres	Alt 6 Acres	Alt 7 Acres
A (< 50 feet)	0	13.5	0	15.3	7.6	4.3	12.3
B (50-100 feet)	0	1.0	0	1.1	0.4	0.3	1.1
C (> 100 feet)	0	2.2	0	2.5	0.9	0.9	2.4
TOTAL	**0**	**16.7**	**0**	**18.9**	**8.9**	**5.5**	**15.8**

[1]Class A floodplains are less than 50 feet wide. Class B floodplains are between 50 and 100 feet wide. Class C floodplains are greater than 100 feet wide.
[2]Acres of impact based on average floodplain width and 50-foot average width of road fill. Calculation is worst case since culvert diameters or bridge lengths are not included as impact, and for Class A and Class B floodplains, numerous crossings have no apparent floodplain.
Source: Kelley 1998.

floodplains could occur. To minimize adverse effects on floodplains, all bridges and culverts are sized so as not to impede floodwater. Consequently, there would be no loss of floodplain function under any of the action alternatives. The only floodplain development proposed in the alternatives is where roads cross streams.

Each action alternative includes between zero and 141 stream crossings (Table 4-18). Depending upon alternative, from zero up to 19 acres of floodplain would be filled by road construction (Table 4-32).

All stream crossings have been field-inspected. In the project area, floodplains are generally narrow and sharply defined by steep-sided stream banks and ravines.

Road construction across floodplains would result in unavoidable filling in floodplains. Road fills and stream crossing structures would be designed with flood relief features to minimize the potential for road fill erosion and stream channel diversion during large flood events. All significant streams with fish habitat (Class I and Class II streams) have a minimum 100-foot buffer from ordinary high water marks to timber harvest activities. Since Class I and II streams typically include many Class A floodplains and all Class B and C floodplains, timber harvest is not anticipated to affect floodplains.

4.9.6. Cultural Resources

Impacts to cultural resources can occur due to project-related activities, increased public access, or from natural processes. Impacts resulting from project activities could include total destruction or partial damage due to ground-disturbing actions, unauthorized use of a site area by project personnel, increased pedestrian or vehicular traffic over a site, souvenir hunting or actual looting. Coastal sites could be affected by erosion from waves caused by vessels' wakes, or by bark deposition and dispersion. In addition, problems could arise if hydrocarbon spills occurred on a site, thereby compromising the integrity of the site or the site's potential for radiocarbon dating.

Natural processes, such as erosion and sedimentation, can adversely affect sites, and these processes could be exacerbated by timber-related activities. The scope of these natural processes is such that they can affect sites that are physically separated from the point of impact. Virtually all impacts to archaeological or historic sites are permanent and irreversible.

4.9.6.1. Harvest Units

Based on literature and archaeological field surveys, no archaeological sites are identified directly within harvest units. With the exception of approximately 3 acres in Unit 321009W (56), all of the harvest units lie above 100 feet in elevation; this places them outside the high probability area for cultural site occurrence as defined by the Forest Service (USDA-FS 1993d). Therefore, there would be no direct impacts to known significant historic or archaeological sites identified directly within harvest units. During previous surveys, forty-five culturally modified trees (CMTs) were identified in some harvest areas; however, these do not meet SHPO requirements as significant sites. Culturally modified trees are trees that were modified (generally by stone tools or metal axes) by past inhabitants of the area, and are important primarily in delineating areas of past land use.

4.9.6.2. Roads

Based on the archaeological field and literature survey, no archaeological sites were identified directly within proposed road areas. Most of the proposed roads lie above 100 feet in elevation, outside the high potential area for cultural site occurrence as defined by the Forest Service (USDA-FS 1993d). A total of 0.35 miles of proposed road were surveyed which lie within high potential areas for the occurrence of cultural resources. Road construction would not directly impact known significant cultural resources. Forest Service Road 8496 would be within 450 feet of an historic cabin feature, SUM 044; however, the cabin ruin does not meet the eligibility requirements of the National Register. Thus it would not be afforded protection under Section 106 of the National Historic Preservation Act. A total of 14 CMTs lie within proposed road construction area; however, as mentioned above, these do not meet SHPO requirements as significant sites.

4.9.6.3. LTFs

The proposed LTF and sort yards were surveyed for cultural resources for this timber sale project. The Little Lagoon LTF lies below the 100 ft. contour, within the Forest Service's high potential area for cultural resource site occurrence. No significant cultural resources were found in the LTF area.

4.9.6.4. Scale Yards

If scale yards are associated within the immediate area of the LTF, then the area associated with the scale yards has been sufficiently surveyed and no additional surveys are anticipated. Should the scale yard be located outside of the 10 acres surveyed for the LTF, an additional cultural resource survey would need to be completed prior to the establishment of that scale yard. An adequate scale yard location has been identified to provide for the needs of the yard and for the protection of the cultural resource.

4.9.6.5. Camps

Since the camp locations have not yet been determined under any alternative, each camp location would need to be given a cultural resource clearance prior to its establishment. Should an identified camp location be found to be in direct conflict with an archaeological site, a new location would be located in the vicinity and protective measures established for the site.

4.9.6.6. National Register of Historic Places

Of the five known cultural resource sites in the refined project area, two meet the eligibility requirements for inclusion in the National Register of Historic Places (See Table 3-22). The following sites lie within the project area: SUM-044, SUM-053, SUM-054, SUM-056, and SUM-057. Only SUM-053 and SUM-057 have been determined as eligible properties to the National Register of Historic Places. Both of these properties are located along Frederick Sound, well away from any proposed project activities. Further evaluation under Section 106 of the National Historic Preservation Act and 36 CFR 800 has determined that there will be no affect on these properties by the proposed timber harvesting and/or associated activities. Once a property has been determined Not Eligible it is no longer considered a significant resource and a Determination of Effect is not necessary for these properties.

4.9.6.7. Cumulative Effects

Cumulative effects on heritage resources occur through natural erosion and weathering, as well as from continued development on lands containing heritage sites.

Much of the project area encompasses territory traditionally used by the Kake Tlingit and the Wrangell Stikine Tlingit. While project activity cannot have an effect on past historic events, continued federal management activities can have a long range, cumulative effect on places of importance to the Tlingit. The Forest Service seeks to participate in partnerships and challenge cost share agreements to promote awareness and interpretation of the local heritage.

Historic and prehistoric sites in a project area can be damaged by timber harvest activity. The Tongass National Forest has been consistently implementing the inventory, evaluation, and assessment of effects through the Section 106 process since the early 1980's. Since the known sites are not threatened by any of the presented alternatives we anticipate no impacts to cultural resources; therefore there should be no additional cumulative effects to these sites. Continuous management of these cultural resources through protective actions, such as those proposed in the Forest Service Research Design and various Federal regulations, can minimize the loss of information potentially contained in cultural resource sites.

4.9.7. Recreational Fisheries

The Recreational Fisheries Executive Order (EO 12962) was signed on June 7, 1995. This Executive Order requires Federal Agencies to evaluate and document the effects of Federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries. Under all the alternatives, including the no action alternative, freshwater fish habitat would be conserved in accordance with the Supplemental Memorandum of Agreement with ADF&G on fish passage, and implementation of BMP's and Forestwide Standards and Guidelines as required by the Forest Plan, and as specified in the unit and road cards. No fisheries habitat restoration or enhancement have been proposed under any alternative.

The project area is remote and the proposed road alternatives lack connection to a transportation network. It is anticipated that if a logging camp was active, camp residents would participate in local recreational fishing opportunities. Camp personnel and their families, may take advantage of the road system to access some freshwater fishing sites, but the vast majority of fishing effort and opportunities would remain at saltwater. The proposed road system would access no major inland fish lakes or streams.

The presence of a logging camp, and associated increase in local fishing during the occupation of the logging camp, may deter other users from participating in recreational fishing. Displacement is most likely in small, protected marine waterways, where fishing vessels might be in close proximity. Neither alternative 1 or 3 would add a logging camp, LTF, or roads to the south side of Port Houghton, so it is less likely that existing users would feel displaced, even temporarily, under those alternatives.

None of the alternatives are expected to result in long-term significant change in the use or quality of recreational fisheries.

4.10. Other Environmental Considerations

4.10.1. Probable Adverse Environmental Effects that Cannot be Avoided

Implementation of any action alternative may result in some adverse environmental effects that cannot be effectively mitigated or avoided if the project is to take place. The interdisciplinary procedure used to identify specific harvest units and roads was designed to eliminate or lessen the significant adverse consequences. In addition, the application of standards and guidelines, BMPs, mitigation measures, and a monitoring plan are intended to further limit the extent, severity, and duration of these effects. The specific environmental effects of the alternatives were discussed earlier in this chapter, and the proposed mitigation measures are discussed for each alternative in Chapter 2 and Appendix L. Although the formulation of the alternatives included avoidance of potentially adverse environmental effects, some adverse impacts to the environment which cannot be completely mitigated may occur.

Although standards and guidelines, BMPs, and monitoring plans are designed to prevent significant adverse effects to soils and water, the potential for adverse impacts does exist. Sediment production would occur as long as roads are being built and timber is harvested. Sediment would be produced by surface erosion, channel erosion, and mass movement.

Disturbance, displacement, or loss of wildlife would occur as a consequence of habitat loss and increased human activity in the project area. New road construction and the human activities associated with new access to areas previously unroaded would result in impacts to fish and wildlife. The proposed activities have the potential to increase competition for subsistence resources.

Ground-disturbing activities would temporarily increase sediment loads in some streams. This could temporarily displace fish, reduce anadromous and resident fish reproductive success, and alter aquatic invertebrate populations. In addition, a loss of fish habitat would occur at road crossings of streams. The portion of a stream bed occupied by a culvert or other structures would be lost as fish habitat.

Both the amount and distribution of mature and old-growth stands would be reduced through implementation of any action alternative. The rate and severity of adverse impacts varies by alternative. Because some wildlife species rely on habitat conditions provided by old-growth stands, the reduction in the populations of some wildlife species can be expected. As old-growth forest stands are converted to young even-aged stands, the capability of the project area to provide optimal habitat for old-growth associated species would be reduced.

Timber harvest and road construction in areas that are currently unroaded would alter natural characteristics of these areas. This would modify the recreational experiences that are offered by these areas. Both Primitive and Semiprimitive recreational opportunities would be lost by these actions. In addition, these development activities would result in a loss of opportunity to consider these areas in future revisions of the Forest Plan, for designation as wilderness, as research natural areas, or for other purposes requiring natural characteristics.

The natural landscape would appear visually altered by timber harvest, particularly where logging activity is highly visible from travel routes. These adverse effects would eventually be reduced by growth of vegetation. Other impacts on the natural appearance of the landscape include roads and structures which are highly visible despite efforts to blend them with land forms and mitigate the effect by landscaping.

The intensity and duration of these effects depends on the alternative and the mitigation measures applied to protect the resources. Some unavoidable effects relative to fisheries are expected to be short term (usually less than ten years). However, other unavoidable adverse impacts are long-term, occurring for many years.

One of the most significant adverse impacts that affects most resources is the loss of old-growth forest. Species dependent on old-growth would no longer utilize areas harvested. A return to old-growth forested ecosystems generally would require a minimum of 200 years. Since sustained yield will require logging in 100 years, these old-growth features will not be replaced entirely.

4.10.2. Relationship Between Short-term Uses and Long-term Productivity

Maintaining the productivity of the land is a complex, long-term objective. All alternatives were designed to protect the long-term productivity of the project area through the use of specific standards and guidelines, mitigative measures, and BMPs. Long-term productivity could change as a result of various management activities proposed in the alternatives. Timber management activities would have direct, indirect, and cumulative effects on the economic, social, and biological environment.

All alternatives would come under the mandate of the Multiple Use and Sustained Yield Act of 1960, which requires the Forest Service to manage National Forest lands for multiple uses, including timber, recreation, fish and wildlife, range, and watershed. All renewable resources are to be managed such that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be reestablished and grow again if the productivity of the land is not impaired.

Timber harvest results in the creation of new timber stands and increased growth rates. Old-growth forests are characterized by low or no net growth with annual growth being offset by mortality (Hutchison and Lebau 1975). In areas that would be precommercially thinned, the amount of usable fiber available for industrial use would be increased.

Under current and proposed management direction, the time between the harvest proposed for this timber sale and a subsequent harvest on the same area is estimated at approximately 100 years. After 100 years, these cut stands would be considered for another harvest. Long-term productivity is not expected to be affected from repeated harvest cuts on 100-year rotations.

Short-term use would result in sediment and temperature related impacts to streams. Revegetation of harvest areas over time should significantly reduce these impacts so that long-term productivity is unaffected. Permanent roads would contribute some sediment over time, and could have a small impact on long-term productivity of fish resources.

Soil and water are two key factors in ecosystem productivity, and these resources would be protected in all alternatives to avoid damage that could take many decades to rectify. Sustained yield of timber, wildlife habitat, and other renewable resources all rely on maintaining long-term soil productivity. Quality and quantity of water from the project area may fluctuate as a result of short-term uses, but no long-term effects to the water resource are expected to occur as a result of timber management activities.

All alternatives would provide the fish and wildlife habitat necessary to maintain existing known populations of native and desirable nonnative species throughout the project area. The acreage to be harvested is less than ten percent of the project area. Wildlife species richness and abundance also depend on the quality, quantity, and distribution of habitat, whether used for breeding, feeding, or resting. The standards, guidelines, and mitigative measures that would be implemented for the proposed harvest would maintain long-term habitat and species productivity.

The harvesting of forest land is a trade-off between the immediate, short-term extraction and use of timber and long-term biodiversity of unharvested old-growth forest. Because there is a relatively small proportion of the landscape that is subject to proposed harvesting in the project area, only a correspondingly small loss of long-term biodiversity would be associated with the short-term extraction of timber. These trade-offs would become significant only if the cumulative effects of several harvest entries into the project area and surrounding areas result in substantially greater fragmentation of old-growth habitat.

Subsistence resources would be affected in the short-term through loss or alteration of some wildlife habitat. Revegetation of harvested areas and the completion of logging activities should significantly reduce the possibility of long-term effects to productivity. Permanent roads may provide improved access, which has the remote possibility for a long-term increase in competition for subsistence resources.

4.10.3. Irreversible and Irretrievable Commitment of Resources

Irreversible commitments of resources are decisions to use, modify, or otherwise affect nonrenewable resources such as cultural resources or minerals. Irreversible commitments could also apply to resources that are renewable only over a long period of time such as soils productivity or old-growth forests. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or the resource has been destroyed or removed. All alternatives result in some irreversible commitments, although the extent and potential for adverse effects increase in alternatives that emphasize resource extraction and utilization.

Irretrievable commitments represent opportunities foregone for the period of the proposed actions, during which other resource utilization cannot be realized. These decisions are reversible, but the lost opportunities for utilization are irretrievable. Under multiple-use management, some irretrievable commitments of resources are unavoidable due to the mutually exclusive relationship between some resources. An example of such a commitment is development at logging camps that would be removed at the completion of logging activities. These developments occupy of to 20 acres, and include bunkhouses, mobile homes, fuel storage facilities, etc. For the 3 to 5 years that such developments exist, the opportunity to otherwise utilize these areas is foregone, thus irretrievable.

A proposed timber harvest is major, long-term commitment of resources such as wildlife habitat, that extends in time well beyond the typical land-use planning time-frame. Harvesting of old-growth timber is considered an irreversible loss, because stands may take up to 200 to 300 years to return to existing ecosystem conditions. Some wildlife, adapted only to old-growth conditions, would be irreversibly lost from the harvested areas until this time. Permanent road construction would also result in irreversible loss of wildlife habitat.

Not harvesting old-growth timber is also an irretrievable commitment. There is an irretrievable loss of wood fiber that occurs after a stand reaches the culmination of mean annual increment (CMAI). By definition, old-growth is overmature timber that is beyond CMAI.

In addition to loss of wildlife habitat, permanent road construction would result in loss of wetlands and an irreversible change in the accessibility of fish and subsistence resources. Soil productivity would be eliminated in landings and rockpits.

Irreversible disturbance of some types of cultural resources may occur as a consequence of management activities. This would be especially true for subsurface resources that cannot be located through surface surveys. Even with mitigation, unanticipated or unavoidable disturbances can result in the loss of cultural values. Mitigation efforts such as data recovery involve the scientific and controlled destruction of a cultural resource site. Once undertaken, the effects are irreversible and the mitigation effort becomes an irretrievable commitment to the resource.

The use of energy resources and the removal of mineral resources are irreversible commitments of resources. The utilization of rock resources for road and facility construction would be an example. The use of fossil fuels during project administration activities would be an irreversible resource commitment. Alternatives vary by the amount of energy and mineral resources used; only the no-action alternative abstains from the use of these nonrenewable resources at this time.

In unroaded areas, development activities such as timber harvest and the road construction associated with harvest would irreversibly reduce the potential amount of area that could be designated as a part of the National Wilderness Preservation system, managed as a Research Natural Area, or managed for other purposes requiring natural characteristics.

In the short-term, recreation experiences would be directly affected by road construction and timber harvesting, including the presence of heavy equipment in the area. Over time, as the harvest units revegetate and the modification of the landscape becomes less evident to visitors, roaded modified opportunities would be replaced by semi-primitive motorized recreation opportunities. Construction of permanent roads would contribute to long-term public access into the area for recreation.

The majority of the project area is currently viewed as roadless, unmodified landscape where only ecological change occurs. Introduction of harvest units, roads, and rockpits would permanently alter the undeveloped character and old-growth qualities. Green-up of harvested land would occur over time, and visual contrasts would begin to soften in five years, with an eventual return to old-growth forest in 200 years without further timber harvest. Most of the proposed road miles, and rockpits would result in permanent alterations to the existing unmodified landscape.

4.10.4. Possible Conflicts with Plans and Policies of Other Jurisdictions

The regulations for implementing NEPA require a determination of possible conflicts between the proposed action and the objectives of federal, state, and local land use plan, policies, and controls for the area. The major land use regulations of concern are the Coastal Zone Management Act (CZMA), Section 810 of ANILCA, the Federal Clean Water Act, state air pollution standards, and the State of Alaska's Forest Practices Act. A discussion of each of these determinations is presented below.

4.10.4.1. Coastal Zone Management Act of 1976 (CZMA)

The CZMA was passed by Congress in 1976 and amended in 1990. This law, as amended, requires Federal agencies conducting activities or undertaking development affecting the coastal zone to ensure that the activities or developments are consistent with approved State coastal management programs to the maximum extent practicable. The State of Alaska passed the Alaska Coastal Management Act in 1977 to establish a program that meets the requirements of the CZMA. It contains the standards and criteria for a determination of consistency for activities within the coastal zone.

Standards against which the consistency evaluation takes place are: Alaska Statute Title 46, Water, Air Energy, and Environmental Conservation; and the Alaska Forest Practices Act of 1990.

The Forest Service has evaluated the alternatives to ensure that the activities and developments affecting the coastal zone are consistent with the enforceable policies of the approved State management program to the maximum extent practicable. The standards and guidelines for timber management activities in the Port Houghton/Cape Fanshaw project area meet or exceed those indicated in the Alaska Forest Practices Act and the Alaska Coastal Management Program.

A review of state agency input and comments, and evaluation of the proposed activities with required standards and guidelines and mitigation measures, against enforceable policies for activities within the coastal zone results in a determination that these activities are consistent with the Alaska Coastal Management Program to the greatest extent practicable. This consistency determination will be reviewed by the State of Alaska Office of Governmental Coordination.

4.10.4.2. Alaska National Interest Lands Conservation Act of 1980 (ANILCA)

Under Section 810 of ANILCA, agencies are required to evaluate the effects of proposed actions on subsistence uses of Federal land and to determine if the proposed action may significantly restrict subsistence opportunities. Refer to the *Subsistence* section of this chapter for the evaluation of impacts to subsistence use as a result of the alternatives.

4.10.4.3. Clean Water Act

Federal Clean Water Act of 1972, as amended in 1977, and the MOU signed between the Forest Service and the ADEC, require the Forest Service to comply with all Federal and State water quality regulations. This act provides a means to protect and improve the quality of the water resources, including wetlands, and maintain their beneficial uses. All alternatives will comply with these standards.

4.10.4.4. Clean Air Act

The project area is governed by ambient particulate standards of 60 $\mu g/m^3$(24-hr). Additionally, the region is classified as a Class II area, which establishes a particulate matter increment for allowable increases above baseline levels. The increments for particulate matter in a Class II area are in annual geometric mean of 19 $\mu g/m^3$. The project area is presently in compliance with these standards. The proposed logging activity would not change this status.

4.10.4.5. State of Alaska's Forest Practices Act of 1990

On May 11, 1990, Governor Cowper approved the legislature's major revision of the State's Forest Practices Act (FPA). The revised act significantly increases the State's role in providing protection and management for important forest resources on State and private lands. The revised Forest Practices Act would also affect

National Forest management through its relationship to the ACMP and the Federal CZMA (see above discussion).

For National Forest timber operations, such as proposed for the project area, the effect of the revised Forest Practices Act is essentially two-fold. First, it clarifies that the revised Forest Practices Act is the standard which must be used for evaluating timber harvest activities on Federal lands for purposes of determining consistency to the maximum extent practicable with the CZMA. Secondly, it calls for minimum 66-ft buffers on all Class I streams, and recognizes that consistency to other maximum extent possible for purposes of the Alaska Coastal Management Program is attainable in Federal timber harvest activities using specific methodologies which may differ from those required by the revised Forest Practices Act or its implementing regulations.

The TTRA prohibited commercial timber harvesting within buffer zones established on all Class I streams and those Class II streams which flow directly into a Class I stream. Buffer zones have a minimum width of 100-ft distance from the edge of either side of the stream.

4.10.5. Compliance with Other Laws and Executive Orders

4.10.5.1. National Forest Management Act

The National Forest Management Act (NFMA) requires specific determinations regarding consistency with the existing Forest Plan and Regional Guide. It also requires a determination of clearcutting as the optimal method of harvesting, and specific authorization of clearcuts over 100 acres. Final determinations will be made in the Record of Decision for the Final Environmental Impact Statement.

Tongass Land Management Plan and Alaska Regional Guide. This project plan is consistent with the 1997 Tongass Land Management Plan and the Alaska Regional Guide.

Clearcutting as the Optimal Method of Harvest. The Alaska Regional Guide established management direction and standards for western hemlock-Sitka spruce forest type (Alaska Regional Guide, page 3-18). The Guide states that even-aged management in the form of clearcutting will be used only where this practice is determined to be optimum to meet the objectives and requirements of the Forest Plan, where there is a high risk of dwarf mistletoe reinfection, and where risk of windthrow is determined to be high. Dwarf mistletoe is somewhat of a problem in specific areas within the Port Houghton/Cape Fanshaw project area. All harvest units in this project proposed for the harvest method of clearcut with reserves have either a high level of mistletoe infection or a high risk of windthrow. Clearcutting the units will help meet the objective of maintaining fast growing, mistletoe-free stands of mixed species. It is the optimum method of harvesting, considering the following factors referenced in the Alaska Regional Guide:

> Hemlock dwarf mistletoe, *Arcenthobium tsuqense*, an important parasite of western hemlock can best be controlled by clearcutting. Elimination of residual overstory trees infected with dwarf mistletoe prevents infection of western hemlock in the new stand. Risk of blowdown in residual stands is eliminated. The chance of blowdown along cutting boundaries is increased but can be reduced through proper design of cutting units.

In addition to the direction in the Alaska Regional Guide, the Chief of the Forest Service established new provisions in June 1992 for the reduction of clearcutting on National Forest System Lands. The new provisions state that clearcutting is to be limited to areas that involve at least one of seven specific circumstances. The clearcuts prescribed in the Port Houghton/Cape Fanshaw project area meet the following circumstances as specified in that direction:

> "To preclude or minimize the occurrence of potentially adverse impacts or insect or disease infestations, windthrow, logging damage, or other factors affecting forest health" (USDA Forest Service 1992).

Clearcuts Over 100 Acres in Size. There are no units in any of the action alternatives which create openings exceeding 100 acres.

Tongass Timber Reform Act

Harvest units would maintain a minimum 100-foot buffer for all Class I streams and Class II streams that flow directly into Class I streams, as required in Section 103 of the TTRA. The actual widths of these buffers would often be greater than the 100-foot minimum because of Forest Plan requirements. Unit cards include BMPs for protection for all streams of all classes.

Endangered Species Act

The action alternatives would not have a direct, indirect, or cumulative effect on any threatened or endangered species in the Port Houghton/Cape Fanshaw project area. A biological evaluation was prepared in compliance with requirements of the Endangered Species Act and Forest Service TES plant and animal policy.

Bald and Golden Eagle Protection Act

Management activities inconsistent with current bald eagle use within 330 feet of an eagle nest tree are restricted by an Interagency Agreement between the Forest Service and the USFWS. One variance from the Agreement has been obtained for a nest site near the Little Lagoon LTF.

National Historic Preservation Act

Heritage resource surveys have been completed in the project area. The State Historic Preservation Officer has been consulted and concurred with the finding that the project would have no effect on heritage resources. Forest Service timber sale contracts contain enforceable measures for protecting any undiscovered heritage resources that might be encountered during sale operations.

Wild and Scenic Rivers Act

The 1997 Forest Plan EIS Record of Decision did not recommend any rivers in the project area for inclusion in the National Wild and Scenic Rivers System.

Federal Cave Resource Protection Act of 1988

The action alternatives would not have a direct, indirect, or cumulative effect on any significant cave in the Port Houghton/Cape Fanshaw project area.

Executive Order 11988

Executive Order 11988 directs federal agencies to take action to avoid, to the extent possible, the long- and short-term impacts associated with the occupancy and modification of floodplains. The numerous streams in the Port Houghton/Cape Fanshaw project area make it impossible to avoid all floodplains during timber harvest and road construction. The design of the developments and the application of BMPs would combine to minimize adverse impacts on floodplains.

Executive Order 11990

Executive Order 11990 requires federal agencies to avoid to the extent possible the long- and short-term adverse impact associated with the destruction or modification of wetlands. The action alternatives avoid most identified wetlands. However, many small wetlands or muskegs occur as inclusions with forested areas. These areas may be altered by timber harvest or road construction; however, techniques and practices required by the Forest Service would maintain wetland attributes. It is estimated there would only be minimal loss of wetlands with any of the alternatives. Soil moisture regimes and vegetation on some wetlands may be altered in some cases; these altered acres would still be classified as wetlands, and function as wetlands in the ecosystem.

Executive Order 12898

Executive Order 12898 directs federal agencies to identify and address the issue of environmental justice, i.e., adverse human health and environmental effects of agency programs that disproportionately impact minority and low income populations. The Executive Order specifically directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife. The issue of environmental justice has been addressed through the Port Houghton/Cape Fanshaw NEPA analysis by identifying minority or low income communities that may be affected by timber management activities; by ensuring that scoping and public involvement activities reach those communities; by evaluating the effects of the alternatives on such communities; and by documenting the analysis in this EIS.

Executive Order 12962

Executive Order 12962 directs federal agencies, to the extent permitted by law and where practicable, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities. Federal agencies are required to evaluate the effects of federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of the Executive Order Planning for the Port Houghton/Cape Fanshaw project included documentation of existing recreational fisheries opportunities; protection of riparian, water quality, and fisheries habitats; and identification of fisheries enhancement opportunities. Harvest unit and road design are consistent with the standards and guidelines in the Forest Plan.

4.10.6. Energy Requirements and Conservation Potential of Alternatives

The implementation of any action alternative in the Port Houghton/Cape Fanshaw area will require the expenditure of energy (e.g., fuel consumption). The amount of energy used varies by alternative based on timber volume harvested and miles of road constructed. The direct effect of the alternatives on energy requirements would be attributed to timber harvest, road construction, and travel necessary to administer the timber sale. Indirect energy requirements include processing wood products and the transport of the products to secondary processors and consumers. The estimated total fuel consumption required for each alternative is displayed in Table 4-33.

Table 4-33
Estimated Fuel Consumption (Gallons)

	Alternative					
Activity	2	3	4	5	6	7
Preparation and Administration (1.56 gallons/MBF)	189,841	17,706	218,203	121,187	36,516	154,513
Logging and Transportation (14.8 gallons/MBF)	1,801,056	167,980	2,070,135	1,149,723	346,438	1,465,896
Road Construction and Maintenance (4,000 gallons/mile)	365,600	40,000	413,600	254,400	91,200	302,000
Total Consumption	**2,356,497**	**225,686**	**2,701,938**	**1,525,310**	**474,154**	**1,922,409**

Note: The estimated fuel consumption for timber harvest activities is based on consumption per MBF of sawlog volume.
Source: Regan 1998.

4.10.7. Natural or Depletable Resource Requirements and Conservation of Alternatives

All alternatives considered in detail are designed to conform to applicable laws and regulations pertaining to natural or depletable resources, including minerals and energy resources. Regulation of mineral and energy activities on the National Forest, under the U.S. Mining Laws Act of May 1872 and the Mineral Leasing Act of February 1920, is shared with the USBLM. The demand for access to National Forest lands for the purpose of mineral and energy exploration and development is expected to increase over time.

The action alternatives propose road construction that would increase opportunities for access to the National Forest within the project area. This increased access may result in increased activity with regard to potential mineral or energy resource occurrences.

4.10.8. Urban Quality, Historic and Cultural Resources, and the Design of the Built Environment

The project area contains no urban areas or built-up areas of any kind. Therefore, the only applicable concern under this topic is with historic and cultural resources. The goal of the Forest Service's Cultural Resource Management Program is to preserve significant cultural resources in their field setting and ensure they remain available in the future for research, social/cultural purposes, recreation, and education. There are adequate standards, guidelines, and procedures to protect cultural resources and to meet the goals of the Cultural Resource Management program. Cultural resources and the proposed project design are discussed in the *Cultural Resources* section of this chapter.

4.10.9. Effects of Alternatives on Consumers, Civil Rights, Minorities, and Women

All Forest Service actions have the potential to produce some form of impacts, positive and/or negative, on the civil rights of individuals or groups, including minorities and women. The need to conduct an analysis of the potential impact is required by Forest Service manual and Handbook direction. The purpose of the impact analysis is to determine the scope, intensity, duration, and direction of impacts resulting from a proposed action. For environmental or natural resource actions as proposed for the project, the civil rights impact analysis is an integral part of the procedures and the variables associated with the social impact analysis.

The effect of the alternatives on consumers is reflected in the discussion of the various goods and services supplied as a result of the proposed actions. This analysis occurs throughout this chapter as an integral part of the analysis pertinent to the effects on minorities as part of the cultural resource, economics, and subsistence sections.

4.10.10. Effects of Alternatives on Prime Farm Land, Rangeland, and Forest Land

All alternatives are in keeping with the intent of Secretary of Agriculture Memorandum 1827 for prime land. The project area does not contain any prime farm lands or rangelands. Prime forest land does not apply to lands within the National Forest system. In all alternatives, lands administered by the Forest Service would be managed with a sensitivity to the effects on adjacent lands.

4.10.11. Effects of Alternatives on Threatened and Endangered Species, and Critical Habitat

There will be no adverse impacts to any Federally listed threatened and endangered species or critical habitat as a result of this project. The discussion of the effects of the alternatives on threatened and endangered species is presented in Section 4.4, Threatened, Endangered, Candidate and Sensitive Species.

Chapter 5

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Chapter 5

5. References Cited

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Chapter 6

Glossary

Chapter 6

Glossary

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

Access Management
Acquiring rights and developing and maintaining facilities needed by people to get to and move through public lands.

Adfluvial Fish
Species or populations of fish that do not go to sea, but live in lakes or ponds, and travel to streams to spawn.

Alaska National Interest Lands Conservation Act (ANILCA)
Passed by Congress in 1980. Public Law 96-487, 96th Congress, 94 Stat. 2371-2551.

Alaska Native Claims Settlement Act (ANCSA)
Approved December 18, 1971. Provides for the settlement of certain land claims of Alaska natives and for other purposes. Public Law 92-203, 92nd Congress, 85 Stat. 688-716.

Allowable Sale Quantity (ASQ)
The maximum quantity of timber that may be sold each decade from suitable lands covered by the Forest Plan (USDA Forest Service 1997).

All-Terrain Vehicle (ATV)
A wheeled vehicle less than 40 inches wide.

Alluvial Fan
A body of unconsolidated material (including gravel, sand, silt, and clay) deposited by running water, with or without debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley (or V-notch) onto a plain.

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.

6 Glossary

Anadromous Fish
Fish species that spend part of their lives in fresh water and part of their lives in salt water. Anadromous fish include pink, chum, coho, sockeye, and king salmon, and steelhead trout. There are also anadromous Dolly Varden char.

Background
The distance part of a landscape. The seen or viewed area located from 3 to 5 miles to infinity from the viewer. See also Foreground and Middleground.

Bark deposition
The settling out and accumulation of bark in the water, commonly referred to as a bark layer, and quantified in inches or centimeters. Usually associated with log transfer facilities.

Bark dispersion
The process of bark being scattered from the point of entry into the water and accumulation by the action of sea currents and tide fluctuations.

Beach Fringe Habitat
Habitat that occurs from the intertidal zone inland 500 feet, and islands of less than 50 acres.

Best Management Practice (BMP)
A practice or combination of practices that, after problem assessment, examination of alternative practices, and appropriate public participation is determined by a state to be the most effective and practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals. A BMP is an action-initiating mechanism which eventually leads to the interdisciplinary development of a site-specific prescription. BMPs are found in Forest Service Handbook 2509.22.

Biological Diversity (Biodiversity)
The variety of life forms and processes, including the complexity of species, communities, gene pools, and ecological functions, within the area covered by a land management plan.

Blowdown
See windthrow.

Bogs, Fens, and Peatlands
A tract of low, marshy ground consisting of organic terrain, relatively rich in mineral salts. The area is typically undrained or imperfectly drained with a vegetation complex composed of sedges, shrubs, and sphagnum mosses, typically with peat formation.

Buffer
An area of undisturbed or lightly disturbed forest reserved to isolate activity areas from sensitive areas.

Candidate Species
Those species of plant or animal that are under consideration (by U.S. Fish and Wildlife Service and National Marine Fisheries Service) for listing as threatened or endangered but which are provided no statutory protection under the Endangered Species Act.

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

Carrying Capacity
The maximum number of species that can be supported indefinitely by available resources in a given area.

Cave
Legally defined under federal law as "any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or human-made. Such term shall include any natural pit, sinkhole or other feature which is an extension of the surface," (Federal Cave Resource Protection Act of 1988).

Cave Resources
Any material or substance occurring in caves on Federal lands, such as animal life, plant life, paleontological resources, cultural resources, sediments, minerals, speleogens, and speleothems.

Channel Migration
Movement of a stream or river channel within a floodplain area, usually over an extended period of time.

Channel Types
The defining of stream sections based on watershed runoff, landform relief, and geology.

Class I, II, III Streams
See Aquatic Habitat Management Units.

Clearcut with Green Tree Retention
See Regeneration Methods

6 Glossary

Climax
A community of plants and animals which is relatively stable over time and which represents the late stages of succession under the current climate and soil conditions.

Commercial Forest Land
Productive forest land that is producing or capable of producing continuous crops of industrial wood and is not withdrawn from timber use 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.

Commercial Thinning
Thinning a stand where the trees to be removed are large enough to sell.

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 right-of-way.

Cover
Refers to trees, shrubs, or other landscape features that allow an animal to partially 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.

Crown
The tree canopy. The upper part of a tree or woody plant that carries the main branch system and foliage.

Cruise
The general activity of determining timber volume and quality.

Cull Logs
Trees that do not meet certain quality specifications.

Culturally Modified Tree (CMT)
A tree which has been intentionally altered by Native people participating in the traditional use of the forest.

Cultural Resource Sensitivity Zones
Areas determined by a Tongass National Forest predictive model to have high, medium, and low site potential, based largely on elevation and slope angle criteria.

Cultural Resources
Historic or prehistoric objects, sites, buildings, structures, etc., that result from past human activities.

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

Debris Avalanche
The sudden movement downslope of the soil mantle; it occurs on steep slopes and is caused by the complete saturation of the soil from prolonged, heavy rains.

Debris Flow
A general term for all types of rapid movement of debris downslope.

Deer Winter Range
Locations that provide food and shelter for Sitka black-tailed deer under moderately severe to severe winter conditions.

Developed Recreation
Recreation that requires facilities that, in turn, result in concentrated use of an area, such as campgrounds and ski areas. Facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings. See also Dispersed Recreation.

Diameter at Breast Height (dbh)
The diameter of a tree measured 4 feet 6 inches from the ground.

Direct Employment
The jobs that are immediately associated with the timber sale including, for example, logging, sawmills and pulp mills.

Directional Falling
The use of specialized equipment, such as hydraulic jacks, to influence the direction of tree falling.

Discount Rate
The rate used to adjust future benefits or costs to their present value.

Dispersed Recreation
Recreational activities that are not confined to a specific place and are generally outside developed recreation sites. This includes activities such as scenic driving, hiking, backpacking, hunting, fishing, snowmobiling, horseback riding, cross-country skiing, and recreation in primitive environments. See also Developed Recreation.

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.

Down
A tree or portion of a tree that is dead and laying on the ground.

Draft Environmental Impact Statement
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).

Eagle Nest Tree Buffer Zone
A 330-foot radius around eagle nest trees established in a Memorandum of Understanding between the U.S. Fish and Wildlife Service and the Forest Service.

Ecosystem
A community of organisms and its physical setting. An ecosystem, whether a fallen log or an entire watershed, includes resident organisms, nonliving 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 EIS 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.

Embeddedness
The degree that larger particles (e.g., cobbles and gravel) are surrounded or covered by fine sediment.

Encumbrance
A claim, lien, charge, or liability attached to and binding real property.

Endangered Species
A species of plant or animal which 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.

Environmental Analysis
A comprehensive evaluation of alternative actions and their predictable short-term and long-term environmental effects, which include physical, biological, economic, social, and environmental design factors and their interactions. An EA is less comprehensive than an EIS, and may result in a Finding of No Significant Impact. Should the EA reveal significant impacts, a full EIS must then be conducted.

Ephemeral Stream
A stream or portion of a stream which flows only in direct response to precipitation. It receives little or no water from springs and no long-continued supply from melting snow or other sources. Its channel is at all times above the water table. The term may be arbitrarily restricted to streams which do not flow continuously during periods of one month.

Epikarst
The surface of karst. Epikarst is an intensely dissolved veneer consisting of an intricate network of intersecting dissolution-widened fissures, cavities, and tubes. It is this network of intersecting fissures which collects and transports surface waters and nutrients vertically to the underlying karst conduits.

Erosion
The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities.

Escapement
Adult anadromous fish that escape from all causes of mortality (human-caused or natural) to return to streams to spawn.

Estuarine Fringe Habitat
A 1,000-foot zone around an estuary.

Estuary
An ecological system at the mouth of a stream where fresh water and salt water mix, and where salt marshes and intertidal mudflats are present. The landward extent of an estuary is the limit of salt-intolerant vegetation, and the seaward extent is a stream's delta at mean low water.

Even-Aged 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. Clearcutting is an example of this type of management.

Existing Visual Condition (EVC)
The level of visual quality or condition presently occurring on the ground. The six existing visual condition categories are:

Type I: These areas appear to be untouched by human activities.

Type II: Areas in which changes in the landscape are not noticed by the average person unless pointed out.

Type III: Areas in which changes in the landscape are noticed by the average person but they do not attract attention. The natural appearance of the landscape still remains dominant.

Type IV: Areas in which changes in the landscape are easily noticed by the average person and may attract some attention. Although the change in landscape is noticeable, it may resemble a natural disturbance.

Type V: Areas in which changes in the landscape are obvious to the average person. These changes appear to be major disturbances.

Type VI: Areas in which changes in the landscape are in glaring contrast to the natural landscape. The changes appear to be drastic disturbances.

Facility
Any structure that is a result of a resource activity. This includes roads, LTFs, rock pits, logging camps, dams, bridges, and culverts, to list a few.

Final Environmental Impact Statement (FEIS or Final EIS)
The final version of the statement of environmental effects required for major federal actions under Section 102 of the National Environmental Policy Act. It is a revision of the Draft EIS that includes public and agency responses to the draft. The decision maker chooses which alternatives to select from the Final EIS, and subsequently issues a Record of Decision (ROD).

Fish Habitat
The aquatic environment and the immediately surrounding terrestrial environment that, combined, afford the necessary physical and biological support systems required by fish species during various life stages.

Fish Timing
A mitigation measure that restricts construction activities within an anadromous fish stream to minimize impacts on fish eggs, fry, and migrating salmonids. The normal period during which construction is permitted in fish streams is May 15 to August 20.

Floodplain
The lowland and relatively flat areas joining inland and coastal waters, including debris cones and flood-prone areas of offshore islands; including, at a minimum, that area subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given year.

Forbs
Any herb that is not a grass or is not grasslike.

Foreground
The stand of trees immediately adjacent to a scenic area, recreation facility, or forest highway; the area located less than 3 mile from the viewer. See also Background and Middleground.

Forested Habitat
All areas with forest cover. Used in this EIS 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.

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.

6 Glossary

Geomorphology
The study of the forms of the land surface and the processes producing them. Also the study of the underlying rocks or parent materials and the landforms present that were formed in geological time.

Group Selection
See Regeneration Methods

Guidelines
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 that is occupied by an organism, population, or community of plants or animals.

Habitat Capability
The number of healthy animals that a habitat can sustain.

Habitat Conservation Areas (HCAs)
See Old-growth Habitat Reserve.

Habitat Improvement
Management of wildlife and fish habitat to increase their capability.

Hard Snags/Soft Snags
Hard snags are dead trees which have little decay and are generally still hard wood. Soft snags are dead trees which have considerable decay and are generally soft, broken wood.

Harvesting Method (Cutting Method)
A method by which a stand is logged. Emphasis is on meeting logging requirements while concurrently attaining silvicultural objectives (see Regeneration Method).

Haul Out
An area of large, smooth rocks used by seals and sea lions for resting and pupping.

Home Range
A community's "Home Range" is defined as the area regularly accessed by typical day users from that community on an average day. In theory, this is the area which receives the most recreation use by the people of a specific town. This concept creates a radius of between 15 and 30 miles around communities wherein most recreation takes place. While there is no precise definition of "home range," 20 miles is the estimated furthest distance a person in a skiff could travel from and to a community in the daylight and still use a Recreation Place.

Indicator Species
See Management Indicator Species.

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

Interdisciplinary (ID) Team
A group of people with different backgrounds who are assembled to research, analyze, and write a project EIS. The team is formed out of the recognition that no one scientific discipline is sufficiently broad to adequately analyze a proposed action and its alternatives.

Intermittent Roads/Facilities
A road or facility that is developed and operated for periodic service and closed for more than one year between periods of use.

Irretrievable Commitments
Loss 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 not irreversible.

Irreversible Commitments
Decisions causing changes that 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 time be allocated to wilderness. Once harvested, the ability of the area to meet wilderness criteria has been irreversibly lost. Often applies to nonrenewable resources such as mineral and cultural resources.

Karst
Topography which develops as the result of the dissolution of soluble rocks, such as limestones and marbles. Dissolution of the subsurface strata produces a landscape that is characterized by well-developed subsurface drainage, collapse features such as sinkholes, dry valleys, vertical shafts, caves, and fluted rock surfaces (epikarst).

Knutsen-Vandenberg Act (KV)
An Act was passed by Congress in 1930 and amended in 1976 to provide for restoration, resource protection, and improvement projects in timber sale areas from funds collected as a portion of the stumpage fee paid by the purchaser. Examples of such projects are stream bank stabilization, fish passage structures, and wildlife habitat improvement.

Krummholz
A physiognomic modification to plants of high elevation areas caused by physical and desecration damage by wind and blowing ice crystals. Vegetation is stunted; twisted and shaped by the blowing winds and snow. The krummholz zone is typically of higher elevation than subalpine forest fringe but below alpine tundra.

Land Use Designation (LUD)
A defined area of land specific to which management direction is applied.

Land Use Prescriptions
Specific management direction applied to a defined area of land (land use designation as defined in the Forest Plan) to attain multiple use and other goals and objectives.

Large Woody Debris (LWD)
Any large piece of relatively stable woody material having at least a diameter of greater than 10 centimeters and a length greater than one meter that intrudes into the stream channel.

Layout
Planning and mapping (using aerial photos) of harvest and road systems needed for total harvest of a given area. Also can refer to the process of on ground designation of roads and harvest units.

Logging Systems

Highlead: A cable yarding system, using a two-drum yarder, in which lead blocks are hung on a spar or tower to provide lift to the front end of the logs.

Aerial Logging Systems: Systems where the cut logs are moved from the stump to the loading area or log deck without touching the ground typically utilizing a helicopter.

Live Skyline/Gravity Carriage Return: A two-drum, live skyline yarding system in which the carriage moves down the skyline by gravity; thus, it is restricted tophill yarding. The skyline is lowered to attach logs then raised and pulled to the landing by the mainline.

Live Skyline/Haulback Required: A live skyline yarding system composed of skyline, mainline, and haulback; the carriage is pulled to the woods by the haulback; the skyline is lowered to permit the chokers to be attached to the carriage, and the turn is brought to the landing by the mainline.

Logging Systems and Transportation Analysis (LSTA)
The LSTA is a map that displays all tentatively suitable timber formed into logical settings; the landings for and the logging system assigned to each setting; and the road system(s) to access all settings, exclusive of those for which helicopter

yarding is proposed. Aerial photo interpretation, use of contour maps, and ground verification are used for plan development. The term is also sometimes referred to as a Logging System Transportation Plan (LSTP).

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 siting and construction are regulated by the 1987 Amendments to the Clean Water Act; formerly termed A terminal transfer facility.@

Long Term Roads/Facility
Roads and facilities that are developed and operated to provide either continuous or intermittent access for long-term land management and resource utilization needs.

Management Area
An area of one or more Value Comparison Units (VCUs) in size for which management direction was written in the Tongass Land Management Plan.

Management Indicator Species (MIS)
Species of vertebrates and invertebrates whose population changes are believed to best indicate the effects of land management. The following categories were used to select MIS: endangered and threatened plant and animal species identified on State and Federal lists; species with special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished, or trapped; nongame species of special interest; additional plants or animals selected because their population changes are believed to indicate effects of management activities on other species of a major biological community or on water quality.

Marginal
Commercial forest land (CFL) areas that do not qualify as standard or special CFL since they are not operable under short-term (ten years or less) projections of accessibility and economic conditions.

Mass Failure
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.

Mass Wasting
A general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another. Also known as mass movement.

MBF
A thousand board feet net sawlog and utility volume.

Microblade
A specific type of small, thin blade tool with roughly parallel sides and a prepared proximal end. Often made from chert or obsidian.

Midden
A deposit of occupation debris, rubbish, or other by-products of human activity.

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 3 to 5 miles from the viewer. See also, Foreground and Background.

Mid-Market Analysis
The value and produce mix represented at the quarter in which the pond log value (end-product selling price less manufacturing cost) for the species and product mix most closely match the point between the ranked quarters of the Alaska Index Operation pond log value, adjusted to Common Year Dollars, where one-half of the harvest of timber from the Tongass National Forest has been removed at higher values and one-half of the timber has been removed at lower values during the period from 1979 to the current quarter (FSH 2409.22 R10 Chapter 531.1-2).

Mineral Soils
Soils consisting predominantly of, and having properties determined by, mineral matter.

Mining Claims
A geographic area of the public lands held under the general mining laws in which the right of exclusive possession is vested in the locator of a valuable mineral deposit.

Mitigation
Measures designed to counteract environmental impacts or to make impacts less severe. These measures may include avoiding an impact by not taking a certain action or part of an action, minimizing an 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 or environments.

MMBF
A million board feet net sawlog and utility volume.

MMCF
A million cubic feet net sawlog and utility volume.

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 (Implementation Monitoring); to confirm whether mitigation measures were effective (Effectiveness Monitoring); or to validate whether overall goals and objectives were appropriate (Validation Monitoring). Different levels call for different monitoring methods.

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

Mycorrhizae
A mutualism between plant roots and certain kinds of fungi. The plants exude carbon compounds to the fungi and the fungi provide the plants with soil nutrients, such as phosphorus.

Natal Streams
Home stream where an anadromous fish is hatched.

National Forest Management Act (NFMA)
A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of Forest plans, Regional guides, and 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.

Native Allotment
A tract of nonmineral land, not to exceed 160 acres, on which an Alaska Native (who was 21 years of age or head of a household) established continuous use and occupancy prior to the creation of the National Forests (authorized under the Native Allotment Act of May 17, 1906).

Native Selection
Application by Native corporations and individuals to a portion of the Bureau of Land Management for conveyance of lands withdrawn in fulfillment of Native entitlements established under ANCSA.

Net Sawlog Volume
Trees suitable in size and quality for producing logs that can 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.

Noncommercial Forest Land
Land with more than 10 percent cover of commercial forest tree species but not qualifying as commercial forest land (CFL).

Notice of Intent (NOI)
A notice printed in the Federal Register announcing that an EIS will be prepared. The NOI must describe the proposed action and possible alternatives, describe the agency's proposed scoping process, and provide a contact person for further information.

Offering
A Forest Service specification of timber harvest units, subdivisions, roads, and other facilities and operations to meet the requirements of a contract.

Offering Area
A geographic area identified by the Forest Service within which the offering specifications are outlined. One or more offering areas may be identified within all or a portion of a project area.

Off-Highway Vehicle (OHV)
Any vehicle that is restricted by law from operating on public roads for general motor vehicle traffic. Includes motorbikes, minibikes, trailbikes, snowmobiles, dunebuggies, all-terrain vehicles, and four-wheel drive, high-clearance vehicles (FSM 2355.01). Sometimes referred to as off-road vehicle or ORV.

Old-Growth Forest
A forest stand characterized by trees well past the age of maturity (dominant trees exceed 300 years on age). Stands exhibit declining growth rates and signs of decadence such as dead and dying trees, snags, and downed woody material. Stands include trees of all ages, multilayered canopies, a range of tree diameter sizes (including very large diameter trees up to and exceeding 3 meters), and the

notable presence of understory vegetation. Old growth forests provide important habitat for Sitka black-tailed deer, marten, black bears, cavity-nesting birds, raptors, and other wildlife species.

Old-Growth Habitat Reserve.
A contiguous unit of old-growth forest habitat to be managed to maintain the integrity of the old-growth forest ecosystem. A system of large, medium, and small habitat reserves that are part of a landscape conservation strategy used to address National Forest Management Act requirements to maintain habitat to support viable wildlife populations well distributed across the Tongass National Forest. Also known as Habitat Conservation Areas (HCAs).

Large Reserves: A landscape of at least 20,000 acres of productive old-growth forest, within a landscape of at least 40,000 acres. To address habitat quality, at least 50 percent (10,000 acres) of the old growth must be highly productive. To ensure interaction of species and dispersal between large reserves, they must be no more than 20 miles apart.

Medium Reserves: A landscape of at least 5,000 acres of productive old growth of which at least 2,500 acres must be the highly productive component. Old growth must occur within a landscape of at least 10,000 acres. Medium reserves should be no less than 8 miles apart to facilitate dispersal and recolonization.

Small Reserves: Provide at least one 800 acres block of productive old growth forest within an area of at least 1600 acres within each 10,000 acres landscape (e.g. 16 percent of each VCU).

Overmature
The stage at which a tree declines in vigor and soundness; for example, past the period of rapid height growth.

Overstory
The portion of trees in a forest that forms the uppermost layer of foliage, usually formed by the tallest trees. Also called the canopy.

Overstory Removal
See Regeneration Methods.

Partial Cut
Method of harvesting trees (not clearcutting) where any number of live stems are left standing in any of various spatial patterns. Can include seed tree, salvage, group selection, shelterwood, shelterwood with reserves, overstory removal, or other methods.

Patch
A nonlinear surface area differing in appearance from its surroundings.

Peak Flow
The highest discharge of water recorded over a specified period of time at a given stream location.

pH
The degree of acidity or alkalinity.

Planning Record
A detailed, formal account of the planning process for an EIS. The record contains data, maps, reports, planning process information, and results of public participation in the planning process. The Planning Record documents the decisions and activities that resulted in the Final EIS. Planning records are available for public review upon request under the Freedom of Information Act.

Plant Association
Climax plant community type.

Podzol
A process of soil development characterized by: (1) rapid accumulation of organic material at the surface, followed by an accumulation of fine organic material at the top of the mineral soil horizons, (2) downward migration of nutrients, leaving a leached layer (often whitish in color) at the top of the mineral layer, and (3) in some areas, development of an impervious iron pan layer. Podzol development occurs in portions of the northern temperate zone, primarily in areas dominated by conifers.

Pond Value
The delivered price of logs at the mill minus the cost to manufacture them into usable products.

Population Viability
Ability of a population to sustain itself.

Precommercial Thinning
The practice of removing some of the trees of less than marketable size from a stand in order to achieve various management objectives.

Present Net Value
The difference between benefits and costs associated with the alternatives.

Proportionality
Section 301(c)(3) of the Tongass Timber Reform Act requires that harvest of high volume old-growth (volume classes 6 and 7) will not be at an accelerated rate. The Act requires that the proportion of harvest in volume classes 6 and 7 will not exceed the proportion of volume of these classes currently represented in a contiguous management area.

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.

Purchaser
The term used to describe the buyer of the Forest Service timber sale contract.

Rain-on-Snow Events
Term used to describe the rapid melting of snow during warm, windy periods of high rainfall which accounts for most high stream flows. These high flows have the greatest likelihood for causing significant effects through alteration of forest hydrologic processes. This occurs through the influence of timber harvest on snow accumulation and melt during these events.

Record of Decision (ROD)
A document separate from, but associated with, an EIS that states the decision, identifies all alternatives, specifying which were environmentally preferable, and states whether all practicable means to avoid environmental harm from the alternatives have been adopted, and if not, why not.

Recreation Opportunity Spectrum (ROS)
A system for planning and managing recreation resources that categorizes recreation opportunities into seven classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs 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. The ROS classes are:

Primitive. An unmodified environment generally greater than 5,000 acres in size and located generally at least 3 miles from all roads and other motorized travel routes. A very low interaction between users (generally less than 3 group encounters per day) results in a very high probability of experiencing solitude, freedom, closeness to nature, tranquillity, self-reliance, challenge, and risk. Evidence of other users is low. Restrictions and controls are not evident after entering the land unit. Motorized use is rare.

Semi-Primitive Non-Motorized. A natural or natural-appearing environment generally greater than 2,500 acres in size and generally located at least 1/2 mile but not further than 3 miles from all roads and other motorized travel routes. Concentration of users is low (generally less than 10 group encounters per day), but there is often evidence of other users. There is a high probability of experiencing solitude, freedom, closeness to nature, tranquillity, self-reliance, challenge, and risk. There is a minimum of subtle on-site controls. No roads are present in the area.

Semi-Primitive Motorized. A natural or natural-appearing environment generally greater than 2,500 acres in size and located within 1/2 mile of primitive roads and other motorized travel routes used by motor vehicles; but not closer than 1/2 mile from better-than-primitive roads and other motorized travel routes. Concentration of users is low (generally less than 10 group encounters per day), but there is often evidence of other users. Moderate probability of experiencing solitude, closeness to nature, and tranquillity, with a high degree of self-reliance, challenge and risk in using motorized equipment. Local roads may be present; along saltwater shorelines there may be extensive boat traffic.

Roaded Natural. Resource modification and utilization are evident, in a predominantly natural-appearing environment generally occurring within 1/2 mile from better-than-primitive roads and other motorized travel routes. Interactions between users may be moderate to high (generally less than 20 group encounters per day), with evidence of other users prevalent. There is an opportunity to affiliate with other users in developed sites but with some chance for privacy. Self-reliance on outdoor skills is only of moderate importance with little opportunity for challenge and risk. Motorized use is allowed.

Roaded Modified. Vegetative and landform alterations typically dominate the landscape. There is little on-site control of users except for gated roads. There is moderate evidence of other users on roads (generally less than 20 group encounters per day), and little evidence of others or interactions at campsites. There is opportunity to get away from others but with easy access. Some self-reliance is required in building campsites and use of motorized equipment. A feeling of independence and freedom exists with little challenge and risk. Recreation users will likely encounter timber management activities.

Rural. The natural environment is substantially modified by land use activities. Opportunity to observe and affiliate with other users is important as is convenience of facilities. There is little opportunity for challenge and risk and self-reliance on outdoor skills is of little importance. Recreation facilities designed for group use are compatible. Users may have more than 20 group encounters per day.

Urban. Urbanized environment with dominant structures, traffic lights and paved streets. May have natural appearing backdrop. Recreation places may be city parks and large resorts. Opportunity to observe and affiliate with other users is very important as is convenience of facilities and recreation opportunities. Interaction between large numbers of users is high. Outdoor skills, risk and challenge are unimportant except for competitive sports. Intensive on-site controls are numerous.

Recreation Place
An area that has natural characteristics which attract people. Examples of natural attractors are sandy beaches, anchorages, and freshwater. Recreation Places are represented on maps and in GIS as polygons. Each Recreation Place has recreation activities associated with it. Some examples of these activities are:

- viewing scenery/wildlife
- boating, hiking
- stream/saltwater/lake fishing
- dispersed camping
- big game hunting.

Recreation Site
A specific site and/or facility occurring within a Recreation Place (excluding anchorages which are not physically in a Recreation Place but are connected to the nearest one in the data base tables.) Recreation Sites are represented by points or stars on the maps in Appendix G. Some examples of Recreation Sites are:

- recreation cabins
- trail heads
- anchorages/mooring buoys

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.

Regeneration (Reproduction) Methods
A cutting method by which new age class is created. For this project, the methods are Clearcutting with Green Tree Retention, Shelterwood with reserves, Patch Clearcuts for a percent of a unit's volume, Overstory Removal, Group Selection, and Single Tree Selection (see Harvesting Methods). See Chapter 2 for a more detailed discussion of each method.

Even-aged Methods: Methods to regenerate a stand with a single age class.

Clearcutting with Green Tree Retention: a method of regenerating an even-aged stand in which a new age class develops in an exposed microclimate after removing most of the trees in the stand in a single cutting. Retained trees are left to attain goals other than regeneration.

Shelterwood with Reserves: Harvesting in one cut area that has shelter trees remaining on the site for purposes other than regeneration of the new stand. This type of cut provides benefits for wildlife, soils, and visual concerns. Reserve trees are culls with little or no commercial value. The amount remaining is 10-50 percent of the MBF within the unit.

Overstory Removal: The cutting of trees comprising an upper canopy layer in order to release trees or other vegetation in an understory.

Patch Clearcuts for a Percent of a Unit's Volume: for this project, clearcuts generally less than 10 acres in size dispersed throughout the identified unit. The clearcuts remove, on a unit-specific basis, either 20, 35, or 50 percent of the unit's volume.

Uneven-aged (Selection) Methods: Methods of regenerating a forest stand, and maintaining an uneven-aged structure, by removing some trees in all size classes either singly or in small groups.

Group Selection: a method of regenerating uneven-aged stands in which trees are removed, and new age classes are established, in small groups.

Single (Individual) Tree Selection: a method of creating new age classes in uneven-aged stands in which individual trees of all size classes are removed more or less uniformly throughout the stand to achieve desired stand structural characteristics.

Region
An area covered by a Forest Service regional guide. A region is generally composed of one or more national forests. Forest Service Region 10 includes the Tongass National Forest and the Chugach National Forest.

Regional Forester
The Forest Service official responsible for administering a single region.

Regional Guide
The guide developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended. It guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands within a given report.

Research Natural Area (RNA)
An area set aside by a public or private agency specifically to preserve a representative sample of an ecological community primarily for scientific and educational purposes. In Forest Service usage, RNAs are areas designated to ensure representative samples of as many major naturally occurring plant communities as possible.

Reserved
Lands that have been withdrawn from the timber base by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service.

Resident Fish
Fish that are not anadromous and that reside in fresh water on a permanent basis. Resident fish include non-anadromous Dolly Varden char and cutthroat trout.

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

Riparian Area
Transition zone between a stream or lake system and the adjacent land. Identified in part by soil characteristics or distinctive plant communities that require free or unbound water.

Road Card
A road card documents the interdisciplinary process that led to the location, access control, maintenance level, and road management objective for the final road location. The card includes a list of resource concerns and a picture of the road layout and surrounding terrain.

Roads

Arterial: Roads usually developed and operated for long-term land and resource management purposes for constant service that serve large land areas usually connected with public highways or other arterial roads to form a network of primary travel routes (see specified road).

Collector: Collects traffic from local roads, serves land areas smaller than what is served by arterials (such as a timber sale or recreational site) and usually connects with other collectors, arterials, or public highways (see specified road).

Local: A forest road that connect terminal facilities with forest collector, forest arterial, or public highways, usually forest local roads are single purpose transportation facilities such as log landings and recreational sites (see specified road).

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 within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.

Road Maintenance Level
The level of service provided by, and maintenance required for, a specific road consistent with road management objectives and maintenance criteria (FSH 7709.58, Section 12.3).

Maintenance Level 1: Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period is one year or longer. Basic custodial maintenance is performed.

Maintenance Level 2: Assigned to roads open for use by high-clearance vehicles. Passenger car traffic is not a consideration.

Maintenance Level 3: Assigned to roads open and maintained for travel by the prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.

Maintenance Level 4: Assigned to roads that provide a moderate degree to user comfort and convenience at moderate travel speeds.

Maintenance Level 5: Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-laned and paved, or aggregate surfaced with dust abatement.

Road Management Objective (RMO)
Defines the intended purposes of an individual road based on Management Area direction and access management objectives. Road management objectives contain design criteria, operation criteria, and maintenance criteria. Only specified roads have RMOs.

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.

Salvage Sale
A timber sale to use dead and downed timber and scattered poor-risk trees that would not be marketable if left in the stand until the next scheduled harvest.

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

Scheduled Timber Harvests
Timber harvests done as part of meeting the allowable sale quantity.

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 are 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 be considered in an EA or an EIS.

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

Seeding/Sapling Stage
The stage following timber harvest when most of the colonizing tree and shrub seedings become established. Usually 1 to 25 years.

Selection Cutting
See Regeneration Methods

Sensitive Species
Plant and animal species that are susceptible or vulnerable to activity impacts or habitat alterations. Those species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on a nonofficial State list, or that are recognized by the regional forester as needing special management on National Forest lands to prevent placement on Federal or State lists.

Sensitivity Level
The measure of people's concern for the scenic quality of the National Forests. In 1980, the Tongass National Forest assigned sensitivity levels to land areas viewed from boat routes and anchorages, plane routes, roads trails, public use areas, and recreation cabins.

Level I: Includes all seen areas from primary travel routes, use areas, and water bodies where at least three-fourths of the forest visitors have a major concern for scenic quality.

Level II: Includes all seen areas from primary travel routes, use areas, and water bodies where at least one-fourth of the forest visitors have a major concern for scenic quality.

Level III: Includes all seen areas from secondary travel routes, use areas, and water bodies where less than one-fourth of the forest visitors have a major concern for scenic quality.

Short-Term Facility
A facility developed and operated for a limited period of time which will cease to exist as a transportation facility after the purpose for which it was constructed is completed, and the occupied land is reclaimed and managed for natural resource purposes.

Significant
Specific legal term under the National Environmental Policy Act that requires considerations of both context and intensity in evaluating impacts.

Silviculture
The science of controlling the establishment, composition, and growth of forests.

Site Preparation
Manipulation of the vegetation or soil of an area prior to planting or seeding. The manipulation follows harvest, wildfire, or construction in order to encourage the growth of favored species. Site preparation may include the application of herbicides burning, or cutting of living vegetation that competes with the favored species; tilling the soil; or burning of organic debris (usually logging slash) that makes planting or seeding difficult.

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

Smolt
Young salmon or trout that move from freshwater streams to saltwater.

Snag
A standing dead tree, usually greater than 5 feet tall and 6 inches in diameter at breast height. Often used by varied wildlife species as a roosting, perching, or feeding site, as well as providing potential habitat for species such as those that nest inside excavated cavities.

Soil Hazard Classes
Classification of soils based on their potential for landslides and mass wasting.

Stability Class I - Low Hazard. These areas have the least probability for landslides. Most of these areas occur on slopes that are less than 35 percent.

Stability Class II - Moderate Hazard. These areas are generally stable in an undisturbed condition, and rarely show evidence of past failures or instability. The slopes generally range from 35 to about 70 percent.

Stability Class III - High Hazard. These areas show evidence of past failure. Scars of old soil failures remain visible; however there is minimal evidence of recent failures. Most of the historical failures originated on very steep slopes (greater than 70 percent), and many of the debris chutes extend well down into the more gently sloping valley bottoms.

Stability Class IV - Very High Hazard. These soils show evidence of frequent past failures, as well as recent failures. The failures occurred under natural conditions (unharvested and unroaded forestland). Most of these failures appear to be shallow types of events, that originated on steep or very steep slopes greater than 70 percent.

Soil Productivity
Capacity of soil to produce plant growth due to the soil's chemical, physical, and biological properties.

Soil Texture
Relative amounts of sand, silt, and clay in a soil. Coarse-textured soils are generally considered sandy and often contain gravel of various sizes. Fine-textured soils are considered very fine, sandy, silty, or clayey.

Specified Roads (also see roads)
Those forest development roads planned for future recurrent land management uses and for which the timber sale contract specifies the location, standards, service life, and design specifications.

The following are definitions of service life:

Long Term Roads
Roads developed and operated to provide continuous access for long-term land management and resource utilization needs.

Intermittent Roads
A road developed and operated for periodic service and closed for more than one year between periods of use.

Short Term Roads
A road developed and operated for a limited period of time which will cease to exist as a transportation facility after the purpose for which it was constructed is completed, and the occupied land is reclaimed and managed for natural resource purposes.

Stand (Tree Stand)
A group of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the forest 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.

State Selection
Application by Alaska Department of Natural Resources to the Bureau of Land Management for conveyance of a portion of the 400,000-acre State entitlement from vacant and unappropriated National Forest System lands in Alaska under the Alaska Statehood Act.

Station
Engineer term representing 100 feet.

Stream Class
A means to categorize stream channels based on their fish production values. There are four stream classes on the Tongass National Forest:

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 of 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.

Non-streams. Rills and other watercourses, generally intermittent and less than one foot in bankfull width, little or no incisement into the surrounding hillslope, and with little or no evidence of scour.

Stream Order
First order streams are the smallest unbranched tributaries; second order streams are initiated by the point where two first order streams meet; third order streams are initiated by the point where two second order streams meet, and so on.

Structural Diversity
The diversity of forest structure, both vertically and horizontally, that provides for a variety of forest habitats such as logs and multilayered forest canopy for plants and animals.

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

Subsistence Use
The customary and traditional uses by rural Alaskan 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 nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing, for personal or daily consumption; and for customary trade.

Subsistence Use Area
Important Subsistence Use Areas include the A most reliable @ and A most often hunted @ categories from the Tongass Resource Use Cooperative Survey (TRUCS) and from subsistence survey data from ADF&G, 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.

Substantive Comment
A public comment that provides factual information, professional opinion, or informed judgement germane to the action being proposed.

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

Suitable
Commercial forest land identified as having both the biological capability and availability to produce industrial wood products.

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

Temporary Roads
See Roads.

Tentatively Suitable Forest Land
Forest land that is producing, or is capable of producing, crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

Thousand Board Foot Measure (MBF)
A method of timber measurement equivalent to 1,000 square feet of lumber one inch thick.

Threatened Species
A species of plant or animal likely to become endangered within the foreseeable future throughout all or a significant portion of its range, 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 and Sensitive Species.)

Tiering
Eliminating repetitive discussion of the same issue by incorporating by reference. The general discussion in an EIS of broader scope; e.g., this document is tiered to TLMP, as amended.

Timber Appraisal
Establishing the fair market value of timber by taking the selling value minus manufacturing costs, the cost of getting logs from the stump to the manufacturer, and an allowance for profit and risk.

Timber Classification
Forested land is classified under each of the land management alternatives according to how it relates to the 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 use 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 Entry
A term used to refer to how far into the timber rotation an area is on the basis of acreage harvested. For example, if an area is being managed for 3 entries over a 100-year rotation, the first entry would be completed when one-third (approximately 33 percent) of the available acreage is harvested (usually in 30 to 40 years); the second entry would be completed when two-thirds (approximately 66 percent) of the available acreage is harvested (usually 60 to 70 years); the third entry would be completed when all of the available acreage is harvested (at the end of the rotation).

Timber Production
The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use.

Tongass Land Management Plan (Forest Plan)
The 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning and the daily uses and activities carried out within the forest.

Tongass Resource Use Cooperative Survey (TRUCS)
A compilation of data on subsistence uses for evaluating the effects of the proposed action in this EIS.

Turbidity
An indicator of the amount of suspended sediments in water.

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

Unit Design Card
The unit design card documents the interdisciplinary process that led to the location and final shape for the unit. The card documents the interdisciplinary process, describes resource concerns, and includes a map of the unit and surrounding terrain.

Unsuitable
Forest land withdrawn from timber use by statute or administrative regulation (e.g., 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, usable pulp chips.

Value Comparison Unit (VCU)
Areas that 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 estimated numbers and distribution of reproductive individuals to insure the population's continued existence is well distributed in the planning area (36 CFR 219.19).

Viewshed
An expansive landscape or panoramic vista seen from a road, marine waterway, or specific viewpoint.

Visual Absorption Capability
An estimate of the relative ability of the landscape to accept management manipulations without significantly affecting its visual character. The three VAC categories are:

Intermediate VAC: Intermediate ability to accept management alterations without significantly affecting the visual character due to moderate landscape complexity.

Low VAC: Limited ability to accept management alterations without significantly affecting the visual character due to low landscape complexity.

High VAC: Greatest ability to accept management alterations without significantly affecting visual character due to high landscape complexity.

Visual Management Classes (VMC)
Qualitative descriptions used in project planning to indicate the relative ease or difficulty that may be required to meet the visual quality objectives for an area. VMCs include:

Class 1: Management activities are not evident or are not evident to the casual observer.

Class 2: Management activities are sometimes evident, but are designed to be visually subordinate to natural landscape character.

Class 3: Management activities are clearly evident and sometimes dominate landscape character, but are designed to appear similar to natural occurrences.

Class 4: Management activities clearly dominate natural landscape character, but are designed to appear as natural occurrences when viewed as background.

Visual Management System
A program developed by the Forest Service to identify the visual characteristics of the forest landscape and analyze in advance the visual effects of resource management actions.

Visual Quality Objective (VQO)
Measurable standards reflecting five different degrees of landscape alteration based upon a landscape's diversity of natural features and the public's concern for high scenic quality. The five categories of VQOs are:

Preservation: Permits ecological changes only. Applies to wilderness areas and other special classified areas.

Retention: Provides for management activities that are not visually evident; requires reduction of contrast through mitigation measures either during or immediately after operation.

Partial Retention: Management activities remain visually subordinate to the natural landscape. Mitigation measures should be accomplished within one year of project completion.

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

Maximum Modification: Management activities may dominate the landscape. Mitigation measures should be accomplished within five years of project completion.

V-notch
A deeply cut valley along some waterways, generally in steep, mountainous terrain, that would look like a A V @ from a frontal view.

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

Volume Strata
Divisions of old-growth timber volume derived from the interpreted 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 (USDA Forest Service1997) for each Administrative Area.

Watershed
That area that contributes water to a drainage or stream; portion of a forest in which all surface water drains to a common point. 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 forested swamps, marshes, bogs, fens, peatlands, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds.

Wild and Scenic Rivers
Rivers or sections of rivers designated by congressional actions under the 1968 Wild and Scenic Rivers Act, as wild, scenic, or recreational by an act of the Legislature of the State or States through which they flow. Wild and scenic rivers may be classified and administered under one or more of the following categories:

Recreational River Areas: Rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Scenic River Areas: Rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Wild River Areas: Rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

Wilderness
Areas designated under the 1964 Wilderness Act. Wilderness is defined as undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions. In Alaska, wilderness also has been designated by TTRA and ANILCA.

Wildlife Analysis Area (WAA)
Alaska Department of Fish and Game administrative designation of an area that includes one or several Value Comparison Units (VCUs) for wildlife analysis and regulating wildlife populations.

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

Wildlife Habitat Management Unit (WHMU)
An area of wildlife habitat identified during the ID Team process as having values important to wildlife.

Windfirm
Configuration of harvest units so as not to create an opening which exposes the adjacent stand of timber to the direction of the major prevailing storm wind (southeast).

Windthrow
The act of trees being uprooted, blown down, or broken off by storm winds. Three types of windthrow include: 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 makes the adjacent standing trees vulnerable to windthrow.

Winter Range
An area, usually at lower elevation, used by big game during the winter months.

Withdrawal
The withholding of an area of Federal land from settlement, sale, location, or entry under some or all of the general land laws of the purposes of limiting activities under those laws to maintain other public values in the area.

Yarding
Hauling timber from the stump to a collection point.

Yield Tables
Tables that estimate the level of outputs that would result from implementing a particular activity. Usually referred to in conjunction with FORPLAN input or output. Yield tables can be developed for timber volumes, range production, soil and water outputs, and other resources.

Chapter 7

Distribution List

Chapter 7

7. Distribution List

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US Coast Guard, 17th District Office
US Coast Guard, EI Branch
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US Department of Interior, Office of Environmental Affairs, Washington, D.C.
US Environmental Protection Agency, Anchorage, AK
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US Environmental Protection Agency, Seattle, WA
US Fish & Wildlife Service, Anchorage, AK
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Chapter 8

List of Preparers

Chapter 8

8. List of Preparers

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Chapter 9

Index

Chapter 9

9. Index

Index

Index

Index

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