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of Agriculture

Forest Service
Tongass National Forest
Alaska
Region
R10-MB-415

DRAFT
EIS
ENVIRONMENTAL
IMPACT
STATEMENT

MADAN TIMBER SALE

Tongass National Forest

May 2000

United States Department of Agriculture | Forest Service | Alaska Region
Tongass National Forest
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File Code: 1950

Date: May 19, 2000

Dear Reviewer:

Here is your copy of the Draft Environmental Impact Statement (EIS) for the Madan Timber Sale in the Wrangell Ranger District of the Tongass National Forest. This document describes one no-action alternative and four action alternatives ranging from approximately 19 to 32 million board feet of timber harvest. At this point, we prefer Alternative 3. This alternative would result in limited road construction and would defer timber harvest in the Virginia Lake watershed. The majority of harvest under this alternative would be partial cuts.

The comment period on the Draft EIS will be a minimum of 45 days from the date of publication of the notice of availability in the Federal Register, anticipated to be June 16, 2000. To allow adequate time for printing and mailing, the deadline for comments will be August 15, 2000. The Final EIS is expected to be completed in the fall of 2000.

Federal court decisions have established that reviewers of a Draft EIS must structure their participation so that it is meaningful and alerts an agency to the reviewer's position and contentions. Environmental objections that could have been raised at the Draft stage may be waived if not raised until after completion of the Final EIS. This is so substantive comments and objections are made available to the Forest Service at a time when we can meaningfully consider them and respond to them in the Final EIS.

As the Assistant Forest Supervisor, I am the official responsible for this project. As a result, I will be deciding whether or not timber harvest will occur in the Madan Project Area at this time. Furthermore, if timber harvest does occur, I will be deciding where and how it occurs, if and where roads and log transfer facilities are developed, and what mitigation measures are required.

Please send written comments to Wrangell District Ranger or Richard Cozby, Team Leader, Attn: Madan EIS, USDA Forest Service, P.O. Box 51, Wrangell, AK 99929; or to the e-mail address: rcozby@fs.fed.us. You may also call (907) 874-2323 for additional information or if you would like additional copies of the Draft EIS.

Carol J. Jorgensen

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Assistant Forest Supervisor
Tongass National Forest

Madan Timber Sale

Draft Environmental Impact Statement
May 2000

United States Department of Agriculture
Forest Service - Alaska Region

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Abstract:

The Forest Service is proposing to implement the Tongass Forest Plan by harvesting timber in the Madan Project Area. This Draft Environmental Impact Statement describes the effects of four "action" alternatives for harvesting timber and one "no action" alternative. The action alternatives would make from 19 to 32 million board feet of timber available for harvest within the Madan Project Area on the mainland portion of the Wrangell Ranger District. The significant issues addressed by the alternatives and the EIS include: 1) scenic quality and recreation values; 2) timber management and economics; 3) wildlife habitat; and 4) road access management.

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ACRONYMS

ACMP	Alaska Coastal Management Program
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ANCSA	Alaska Native Claims Settlement Act of 1971
ANILCA	Alaska Native Interest Lands Conservation Act of 1980
ATV	all-terrain vehicle
BA	Biological Assessment
BE	Biological Evaluation
BF	board feet
BMP	Best Management Practices
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
CRIA	Civil Rights Impact Analysis
CZMA	Coastal Zone Management Act of 1976
DBH	diameter at breast height
DGC	Division of Governmental Coordination
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
GIS	geographic information system
GMU	Game Management Unit
HCI	habitat capability index
HCM	habitat conservation model
IDT	Interdisciplinary team
km	kilometer
LSTA	Logging Systems Transportation Analysis
LTF	log transfer facility
LUD	Land Use Designation
LWD	large woody debris
MBF	thousand board feet
MIS	Management Indicator Species
MMBF	million board feet
MMI	Mass Movement Index
MP	Mile Post
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NFMA	National Forest Management Act of 1976
NMFS	National Marine Fisheries Service
NWI	National Wetland Inventory
Project Area	Skipping Cow Project Area
RM	Roaded Modified
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
RPA	Resources Planning Act of 1974

ACRONYMS (continued)

SHPO	State Historic Preservation Office
SPM	Semi-Primitive Motorized
SPNM	Semi-Primitive Non-Motorized
TLMP	Tongass Land Management Plan
TRUCS	Tongass Resource Use Cooperative Survey
TSPIRS	Timber Sale Program Information Reporting System
TTRA	Tongass Timber Reform Act of 1990
USDA	United States Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VCU	Value Comparison Units
VQO	Visual Quality Objective
WAA	Wildlife Analysis Area

Summary

SUMMARY

Introduction

This Draft Environmental Impact Statement (Draft EIS) was prepared by the Wrangell Ranger District of the Tongass National Forest to document the effects of a possible timber sale within the Madan Project Area (Project Area) near Wrangell Island. This EIS is being prepared in compliance with the National Environmental Policy Act (NEPA) and other federal and state laws and regulations. The Assistant Forest Supervisor, Tongass National Forest, will make the final decision, which will be documented in a Record of Decision (ROD).

Proposed Action

At the start of the planning process for this project, we defined a Proposed Action. This Proposed Action would harvest approximately 28 million board feet (MMBF) of sawlog and utility timber on approximately 1,900 acres in VCUs 502 and 504. This original Proposed Action has been refined into Alternative 2, which would harvest approximately 32 MMBF on approximately 2,105 acres. Both helicopter and cable (or other ground-based) logging systems would be used. Both clearcutting with reserve trees and partial cutting would be used. Approximately 15 miles of road would be constructed in the Gypsy Creek, Glacier Creek, Jenkins Cove, and adjacent drainages, and 6 miles of road would be constructed in the Moose Creek drainage. Two LTFs would be constructed, one at Jenkins Cove and one at Moose Creek.

The Proposed Action, and all the action alternatives, include a non-significant amendment to the Forest Plan to increase the size of the two old-growth reserves (OGRs) in the Project Area. The changes to these OGRs would make them consistent with the Forest Plan in terms of size and amount of productive old growth forest. In VCU 502, the Madan OGR would be increased by adding the area along Madan Bay, which is currently designated Scenic Viewshed management prescription. The change would increase the size of the reserve by approximately 905 acres. In VCU 504, the Virginia Lake OGR would be increased by adding the lower reaches of Porterfield and Glacier Creeks, which is currently designated Scenic Viewshed and Recreation River management prescriptions. The change would increase the size of the reserve by approximately 3,655 acres.

Summary

Purpose and Need

The purpose and need for the Proposed Action is to respond to the goals and objectives identified by the Forest Plan for the timber resource while moving the Project Area towards the desired future condition for all resources. The reasons for scheduling a timber sale in this area at this time are discussed in Appendix A of the EIS.

The following Forest Plan goals and objectives are considered applicable to this project proposal:

1. Manage the Tongass 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 (USDA Forest Service, 1997a: 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 (USDA Forest Service, 1997a): pages 2-4, 3-126, 3-135, and 3-144).
3. Recognize the scenic values of suitable timber lands viewed from selected popular roads, trails, water travel routes, recreation sites, bays and anchorages, and to modify timber harvest practices accordingly (USDA Forest Service, 1997a): pages 3-126 and 3-135).
4. Maintain and promote industrial wood production from suitable timber lands, providing a continuous supply of wood to meet society's needs (USDA Forest Service, 1997a: pages 3-135 and 3-144).
5. Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of southeast Alaska (USDA Forest Service, 1997a: page 2-3).
6. Support a wide range of natural-resource employment opportunities within southeast Alaska communities (USDA Forest Service, 1997a: page 2-3).
7. Maintain a Forest-wide system of old growth forest habitat to sustain old-growth associated species, and ensure that the reserve system meets the minimum size, spacing, and composition criteria in Appendix K of TLMP (1997: page 2-3).

A preliminary analysis suggests that to achieve these goals while meeting Forest Plan standards and guidelines, approximately 19 to 32 MMBF of timber could be harvested from approximately 1,350 to 2,100 acres.

Public Involvement

When a timber sale project begins, a group of professionals with a variety of educational backgrounds are designated as an interdisciplinary (ID) team. The ID Team conducted the planning process and wrote this document to inform the public and the Assistant Forest Supervisor of the environmental consequences of the Proposed Action and alternatives.

"Public scoping" is the term used to describe the process of identifying the significant issues for a project by contacting interested individuals and agencies to determine their concerns. The following is a summary of the letters, contacts, and meetings that took place during the planning of this project:

- January 1998: Agency scoping meeting held in Juneau
- April 1998: Scoping Letter sent out to identify issues
- October 1998: Notice of Intent to prepare an EIS published in the Federal Register
- October 1998: Second Scoping/Update Letter sent out
- October 1998: Second agency scoping/update meeting held in Juneau
- November 1998: Public Open House held in Wrangell
- April 1999: Meeting with Wrangell Cooperative Association, a federally-recognized tribal government
- A number of additional smaller meetings held with individuals, agencies, and organizations including the Alaska Department of Fish and Game (ADF&G) and the U.S. Fish and Wildlife Service (USFWS), and the Wrangell Indian Resource Association.

Issues

Although there are often many potential issues and concerns associated with the planning of a timber sale, NEPA directs us to analyze in detail those issues that are significant. This ensures that the analysis and documentation are focused primarily on the issues that are most important to the specific Project Area and the decision to be made. We reviewed planning documents for other projects in the area and listened to comments during the public participation process. This information plus our knowledge of the Project Area derived from field studies were used to identify four key issues, which form the basis for the analysis of alternatives. These key issues include: 1) Scenic Quality and Recreation Management; 2) Timber Management and Economics; 3) Wildlife Habitat; and 4) Road Access Management. Other concerns are discussed in the Resource Reports and are summarized in Chapter 3.

Alternatives Considered in Detail

Items Common to All Action Alternatives

Access Management

Two access options are being considered under each of the action alternatives. Under Option A, most roads would be left open after harvest and stormproofed. There would also be selective road closures for short segments of the system. These roads would be placed in storage with the drainage structures removed. Under Option B, most roads would be closed after harvest, either by barrier berms or by placing the road in storage. Roads placed in storage would be stormproofed. Storage results in maintaining roads to protect improvements and resource values only.

Logging Camps

No land-based logging camps would be authorized for this timber sale. The purchaser may use a floating camp, which would be subject to state and federal permits, and operated only during project implementation. If used, this camp would most likely be located at Jenkins Cove. If an alternative with roads is selected, there can be some minor land-based facilities, such as a repair shop for trucks and other equipment, and storage facilities for fuel/lubricants, or road-building explosives.

Log Transfer Facilities (LTFs)

One or two LTFs may be built to service the timber sale, depending on the alternative. One would be located at Jenkins Cove and one near the mouth of Moose Creek. At Jenkins Cove, the LTF would be a floating LTF just north of the cove and would include an equipment ramp inside the cove on the north shore. At Moose Creek, the LTF would be a low-angle ramp design LTF and would be located to the west of the mouth of Moose Creek. After the sale, all floating elements of the LTFs would be removed, but elements on shore would be maintained for possible future use.

Old-Growth Habitat Reserves (OGRs)

An OGR is an area containing a contiguous unit of old-growth habitat to be managed to maintain the integrity of the old-growth forest ecosystem. The Forest Plan created a system of OGRs across the entire Tongass National Forest, consisting of small, medium, and large ones. The Project Area contains two small OGRs.

The Forest Plan directs that the size and shape of small OGRs should be reviewed and revised, if appropriate, during project evaluations. Based on an evaluation of the Madan Project Area OGRs and their degree of compliance with criteria established in the Forest Plan, the size and shape of both OGRs in the Project Area is proposed for revision in each of the action alternatives. The existing OGR boundaries would be retained with the no action alternative.

Silvicultural Prescriptions

The harvest units in each of the action alternatives would be harvested following one of four general prescriptions listed below. Each prescription incorporates reserve trees to varying degrees.

Clearcut w/Minimum 10 Percent Retention - Up to 90 percent of the merchantable volume would be harvested; a minimum of 10 percent of the merchantable volume would be retained in clumps or along setting boundaries. Note that the percent retention both here and below refers to merchantable trees greater than 9 inches in diameter at breast height. This percent would be in addition to the retention of non-merchantable trees. However, lower quality merchantable trees with high defect may be emphasized for retention, such as mature trees with substantial rot, twist, or other defects. These are often the best wildlife trees. Trees with little or no mistletoe would be retained. This prescription is generally used for units that do not have visual, slope stability, or reforestation concerns.

Patch Cut w/Minimum 60 Percent Retention – This prescription involves creating small openings up to 5 acres in size, scattered throughout the unit. Non-merchantable trees and safe snags would be retained in the openings. Approximately 30 percent of the volume in the unit would be targeted for harvest, but harvest may reach 40 percent. This prescription would leave 60 to 70 percent of the volume in merchantable trees greater than 9 inches in diameter at breast height. The intent is to have 3 entries over the next 100 to 150 years with about 30 percent harvested during each entry and about 10 percent of the volume remaining as permanent retention. Entries would likely take place 30 to 60 years apart. This prescription is often used for units that have visual, slope stability, or reforestation concerns.

Group Selection w/Minimum 70 Percent Retention - Groups up to 2 acres in size, would be harvested, scattered throughout the unit. Approximately 25 percent of the volume would be targeted for harvest, but harvest may reach 30 percent. This would leave 70 to 75 percent of the volume in merchantable trees on site after harvest. Entries would likely take place 30 to 60 years apart. This prescription is often used for units that have visual, slope stability, or reforestation concerns.

Individual/Group Selection w/Minimum 70 Percent Retention - Individual trees and/or small groups up to 2 acres in size, would be harvested, scattered

throughout the unit. This prescription may include selection by diameter limits. Approximately 25 percent of the unit would be targeted for harvest, but harvest may reach 30 percent. A variation of this prescription would be used in units J-5, J-10, and J-13 in Alternative 4; because these units are largely "not seen," the minimum retention would be 50 percent and the targeted harvest percentage would be 45 percent. Where individual selection is used, removal of 25 to 30 percent of the volume would likely leave 70 to 75 percent of the existing merchantable trees on site after harvest. Entries would likely take place 30 to 60 years apart. This prescription is often used for units that have visual, slope stability, or reforestation concerns.

Sort Yards

Two areas for log sorting have been identified; one is on the north side of Jenkins Cove and one is near the mouth of Moose Creek. Each sort yard would occupy 3 to 4 acres. At each location, the sort yards would be developed away from the shoreline and out-of-sight.

Alternative 1: No Action

In this alternative, we analyze the effects of not harvesting timber or building roads in the Project Area at this time. This alternative would respond to the issues of scenic quality, recreation value, the maintenance of existing roadless character, and wildlife habitat protection, including old-growth forests, by not building roads or harvesting timber. However, this alternative would not respond to the issue of providing employment and contributing to the local economy and would not contribute sawtimber or other wood products to meet the annual demand for Tongass National Forest timber from the Project Area, as described in Purpose and Need (Chapter 1). Under this alternative, the small OGRs, located at Virginia Lake and Madan Bay, would remain as mapped in the Forest Plan.

This alternative would not move the Project Area towards the desired future condition described in the Forest Plan (TLMP, 1997). The existing condition would continue to be influenced by natural disturbance processes. In addition to providing an alternative to the action alternatives, the No Action Alternative provides a benchmark that allows the decision-maker to compare the magnitude of the environmental effects of the action alternatives with the current condition (CEQ Regulations, Section 1502.14[c]).

Alternative 2: Proposed Action

This alternative emphasizes economic timber harvest within the constraints of Forest Plan standards and guidelines. Timber volume is maximized to the extent that reasonably economic timber harvest can be achieved. It includes the harvest

of approximately 32 MMBF from approximately 2,105 acres. It involves the development of approximately 21 miles of road, including 3 miles of temporary road. This alternative focuses on establishing the infrastructure in this initial entry for use in subsequent entries. It constructs LTFs at Moose Creek and Jenkins Cove. It features timber development within Virginia Lake, Gypsy Creek, Jenkins Cove, and Moose Creek watersheds. It employs a variety of harvest methods including helicopter, live and running skyline, and highlead systems. It generally relies more on conventional silvicultural prescriptions as in clearcuts with minimum 10 percent volume retention.

The OGRs located at Virginia Lake and Madan Bay would be modified to make them consistent with the Forest Plan in terms of size and acres of productive old growth, based on recommendations from the ID Team and resource agencies.

Alternative 3

Alternative 3 reduces road construction and acres of treatment within the Moose Creek watershed and defers road construction and timber harvest entirely within the Virginia Lake watershed. It also reduces road construction within the Jenkins Cove and Gypsy Creek watersheds. It includes the harvest of approximately 19 MMBF from approximately 1,719 acres. It involves the development of approximately 9 miles of road, including 1 mile of temporary road. It retains conventional harvest prescriptions and methods adjacent to the constructed road segments, but proposes non-conventional prescriptions for the majority of the suitable timber within the Jenkins Cove watershed. The prescription includes individual/group selection harvest by helicopter with approximately 25 percent stem removal within almost the entire suitable stratum. Two LTF's, one at Jenkins Cove and one at Moose Creek, would still be constructed.

Because of the large amount of selection harvest and the low density of roads, this alternative is the second-most responsive to the scenic issue and also addresses the road development/access management and wildlife habitat/species conservation issues. Future road development options and harvest opportunities within the Moose Creek and the Virginia Lake watersheds are retained.

The OGRs located at Virginia Lake and Madan Bay would be modified to make them consistent with the Forest Plan in terms of size and acres of productive old growth, based on recommendations from the IDT and resource agencies.

Alternative 4

Alternative 4 emphasizes helicopter harvest and minimizes road construction. This alternative defers all treatment and constructs no roads within the Virginia Lake watershed (as in Alternative 3) and also throughout most of the Gypsy Creek watershed. Within the Jenkins Cove watershed all harvest would be by

individual or group selection. The alternative would construct 0.3 mile of road and a sort yard and all harvest would be by helicopter with approximately 25 percent stem removal within almost the entire suitable stratum. Stem removal would be increased to 50 percent in Units J-5, J-10, and J-13 because these units are largely not seen. This alternative also includes two barges to provide for more economical helicopter yarding distances; one would be south of Jenkins Cove and one would be at the head of Madan Bay. In these areas, logs would be yarded directly to the barges and limbed. Then they would either be loaded onto an adjacent barge for transport, or returned to the LTF for sorting and bundling.

In the Moose Creek drainage, the LTF and transportation system would be fully developed and harvest would be almost at the same level and using the same prescriptions as in Alternative 2. This level of harvest is consistent with the Forest Plan designation of Timber Production in most of this watershed and may be necessary to make this alternative economically viable because of the expected low economics of the Jenkins Cove watershed helicopter harvest.

It includes the harvest of approximately 19 MMBF from approximately 1,769 acres. It involves the development of approximately 7 miles of road, including 1 mile of temporary road.

Because of the high proportion of selection harvest and the lack of roads, this alternative is the most responsive to the scenic issue and addresses the road development/access management and wildlife habitat/species conservation issues. Future road development options and harvest opportunities within the Virginia Lake watershed are retained.

The OGRs located at Virginia Lake and Madan Bay would be modified to make them consistent with the Forest Plan in terms of size and acres of productive old growth, based on recommendations from the IDT and resource agencies.

Alternative 5

Alternative 5 defers all treatment within the Moose Creek watershed in an effort to maintain the integrity of all resource values in this watershed. It maintains future options for harvest and road construction in this watershed. This alternative treats the Virginia Lake, Gypsy Creek, and Jenkins Cove watersheds at the same level as in Alternative 2. This includes maximum road development and conventional harvest where practical. It includes the harvest of approximately 21 MMBF from approximately 1,352 acres. It involves the development of approximately 15 miles of road, including 2 miles of temporary road. Only the Jenkins Cove LTF would be developed.

This alternative is responsive to the road development/access management and wildlife habitat/species conservation issues in the Moose Creek watershed. In other areas, it emphasizes economic timber harvest within the constraints of Forest Plan standards and guidelines.

The OGRs located at Virginia Lake and Madan Bay would be modified to make them consistent with the Forest Plan in terms of size and acres of productive old growth, based on recommendations from the IDT and resource agencies.

Effects of Alternatives

The alternatives are compared and evaluated relative to the significant issues in the following paragraphs:

Issue 1: Scenic Quality and Recreation Values

There is concern about how this sale would affect scenic quality and recreation values, particularly in and around Virginia Lake and along the Eastern Passage (Back Channel). All alternatives are designed to be consistent with the Forest Plan by meeting the VQOs of Retention and Partial Retention that are prescribed for the areas seen from visual priority travel routes and use areas. Alternative 1 would result in no changes along visual priority travel routes and use areas, or anywhere in the Project Area. Alternatives 3 and 4 would result in the least noticeable harvest activities among the action alternatives. Both alternatives would completely avoid the Virginia Lake watershed and Alternative 4 would not permit any clearcutting and only minimal road building, except in "not seen" areas within the Moose Creek watershed. Alternative 2 is the least responsive alternative for maintaining current scenic quality. Because of the extent of harvest in the Virginia Lake and Jenkins Cove watersheds, some viewers would notice the alteration. However, the level of alteration would be subordinate to the characteristic landscape. Alternative 5 would have almost the same degree of alteration along visual priority travel routes and use areas as Alternative 2, but would not include any harvest in the Moose Creek drainage. Two LTFs would be visible from the Eastern Passage under Alternatives 2, 3, or 4, one would be visible under Alternative 5, and none would be visible under Alternative 1.

Alternative 1 would not result in any change in the recreation settings of the Project Area. Alternative 4 would have the smallest effect among the action alternatives, resulting in a decrease of approximately 1,302 acres of unroaded Recreation Opportunity Spectrum (ROS) settings. Alternatives 3 and 5 would result in an intermediate decrease of unroaded ROS settings and Alternative 2 would decrease unroaded settings by approximately 4,071 acres.

Under the action alternatives, Option A (roads mostly open after sale) would allow limited use by high-clearance highway vehicles as well as full use by non-highway vehicles, mountain bikers, and hikers. Option B (roads mostly closed after sale) would not allow use by motorized vehicles but would allow full use by mountain bikes and hikers.

Issue 2: Timber Management and Economics

This issue deals with concern regarding the amount of timber to be harvested, the long-term timber supply, the effect on local communities, and the economic viability of the sale. Of the 17 million acres that make up the Tongass National Forest, approximately 10 million acres are identified as forest land. The Forest Plan allocates 576,000 of these acres, or approximately 6 percent of the forest land, as suitable for timber management. The Project Area includes about 10,000 acres of suitable timber lands or about 1.7 percent of the suitable land and 0.2 percent of the productive forest land on the Tongass. Under the action alternatives, the suitable timber lands in the Project Area would be reduced by about 1,084 acres, under the action alternatives, due to OGR expansion. The Madan Timber Sale proposes up to 2,105 acres for timber management or up to 0.4 percent of the suitable lands and less than 0.1 percent of the productive forest land on the Tongass. The project would have a positive effect on the local timber industry in Wrangell, with the greatest positive benefits being produced by Alternative 2 and the smallest being derived from Alternatives 3 and 4. Alternative 1 would potentially have negative effects on the local economy by contributing to the continuation of negative trends in the timber industry.

The economic viability of the timber sale is of concern to industry and the public. In Chapter 3 we compare alternatives under a High Market and a Low Market scenario. All action alternatives produce positive net stumpage values under the High Market and negative net stumpage values under the Low Market scenarios. Actual stumpage returns are very difficult to predict and the estimated values should be considered relative values for alternative comparisons, rather than definitive predictions of actual returns. Results indicate that Alternative 5 would have the best economics and Alternative 2 would have the second best. Alternative 3 ranks third best economically and Alternative 4 ranks lowest. The primary reason for the lower economics of Alternatives 3 and 4 is the high proportion of volume that is planned for helicopter yarding in these alternatives.

Issue 3: Wildlife Habitat

The Forest Plan has identified a conservation strategy to ensure wildlife viability on the Tongass, that is based heavily on a series of large, medium, and small old-growth habitat reserves (OGRs), and connectivity among them. The Madan Project Area includes two small OGRs that are part of this system. Both OGRs are smaller in size and the Virginia Lake OGR also contains less productive old growth than is recommended by the Forest Plan. Under Alternative 1 the OGRs would not be modified and would remain the same in size. However, there would be no timber management in adjacent areas and such areas could be used for future old-growth unit expansion if needed. Under Alternatives 2, 3, 4, and 5, both OGRs would be expanded based on recommendations of the team of

biologists who studied them, and would meet or exceed the minimum Forest Plan recommendations for both total size and amount of productive old growth.

The other major part of the Forest Plan conservation strategy relates to the management of the lands, where timber harvest may occur according to a set of standards and guidelines. The Madan action alternatives involve extensive use of a variety of silvicultural techniques designed to enhance wildlife diversity over time. A portion of the lands are proposed for clearcutting, but at least 10 percent reserve trees would be left behind as legacies. Most of the lands involved in each alternative have a prescription of individual tree or group selection that would provide much greater structural diversity over time. Alternative 2 would affect the greatest number of acres and Alternative 5 would have the fewest acres treated. However, Alternatives 2 and 5 would result in the greatest number of clearcut acres and Alternatives 3 and 4 the least.

Other factors that relate to this issue are the change in deer habitat capability over time, future road densities, and the areas of high value habitats to be harvested. Deer habitat capability declines would range from 0 percent under Alternative 1 to a maximum of 6.3 percent over time under Alternative 2. Future road densities in the WAAs under all action alternatives would remain far below (<0.1 mile per square mile) the 0.7mile per square mile of open roads recommended for the protection of wolves. High value habitats for marten, northern goshawks, and marbled murrelets would not be affected with Alternative 1 and would be maximally harvested for marten and murrelets under Alternative 2, and for goshawks under Alternative 4. Lowest effects on high value habitats for marten, goshawks, and murrelets would occur with Alternative 5.

Issue 4: Road Access Management

The Madan Project Area is part of an extensive mainland area, that is currently unroaded. Building roads in previously unroaded areas is of national concern as well as being a local issue. While some people would like to see no roads constructed in the Project Area, others would like to see roads built for recreation and subsistence activities, as well as for timber harvest. No roads would be constructed with Alternative 1 and almost 19 miles of permanent forest roads would be developed under Alternative 2. Alternative 5 would result in the development of approximately 13 miles of permanent roads and Alternatives 3 and 4 would result in approximately 8 and 6 miles of permanent road development, respectively. Temporary road development would be limited to between 0.6 and 2.6 miles under the action alternatives. Following harvest, all temporary roads would be closed and permanent roads would be left open or closed depending on the road management option selected. Another aspect of this issue is balancing the benefits to public recreation and use of the area after timber sale harvest in an area relatively close to the community of Wrangell,

with the costs of long term road maintenance and impacts to wildlife, watersheds, and fish.

To analyze effects of a range of road management alternatives, two road management options are being considered in all action alternatives. Option A would manage the specified road system as open. Option B would manage the specified road system as closed after timber harvest was complete. Permutations with the range of these options are possible with some roads managed as open and others closed.

Preferred Alternative

At this stage, Alternative 3 is the preferred alternative because it meets the purpose and need and it addresses the important visual concerns that have been raised by the public, particularly in regard to harvest in areas viewed from Virginia Lake. Our preference for Alternative 3 is partially based on the fact that it builds sufficient road infrastructure to allow for reasonable helicopter yarding distances for this sale and for future sales. The highly visible sloping terrain in the Jenkins Cove area will require future partial-cut helicopter entries over a long period of time to maintain the forested appearance of the hillside. The road in the Jenkins Cove area would also allow for some cable harvest in the more visually screened portions of the hillside; this improves the economic viability of the sale as a whole. Alternative 3 also allows for harvest in the Moose Creek area. Much of this harvest is in a timber production land use designation under the Tongass Forest Plan and timber harvest in this area is largely screened from view. At this time we prefer road management Option "A". This option will leave portions of the specified road system in place for public use after timber sale harvest.

Chapter 1

Purpose and Need

CHAPTER 1
PURPOSE AND NEED

Introduction

This Draft Environmental Impact Statement (Draft EIS) was prepared by the Wrangell Ranger District of the Tongass National Forest to document the effects of a possible timber sale within the Madan Project Area (Project Area) near Wrangell Island. This EIS is being prepared in compliance with the National Environmental Policy Act (NEPA) and other federal and state laws and regulations. The Assistant Forest Supervisor, Tongass National Forest, will make the final decision, which will be documented in a Record of Decision (ROD).

This document describes the effects of a proposed timber sale on the mainland known as the Madan Timber Sale. It describes the "No Action" Alternative (Alternative 1), the "Proposed Action" (Alternative 2), and three alternative strategies for harvesting timber. The action alternatives also include building and maintaining roads and building and maintaining log transfer facilities (LTFs). This EIS discloses the environmental effects and resource outputs that are expected from each of the alternatives and potential mitigation measures.

This Draft EIS was prepared according to the format established by Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500-1508). In general, the objective 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.

The Madan Project implements direction contained in the Tongass Land Management Plan (TLMP) published in 1997 and modified in 1999 (Forest Plan) and tiers to the TLMP Final EIS (1997b) and ROD (1999). It also relies on direction contained in the Tongass Timber Reform Act (TTRA), the Resources Planning Act (RPA), and the Alaska Regional Guide. These are all available at public libraries around the region, as well as at the Forest Supervisor's Office in Petersburg, Sitka, and Ketchikan. Alaska.

Document Organization

Chapter 1 provides the purpose and need for the proposed project, the public issues surrounding the action, and other introductory information. It also discusses how the Madan Timber Sale relates to the Forest Plan, NEPA, the key issues driving the EIS analysis, and the authorities guiding the EIS process.

Chapter 2 describes and compares the alternatives for the proposed activities. It includes summary information on their environmental impacts, implementation, and mitigation.

Chapter 3 describes the existing environment and predicts environmental effects likely to occur with implementation of the alternatives. These effects include both direct and indirect impacts of each alternative on the human and natural environment for each

resource issue. Potential cumulative impacts of reasonably foreseeable or similar actions are also disclosed.

Chapter 4 contains the list of references cited, **Chapter 5** provides a glossary (which will be especially useful to reviewers unfamiliar with technical terms or some of the more relevant laws regarding environmental analyses), **Chapter 6** contains the EIS distribution list, **Chapter 7** gives a list of the EIS preparers, and **Chapter 8** provides an index.

The **appendices** include supporting information on units, roads, log transfer facilities, mitigation, and how this sale fits in with the Tongass-wide timber sale program. This EIS incorporates documented analysis by summarization and reference where appropriate.

Project Area

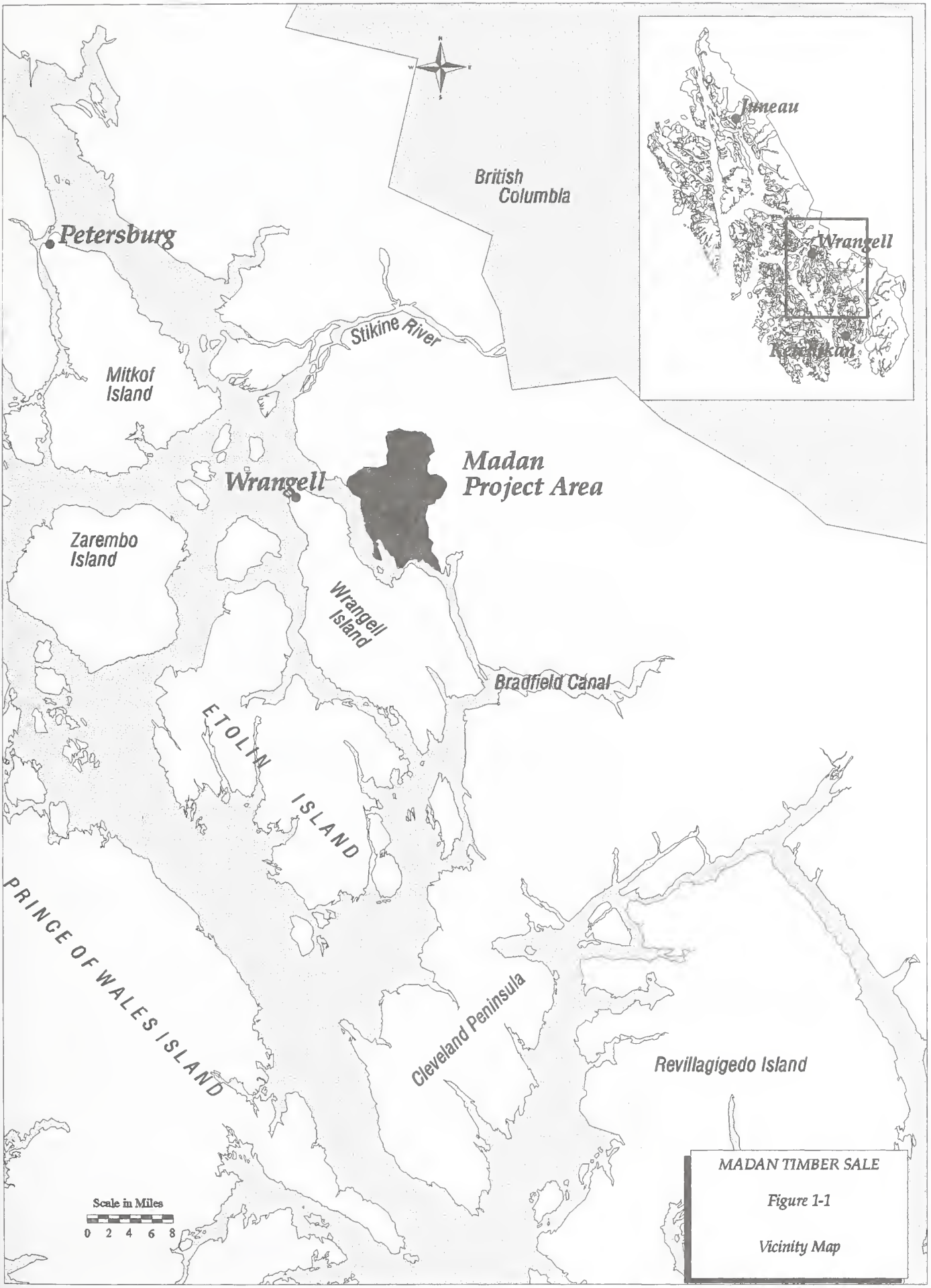
The Project Area is located in Southeast Alaska on the mainland, and is about 6 miles east of the town of Wrangell, Alaska (see Figure 1-1). The Project Area, which is approximately 43,000 acres in size, includes Virginia Lake and Mill Creek (in the north), Madan Bay (in the southwest), and Moose Creek (in the southeast). The Tongass National Forest is divided into a common set of areas to facilitate resource inventory and interpretation. These areas, which generally encompass a drainage basin containing one or more large stream systems and follow easily recognizable watershed divides, are known as Value Comparison Units (VCUs). Portions of VCUs 502 and 504 are included in the Project Area.

The Project Area is completely unroaded and no LTFs currently exist. Past timber harvest has been limited to a 34-acre unit near the mouth of Moose Creek. The saltwater shorelines of the Project Area, as well as its interior are mostly allocated to the Scenic Viewshed Land Use Designation (LUD). Two small old-growth reserves (OGRs), one north of Virginia Lake and one between Madan Bay and Moose Creek, are also included in the area. Other LUDs included in the Project Area are Modified Landscape, Timber Production, and Recreation River. State lands occur along Mill Creek and the nearby shorelines and at the west end of Virginia Lake (see Figure 2-1).

Proposed Action

At the start of the planning process, we defined a Proposed Action. This serves as a starting point for the planning process, which initially involved identifying significant issues for the project by contacting interested individuals and agencies to determine their concerns. We then developed other alternatives to the Proposed Action in response to environmental issues, public concerns, and comments from other agencies. This process is described in more detail in Chapter 2.

The original Proposed Action for this project would harvest about 28 million board feet (MMBF) of sawlog and utility timber on approximately 1,900 acres in VCUs 502 and 504. This has been refined into Alternative 2, which would harvest approximately 32 MMBF on approximately 2,105 acres. Both helicopter and cable (or other ground-based) logging systems would be used. Both clearcutting with reserve trees and partial cutting would be used. Approximately 15 miles of road would be constructed in the Gypsy Creek, Glacier Creek, Jenkins Cove, and adjacent drainages, and 6 miles of road would be constructed in the Moose Creek drainage. Two LTFs would be constructed, one at Jenkins Cove and one at Moose Creek (see Figure 2-2).



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The Proposed Action, and all the action alternatives, include a non-significant amendment to the Forest Plan to increase the size of the two old-growth reserves (OGRs) in the Project Area. The changes to these OGRs would make them consistent with the Forest Plan in terms of size and amount of productive old growth forest. In VCU 502, the Madan OGR would be increased by adding the area along Madan Bay, which is currently designated Scenic Viewshed management prescription. The change would increase the size of the reserve by approximately 905 acres. In VCU 504, the Virginia Lake OGR would be increased by adding the lower reaches of Porterfield and Glacier Creeks, which is currently designated Scenic Viewshed and Recreation River management prescriptions. The change would increase the size of the reserve by approximately 3,655 acres.

Purpose and Need

The purpose and need for the Proposed Action is to respond to the goals and objectives identified by the Forest Plan for the timber resource while moving the Project Area towards the desired future condition for all resources. The reasons for scheduling a timber sale in this area at this time are discussed in Appendix A.

The following Forest Plan goals and objectives are considered applicable to this project proposal:

1. Manage the Tongass 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 (USDA Forest Service, 1997a: 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 (USDA Forest Service, 1997a): pages 2-4, 3-126, 3-135, and 3-144).
3. Recognize the scenic values of suitable timber lands viewed from selected popular roads, trails, water travel routes, recreation sites, bays and anchorages, and to modify timber harvest practices accordingly (USDA Forest Service, 1997a): pages 3-126 and 3-135).
4. Maintain and promote industrial wood production from suitable timber lands, providing a continuous supply of wood to meet society's needs (USDA Forest Service, 1997a: pages 3-135 and 3-144).
5. Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of southeast Alaska (USDA Forest Service, 1997a: page 2-3).
6. Support a wide range of natural-resource employment opportunities within southeast Alaska communities (USDA Forest Service, 1997a: page 2-3).
7. Maintain a Forest-wide system of old growth forest habitat to sustain old-growth associated species, and ensure that the reserve system meets the minimum size, spacing, and composition criteria in Appendix K of TLMP (1997: page 2-3).

A preliminary analysis suggests that to achieve these goals while meeting Forest Plan standards and guidelines, approximately 19 to 32 MMBF of timber could be harvested from approximately 1,350 to 2,100 acres.

The Decision-Making Process

National Forest planning takes place at several levels. The decision making begins with long-range planning at the national level, continuing down through the regional and forest levels to the project level. The Madan Project is part of this hierarchical planning process. This EIS is a project-level analysis; its scope is confined to issues within the Madan Project Area. It does not attempt to address decisions made at higher levels, such as with the Forest Plan. It does, however, implement direction provided at those higher levels.

Relationship to Forest Plan

The National Forest Management Act (NFMA) directs each National Forest to prepare an overall plan of activities. The Forest Plan provides land and resource management direction for the forest. It establishes LUDs to guide management of the land for certain uses. The LUDs describe the activities that may be authorized within VCUs. VCUs generally subdivide the LUDs into logical analysis units.

The Forest Plan also guides all natural resource management activities by establishing forest-wide standards and guidelines. These standards and guidelines apply to all or most areas of the Forest and are used in conjunction with the management prescriptions for each LUD.

For the Tongass National Forest, the Forest Plan is the modified 1997 TLMP (USDA Forest Service, 1999). The Madan EIS tiers to the Forest Plan EIS (USDA Forest Service, 1997) and the Alaska Regional Guide EIS (USDA Forest Service, 1983). In some instances, it incorporates documented analysis from the Forest Plan by reference (40 CFR 1502.21) rather than repeating it in this EIS.

Decision to be Made

The 1999 ROD for the Forest Plan established that timber harvest is an appropriate activity in the Project Area. The Assistant Forest Supervisor will decide: (1) if, where, and how much timber harvest should occur in the Project Area at this time; and if so, (2) if, where, and how much road and LTF development should occur to facilitate harvest; (3) if and how to modify the boundaries of the two Project Area OGRs; and (4) what mitigation measures and monitoring would be implemented.

Forest Plan Direction for the Project

Land Use Designations

Forest Plan direction for this Project establishes boundaries for project planning. This direction is embodied in the management prescriptions identified for each land use designation (LUD) in the Project Area and in the Forest-wide Standards and Guidelines.

The Forest Plan designates areas appropriate for various activities through the use of 19 Land Use Designations (LUDs). These LUDs include management objectives and specific standards and guidelines designed to ensure attainment of those objectives. Standards and guidelines take precedence over annual targets or projected outputs; no project will be funded for which the standards and guidelines cannot be implemented. The Forest Plan LUDs in the Project Area are described below and shown with reference to the VCUs in Figure 1-2. Table 1-1 displays the area of each LUD in the Project Area.

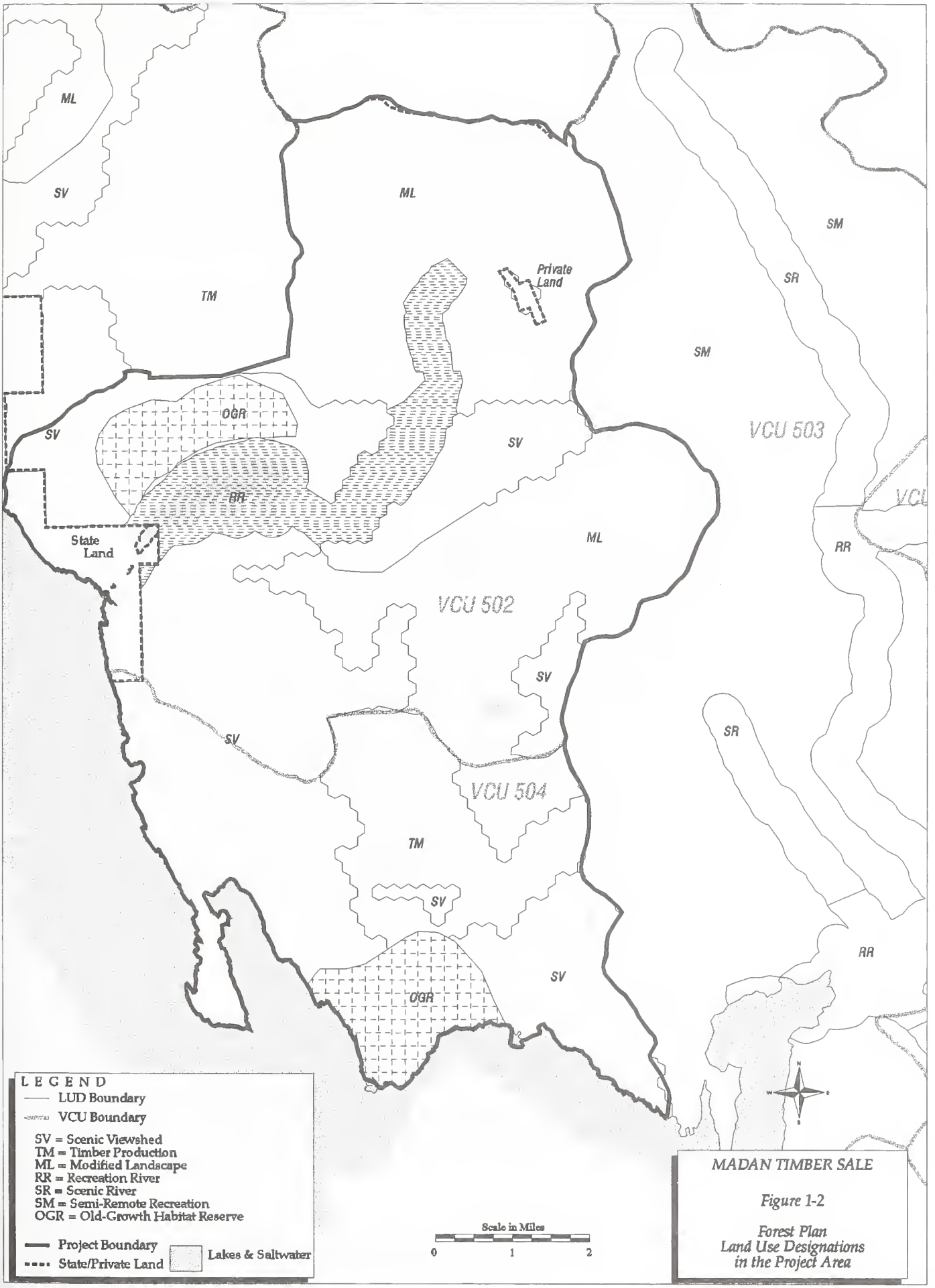
Table 1-1.
Land Use Designation (LUD) Areas in the Project Area

Land Use Designation (LUD)	Acres
Scenic Viewshed	16,077
Modified Landscape	16,700
Timber Production	3,615
Old-Growth Habitat Reserves	3,201
Recreational River	3,210
Total National Forest Land	42,803
State/Private	1,376
Total Project Area Land	44,179

Scenic Viewshed

About 36 percent of the Project Area, including most areas visible from salt water, are designated as Scenic Viewshed. Timber harvest is proposed for portions of this LUD. Goals in the Forest Plan for management of Scenic Viewshed LUDs are to provide a sustained yield of timber and a mix of resource activities while minimizing the visibility of developments. Objectives include:

- Apply the Visual Quality Objective (VQO) of Retention in the foreground distance zone and Partial Retention in the middleground and background distance zones from Visual Priority Travel Routes and Use Areas. Apply Maximum Modification to all other areas.
- Suitable forest lands are available for timber harvest. Use appropriate silvicultural systems consistent with the adopted VQO.
- Perform viewshed analysis in conjunction with project development.
- Provide a spectrum of recreation and tourism opportunities consistent with the capabilities of the LUD. Semi-Primitive to roaded experiences may be offered.
- Provide a transportation network compatible with the characteristic landscape.
- Extend rotations, as necessary, to meet the VQOs.



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Modified Landscape

Most of the higher elevation lands in the northern and eastern portions of the Project Area have a LUD of Modified Landscape (38 percent of the Project Area). Timber harvest is proposed for portions of this LUD. Goals in the Forest Plan for management of Modified Landscape LUDs are to provide a sustained yield of timber and a mix of resource activities while minimizing the visibility of developments in the foreground distance zone. Objectives include:

- Apply the VQO of Partial Retention in the foreground distance zone and Modification in the middleground and background distance zones, as seen from Visual Priority Travel Routes and Use Areas. Apply Maximum Modification to all other areas.
- Suitable forest lands are available for timber harvest. Use appropriate silvicultural systems consistent with the adopted VQO.
- Maintain a spectrum of recreation and tourism opportunities consistent with the capabilities of the LUD. Semi-primitive to roaded experiences may be offered.
- Design roads and associated rock quarries to meet the applicable VQO.

Timber Production

About 8 percent of the Project Area has a LUD of Timber Production. This LUD is mostly an inland block in the southern half of the Project Area. Timber harvest is proposed for portions of this LUD. Goals in the Forest Plan for management of Timber Production LUDs emphasize sustained, long-term timber production. Objectives include:

- Apply the VQO of Modification in the foreground distance zone from Visual Priority Travel Routes and Use Areas. Apply Maximum Modification to all other areas.
- Locate and design timber harvest activities primarily to meet timber objectives, but seek to reduce clearcutting when other cutting methods will meet land management objectives. Clear cutting may be used when the topography and stand characteristics do not facilitate other cutting methods.
- Maintain a spectrum of recreation and tourism opportunities consistent with the capabilities of the LUD and compatible with timber production objectives.
- Plan a transportation network of roads and helicopter access that will eventually access most of the suitable timber lands for standard logging or helicopter yarding systems.

Old Growth Habitat

The Project Area includes two areas of Old Growth Habitat LUD, which represent small OGRs. Together, these cover about 7 percent of the Project Area. They are referred to as the Virginia Lake and the Madan OGRs. No road construction or timber harvest units are proposed under any alternative within the Old Growth Habitat LUD. The goals in the Forest Plan for management of Old Growth Habitat LUDs are to maintain old-growth forest and their associated ecological processes to provide habitat for old-growth associated species. Objectives include:

- Provide old-growth forests habitats, in combination with other LUDs, to maintain viable populations of native and desired non-native fish and wildlife species that may be associated with old-growth species.
- Contribute to habitat capability of fish and wildlife resources to support sustainable human subsistence and recreational uses.
- Maintain biodiversity and ecological processes associated with old-growth forests.
- Allow previously harvested conifer stands to develop naturally to old-growth forest habitats or apply silvicultural prescriptions to accelerate forest succession.
- To the extent feasible, limit roads and permitted uses to those compatible with Old Growth Habitat management objectives.

Recreational River

The Recreational River LUD occupies 7 percent of the Project Area along Virginia Lake and Porterfield Creek. The Virginia Lake/Porterfield Creek system is to be recommended for Recreational River status under the Wild and Scenic Rivers Act (P.L. 90-542); but it has not been so designated by Congress. According to the 1999 ROD, the Virginia Lake/Porterfield Creek system has high recreation values. A readily accessible and barrier-free public recreation cabin is located at the upper end of the lake. Recreation activities include fishing for trophy-size cutthroat trout and wildlife viewing. Also ongoing fishery habitat improvements have increased the potential of the lake for sockeye spawning. This lake/stream system meets the guidelines for scenic classification but is more suitable for recreational designation, which maintains the potential for mineral development and road construction options. No timber harvest or road construction is proposed for this LUD. Goals in the Forest Plan for management of Recreational River LUDs along recommended Recreational River segments are to maintain their outstandingly remarkable values and classification eligibility until Congress designates the segments or decides not to designate them. Objectives include:

- Apply the Partial Retention VQO to foreground areas seen from the river, roads, and recreation facilities, and Modification to all other seen areas.
- Manage to maintain a free-flowing river resource, while providing for access and use consistent with the Wild and Scenic Rivers Act and the Alaska National Interest Lands Conservation Act (ANILCA).
- Permit timber harvest on suitable timber lands if adjacent lands are being managed for that purpose.
- Manage recreation use and activities to meet the levels of social encounters, on-site developments, methods of access, and visitor impacts indicated for the desired Recreation Opportunity Spectrum (ROS) class – generally Roaded Natural. The Roaded Natural ROS class would permit roads to access, parallel, or cross the river.

The following Standards and Guidelines delineate spatial areas not available for programmed timber harvest within the LUDs that are described above. Each applies to a specific habitat or ecological component. More detailed information about these and other Standards and Guidelines can be found in Chapter 4 of the Forest Plan.

Beach and Estuary Fringe

The beach and estuary fringe is an area of approximately 1,000 feet inland from mean high tide around all marine coastline. Programmed timber harvest is not allowed and roads are located outside the fringe when possible.

Riparian

Riparian Management Areas are areas of special concern to fish, other aquatic resources, and wildlife. These areas are delineated according to the process group direction in the Riparian Forest-wide Standards and Guidelines (Forest Plan, pages 4-56 to 4-73). Some riparian boundaries may be adjusted after completion of a project-specific watershed analysis (Forest Plan, page 4-56 and Appendix J). Timber harvest is not scheduled in Riparian Management Areas.

Desired Future Condition

The Forest Plan describes the following desired condition for the Scenic Viewshed LUD, which covers most of the area to be harvested and roaded under this Project:

In areas managed under the Scenic Viewshed LUD, forest visitors, recreationists, and others using identified popular travel routes and use areas will view a natural-appearing landscape. Management activities in the foreground will not be evident to the casual observer. Activities in the middleground and background will be subordinate to the characteristic landscape. Areas topographically screened from Visual Priority Travel Routes and Use Areas may be heavily modified. Within these viewsheds, timber harvest units are typically small and affect only a small percentage of the seen area. At any given point in time, roads, facilities, and other structures are either not visually evident or are subordinate to the landscape. A variety of successional stages providing wildlife habitat occur, although late successional stages predominate. Recreation and tourism opportunities in a range of settings are available. In the areas managed for Retention or Partial Retention VQOs, timber yields will generally be obtained through the use of small openings or uneven-aged systems. A yield of timber is produced that contributes to Forest-wide sustained yield.

The desired conditions described by the Forest Plan provide a basis for management of the Project Area. Management activities will also be influenced by Forest Plan standards and guidelines (USDA Forest Service, 1997a, as modified by USDA Forest Service, 1999) and circumstances specific to the Project Area. Those circumstances include the Recreational River LUD and the two small OGRs in the Project Area.

Public Involvement

When a timber sale project begins, a group of professionals with a variety of educational backgrounds are designated as an interdisciplinary team (IDT). The Madan ID Team listened to public comment and worked with the public and various state and federal agencies in an effort to plan the best possible project. The ID Team conducted the planning process and wrote this document to inform the public and the Assistant Forest Supervisor of the environmental consequences of the Proposed Action and alternatives.

Public Scoping

"Public scoping" is the term used to describe the process of identifying the significant issues for a project by contacting interested individuals and agencies to determine their concerns. The following is a summary of the letters, contacts, and meetings that took place during the planning of this project:

- January 1998: Agency scoping meeting held in Juneau
- April 1998: Scoping Letter sent out to identify issues
- October 1998: Notice of Intent to prepare an EIS published in the Federal Register
- October 1998: Second Scoping/Update Letter sent out
- October 1998: Second agency scoping/update meeting held in Juneau
- November 1998: Public Open House held in Wrangell
- April 1999: Meeting with Wrangell Cooperative Association, a federally-recognized tribal government
- A number of additional smaller meetings held with individuals, agencies, and organizations including the Alaska Department of Fish and Game (ADF&G) and the U.S. Fish and Wildlife Service (USFWS), and the Wrangell Indian Resource Association.

Issues

Although there are often many potential issues and concerns associated with the planning of a timber sale, NEPA directs us to analyze in detail those issues that are significant. This ensures that the analysis and documentation are focused primarily on the issues that are most important to the specific Project Area and the decision to be made. We reviewed planning documents for other projects in the area and listened to comments during the public participation process. A cross-section of these comments is included in the margin adjacent to each issue. This information plus our knowledge of the Project Area derived from field studies were used to identify four key issues, which form the basis for the analysis of alternatives. These key issues are discussed in the following paragraphs. Other concerns are listed under Other Environmental Considerations, are discussed in the Resource Reports, and are summarized in Chapter 3.

Virginia Lake "...is a special place close to town with scenic, recreational and wild values. All logging and road construction should be kept out of the Virginia Lake watershed."

Issue 1: Scenic Quality and Recreation Values

Because of past and future logging on State and private land along the Back Channel "...the Forest Service probably shouldn't harvest any trees...in order to balance the impact on the viewshed..."

"...provide the maximum environmentally feasible and economically harvestable volume from each NEPA project."

There is concern about how this sale will affect scenic quality. The viewpoints of most concern are the saltwater route along the Eastern Passage (Back Channel) and the Virginia Lake Cabin. Views from the Wrangell Island road system are also a concern. From a recreational standpoint, Virginia Lake is the most heavily used location in the Project Area. It is a popular destination for hunting, fishing, and general recreation because of its resource values, proximity to Wrangell, and the availability of a public recreation cabin and boat. We received mixed feedback on Virginia Lake. Some feel that the area surrounding Virginia Lake should be left alone, while others feel that some development is acceptable to contribute to the timber industry and the timber-dependent economy. Likewise, people voiced concern about impacting the scenery along the Eastern Passage, in light of existing harvest on state and federal lands along the route.

Some felt that development was acceptable, while others felt that we should not add to the impacts.

"The proposed sale, with its proximity to Wrangell is particularly attractive as it should mean that the log transportation costs will be kept to a minimum making the sale more economically viable."

Issue 2: Timber Management and Economics

The potential for the project to affect employment and the economy of local communities was brought up as an issue during public scoping. There was much concern regarding the economic viability and amount of volume in the planned sale. Public comments indicated concern about current changes in the timber industry and question the need for this sale in light of the perceived market decline. Comments ranged from voicing strong support for harvesting timber in the Project Area to questioning the need for the sale given recent mill closures in the area. The amount of wood harvested and any infrastructure developed with this entry may affect the amount of available timber and costs associated with future entries for timber harvest. Roads constructed for timber harvest may make future sales more economical, but the access they provide between sales is a concern due to other issues, such as increased vulnerability of wildlife to hunting and other disturbances.

"The sale areas substantial brown bear populations would be significantly impacted by logging operations, and the increased access logging roads would provide hunters."

Issue 3: Wildlife Habitat

The Forest Plan conservation biology strategy includes two basic components: a system of OGRs and management of the matrix, which includes the land in development LUDs. The location, size, and the quality of habitat within the OGRs and the corridors connecting them are key parts of the strategy. The Forest Plan directs the Forest Service to evaluate whether each OGR meets size and specified habitat quality criteria on a project level. The two existing Project Area OGRs do not meet the Forest Plan criteria for amount of productive old growth and/or total size.

"The area for this sale is the most critical winter range for "main land" Sitka Black-tail (deer) in the Wrangell area."

The location, density, and use of roads has an effect on the quality of wildlife habitat for certain species, including wolves and brown bears. Roads on the mainland can provide human access to interior game animals that are currently only accessed from shore. Portions of the area provide high quality deer winter range.

Issue 4: Road Access Management

"...seriously consider an alternative which uses selection logging methods and helicopter transfer to barge with no new road building"

"...especially opposed to any road building in the sale area."

The Project Area, located on the mainland, is a part of a vast area which has no previous road development. It is located on the mainland between the Stikine River to the north and the Bradfield Canal to the south. This large geographic area is currently unroaded and much of this area will remain unroaded under the current Forest Plan designations. Of this larger geographic area, 154,084 acres (70 percent of the total land is this area) are designated non-development LUDs, such as wilderness, remote, or semi-remote recreation LUDs. In these LUDs, road development is not foreseeable at any time in the future and is normally not permitted under the Forest Plan and the 1999 ROD.

Also within this geographic area are 65,340 acres (30 percent of the total land) in which road development could be allowed under either state, private, or national forest management. These acres include the development LUDs (such as timber production, modified landscape, and scenic viewshed) that would allow roaded development, as well as any state or private lands. In these areas, some degree of roaded development is allowed, though topography and terrain would likely limit the extent of road development.

Numerous public concerns were received which questioned road building, location, design, management, and maintenance. Both the direct and indirect effects of road building on wildlife, water, soils, visual quality, and recreation were a concern. Roads can result in increased hunting pressure on wildlife. Some commentors considered this a

"The roads proposed for the project will allow more and greater opportunities for hunting, camping, and other forms of recreation."

positive effect while others considered it a negative effect. Some looked forward to increased opportunity to hunt because of the improved access, others thought that the nature of the hunting experience would be degraded because more area would be roaded. Part of this issue is whether or not roads, if constructed, should be managed as open or closed to provide local recreational access to the National Forest.

Other Environmental Considerations

Other resource concerns are important, but were not used to drive alternative development. These resources are protected to such a degree by the Forest Plan standards and guidelines, and by other laws and constraints, that the effects from each of the alternatives are not significant. A more detailed discussion of these important resources and the protection measures used for them can be found in the Resource Reports and is summarized in Chapter 3.

Issues considered as part of this analysis, which do not appear to be significant, include:

- Air Quality
- Minerals, Karst, and Soils
- Water Quality
- Fish Habitat
- Marine Resources
- Wetlands
- Vegetation
- Cultural and Archeological Resources
- Subsistence
- Effects on Consumers, Civil Rights, and Women

These issues are summarized in Chapter 3. In addition, the following individual Resource Reports were prepared for the project and provide more detail:

- Geology, Minerals, and Karst
- Soils
- Watershed and Fisheries
- Timber/Silviculture
- Wetlands and Threatened, Endangered and Sensitive (TES) Plants
- Wildlife
- Logging System and Transportation Analysis and Timber Economics
- Cultural Resource Survey
- Recreation, Scenery, and Lands
- Subsistence
- Community Profiles and Socioeconomics

Other Agency Involvement—Permits, Licenses, and Certifications

Several other agencies reviewed this project and provided their professional input on topics in which they have expertise. In some cases, reviews are necessary because another agency has authority to issue permits for a specific activity we propose. Our relationship to other agencies in the planning of this project is described below.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (Corps) is responsible for approving proposals to dredge or place fill materials in the coastal waters of the United States under Section 404 of the Clean Water Act. The Corps also has administrative authority over activities associated with wetlands. Any road construction in wetlands is of interest to the Corps and we must consider and reduce our effects on those areas. All roads proposed for this project are for the primary purpose of managing the timber resource.

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) provides a general review in accordance with their responsibilities under NEPA, Section 309 of the Clean Air Act, and Section 402 of the Clean Water Act. They also administer permits associated with the LTFs under the National Pollution Discharge Elimination System.

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) has authority for threatened or endangered marine life and for all anadromous salmon. They are currently evaluating Essential Habitat for all salmon, including fresh water salmon. We consult with NMFS on possible effects on those species.

U.S. Fish and Wildlife Service

The USFWS administers the Endangered Species Act (ESA). We consult with the USFWS to determine if the proposed project would affect threatened or endangered species. Effects on other wildlife species are also discussed with the USFWS, because they have expertise in many areas and are interested in managing wildlife in ways that will prevent the need for listing species as threatened or endangered in the future.

State of Alaska

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

1. Division of Governmental Coordination (DGC)—Provides overall coordination for the State's comments and administers the Alaska Coastal Management Program (ACMP), which requires the Forest Service to design activities compatible with approved State management guidelines.

2. Alaska Department of Environmental Conservation (ADEC)—Participates in cooperative water quality management through Section 319 of the Clean Water Act and a Memorandum of Agreement with the Forest Service. ADEC also issues a certificate of compliance with Alaska Water Quality Standards under Section 401 of the Clean Water Act.
3. Alaska Department of Fish and Game (ADF&G)—Involved in the Coastal Zone Consistency review and is especially interested in instream activities and other fish, water, wildlife, and subsistence issues.
4. Alaska Department of Natural Resources (ADNR)—Tideland permit and lease or easement necessary for the log transfer site.
5. State Historic Preservation Office (SHPO)—Compliance with Section 106 of the National Historic Preservation Act (NHPA), a process to determine the effects of alternatives on heritage resources.

Wrangell Cooperative Association

The Wrangell Cooperative Association is a federally-recognized tribal government, and we consult with them on possible cultural resource impacts, as well as other resource impacts from the project.

Legislation and Executive Orders Related to this EIS

A brief list of laws pertaining to preparation of EISs on federal lands is shown below. Some of these laws are specific to Alaska, while others pertain to all Federal lands.

- Multiple Use Sustained Yield Act of 1960
- National Historic Preservation Act (NHPA) of 1966 (as amended)
- Wild and Scenic Rivers Act of 1968, amended 1986
- 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 (ESA) of 1973 (as amended)
- Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)
- National Forest Management Act (NFMA) of 1976 (as amended)
- Clean Water Act of 1977 (as amended)
- American Indian Religious Freedom Act of 1978
- Alaska National Interest Lands Conservation Act (ANILCA) of 1980
- Archeological Resource Protection Act of 1980
- Cave Resource Protection Act of 1988
- Tongass Timber Reform Act (TTRA) of 1990

- Magnuson-Stevens Fishery Conservation and Management Act of 1996
- Executive Order 11988 (floodplains)
- Executive Order 11990 (wetlands)
- Executive Order 11593 (heritage)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (aquatic systems and recreational fisheries)

In addition, the Coastal Zone Management Act (CZMA) of 1976, as amended, pertains to the preparation of this EIS. Federal lands are not included in the definition of the coastal zone as prescribed in the CZMA. However, the CZMA requires that when federal agencies conduct activities or developments that affect the coastal zone, that agency's activities or developments must be consistent to the maximum extent practicable with the approved State Coastal Management Program. This determination is made by the Forest Service.

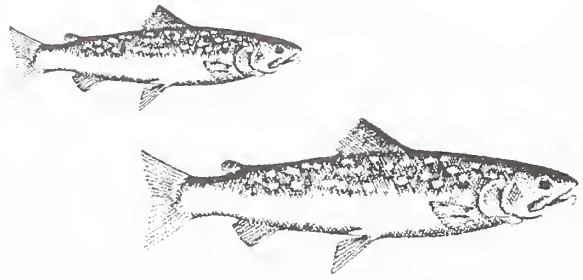
The Alaska Coastal Management Plan incorporated the Alaska Forest Resources and Practices Act of 1979 as applied standards and guidelines for timber harvesting and processing. The Forest Service standards and guidelines and mitigation measures described in Chapter 2 of this document equal or exceed State standards.

A Civil Rights Impact Analysis (CRIA) is included as part of this Draft EIS. The purpose of the CRIA is to identify any possible impacts associated with this proposed project based on an individual's civil rights (race, color, national origin, age, religion, gender, disability, political beliefs, sexual orientation, marital or family status). If you feel this project will impact your civil rights, please let us know.

Availability of the Planning Record

An important consideration in the preparation of this EIS has been the reduction of paperwork as specified in 40 CFR 1500.4. In general, the objective 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.

The planning record is a comprehensive project file documenting the process of developing this EIS, and is located through the Wrangell Ranger District Office in Wrangell, Alaska. Other reference documents such as the Forest Plan, the Tongass Timber Reform Act, the Resources Planning Act, and the Alaska Regional Guide are available at public libraries around the region as well as at the Assistant Forest Supervisor's Office in Petersburg and Sitka, and the Forest Supervisor's Office in Ketchikan, Alaska. The Forest Plan ROD is also available on the Internet and CD-ROM.



Chapter 2

Alternatives

CHAPTER 2
ALTERNATIVES

Introduction

This chapter describes the alternatives under consideration in this EIS and discusses the process followed to develop the alternatives. We also describe the field studies conducted, the alternatives considered, but not in detail, and identify the proposed mitigation measures. At the end of the chapter, we provide a comparison of the alternatives.

Field Studies

Field studies were conducted in 1997 and 1998 to collect specific information relative to issues and to verify resource information contained in the Tongass National Forest geographic information system (GIS). Resource information maintained in the GIS includes streams, important wildlife habitat, timber and soil inventories, and locations of proposed harvest units. Specific studies included silvicultural stand exams, goshawk and marbled murrelet surveys, deer winter range assessments, stream electrofishing for fish presence/absence, and others. Unit and road cards were used to document the locations and resource concerns regarding possible harvest units and roads. Resource specialists listed specific concerns on the cards and gave recommendations for addressing or mitigating those concerns (Appendices B and C). Information from field studies and GIS was then used to assess the issues, develop alternatives and analyze the environmental effects of each alternative.

Inventories, resource specialist reports, and GIS information are part of the Madan Timber Sale planning record. Also included in the planning record are the results of public scoping and the unit and road design cards. The planning record is available for public inspection through the Wrangell Ranger District office in Wrangell, Alaska.

Alternative Development

An alternative is a set of activities designed to accomplish the goals described in the Purpose and Need section of Chapter 1. The Proposed Action (Alternative 2) is one of many possible approaches to accomplishing these goals by harvesting timber in the Project Area. It was developed during the early planning phase of this project. The planning phase included completing a logging system and transportation analysis (LSTA) for the Project Area. During this analysis, the suitable timber in the Project Area was divided into logical harvest units. This group of units is called the unit pool. In addition, the roads needed to access the unit pool were mapped. These units and the roads were surveyed in 1997 and 1998. During this field work, the shape of units and the locations of roads were modified to reflect on-the-ground conditions and a number of units and roads were dropped because they were determined to be inconsistent with the Forest Plan. All

Road Management Options:

- *Road Storage*
- *Decommissioned or Closed (ADNR definition)*
- *Maintenance*

Road Storage:

Process of putting a road into a closed condition which protects resources including soils, water quality, fisheries, and wildlife. These roads may be left in this condition for many years. The road remains on the forest road transportation inventory and will be reopened at a future date.

Three Steps of Storage:

1. *Establishing drainages across the roadway that are self-maintaining and that effectively prevent erosion.*
2. *Removing culverts and bridges and reestablishing the natural drainage patterns of streams and bypassing ditch relief culverts with waterbars.*
3. *Returning the roadway to resource production through natural or planted vegetation (grass, browse, or trees).*

Decommissioning:

Same minimum requirements as for Storage, except that the road is removed from the forest road transportation inventory. There are no plans to reopen the roads that have been decommissioned.

Maintenance:

Maintain the road to the standard assigned for the maintenance level of the road.

Stormproofing: *Leave drainage structures in place, but provide waterbars, rolling dips, outslopes, and other features to ensure controlled runoff until any needed maintenance can be performed on the primary drainage system.*

unit modifications were documented in a section on the unit cards titled "Unit Development" (Appendix B). Many of the reasons for road locations are also included on the Road Cards (Appendix C). Information on LTF design and development is presented in Appendix D.

A group of resource specialists, known as the IDT, designed alternatives to the Proposed Action to provide different approaches for meeting the purpose and need. These alternatives were designed to address the issues identified during scoping (see Chapter 1). They were also designed to meet Forest Plan standards and guidelines (TLMP, 1997, as modified by the revised TLMP ROD, 1999) and applicable laws.

The original alternatives were refined over succeeding months to broaden the range of issues they addressed. As a result, a number of the original alternatives were dropped from detailed analysis because they fell within the range of the alternatives considered in detail (see below).

Various combinations of elements in Alternatives 1 through 5 are possible. The alternatives presented in this document are intended to provide a reasonable range of options in order to achieve the purpose and need of the project. Within this range, various combinations of alternatives can be considered in determining the selected alternative.

Forest Plan Consistency

On April 13, 1999 the Deputy Under Secretary of Agriculture, James Lyons, signed a new ROD for the TLMP. This ROD contained modifications to the 1997 Forest Plan and became effective on October 1, 1999.

The alternatives incorporate all applicable management direction from the 1997 Forest Plan, as modified by the 1999 ROD and are fully consistent with its goals and objectives, standards and guidelines, and management area prescriptions as they apply to the Project Area.

Alternatives Considered in Detail

Items Common to All Action Alternatives

Access Management

Two access options are being considered under each of the action alternatives. Under Option A, most roads would be left open after harvest and stormproofed (see sidebar). There would also be selective road closures for short segments of the system. These roads would be placed in storage with the drainage structures removed. Under Option B, most roads would be closed after harvest, either by barrier berms or by placing the road in storage. Roads placed in storage would be stormproofed. Storage results in maintaining roads to protect improvements and resource values only (see sidebar).

Logging Camps

No land-based logging camps would be authorized for this timber sale. The purchaser may use a floating camp, which would be subject to state and federal permits, and operated only during project implementation. If used, this camp would most likely be located at Jenkins Cove. If an alternative with roads is selected, there can be some minor land-based facilities, such as a repair shop for trucks and other equipment, and storage facilities for fuel/lubricants, or road-building explosives.

Log Transfer Facilities (LTFs)

One or two LTFs may be built to service the timber sale, depending on the alternative. One would be located at Jenkins Cove and one near the mouth of Moose Creek. At Jenkins Cove, the LTF would be a floating LTF just north of the cove and would include an equipment ramp inside the cove on the north shore. At Moose Creek, the LTF would be a low-angle ramp design LTF and would be located to the west of the mouth of Moose Creek. After the sale, all floating elements of the LTFs would be removed, but elements on shore would be maintained for possible future use.

Old-Growth Habitat Reserves (OGRs)

An OGR is an area containing a contiguous unit of old-growth habitat to be managed to maintain the integrity of the old-growth forest ecosystem. The Forest Plan created a system of OGRs across the entire Tongass National Forest, consisting of small, medium, and large ones. The Project Area contains two small OGRs.

The Forest Plan directs that the size and shape of small OGRs should be reviewed and revised, if appropriate, during project evaluations. Based on an evaluation of the Madan Project Area OGRs and their degree of compliance with criteria established in the Forest Plan, the size and shape of both OGRs in the Project Area is proposed for revision in each of the action alternatives. The existing OGR boundaries would be retained with the no action alternative.

Silvicultural Prescriptions

The harvest units in each of the action alternatives would be harvested following one of four general prescriptions listed below. Each prescription incorporates reserve trees to varying degrees.

Clearcut w/Minimum 10% Retention - Up to 90% of the merchantable volume would be harvested; a minimum of 10% of the merchantable volume would be retained in clumps or along setting boundaries. Note that the percent retention both here and below refers to merchantable trees greater than 9 inches in diameter at breast height. This percent would be in addition to the retention of non-merchantable trees. However, lower quality merchantable trees with high defect may be emphasized for retention, such as mature trees with substantial rot, twist, or other defects. These are often the best wildlife trees. Trees with little or no mistletoe would be retained. This prescription is generally used for units that do not have visual, slope stability, or reforestation concerns.

Patch Cut w/Minimum 60% Retention – This prescription involves creating small openings up to 5 acres in size, scattered throughout the unit. Non-merchantable trees and safe snags would be retained in the openings. Approximately 30% of the volume in the unit would be targeted for harvest, but harvest may reach 40%. This prescription would leave 60 to 70% of the volume in merchantable trees greater than 9 inches in diameter at breast height. The intent is to have 3 entries over the next 100 to 150 years with about

30% harvested during each entry and about 10% of the volume remaining as permanent retention. Entries would likely take place 30 to 60 years apart. This prescription is often used for units that have visual, slope stability, or reforestation concerns.

Group Selection w/Minimum 70% Retention - Groups up to 2 acres in size, would be harvested, scattered throughout the unit. Approximately 25% of the volume would be targeted for harvest, but harvest may reach 30%. This would leave 70 to 75% of the volume in merchantable trees on site after harvest. Entries would likely take place 30 to 60 years apart. This prescription is often used for units that have visual, slope stability, or reforestation concerns.

Individual/Group Selection w/Minimum 70% Retention - Individual trees and/or small groups up to 2 acres in size, would be harvested, scattered throughout the unit. This prescription may include selection by diameter limits. Approximately 25% of the unit would be targeted for harvest, but harvest may reach 30%. A variation of this prescription would be used in units J-5, J-10, and J-13 in Alternative 4; because these units are largely "not seen," the minimum retention would be 50% and the targeted harvest percentage would be 45%. Where individual selection is used, removal of 25 to 30% of the volume would likely leave 70 to 75% of the existing merchantable trees on site after harvest. Entries will likely take place 30 to 60 years apart. This prescription is often used for units that have visual, slope stability, or reforestation concerns.

Sort Yards

Two areas for log sorting have been identified; one is on the north side of Jenkins Cove and one is near the mouth of Moose Creek. Each sort yard would occupy 3 to 4 acres. At each location, the sort yards would be developed away from the shoreline and out-of-sight.

Alternative 1: No Action

In this alternative, we analyze the effects of not harvesting timber or building roads in the Project Area at this time. This alternative would respond to the issues of scenic quality, recreation value, the maintenance of existing roadless character, and wildlife habitat protection, including old-growth forests, by not building roads or harvesting timber. However, this alternative would not respond to the issue of providing employment and contributing to the local economy and would not contribute sawtimber or other wood products to meet the annual demand for Tongass National Forest timber from the Project Area, as described in Purpose and Need (Chapter 1). Under this alternative, the small OGRs, located at Virginia Lake and Madan Bay, would remain as mapped in the Forest Plan.

This alternative would not move the Project Area towards the desired future condition described in the Forest Plan (TLMP, 1997). The existing condition would continue to be influenced by natural disturbance processes (Figure 2-1). In addition to providing an alternative to the action alternatives, the No Action Alternative provides a benchmark that allows the decision-maker to compare the magnitude of the environmental effects of the action alternatives with the current condition (CEQ Regulations, Section 1502.14[c]).

Alternative 2: Proposed Action

This alternative emphasizes economic timber harvest within the constraints of Forest Plan standards and guidelines. Timber volume is maximized to the extent that reasonably economic timber harvest can be achieved. It includes the harvest of approximately 32

MMBF from approximately 2,105 acres. It involves the development of approximately 21 miles of road, including 3 miles of temporary road. This alternative focuses on establishing the infrastructure in this initial entry for use in subsequent entries (Figure 2-2). It constructs LTFs at Moose Creek and Jenkins Cove. It features timber development within Virginia Lake, Gypsy Creek, Jenkins Cove, and Moose Creek watersheds. It employs a variety of harvest methods including helicopter, live and running skyline, and highlead systems. It generally relies more on conventional silvicultural prescriptions as in clearcuts with minimum 10% volume retention.

The OGRs located at Virginia Lake and Madan Bay would be modified to make them consistent with the Forest Plan in terms of size and acres of productive old growth, as shown in Figure 2-2, based on recommendations from the IDT and resource agencies.

Alternative 3

Alternative 3 reduces road construction and acres of treatment within the Moose Creek watershed and defers road construction and timber harvest entirely within the Virginia Lake watershed. It also reduces road construction within the Jenkins Cove and Gypsy Creek watersheds. It includes the harvest of approximately 19 MMBF from approximately 1,719 acres. It involves the development of approximately 9 miles of road, including 1 mile of temporary road. It retains conventional harvest prescriptions and methods adjacent to the constructed road segments, but proposes non-conventional prescriptions for the majority of the suitable timber within the Jenkins Cove watershed. The prescription includes individual/group selection harvest by helicopter with approximately 25% stem removal within almost the entire suitable stratum. Two LTF's, one at Jenkins Cove and one at Moose Creek, would still be constructed.

Because of the large amount of selection harvest and the low density of roads, this alternative is the second-most responsive to the scenic issue and also addresses the road development/access management and wildlife habitat/species conservation issues. Future road development options and harvest opportunities within the Moose Creek and the Virginia Lake watersheds are retained.

The OGRs located at Virginia Lake and Madan Bay would be modified to make them consistent with the Forest Plan in terms of size and acres of productive old growth, as shown in Figure 2-3, based on recommendations from the IDT and resource agencies.

Alternative 4

Alternative 4 emphasizes helicopter harvest and minimizes road construction. This alternative defers all treatment and constructs no roads within the Virginia Lake watershed (as in Alternative 3) and also throughout most of the Gypsy Creek watershed. Within the Jenkins Cove watershed all harvest would be by individual or group selection. The alternative would construct 0.3 mile of road and a sort yard and all harvest would be by helicopter with approximately 25% stem removal within almost the entire suitable stratum. Stem removal would be increased to 50% in Units J-5, J-10, and J-13 because these units are largely not seen. This alternative also includes two barges to provide for more economical helicopter yarding distances; one would be south of Jenkins Cove and one would be at the head of Madan Bay. In these areas, logs would be yarded directly to the barges and limbed. Then they would either be loaded onto an adjacent barge for transport, or returned to the LTF for sorting and bundling.

In the Moose Creek drainage, the LTF and transportation system would be fully developed and harvest would be almost at the same level and using the same prescriptions as in Alternative 2. This level of harvest is consistent with the Forest Plan designation of Timber Production in most of this watershed and may be necessary to make this alternative economically viable because of the expected low economics of the Jenkins Cove watershed helicopter harvest.

It includes the harvest of approximately 19 MMBF from approximately 1,769 acres. It involves the development of approximately 7 miles of road, including 1 mile of temporary road.

Because of the high proportion of selection harvest and the lack of roads, this alternative is the most responsive to the scenic issue and addresses the road development/access management and wildlife habitat/species conservation issues. Future road development options and harvest opportunities within the Virginia Lake watershed are retained.

The OGRs located at Virginia Lake and Madan Bay would be modified to make them consistent with the Forest Plan in terms of size and acres of productive old growth, as shown in Figure 2-4, based on recommendations from the IDT and resource agencies.

Alternative 5

Alternative 5 defers all treatment within the Moose Creek watershed in an effort to maintain the integrity of all resource values in this watershed. It maintains future options for harvest and road construction in this watershed. This alternative treats the Virginia Lake, Gypsy Creek, and Jenkins Cove watersheds at the same level as in Alternative 2. This includes maximum road development and conventional harvest where practical. It includes the harvest of approximately 21 MMBF from approximately 1,352 acres. It involves the development of approximately 15 miles of road, including 2 miles of temporary road. Only the Jenkins Cove LTF would be developed.

This alternative is responsive to the road development/access management and wildlife habitat/species conservation issues in the Moose Creek watershed. In other areas, it emphasizes economic timber harvest within the constraints of Forest Plan standards and guidelines.

The OGRs located at Virginia Lake and Madan Bay would be modified to make them consistent with the Forest Plan in terms of size and acres of productive old growth, as shown in Figure 2-5, based on recommendations from the IDT and resource agencies.

Alternatives Considered But Eliminated From Detailed Study

Full Entry/Limited Road Emphasis

This alternative was a precursor of Alternative 3, but would have allowed entry into all areas entered under Alternative 2. It would have limited road construction by allowing only mainline roads and short spurs to be built and avoiding construction of higher elevation roads. Higher elevation units would have been harvested by helicopter and most helicopter units under Alternative 2 would have been included. Units near Glacier

Creek and the eastern half of Virginia Lake were not included in this alternative. Compared with Alternative 3, it permitted entry into more areas, but did not include as much helicopter harvest in the Jenkins Cove area. This alternative was dropped from detailed study because the issues it addresses and its effects fall within the range of the alternatives considered in detail. In general, its effects would be greater than those of Alternative 3 and less than those of Alternative 2.

Visual/Wildlife Emphasis with Roads

This alternative was a precursor of Alternative 4 and would have avoided harvest in areas with highest visual and wildlife values. It would have avoided harvest in high volume stands, especially those with high deer winter range or goshawk habitat values. It would have also avoided harvest in areas with the highest visual concerns, especially along Virginia Lake and along saltwater shorelines from Madan Bay south. Compared with Alternative 4, it permitted entry into more areas and greater road development, but did not include as much helicopter harvest in the Jenkins Cove area. This alternative was dropped from detailed study because the issues it addresses and its effects fall within the range of the alternatives considered in detail.

Helicopter Only

A helicopter-only alternative would respond to the roadless issues as well as the effects associated with LTF's upon marine resources. By implementing a helicopter-only alternative, the effects of road construction associated with stream crossings, soil movement, visual quality and cable logging would all be avoided. This alternative would require that all logs be flown to barges for transport. Harvest options within approximately 1 mile of saltwater, but beyond the 1,000-foot beach buffer, would be evaluated. Beyond 1 mile, helicopter yarding is generally not economical. While this alternative avoids upland disturbances associated with roads, it fails to adequately meet Forest Plan direction in terms of the management options it provides. Alternative 4 represents a helicopter-only alternative for the Jenkins Cove-Madan Bay area. Because the vast majority of harvestable timber in the Moose Creek drainage is more than 1 mile from saltwater, this option was not analyzed for Moose Creek. Therefore, a separate helicopter-only alternative was not analyzed in detail.

LTF-Barge Only

An LTF-barge only alternative would respond directly to the issues which address bark and woody debris deposition associated with placing logs into saltwater. This alternative would require an LTF capable of accepting barges directly up to the side of the bulkhead. This would require a more sophisticated deep-water LTF. Log transfer from the LTF to the barge would be intermittent due to tidal water depth changes. This alternative would also require a larger than normal decking area to accommodate the intermittent nature of tidal change and LTF/barge transfer. This would have significant effects upon sale economics. While transportation costs of a barge are more economical than rafting logs, barging requires more log handling which can off-set the economics of transportation. In addition, through analysis of Alternatives 2-5, it was concluded that impacts associated with the proposed LTF use and designs would not have significant negative impacts (see Marine Resources section of Chapter 3). Therefore, it was judged that the benefits of an LTF-barge only alternative do not outweigh the costs in terms of economic and environmental issues combined. As a result, this alternative was not considered in detail.

Mitigation Measures

Best Management Practices

Best Management Practices (BMPs) are practices and operating procedures designed to protect water quality and wetlands. They are the result of extensive efforts between the Forest Service and the State of Alaska to identify practices that will ensure that timber harvest activities minimize soil erosion and protect aquatic habitat.

BMPs are standards to be achieved, not detailed or site-specific prescriptions or solutions. As defined in the USDA Forest Service's Soil and Water Conservation Handbook, BMPs are mandated for use in Region 10 under the Tongass Timber Reform Act.

The analysis documented in this EIS discloses the possible adverse impacts that may occur as a result of implementing the actions proposed. Therefore, measures were formulated to mitigate these impacts. These measures were guided by the Forest Service goals and objectives for the applicable LUDs and follow the Forest Plan standards and guidelines (TLMP, 1997).

A variety of site-specific mitigation measures designed primarily to avoid or minimize adverse impacts have been evaluated, and those that are most appropriate have been incorporated into harvest unit and road design. These measures are referenced on the unit cards and road cards (Appendices B and C). Appendix E lists each site-specific mitigation measure and the unit and alternative to which it applies.

In addition to the site-specific measures listed in Appendix D, a variety of general and other site-specific measures would apply to all harvest and construction activities and would be incorporated into the timber harvest unit and road design. These include all appropriate BMPs not specifically identified below. Direction for use of BMPs on National Forest System lands in Alaska is included in Chapter 10 of FSH 2509.22, Region 10 Soil and Water Conservation Handbook (USDA Forest Service, 1991c). The handbook describes the application, monitoring, evaluation, and refinement of these BMPs. Appendix C of the Forest Plan (TLMP FEIS, 1997) provides a list and brief summary of the BMPs used in Region 10. Many other Forest Plan standards and guidelines apply in addition to those cited below. These standards and guidelines, including Appendix C of the Forest Plan, are incorporated by reference (TLMP, 1997 and TLMP FEIS, 1997).

General Mitigation Measures

These general mitigation measures apply to all units and roads in the Project Area. They may also apply to other portions of the Project Area. The source(s) of each general measure are listed after the measure in terms of individual Forest Plan Standards and Guidelines (see Chapter 4 of the Forest Plan) or BMPs (see Appendix C of the Forest Plan and Chapter 10 of FSH 2509.22, Region 10 Soil and Water Conservation Handbook). Specific mitigation measures that are applied to selected units and/or roads in a project are identified in Appendix E.

Air Quality Protection: Design projects to control air pollution impacts and to ensure that the predicted emissions from all pollution sources do not exceed ambient air quality standards, as specified under the Alaska Administration Code, Title 18, Chapter 50; applicable permits will be obtained from ADEC for all projects. (AIR 112)

Soil/Water Protection During Timber Sale Planning: Incorporate soil and water resource considerations into timber sale planning. Include site-specific considerations, site preparation, designating water quality protection needs on sale area maps, locating and designing landings for good drainage and dispersion of water, incorporating erosion control and timing responsibilities into the Operating Schedule, scheduling and enforcement of erosion control during and at completion of the timber sale, including non-recurring "C" provisions to protect soil and water resources in timber sale contracts, and seeking an environmental modification of the contract if new circumstances or

conditions indicate that soil, water, or watershed damage may occur. (BMP 13.1, 13.2, 13.3, 13.4, 13.10, 13.11, 13.12, 13.14, 13.17, and 13.18)

Soil/Water Protection During Road Development: Implement measures to reduce surface erosion and drainage interruption related to transportation including water barring and cross-draining roads using ditches and culverts to prevent water running long distances over roads, closure, and seeding and fertilizing cut-and-fill slopes. (BMPs 14.1, 14.2, 14.3, 14.5, 14.7, 14.8, 14.9, 14.10, 14.11, 14.12, and 14.19)

Soil/Water Protection During Road Management: Conduct road maintenance and snow removal operations to minimize disruption of road surfaces, embankments, ditches, and drainage facilities, and use road closures or other measures to keep road surface and road site erosion at low or background levels. (TRAN23-I, BMPs 14.20 and 14.23)

Management of Road Use to Reduce Erosion and Sedimentation: Control access and manage road use to reduce the risk of erosion and sedimentation from road surface disturbance especially during the higher risk periods associated with high runoff and spring thaw conditions. (BMP 14.22)

Temporary Road Closure: Close temporary roads after use, remove drainage structures and install waterbars in appropriate places. (RIP2-II and BMPs 12.17 and 14.24)

Soil/Water Protection During Development of Rock Sources, LTFs, & Other Facilities: Implement measures to reduce surface erosion and other impacts on soils and water from gravel sources and quarries, LTFs, sort yards, and other facilities. (BMPs 14.18, 14.19, 14.25, 14.26, and 14.27)

LTF Siting: Site LTFs in locations that will best avoid or minimize potential impacts on water quality, aquatic habitat, wildlife, and other resources. (TRAN214-V, WILD112, and BMP 14.4)

Camp and Facility Siting: Site camps and other facilities sufficiently far from important seasonal bear concentrations, raptor nest sites, and other important wildlife habitats, to avoid or minimize wildlife-human conflicts. (WILD112)

Sanitation at Facilities: Comply with all regulations for the disposal of sewage at camps, LTFs, and other facilities; require incinerators and/or other bear-proof garbage disposal methods at work camps. (FAC1, FAC22, WILD112-VI, BMP 12.10, 12.15, and 12.16)

Accidental Spills: Implement measures and plans to prevent the contamination of soil and water from accidental spills of petroleum products and hazardous substances. (BMP 12.8 and 12.9)

Heritage Site Discovery: Suspend work if a heritage site is discovered during project implementation. Authorize resumption of work only after consultation with the SHPO is complete.

Karst/Cave Inventory: Inventory karst landscapes and cave resources prior to initiation of project planning. If caves or karst features are discovered during layout or implementation, these will be reviewed by a geologist prior to continuing with harvest activity. (KARST-III)

Maximum Size of Created Openings: Limit created openings to a maximum size of 100 acres. (TIM114-IV)

Windthrow Hazards Along the Boundaries of Protected LUDs: Where chance of windthrow in an adjacent stand (in a non-development LUD) is increased by timber

harvest, measures will be taken to contain windthrow within a development LUD. (TIM114-XII)

Certification of Reforestation: Certify that every unit that receives a final harvest meets or surpasses the stocking guidelines and certification standards (FSH 2409.17) within 5 years. (TIM24)

Wetland Protection: Minimize the loss of all wetlands, but particularly the higher value wetlands (especially fens), and minimize the adverse impacts of land management activities on wetlands; follow Executive Order 11990 and the BMPs. (WET-I, WET-III, BMP 12.5)

Beach and Estuary Fringe Protection: Avoid harvest within the beach and estuary fringe; avoid road construction within this zone, except where no feasible alternative exists. (BEACH 2)

Non-Development LUD Protection: Avoid timber harvest impacts and minimize road construction within non-development LUDs such as Old-Growth Habitat, Remote and Semi-Remote Recreation, and Recreational River corridors.

Connectivity Between Old Growth Reserves: Provide corridors of old growth forest between medium OGRs. Where sufficient connectivity does not exist, or where the minimum Forest Plan criteria are not met, relocate or redesign mapped, small OGRs. (WILD112-XVIII)

Marine Mammal Protection: Ensure that Forest Service permitted or approved activities are conducted in a manner consistent with the Marine Mammal Protection Act, the ESA, and NMFS regulations for approaching whales, dolphins, porpoises, seals, and sea lions. Site camps, LTFs, and other facilities at least one mile away from known Stellar sea lion haulouts. (TE&S-I)

Monitoring

The NFMA requires that the National Forests monitor and evaluate their forest plans (36 CFR 219.11). The importance of this requirement is emphasized in the National Monitoring and Evaluation Strategy (USDA Forest Service, 1993). This strategy is designed to focus agency attention and resources on evaluating how forest plans are being implemented, in order to provide the Forest Service with the information needed to ensure responsive and efficient management of the National Forests. The strategy contains three principles: (1) evaluation of results will be readily available to the public, agencies, and other groups; (2) monitoring and evaluation will focus on ecosystems and will emphasize relationships among biotic and abiotic components of those ecosystems; and (3) the strategy will be flexible enough to meet local needs while encompassing forest, regional, and national requirements.

Three levels of monitoring are incorporated into Forest Plan monitoring:

Implementation monitoring is used to determine if the goals, objectives, standards and guidelines, and management prescriptions are implemented as detailed in the Forest Plan.

Effectiveness monitoring is used to determine if the standards and guidelines and the management prescriptions, as designed and implemented, are effective in meeting the Forest Plan goals and objectives.

Validation monitoring is used to determine whether the data, assumptions, and coefficients used in developing the plan are correct.

Most monitoring elements involve the mitigation measures discussed in the previous section. The three types of monitoring listed above are used to determine if the measures were implemented and if they are effective in mitigating the effects of the project or if they need to be revised. Information derived from monitoring can be used to develop improved or additional treatments to ensure that mitigation will be effective in the future.

A monitoring report is prepared by the Tongass National Forest and released each year. The report addresses all monitoring questions contained in the Forest Plan. It references all monitoring being conducted on the Tongass National Forest and assesses progress toward achieving the goals and objectives of the Forest Plan. The report either certifies that the Forest Plan is sufficient to guide management of the Tongass National Forest over the next year or it proposes the changes needed to achieve the goals and objectives and an approach for making those changes.

Forest Plan monitoring is conducted over the entire Tongass National Forest on a sample basis. Samples will be taken within the Madan Project Area. These results can be used to help answer questions regarding the implementation and effectiveness of mitigation within the Project Area. A number of implementation, effectiveness, and validation monitoring items are identified for each resource area in the Forest-wide monitoring plan described in the Forest Plan (TLMP, 1997).

In addition, implementation monitoring is conducted in each project area to assess whether the project was implemented as designed and whether it complies with the Forest Plan. Planning for routine implementation monitoring began with the preliminary design of the harvest units and the road system. Specialists used on-the-ground inventories, computer inventories, and aerial photographs to prepare a unit card for each harvest unit in each alternative (Appendix B). Cards were also prepared for each road (Appendix C). Resource specialists recorded their concerns on the cards and the mitigation measures needed to address those concerns in the design of each unit and road. Silvicultural prescriptions were prepared for each unit in each alternative. These concerns, mitigation measures, and prescriptions will be refined during the final layout phase of the project, when specialists will use the knowledge they gain in the field to revise and improve the unit card and road card recommendations and prescriptions as needed. Implementation monitoring will use the final unit card and road card mitigation measures and prescriptions as the basis for determining whether recommendations were implemented in the project.

Routine post-sale monitoring is also done by the road maintenance crew and by silviculturists. The road maintenance crew annually checks roads on the district for trees across the road, plugged culverts, and brushing needs. The silviculturist routinely monitors each harvest unit to determine if adequate regeneration of trees to meet NFMA requirements has been accomplished.

Mitigation measures and prescriptions are translated into contract specifications for timber harvest and road construction. Forest Service timber sale administrators and engineering representatives regularly inspect operations to ensure that harvest activities and road construction adhere to contract specifications. Implementation monitoring forms are completed during these inspections according to Tongass National Forest BMP Implementation Monitoring Protocols. Resource specialists such as hydrologists and wildlife biologists are available to assist with inspections as necessary. An interdisciplinary team conducts quality control implementation monitoring to 10 percent of all harvested units and road projects annually across the Tongass National Forest.

Comparison of Alternatives

This section compares the alternatives based on how they respond to the major issues discussed in Chapter 1. The information presented here is derived from the analyses presented in Chapter 3. The affected environment and the environmental effects are discussed in greater detail in Chapter 3. A comparison of Alternatives 1 through 5 is provided in Table 2-1.

Issue 1: Scenic Quality and Recreation Values

There is concern about how this sale would affect scenic quality and recreation values, particularly in and around Virginia Lake and along the Eastern Passage (Back Channel). All alternatives are designed to be consistent with the Forest Plan by meeting the VQOs of Retention and Partial Retention that are prescribed for the areas seen from visual priority travel routes and use areas. Alternative 1 would result in no changes along visual priority travel routes and use areas, or anywhere in the Project Area. Alternatives 3 and 4 would result in the least noticeable harvest activities among the action alternatives (Table 2-1). Both alternatives would completely avoid the Virginia Lake watershed and Alternative 4 would not permit any clearcutting and only very minimal road building, except in "not seen" areas within the Moose Creek watershed. Alternative 2 is the least responsive alternative for maintaining current scenic quality (Table 2-1). Because of the extent of harvest in the Virginia Lake and Jenkins Cove watersheds, some viewers would notice the alteration. However, the level of alteration would be subordinate to the characteristic landscape. Alternative 5 would have almost the same degree of alteration along visual priority travel routes and use areas as Alternative 2, but would not include any harvest in the Moose Creek drainage. Two LTFs would be visible from the Eastern Passage under Alternatives 2, 3, or 4, one would be visible under Alternative 5, and none would be visible under Alternative 1.

Alternative 1 would not result in any change in the recreation settings of the Project Area. Alternative 4 would have the smallest effect among the action alternatives, resulting in a decrease of approximately 1,302 acres of unroaded Recreation Opportunity Spectrum (ROS) settings (Table 2-1). Alternatives 3 and 5 would result in an intermediate decrease of unroaded ROS settings and Alternative 2 would decrease unroaded settings by approximately 4,071 acres.

Under the action alternatives, Option A (roads mostly open after sale) would allow limited use by high-clearance highway vehicles as well as full use by non-highway vehicles, mountain bikers, and hikers. Option B (roads mostly closed after sale) would not allow use by motorized vehicles but would allow full use by mountain bikes and hikers.

Issue 2: Timber Management and Economics

This issue deals with concern regarding the amount of timber to be harvested, the long-term timber supply, the effect on local communities, and the economic viability of the sale. Of the 17 million acres that make up the Tongass National Forest, approximately 10 million acres are identified as forest land. The Forest Plan allocates 576,000 of these acres, or approximately 6 percent of the forest land, as suitable for timber management. The Project Area includes about 10,000 acres of suitable timber lands or about 1.7 percent of the suitable land and 2 percent of the productive forest land on the Tongass. Under the action alternatives, the suitable timber lands in the Project Area would be reduced by about 1,084 acres, under the action alternatives, due to OGR expansion. The

Madan Timber Sale proposes up to 2,105 acres for timber management or up to 0.4 percent of the suitable lands and less than 0.1 percent of the productive forest land on the Tongass (Table 2-1). The project would have a positive effect on the local timber industry in Wrangell, with the greatest positive benefits being produced by Alternative 2 and the smallest being derived from Alternatives 3 and 4. Alternative 1 would potentially have negative effects on the local economy by contributing to the continuation of negative trends in the timber industry.

The economic viability of the timber sale is of concern to industry and the public. In Chapter 3 we compare alternatives under a High Market and a Low Market scenario. All action alternatives produce positive net stumpage values under the High Market and negative net stumpage values under the Low Market scenarios (Table 2-1). Actual stumpage returns are very difficult to predict and the estimated values should be considered relative values for alternative comparisons, rather than definitive predictions of actual returns. Results indicate that Alternative 5 would have the best economics and Alternative 2 would have the second best. Alternative 3 ranks third best economically and Alternative 4 ranks lowest. The primary reason for the lower economics of Alternatives 3 and 4 is the high proportion of volume that is planned for helicopter yarding in these alternatives.

Issue 3: Wildlife Habitat

The Forest Plan has identified a conservation strategy to ensure wildlife viability on the Tongass, that is based heavily on a series of large, medium, and small old-growth habitat reserves (OGRs), and connectivity among them. The Madan Project Area includes two small OGRs that are part of this system. Both OGRs are smaller in size and the Virginia Lake OGR also contains less productive old growth than is recommended by the Forest Plan. Under Alternative 1 the OGRs would not be modified and would remain the same in size. However, there would be no timber management in adjacent areas and such areas could be used for future old-growth unit expansion if needed. Under Alternatives 2, 3, 4, and 5, both OGRs would be expanded based on recommendations of the team of biologists who studied them, and would meet or exceed the minimum Forest Plan recommendations for both total size and amount of productive old growth.

The other major part of the Forest Plan conservation strategy relates to the management of the lands, where timber harvest may occur according to a set of standards and guidelines. The Madan action alternatives involve extensive use of a variety of silvicultural techniques designed to enhance wildlife diversity over time. A portion of the lands are proposed for clearcutting, but at least 10 percent reserve trees would be left behind as legacies. Most of the lands involved in each alternative have a prescription of individual tree or group selection that would provide much greater structural diversity over time. Alternative 2 would affect the greatest number of acres and Alternative 5 would have the fewest acres treated (Table 2-1). However, Alternatives 2 and 5 would result in the greatest number of clearcut acres and Alternatives 3 and 4 the least.

Other factors that relate to this issue are the change in deer habitat capability over time, future road densities, and the areas of high value habitats to be harvested. Deer habitat capability declines would range from 0 percent under Alternative 1 to a maximum of 6.3 percent over time under Alternative 2 (Table 2-1). The smallest decline among the action alternatives would be the 3.7 percent reduction associated with Alternative 4. Future road densities in the WAAs under all action alternatives would remain far below (<0.1 mile per square mile) the 0.7mile per square mile of open roads recommended for the protection of wolves. High value habitats for marten, northern goshawks, and marbled murrelets would not be affected with Alternative 1 and would be maximally harvested for marten and

murrelets under Alternative 2, and for goshawks under Alternative 4 (Table 2-1). Lowest effects on high value habitats for marten, goshawks, and murrelets would occur with Alternative 5.

Issue 4: Road Access Management

The Madan Project Area is part of an extensive mainland area, that is currently unroaded. Building roads in previously unroaded areas is of national concern as well as being a local issue. While some people would like to see no roads constructed in the Project Area, others would like to see roads built for recreation and subsistence activities, as well as for timber harvest. No roads would be constructed with Alternative 1 and almost 19 miles of permanent forest roads would be developed under Alternative 2 (Table 2-1). Alternative 5 would result in the development of approximately 13 miles of permanent roads and Alternatives 3 and 4 would result in approximately 8 and 6 miles of permanent road development, respectively. Temporary road development would be limited to between 0.6 and 2.6 miles under the action alternatives (Table 2-1). Following harvest, all temporary roads would be closed and permanent roads would be left open or closed depending on the road management option selected. Another aspect of this issue is balancing the benefits to public recreation and use of the area after timber sale harvest in an area relatively close to the community of Wrangell, with the costs of long term road maintenance and impacts to wildlife, watersheds, and fish. Comparisons in this regard are found in Chapter 3 under Issue 4: Road Access Management.

To analyze effects of a range of road management alternatives, two road management options are being considered in all action alternatives. Option A would manage the specified road system as open. Option B would manage the specified road system as closed after timber harvest was complete. Permutations with the range of these options are possible with some roads managed as open and others closed.

Preferred Alternative

The preferred alternative is Alternative 3. At this time, we prefer Alternative 3 because:

- Alternative 3 meets the purpose and need of the proposal.
- Alternative 3 addresses the important visual concerns that have been raised by the public, particularly in regard to harvest in areas viewed from Virginia Lake. While Alternative 3 defers harvest in the Virginia Lake area, it does allow for future entry. The partial-cut harvest prescriptions used in Alternative 3 along most of the visible face of the Back Channel, are a conservative approach that will result in harvest that is not readily apparent to the casual observer. This type harvest in the Jenkins Cove area could provide an active, adaptive, example of visually sensitive harvest in the project area. Once successfully completed, this "real world example" would help build public confidence that harvest in areas visible from Virginia Lake could be satisfactorily accomplished in the future.
- Our preference for Alternative 3 is partially based on the fact that it builds sufficient road infrastructure to allow for reasonable helicopter yarding distances for this sale and for future sales. The highly visible sloping terrain in the Jenkins Cove area will require future partial-cut helicopter entries over a long period of time to maintain the forested appearance of the hillside. The road in the Jenkins Cove area would also allow for some cable harvest in the more visually screened

portions of the hillside; this improves the economic viability of the sale as a whole.

Without a road established in the Jenkins Cove area, present and future helicopter yarding distances would be greatly in excess of 1 mile from a landing area for a large portion of the project area. Such a situation could effectively isolate a sizeable portion of the project area from future economic harvest.

- Alternative 3 allows for harvest in the Moose Creek area. Much of this harvest is in a timber production land use designation under the Tongass Forest Plan. Timber harvest in this area is largely screened from view. It is possible to use cable harvest in the Moose Creek area while meeting visual quality objectives. This type of harvest is generally much cheaper than helicopter yarding. Alternative 3, in the Moose Creek area, starts timber management in an area given a high priority for this use under the Forest Plan. Harvest in this area results in additional volume with related positive employment and economic affects. Harvest in this area may also allow the flexibility to separate the large helicopter harvest in the Jenkins Cove area from a sale in the Moose Creek area that may appeal more to timber sale purchasers with cable yarding equipment.
- The analysis in the Draft EIS indicates that Alternative 3 would not have significant wildlife, soils, or watershed impacts and is consistent with the Forest Plan. Alternative 3 may balance such impacts better than some of the other action alternatives while still allowing for reasonable economic timber harvest over time.
- At this time we prefer road management Option "A". This option will leave portions of the specified road system in place for public use after timber sale harvest. During scoping, we received input in favor of both closing the roads and leaving them open. There is interest in recreational use of these roads due to their relative close proximity to the community of Wrangell. Economic analysis contained in the Draft EIS indicates that the cost for road maintenance over a 30-year period under Option B would be similar to the costs of closing the roads at the termination of the sale under Option B (based on the assumption that there would be about 30 years between harvests). Road use is anticipated to be relatively light since the road system, although close to Wrangell, is not connected by land. The availability of portions of this road system would allow for motorized and non-motorized recreational opportunities that are currently in relatively limited supply near Wrangell. Road specification and design would provide for a design which is intended to accommodate vehicles and traffic associated with a timber sale. The level of traffic associated with this facility is expected to be much less after the sale than during the sale.

  Wildlife, fisheries, and watershed analysis for the Madan project area indicate that leaving portions of the road system open would not have significant adverse environmental effects. This, coupled with local public comment requesting additional roaded recreational opportunities, makes us prefer road management Option "A".

We would like your comments on the preferred alternative or any other thoughts or comments you may have about this project. We do have some specific questions relating to our preference of Alternative 3. What are your thoughts on road management option "A" which would leave portions of the road system open for public use? Alternative 3 defers harvest in areas viewed from Virginia Lake. What do you think of this approach? Would it be better to begin some lighter harvest in this area now so that harvest prescriptions that are sensitive to the visual importance of Virginia Lake could be done over a longer period of time, as is being done in the Jenkins Cove area under Alternative 3?

We want to ensure that the final project is as economic an offering as possible while meeting environmental and social concerns. Your input on unit or prescription changes that could improve the timber sale economics, reduce impacts, or respond to site-specific concerns, would help us in that regard and will help us improve the alternatives in the final environmental impact statement. For example, we are interested in comments about whether the Moose Creek portion of the sale might be improved economically through any specific unit or road changes.

Any comments you have about additional things to consider, especially those that relate to any site-specific knowledge you may have, are very welcome. Your comments will help improve the final decision to be made.

Table 2-1.
Comparison of Alternatives

Issue	Units	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Scenic Quality and Recreation Values						
Area of clearcuts seen from KVA 1—Virginia Lake	acres	0	39	0	0	39
Area of uneven-aged management seen from KVA-1—Virginia Lake	acres	0	181	0	0	181
Area of clearcuts seen from KVA-2—Eastern Passage	acres	0	43	50	0	43
Area of uneven-aged management seen from KVA-2—Eastern Passage	acres	0	293	428	461	458
Loss of Unroaded ROS settings [1/]	acres	0	4,071	2,110	1,302	2,161
Timber Management and Economics						
Total volume of timber harvested	MMBF	0	32,169	19,053	19,491	20,646
Total area treated	acres	0	2,105	1,719	1,769	1,352
Area clearcut (w/10% retention) by cable	acres	0	719	356	283	436
Area clearcut (w/10% retention) by helicopter	acres	0	72	25	0	72
Area of patch and selection harvest by cable	acres	0	129	0	0	129
Area of patch and selection harvest by helicopter	acres	0	1,185	1,338	1,486	716
Percent of suitable land harvested	%	0	24	19	20	15
Net stumpage high-value market	$/MBF	0	135.53	102.69	100.76	154.89
Net stumpage low-value market	$/MBF	0	-255.96	-286.83	-286.91	-246.94
Permanent road construction	miles	0	18.6	8.4	5.9	12.9
Temporary road construction	miles	0	2.7	0.6	0.8	1.8
Wildlife Habitat						
Area of productive old growth changed to a lower volume stratum due to selective harvest	acres	0	1,101	1,037	1,156	710
Area of productive old growth changed to early seral vegetation due to clearcut harvest	acres	0	797	390	293	503
Area of productive old growth in Virginia Lake OGR	acres	946	3,959	3,959	3,959	3,959
Area of productive old growth in Madan OGR	acres	1,454	2,118	2,118	2,118	2,118
Future road density in WAA 1810	mi/mi^2	0	0.07	0.01	0	0.07
Future road density in WAA 1811	mi/mi^2	0	0.09	0.05	0.04	0.05
Future project area open road density under Road Management Option A	mi/mi^2	0	0.6	0.2	0.2	0.4
Future project area open road density under Road Management Option B	mi/mi^2	0	0	0	0	0
Long-term change in deer habitat capability	%	0	-6.3	-5.2	-3.7	-5.2
High-value (HSI >0.61) deer winter range removed (1,395 ac in Project Area)	acres	0	132	252	231	132
Area of high value marten habitat harvested (7,509 ac in Project Area)	acres	0	980	735	718	662
Area of high value goshawk habitat harvested (5,402 ac in Project Area)	acres	0	277	282	323	245
Area of high value murrelet habitat harvested (15,992 ac in Project Area)	acres	0	1,118	779	784	673

Table 2-1.
Comparison of Alternatives (continued)

Issue	Units	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Road Access Management						
Roads open to motorized travel use in Option A [2/]	miles	0	15.0	7.4	4.6	10.3
Roads open to motorized travel use in Option B [2/]	miles	0	0	0	0	0
Percent of Project Area within one mile of road		0	31.2	21.2	13.9	19.2
Other Issues						
Area of harvest-related ground disturbance	acres	0	66	41	37	36
Area of road-related ground disturbance	acres	0	213	90	67	147
Area of harvest on MMI 3 soils	acres	0	478	524	547	185
Road length on MMI 3 and MMI 4 soils	miles	0	4	3	0	0
Jenkins Cove LTF constructed	Y/N	N	Y	Y	Y	Y
Moose Creek LTF constructed	Y/N	N	Y	Y	Y	N
Timber volume processed through Jenkins Cove LTF	MBF	0	21,937	12,425	8,235	20,646
Timber volume processed through Moose Creek LTF	MBF	0	10,231	6,628	10,231	0
Timber volume processed through barge	MBF	0	0	0	748	0
Percent of watershed area harvested	%	0	3.0	1.6	2.5	1.7
Percent of watershed area roaded	%	0	0.4	0.2	0.1	0.3
Number of Class I stream crossings	#	0	0	0	0	0
Number of Class II stream crossings	#	0	5	1	0	5
Road length on wetlands	miles	0	6.5	2.2	0.1	6.0
Roads constructed on wetlands [3/] (7,925 acres of wetlands in Project Area)	acres	0	39	13	1	36
Percent area of Virginia Lake watershed treated [4/]	%	0	1.5	0	0	1.5

1/ Includes the net reduction in Primitive and Semi-primitive Non-motorized ROS settings, combined.
2/ This includes the use of non-highway vehicles.
3/ This assumes a 50-ft wide road width. Although the majority of the roads would be 25-ft wide.
4/ Includes the Glacier Creek (A07C), Porterfield Creek watershed (A07B), and the small watersheds draining into Virginia Lake (A07D).

Acronyms:
KVA=Key Viewing Area; ROS=Recreational Opportunity Spectrum;
MMBF=Million Board Feet; MBF=Thousand Board Feet;
HSI=Habitat Suitability Index; MMI=Mass Movement Index

Alternative 1

M-10 Unit Number

Unit Boundary

State Land Boundary

Streams

Class 1

Class 2

Class 3

E Log Transfer Facility (LTF)

S Sort Yard

B General Barge Location

Prescriptions:

Clear Cut (Minimum 10% Retention)

Patch Cut (Minimum 60% Retention)

Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 50% Retention)

Productive Forest

OGR

Non-Productive Forest

Non-Forest

Scale in Feet

0 1000 2000 3000 4500 6000

0 1/4 1/2 3/4 1

Scale in Miles

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Alternative 1

M-10 Unit Number

Unit Boundary

State Land Boundary

Streams

Class 1

Class 2

Class 3

E Log Transfer Facility (LTF)

S Sort Yard

B General Barge Location

Prescriptions:

Clear Cut (Minimum 10% Retention)

Patch Cut (Minimum 60% Retention)

Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 50% Retention)

Productive Forest

Non-Productive Forest

Non-Forest

OGR

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Alternative 2

M-10 Unit Number

Unit Boundary

State Land Boundary

Specified Road

Specified Road (to be placed in storage after timber sale)

Temporary Road

Streams

Class 1

Class 2

Class 3

E Log Transfer Facility (LTF)

S Sort Yard

B General Barge Location

Prescriptions:

Clear Cut (Minimum 10% Retention)

Patch Cut (Minimum 60% Retention)

Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 50% Retention)

Productive Forest

OGR

Non-Productive Forest

Non-Forest

N

W E

S

Scale in Feet

0 1000 2000 3000 4500 6000

0 1/4 1/2 3/4 1

Scale in Miles

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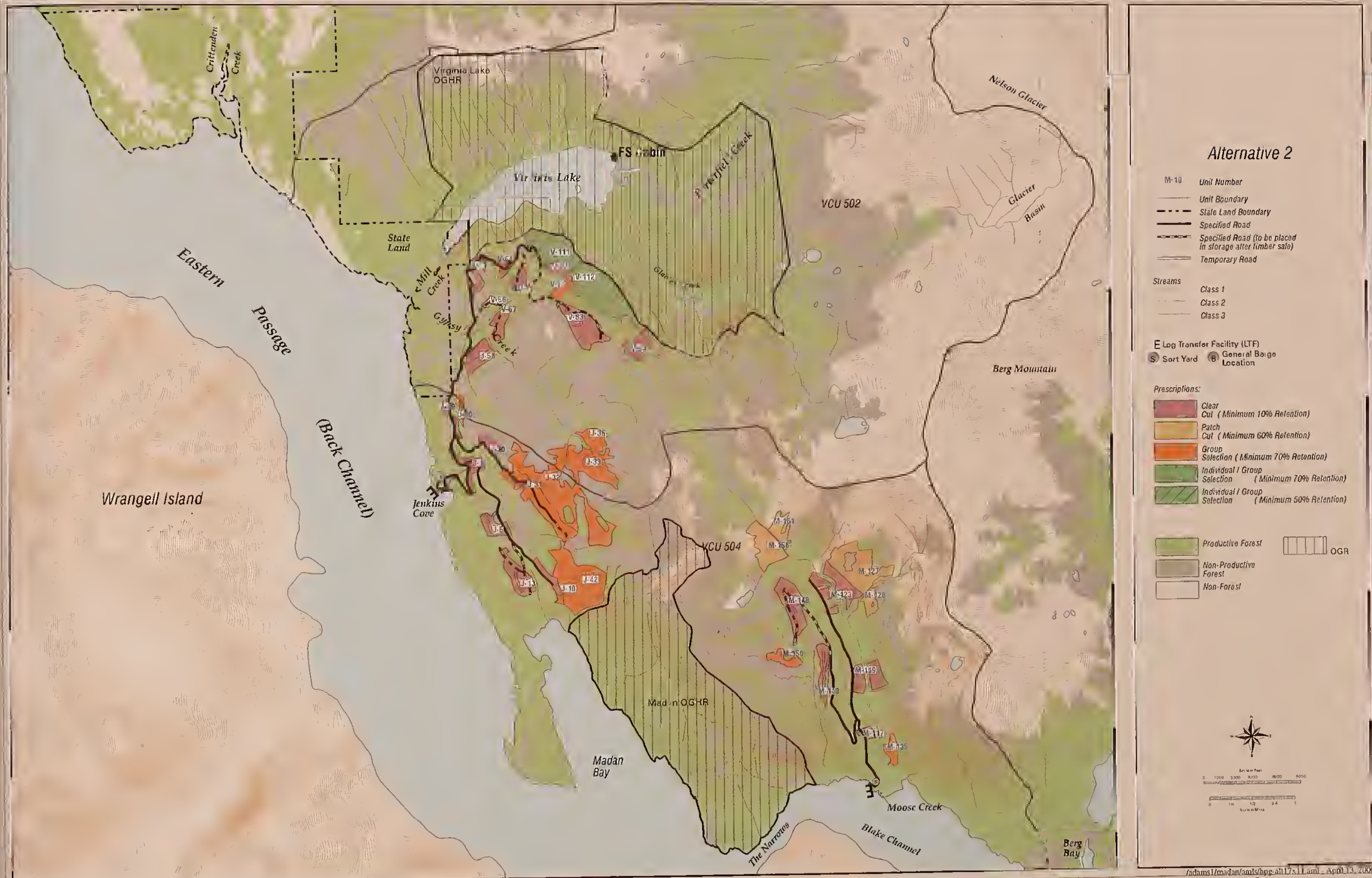

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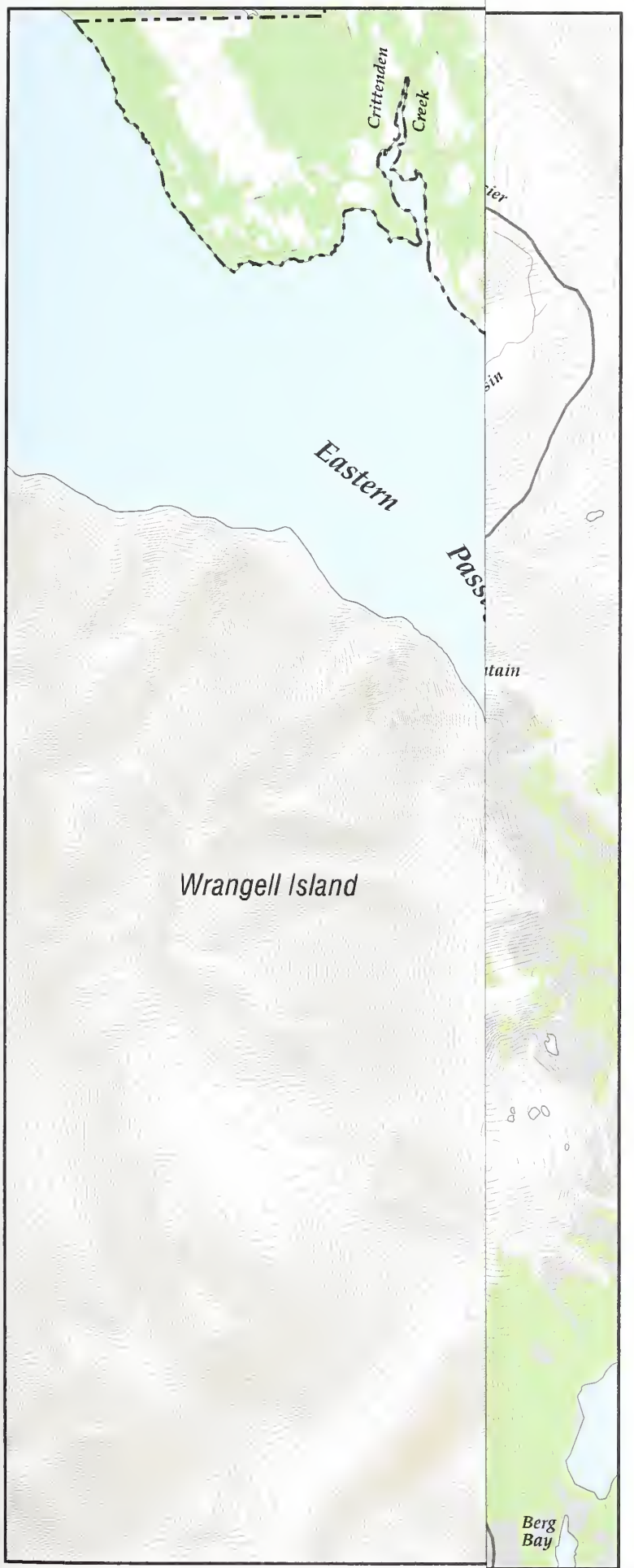

Alternative 3

M-10 Unit Number

Unit Boundary

State Land Boundary

Specified Road

Specified Road (to be placed in storage after timber sale)

Temporary Road

Streams

Class 1

Class 2

Class 3

E Log Transfer Facility (LTF)

S Sort Yard

B General Barge Location

Prescriptions:

Clear Cut (Minimum 10% Retention)

Patch Cut (Minimum 60% Retention)

Croup Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 50% Retention)

Productive Forest

Non-Productive Forest

Non-Forest

OGR

N

W E

S

Scale in Feet

0 1000 2000 3000 4500 6000

0 1/4 1/2 3/4 1

Scale in Miles

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Crittenden Creek

Virginia Lake OGHR

FS Cabin

Virginia Lake

Portage Ltd Creek

VCU 502

Nelson Glacier

Glacier Basin

State Land

Mill Creek

Gypsy Creek

Glacier Creek

Eastern Passage (Back Channel)

Wrangell Island

Jenkins Cove

J-53 J-49 J-50 J-52 J-39 J-31 J-32 J-34 J-35 J-201 J-203 J-37 J-204 J-42 J-10 J-202

VCU 504

M-151 M-156 M-127 M-123 M-128 M-119 M-117 M-135

Madan OGHR

Madan Bay

Berg Mountain

Moose Creek

Blake Channel

The Narrows

Berg Bay

Alternative 3

M-10 Unit Number

Unit Boundary

State Land Boundary

Specified Road

Specified Road (to be placed in storage after timber sale)

Temporary Road

Streams

Class 1

Class 2

Class 3

E Log Transfer Facility (LTF)

S Sort Yard B General Barge Location

Prescriptions:

Clear Cut (Minimum 10% Retention)

Patch Cut (Minimum 60% Retention)

Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 50% Retention)

Productive Forest

Non-Productive Forest

Non-Forest

OGR

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Alternative 4

M-10 Unit Number

Unit Boundary

State Land Boundary

Specified Road

Specified Road (to be placed in storage after timber sale)

Temporary Road

Streams

Class 1

Class 2

Class 3

E Log Transfer Facility (LTF)

S Sort Yard B General Barge Location

Prescriptions:

Clear Cut (Minimum 10% Retention)

Patch Cut (Minimum 60% Retention)

Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 50% Retention)

Productive Forest

Non-Productive Forest

Non-Forest

OGR

N

W E

S

Scale in Feet

0 1000 2000 3000 4500 6000

0 1/4 1/2 3/4 1

Scale in Miles

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Alternative 4

M-10 Unit Number

Unit Boundary

State Land Boundary

Specified Road

Specified Road (to be placed in storage after timber sale)

Temporary Road

Streams

Class 1

Class 2

Class 3

E Log Transfer Facility (LTF)

S Sort Yard

B General Barge Location

Prescriptions:

Clear Cut (Minimum 10% Retention)

Patch Cut (Minimum 60% Retention)

Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 50% Retention)

Productive Forest

Non-Productive Forest

Non-Forest

OGR

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Alternative 5

M-10 Unit Number

Unit Boundary

State Land Boundary

Specified Road

Specified Road (to be placed in storage after timber sale)

Temporary Road

Streams

Class 1

Class 2

Class 3

E Log Transfer Facility (LTF)

S Sort Yard

B General Barge Location

Prescriptions:

Clear Cut (Minimum 10% Retention)

Patch Cut (Minimum 60% Retention)

Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 70% Retention)

Individual / Group Selection (Minimum 50% Retention)

Productive Forest

OGR

Non-Productive Forest

Non-Forest

Scale in Feet

0 1000 2000 3000 4500 6000

0 1/4 1/2 3/4 1

Scale in Miles

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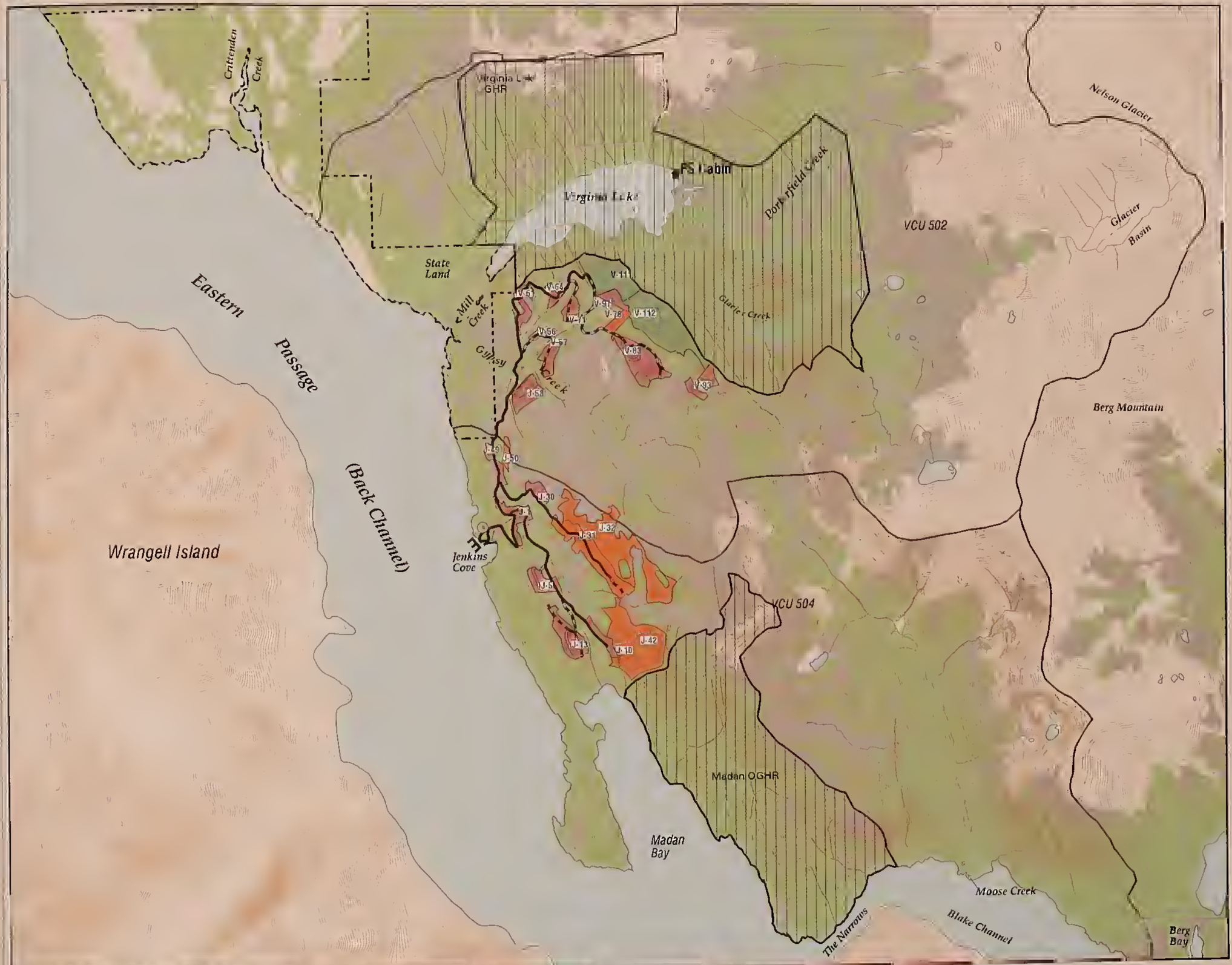

Alternative 5

- M-10 Unit Number
- Unit Boundary
- State Land Boundary
- Specified Road
- Specified Road (to be placed in storage after timber sale)
- Temporary Road

Streams
- Class 1
- Class 2
- Class 3

E Log Transfer Facility (LTF)
(S) Sort Yard (B) General Barge Location

Prescriptions:
- Clear Cut (Minimum 10% Retention)
- Patch Cut (Minimum 60% Retention)
- Group Selection (Minimum 70% Retention)
- Individual / Group Selection (Minimum 70% Retention)
- Individual / Group Selection (Minimum 50% Retention)

- Productive Forest
- Non-Productive Forest
- Non-Forest
- OGR

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Chapter 3

Affected Environment and Environmental Consequences

CHAPTER 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Introduction

In this chapter, we describe the environment that would potentially be modified by the project and the environmental effects associated with the significant issues. These include scenic quality and recreation values, timber management and economics, wildlife habitat, and road access management. Other concerns raised during public scoping that are not significant issues are also discussed. Other environmental considerations and required disclosures are addressed at the end of the chapter.

Issue 1: Scenic Quality and Recreation Values

There is concern that timber harvest associated with the Madan sale will be visible from the Eastern Passage, Virginia Lake and parts of Wrangell Island. As a result, there is concern that the scenic quality of the Project Area will be diminished along with recreational experiences. Although there is not a great deal of recreational activity that occurs in the Project Area, outside of the Virginia Lake and Mill Creek areas, the high scenic quality of the Project Area is an important part of the recreational experience for many. Residents, recreationists, and outfitter/guides that use and/or pass near the Project Area can view it for extended periods of time.

We have divided this issue into two main components:

- The effects of the alternatives on scenery.
- The effects of the alternatives on potential roaded and unroaded recreation areas and on recreation experience (including impacts on outfitters and guides).

Scenery

The Project Area is located on the portion of the mainland east of Wrangell Island. It has been classified as having a landscape type with a Coastal Hill scenic character type. This character type has extensive landform variety with rounded, but steep, hills rising up from saltwater (Figure 3-1). Behind and above the coastal hills are rugged glaciated mountain peaks that rise to elevations over 4,500 feet. These hills and mountains are dissected by steep-walled, u-shaped valleys and fjords. Drainages are characterized by short, swift streams and many lakes and waterfalls. The coastal hillsides are covered

Figure 3-1.
Photograph of Project Area Landscape Type (Virginia Lake and Mill Creek Inlet)

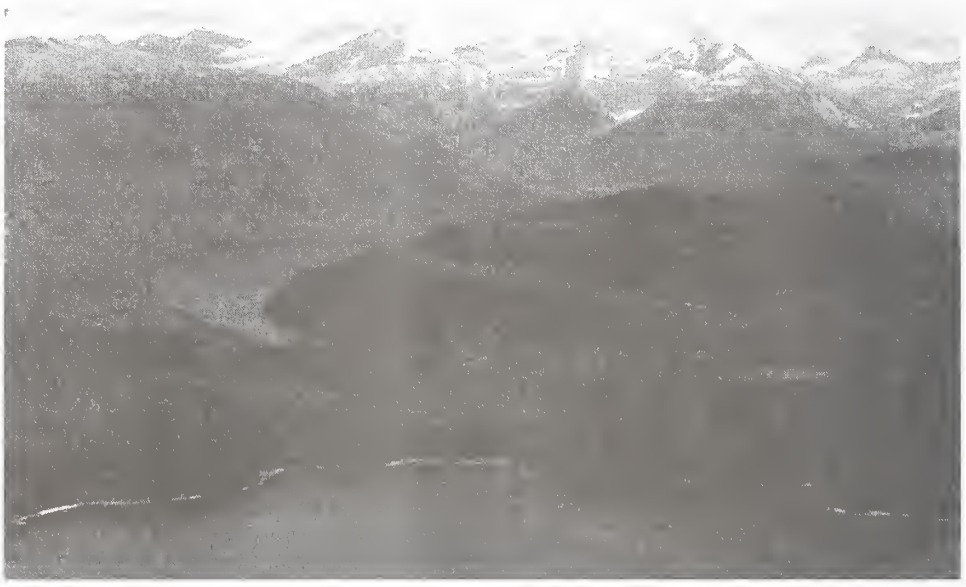


Figure 3-2.
Photograph of Wrangell Island from Earl West Cove

with hemlock-Sitka spruce forest type that gives the visual impression of uniform color and texture. Scattered muskegs, rock outcrops, and glaciated peaks break up the uniform appearance of the forest.

The northern-most portion of the Project Area surrounds Virginia Lake and the southern-most is located in and encompasses the Moose Creek drainage. The Project Area is largely untouched by human activities and maintains a pristine appearance. Across the Eastern Passage from the Project Area on Wrangell Island are state and federal lands that have been extensively harvested and are quite visible from the Eastern Passage (Figure 3-2). State lands on the mainland adjacent to the Project Area have not yet been harvested.

The Project Area is most commonly viewed by people in boats from the Eastern Passage, several areas on Wrangell Island, Virginia Lake, and flying into Virginia Lake. The area can also be viewed from boats passing through the Narrows and from the northern portion of Blake Channel (Figure 3-3).

Viewers boating along the Back Channel can view the Project Area for extended periods of time. Viewers on Wrangell Island include residents of several homes along the shores of the Back Channel, people driving along Forest Road 6265, and recreationists at Earl West Cove. Recreationists using Virginia Lake and/or staying at the Virginia Lake Forest Service cabin also have views of parts of the Project Area.

The Forest Plan identified important travel routes and use areas which dictate which Visual Quality Objectives (VQOs) must be met, depending on the land use designation (LUD) in which an activity is proposed. These routes and use areas are listed in Appendix F of the Forest Plan. Routes and use areas which may be affected by this project include: Eastern Passage and Blake Channel (Travel Routes); Road #6265 on Wrangell Island (Public Use Roads); Virginia Creek and Lake (Recommended Recreation River); Earl West Cove (Saltwater Use Areas): Virginia Lake (Dispersed Recreation Areas): Virginia Lake Cabin (Forest Service Cabins); Earl West Picnic Area (Developed Recreation Sites): and Mill Creek Trail #515 (Hiking Trails).

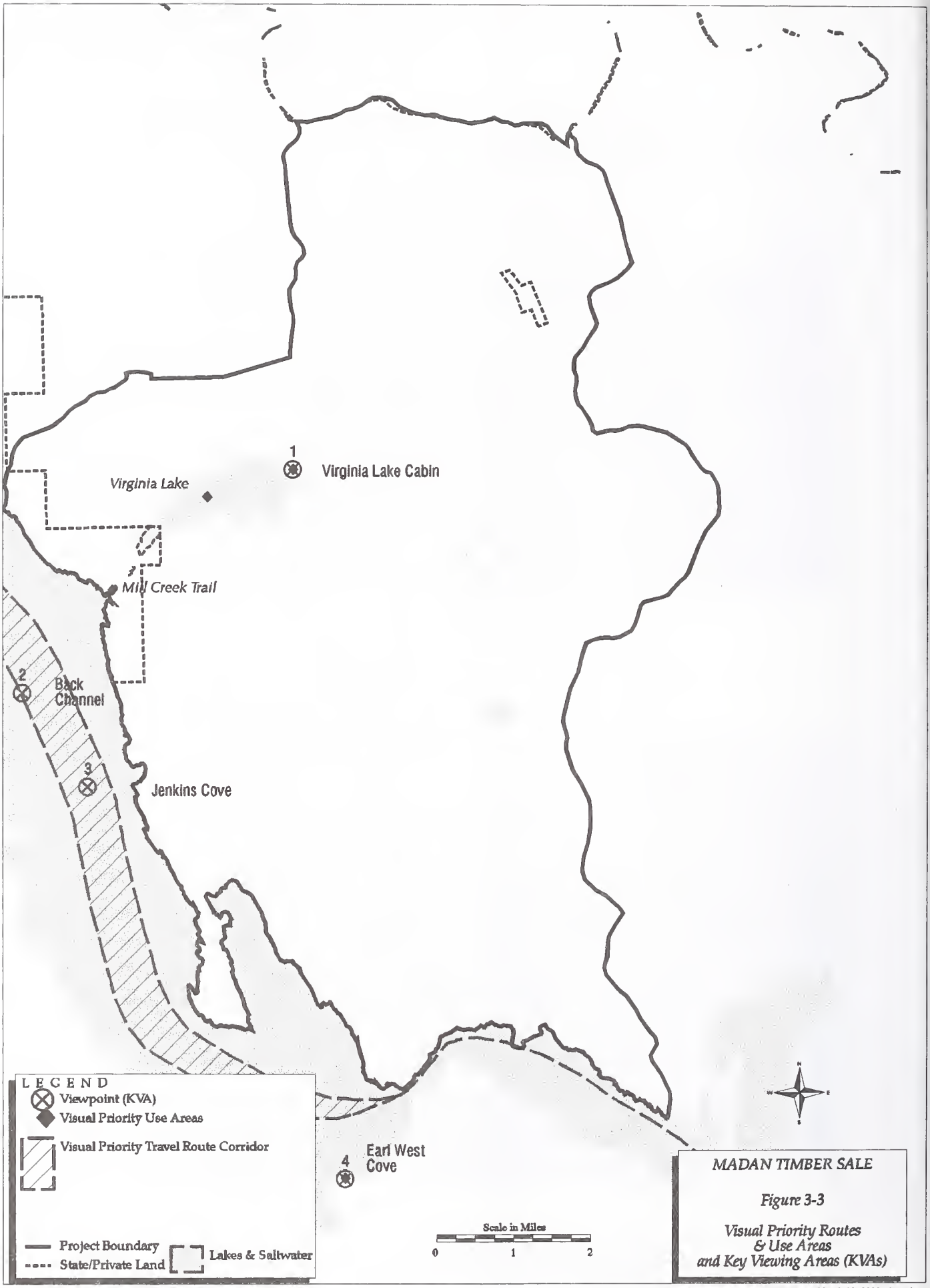
Desired Future Scenic Conditions

Desired future conditions for visual quality are guided by management prescriptions and corresponding VQOs in the Forest Plan. Management prescriptions includes the identification of LUDs for all lands in the Forest. The LUDs that have been assigned to the Project Area are depicted in Figure 3-4. They include: Old Growth Habitat; Recreation River; Scenic Viewshed; Modified Landscape; and Timber Production. All of the LUDs in the Project Area except Old Growth Habitat, allow some level of timber harvest.

There are two Old Growth Habitat Reserves (OGRs) in the Project Area. They are the Virginia Lake and Madan Old Growth Reserves. A Recreation River LUD follows Virginia Lake and the Porterfield Creek drainage.

The Scenic Viewshed LUD begins at the coastline and continues up into the high country of the Project Area. This area was assigned the Scenic Viewshed LUD primarily to protect the scenic quality of views from Eastern Passage/Blake Channel, Virginia Lake, and the Earl West Cove.

The Modified Landscape LUD area is located primarily in areas that are in the middleground and background when viewed from Visual Priority Routes and Use Areas.



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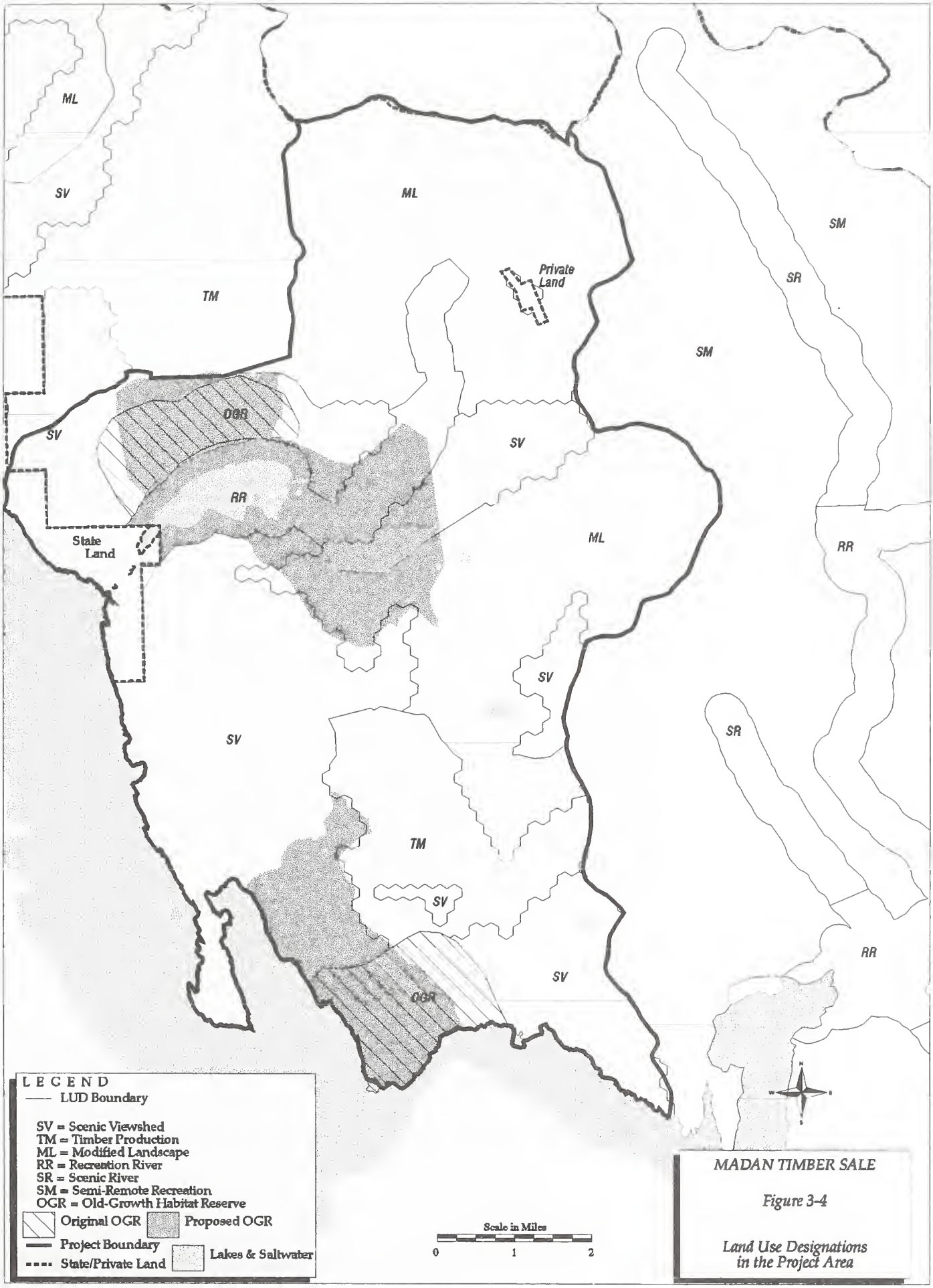
ML
SV
ML
SM
Private Land
SR
TM
SM
OGR
SV
SV
RR
State Land
ML
RR
SV
SV
SR
TM
SV
RR
SV
OGR
LEGEND
LUD Boundary
SV = Scenic Viewshed
TM = Timber Production
ML = Modified Landscape
RR = Recreation River
SR = Scenic River
SM = Semi-Remote Recreation
OGR = Old-Growth Habitat Reserve
Original OGR
Proposed OGR
Project Boundary
State/Private Land
Lakes & Saltwater
Scale in Miles
0
1
2
MADAN TIMBER SALE
Figure 3-4
Land Use Designations in the Project Area
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The Timber Production LUD is located in high areas away from the shoreline that are also unseen from Visual Priority Routes and Use Areas.

The primary component of the Visual Management System used by the Forest Service is the VQO. Activities that would change the appearance of National Forest System lands must meet established VQOs. VQOs for a particular area are determined in the Forest Plan, depending on the LUD and the distance from Visual Priority Routes and Use Areas. VQOs are expressed in terms of the objective for the landscape and range from minimally disturbed to highly disturbed landscapes. The VQOs that are found in the Project Area are, in order from least disturbed to most disturbed: Retention, Partial Retention, Modification, and Maximum Modification (Figure 3-5). The VQOs shown in Figure 3-5 are based on distances and views from Visual Priority Travel Routes and Use Areas (Table 3-1).

Table 3-1.
LUDs in the Project Area That Could Support Timber Harvest and Assigned VQOs based on Distance Zone from Visual Priority Routes and Use Areas

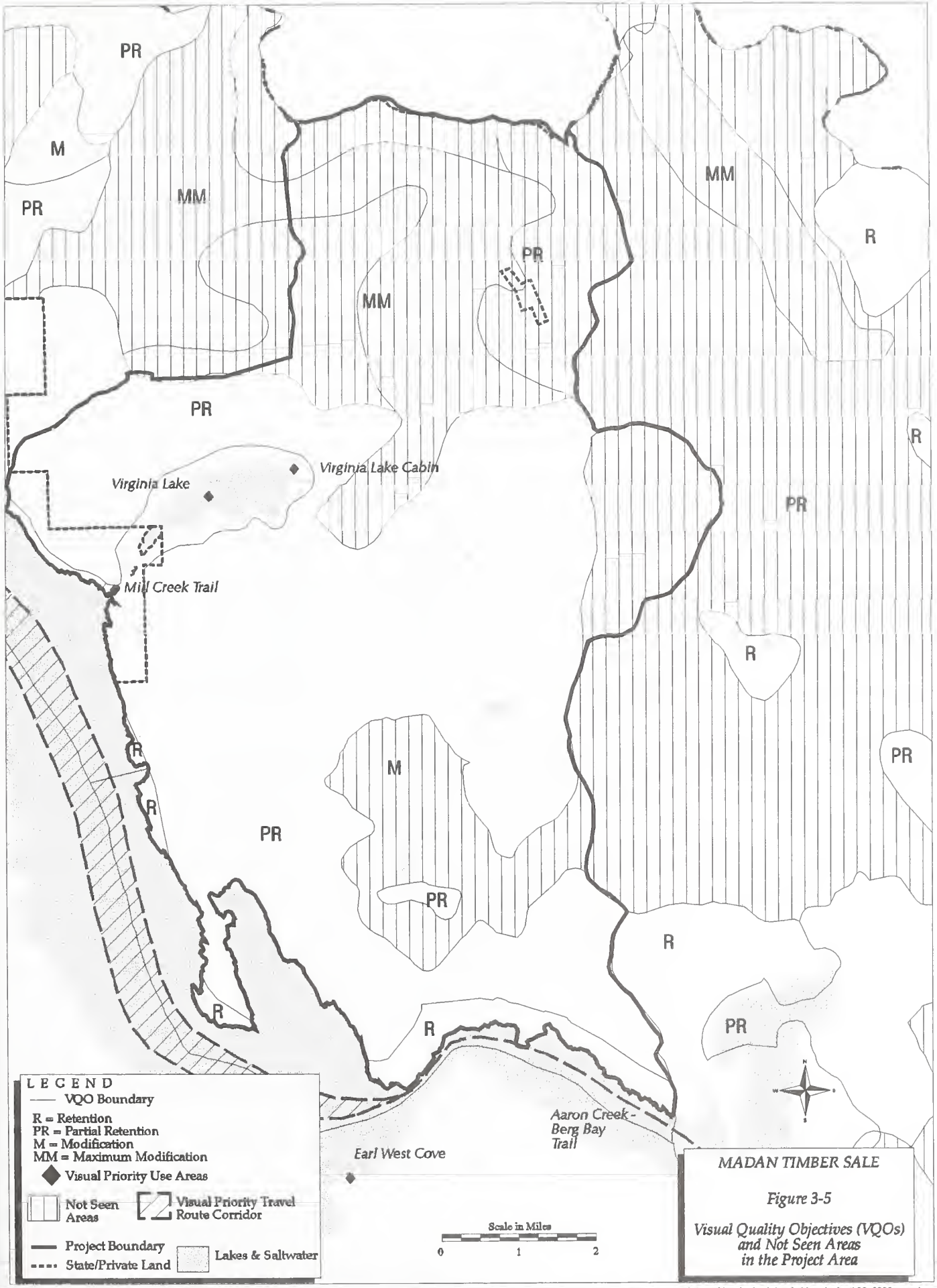
LUD	Foreground	Middleground	Background	Not Seen
Recreation River	Partial Retention	Modification	Modification	Maximum Modification
Scenic Viewshed	Retention	Partial Retention	Partial Retention	Maximum Modification
Modified Landscape	Partial Retention	Modification	Modification	Maximum Modification
Timber Production	Modification	Maximum Modification	Maximum Modification	Maximum Modification

The Retention VQO requires that harvest activities must not be visually evident to the casual observer. With the Partial Retention VQO, harvest activities must be subordinate to the landscape character of the area. In areas with the Modification VQO, harvest activities may visually dominate the landscape, but must have visual characteristics similar to those of natural occurrences within the surrounding area or character type. In areas with the Maximum Modification VQO, harvest activities may dominate the landscape, yet when viewed as background, should appear to be a natural occurrence.

The Visual Absorption Capability (VAC) of an area also influences the level of harvest activity that is compatible with the VQO. VAC is determined by the general complexity of the landscape, the slope, and the distance from which a person would view an area. It is expressed as high, intermediate, or low. All three VACs are present in the Madan Project Area.

General Effects on Visual Quality

All harvest units in all of the alternatives were designed to meet established VQOs. Some of the units are in areas visible from the Eastern Passage and Blake Channel Visual Priority Travel Routes (along other saltwater areas) and several Visual Priority Use Areas. Several of the units could potentially be noticed by the casual forest visitor but would still meet the relevant VQO. The proposed units would be located at least 0.5 mile from the closest edge of the Eastern Passage Visual Priority Route corridor.



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All of the visible units are located in areas with VQOs of Partial Retention. As per the Forest Plan, the units in areas with a VQO of Partial Retention could be noticeable to the casual forest visitor and still meet Partial Retention so long as they would be visually subordinate to the landscape. These proposed harvest units would be expected to meet or exceed this criteria.

The prescriptive standard for tree retention or removal in the EIS is based on a percentage of the volume of the original stand. For example, the retention of 70 percent of a stands merchantable volume will result in leaving at least 70 percent (and likely more) of the existing trees in place. For the purpose of visual discussions that follow, reference will be made to the percentage of trees taken or left in given units.

During the IDT planning phase of the project, every effort was made to exceed the Partial Retention VQO. This was accomplished by using methods such as: siting clearcut units in areas not seen, or minimally seen, from Visual Priority Route and Use Areas; using group and individual selection harvest techniques; leaving a minimum of 70 percent of the trees behind as retention in areas with VQOs of Partial Retention that are visible from Visual Priority Travel Routes and Use Areas; clustering retention trees in areas that would help screen adjacent harvest activities, and feathering the edges of harvest units where appropriate. Helicopter harvest was proposed in many cases to avoid the visual impacts of roads and cable harvest. Roads were also sited to take advantage of topographic features, such as knobs (that would screen them), to reduce their visibility.

The remainder of the units are in not seen areas and are only required to meet the Maximum Modification VQO. To determine where the not seen areas of the Project Area are the Forest Service GIS database was consulted. In addition, a seen area analysis was conducted from sensitive viewing areas to help determine what kind of prescription would be appropriate for each harvest unit. The larger "not seen" areas are displayed in Figure 3-5.

As discussed in the King George Timber Sale EIS, harvest units viewed from below at oblique angles that retain 50 percent or more of the trees should not be noticed by most people. The King George EIS determined that leaving approximately 50 percent of the trees could result in some blowdown potential. Leaving approximately 70 percent of the stand in this area where there is little evidence of previous large-scale blowdown, should result in stands that are fairly resistant to blowdown and that would likely not be noticed.

To analyze the effects of timber harvest on the scenic quality, four representative viewpoints, or Key Viewing Areas (KVAs), were selected to represent several Visual Priority Routes or Use Areas. The locations of the KVAs are: the Virginia Lake Cabin (KVA 1); the Back Channel (KVAs 2 and 3); and Earl West Cove (KVA 4). These viewpoints represent the views that would be seen by the greatest number of people recreating in, or travelling through, the vicinity of the Project Area.

The Virginia Lake Cabin (KVA 1)

This KVA is located on the deck of the Virginia Lake cabin and represents the views that recreationists staying at the cabin would see. From the deck, the view includes the steep hillside to the north of the lake, the majority of the lake to the west and southwest and the hillsides to the south and southwest that includes the Project Area.

Alternative 1

There would be no changes to the existing scenic conditions viewed from the Virginia Lake cabin under Alternative 1 (Table 3-2).

Table 3-2.
Acres Harvested by VQO in Seen Area of Virginia Lake Cabin (KVA 1) for each Alternative by Prescription[1/]

KVA 1 Virginia Lake Cabin—Acres Harvested In Seen Area by Alternative							
	Distance to Closest Visible		Acres of Unit in Seen Area				
Unit[2/]	Part of Unit (miles)	VQO	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
V-78	1.5	PR	0	15	0	0	15
V-93	2.2	PR	0	18 (cc)	0	0	18 (cc)
V-97	1.5	PR	0	6 (cc)	0	0	6 (cc)
V-111	1.2	PR	0	69	0	0	69
V-112	1.5	PR	0	112	0	0	112
Total Clearcut Acres in Seen Area			0	24	0	0	24
Total 70% Retention Acres in Seen Area			0	196	0	0	196
Total Acres Harvested in Seen Area			0	220	0	0	220

1/ Note: cc = clearcut prescription with reserve trees. All other prescriptions are group or individual selection with 70 percent retention.

2/ Units not included in this table cannot be seen from this KVA due to screening by terrain.

Alternatives 2 and 5

Under Alternatives 2 and 5, portions of five units totaling 220 acres would be located in the seen area of Virginia Lake cabin (Figure 3-6). Three of the units that account for 196 acres, have prescriptions that would leave at least 70 percent of the trees as retention (Table 3-2). As a result, the hillsides on which these units are located would appear not to have been harvested, although they would be somewhat coarser in texture.

Units V-93 and V-97 would have prescriptions of clearcut with reserve trees. Unit V-93 is located in a valley above Glacier Creek next to Unit V-112 and would have 18 acres in the seen area. Unit V-97 is located in a relatively flat area above Unit V-111 and would have 6 acres located in the seen area. Both units are in areas with VQOs of Partial Retention. Because of the low viewing angles from the cabin and the amount of retention trees left in the parts of the seen areas closest to KVA 1, no bare ground would be visible.

Units V-93 and V-97 would meet a VQO of Partial Retention (because there are other similar natural openings farther up the valley). Overall, Alternatives 2 and 5 would meet the Partial Retention VQO from KVA 1.

Alternatives 3 and 4

No units would be visible from the Virginia Lake cabin with these two alternatives.

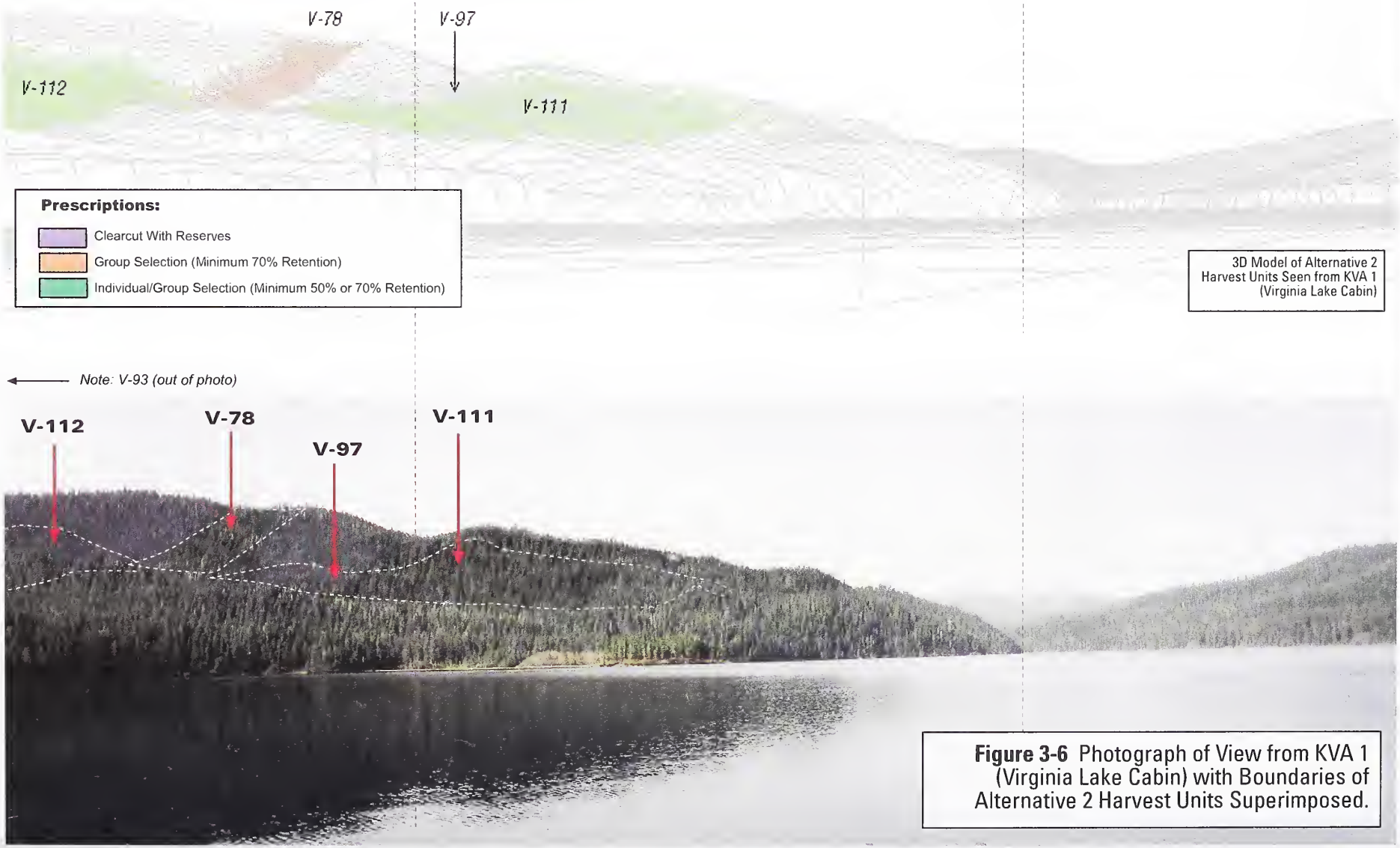


Figure 3-6 Photograph of View from KVA 1 (Virginia Lake Cabin) with Boundaries of Alternative 2 Harvest Units Superimposed.

Eastern Passage (KVA 2)

This KVA is located west of the center of the Eastern Passage, between Mill Creek and Jenkins Cove, and represents the view that many recreationists travelling through the Eastern Passage from Wrangell would see. Many of the boats heading to Blake Channel, Bradfield Canal, or the Anan Wildlife Observatory pass through this area and would have this view of the Project Area.

Alternative 1

There would be no change to the existing scenic conditions from this portion of the Eastern Passage under Alternative 1.

Alternative 2

Fourteen harvest units would be partially located in the seen area of KVA 2 (Figure 3-7). Together these units would have approximately 392 acres in the seen area (Table 3-3).

Table 3-3.
Acres Harvested by VQO in Seen Area of Eastern Passage (KVA 2) for each Alternative by Prescription[1/]

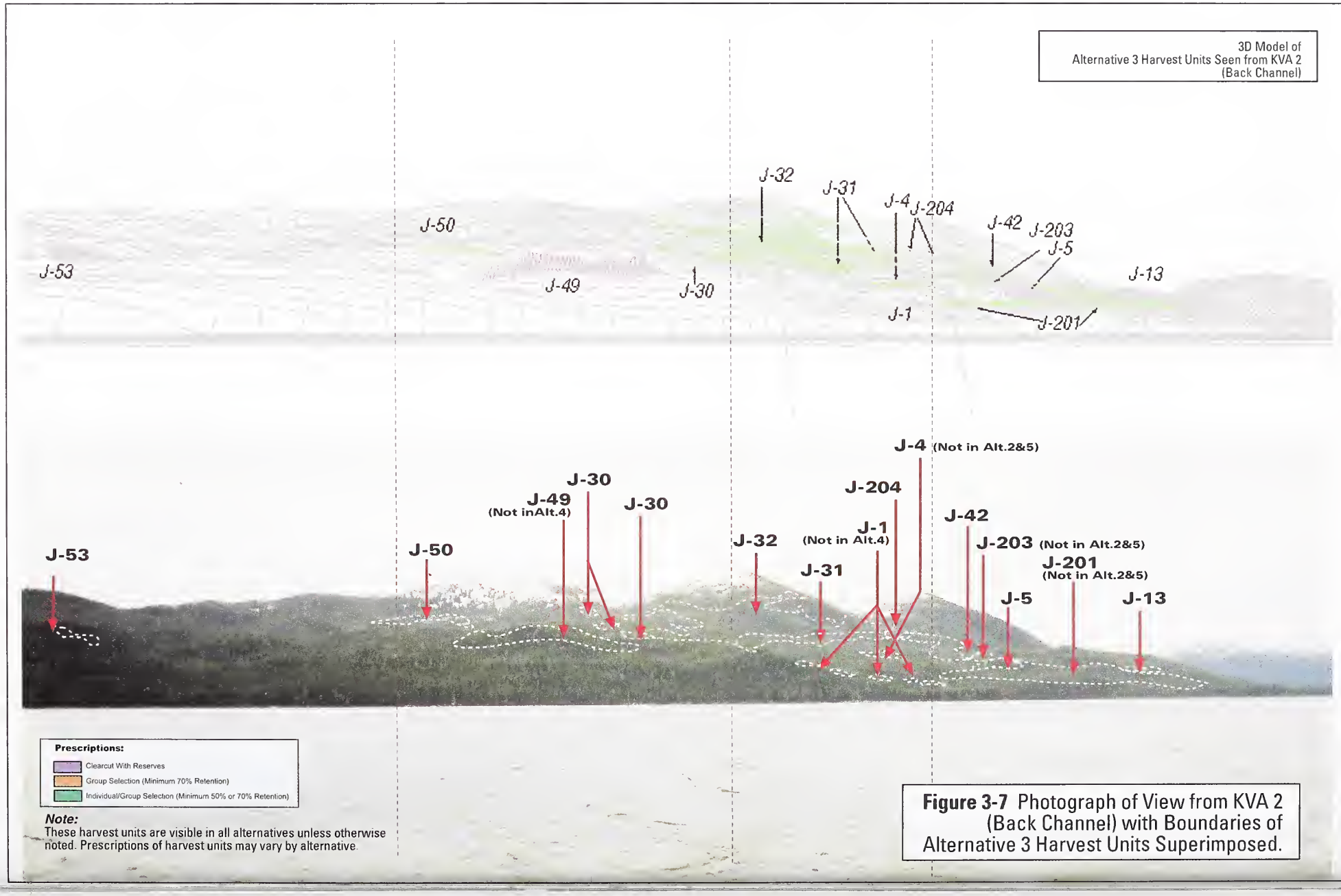
Eastern Passage (KVA 2)—Acres Harvested In Seen Area by Alternative

Unit [2/]	Distance to Closest Visible Part of Unit (miles)	VQO	Acres of Unit in Seen Area				
			Alt.1	Alt.2	Alt.3	Alt.4	Alt.5
J-1	2.2	PR	0	5 (cc)	5 (cc)	0	5 (cc)
J-5	2.5	PR	0	23 (cc)	23 (cc)	23[3/]	23 (cc)
J-13	3.5	PR	0	26 (cc)	26 (cc)	26[3/]	26 (cc)
J-30	2.0	PR	0	1 (cc)	1	1	1 (cc)
J-31	2.5	PR	0	65	65	65	65
J-32	2.5	PR	0	144	144	144	144
J-33	2.8	PR	0	14	0	0	0
J-36	3.2	PR	0	21	0	0	0
J-42	3.5	PR	0	47	47	47	47
J-49	1.5	PR	0	9 (cc)	9 (cc)	0	9 (cc)
J-50	1.5	PR	0	4	4	4	4
J-53	2.0	PR	0	7 (cc)	7 (cc)	0	7 (cc)
J-201	2.2	PR	0	0	108	108	0
J-203	3.2	PR	0	0	20	20	0
J-204	3.5	PR	0	0	23	23	0
V-57	2.5	PR	0	6 (cc)	0	0	6 (cc)
V-83	3.5	PR	0	20 (cc)	0	0	20 (cc)
Total Clearcut Acres in Seen Area				97	70	0	97
Total 70% Retention Acres in Seen Area				295	412	461	260
Grand Total Acres Harvested in Seen Area				392	482	461	357

1/ Note: cc = clearcut with reserve trees prescription. All other prescriptions are group or individual selection with 70 percent retention (except, see footnote 3).

2/Units not included in this table cannot be seen from this KVA due to screening by terrain.

3/Note that the prescription for these two units calls for 50% retention in Alternative 4.



Note:
These harvest units are visible in all alternatives unless otherwise noted. Prescriptions of harvest units may vary by alternative.

Figure 3-7 Photograph of View from KVA 2 (Back Channel) with Boundaries of Alternative 3 Harvest Units Superimposed.

Six of the units, accounting for 302 of the 392 acres, would have prescriptions specifying a minimum of 70 percent retention. Because of the 70 percent retention and the distance from the seen portions of the units to KVA 2 (from approximately 2.5 to 3.5 miles), it would be very difficult for observers to tell that harvest had occurred.

Units J-1, J-5, J-13, J-30, J-49, J-53, V-57 and V-83 would have clearcut prescriptions with reserve trees and would individually have from 1 to 20 acres that would be located in the seen area of KVA 2. The VQO of the area of these units would be Partial Retention. These units would be from 2.0 to 3.5 miles away from KVA 2 and would appear as openings in the forest canopy of varying sizes. By feathering the edges of the units and concentrating most of the 10 percent retention trees in the seen area portions of the units, it would be difficult for casual forest visitors to notice these units from KVA 2. Alternative 2 would meet the Partial Retention VQO from KVA 2.

Alternative 3

Thirteen units totaling 482 acres would be located in the seen area of KVA 2. Eight of the units, totaling 412 acres, would have prescriptions leaving at least 70 percent of the trees and would be located in areas with a VQO of Partial Retention. As a result of the 70 percent tree retention and the distance from the seen portions of the units to KVA 2 (from approximately 2.5 to 3.5 miles), it would be very difficult for observers from KVA 2 to distinguish that harvest had occurred in these units. Units J-1, J-5, J-13, J-49, and J-53 would have prescriptions of clearcut with 10 percent tree retention and would together combine for 70 acres in the seen area of KVA 2. The units would appear as a number of openings of varying sizes in the forest canopy and would all be located in an area with a VQO of Partial Retention. By feathering edges and carefully leaving 10 percent of the retention trees concentrated in the seen portions of the units, all of the units would meet, and possibly exceed, the Partial Retention VQO, when viewed from KVA 2.

Alternative 4

Ten harvest units totaling 461 acres would be located in the seen area of KVA 2. The effect of Alternative 4 on visual quality from KVA 2 would be slightly less than that of Alternative 3. The primary difference is that, with Alternative 4, Units J-5 and J-13 would leave 50 percent of the trees as retention, rather than the clearcut prescription of Alternative 3. Alternative 4 would meet or exceed the VQO of Partial Retention from KVA 2.

Alternative 5

Alternative 5 would have essentially the same effect on scenic quality as Alternative 2. The difference between the two alternatives is that Units J-33 and J-36 would not be included in Alternative 5 and Units J-1 and J-42 would not be in Alternative 4.

The Eastern Passage Near Jenkins Cove (KVA 3)

This KVA represents what viewers from boats travelling relatively close to the mainland would see of the Project Area off Jenkins Cove. From this location, hills behind Jenkins Cove and the beach of Jenkins Cove can be clearly seen.

Alternative 1

There would be no change to the existing scenic conditions viewed from this part of the Eastern Passage.

Alternatives 2 and 5

Portions of nine units, totaling 315 acres would be located in the seen area of KVA 3 (Figure 3-8). Four of the units that total 260 acres, would have a group selection prescription that would have a retention rate of 70 percent (Table 3-4). These four units would be located in areas with a VQO of Partial Retention. In the flatter, lower portions of the units in the seen area, it would be very difficult to discern that timber harvest had taken place. The steeper portions of the units would have a coarser texture due to the removal of approximately 30 percent of the trees. However, Alternatives 2 and 5 would still meet the Partial Retention VQO from KVA 3.

Table 3-4.
Acres Harvested by VQO in Seen Area of Eastern Passage-Jenkins Cove (KVA 3) for each Alternative by Prescription[1/]

Jenkins Cove (KVA 3)—Acres Harvested In Seen Area by Alternative							
	Distance to Closest		Acres of Unit in Seen Area				
Unit[2/]	Visible Part of Unit (miles)	VQO	Alt. 1	Alt.2	Alt.3	Alt.4	Alt.5
J-1	1.2	PR	0	5 (cc)	5 (cc)	0	5 (cc)
J-5	1.2	PR	0	19 (cc)	19 (cc)	19[3/]	19 (cc)
J-13	1.5	PR	0	28 (cc)	28 (cc)	28[3/]	28 (cc)
J-201	1.0	PR	0	0	106	106	0
J-204	2.2	PR	0	0	22	22	0
J-30	1.5	PR	0	1 (cc)	1	1	1 (cc)
J-31	1.8	PR	0	69	69	69	69
J-32	1.8	PR	0	160	160	160	160
J-42	2.0	PR	0	29	29	29	29
J-49	1.3	PR	0	2(cc)	2(cc)	0	2(cc)
J-50	1.5	PR	0	2	2	2	2
Total Clearcut Acres in Seen Area				55	54	0	55
Total 70% Retention Acres in Seen Area				260	389	389	260
Total Acres Harvested in Seen Area				315	443	436	315

[1/] Note: cc = clearcut prescription with reserve trees. All other prescriptions are group or individual selection with 70 percent retention (except, see footnote 3).

[2/]Note that the prescription for these two units calls for 50 percent retention in Alternative 4.

[3/]Units not included in this table cannot be seen from this KVA due to screening by terrain.

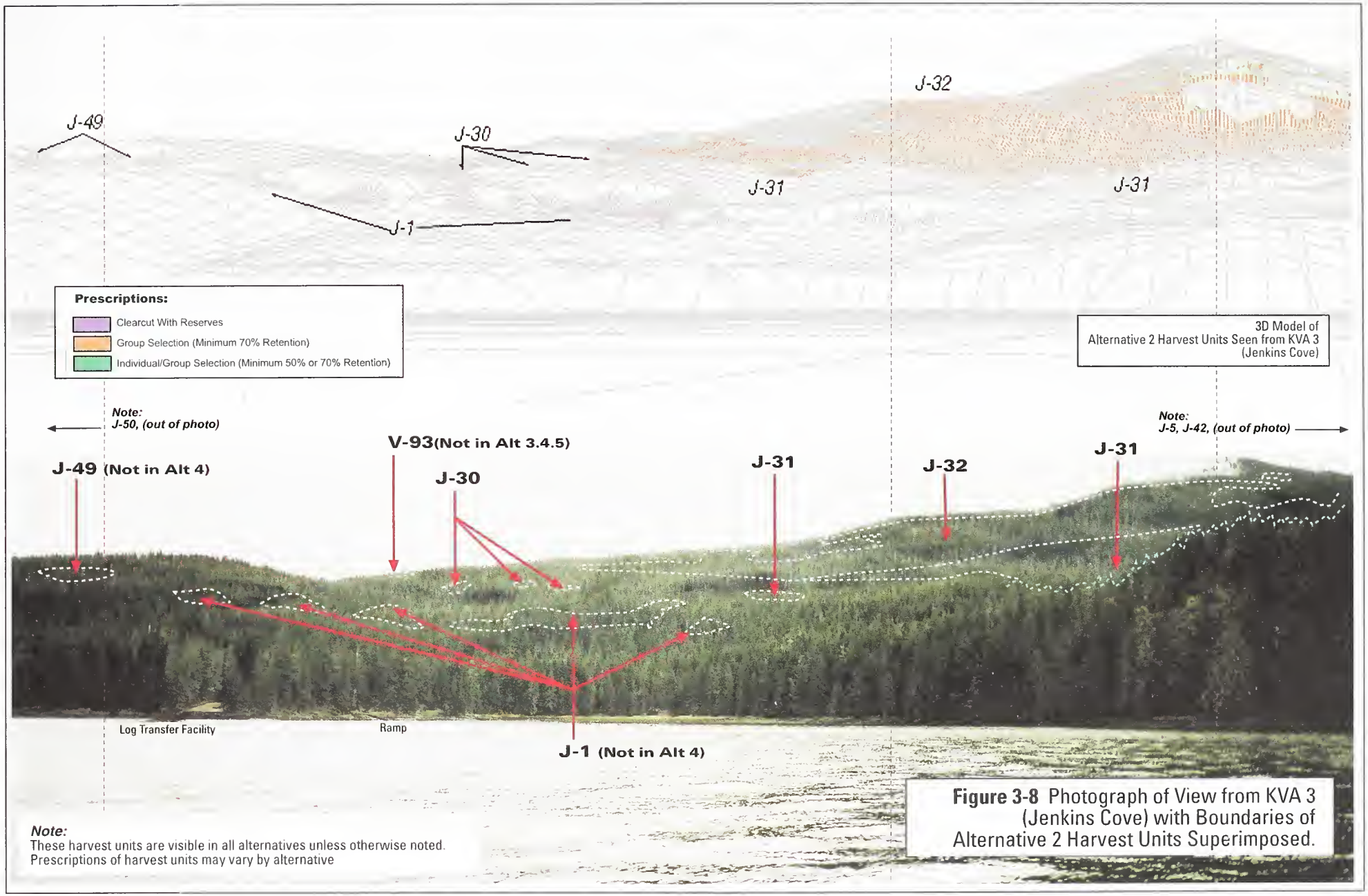


Figure 3-8 Photograph of View from KVA 3 (Jenkins Cove) with Boundaries of Alternative 2 Harvest Units Superimposed.

Note:
These harvest units are visible in all alternatives unless otherwise noted.
Prescriptions of harvest units may vary by alternative

The closest units to KVA 3 would be Units J-1, J-5, J-30 and J-49, which would all be approximately 1.25 miles away. These units would have prescriptions of clearcut with reserves and would individually have from 1 to 11 acres in the seen area from KVA 3. The top of the openings of these units would be somewhat noticeable from KVA 3, however bare ground would not be visible. The units would appear as horizontal shadows in the forest canopy, not unlike the horizontal shadow areas currently visible on the hillsides. Mitigation measures such as feathering the edges of the units and leaving most of the 10 percent retention trees in the seen parts of the units would give the units the appearance of natural openings. Due to location, shape, and retention, the other visible units would blend in well with the landscape. The harvest proposed for Alternative 2 would meet the Partial Retention VQO from KVA 3.

The LTF at Jenkins Cove would be visible and would not meet the VQO of Partial Retention for the period of time the LTF was in use. The Forest Plan states that exceptions for small nonconforming developments, such as recreation sites, LTFs, and mining developments may be considered on a case-by-case basis. The LTFs at Jenkins Cove and Moose Creek would be designed to minimize visual impacts from the Eastern Passage Visual Priority Travel Route. Both LTFs could be permanent or could be removed after harvest is completed depending on which road management action is chosen. Similarly, the equipment ramp located farther in Jenkins Cove could remain in place or be removed after harvest is completed.

People viewing the Project Area from Jenkins Cove (KVA 3) would see the LTF and, at some angles, the equipment ramp. They would also notice ground disturbance from clearing for work areas and roads. The LTF would be designed to minimize visual impacts by screening much of the area associated with LTF development from the Back Channel with trees. The log slide would be the component that would be most visible. The slide would be used to transfer bundles of logs to water. The slide would be approximately 100 feet long and would be attached to a log crib on the upland area and end at a 30-foot by 60-foot floating platform. Log bundles would slide down the inclined slide skids to the raft until there were enough logs in the raft to sink it, thus floating the logs. The slide and raft would be removed and the cleared areas would be stabilized and rehabilitated upon completion of the sale. Within several years, disturbed areas around the ramp would be stabilized and rehabilitated and the area around the ramp would meet a VQO of Partial Retention.

Alternative 3

Eleven harvest units totaling 443 acres would be located in the KVA 3 seen area (Figure 3-8). Seven of the units that together comprise 389 acres in the seen area, would have a minimum of 70 percent retention. All of these units would be located in an area with a VQO of Partial Retention. Because of the retention of 70 percent of the trees, none of these units would be noticeable to the casual forest visitor.

Four units (J-1, J-5, J-13 and J-49) that together comprise 54 acres in the seen area of KVA 3, would have a prescription of clearcut with reserve trees. All of the units would be located in an area with a VQO of Partial Retention. With proper placement of retention trees in the most visible parts of the units, the units would meet the established VQO. Alternative 3 would meet, or possibly exceed, the VQO of Partial Retention for KVA 3.

Alternative 4

Alternative 4 would have nine harvest units within the seen area of KVA 3 (Figure 3-8). The effect on visual quality from Alternative 4 would be similar to that of Alternative 3. The primary difference between Alternatives 3 and 4 would be that there would be no visible openings with Alternative 4. The prescriptions of Units J-5 and J-13 would be individual-group selection with 50 percent retention, rather than clearcut with reserve trees. Alternative 4 would meet or exceed the Partial Retention VQO for KVA 3.

Earl West Cove (KVA 4)

This KVA is located on the shoreline of Wrangell Island at the Earl West Cove recreation area and represents the view recreationists walking along the shore would see. Views from this point include the entrance to the Narrows (approximately 1.5 miles away), the mainland shoreline between the Narrows and Madan Bay, the Madan Peninsula, Madan Bay (the end of which is approximately 4 miles away), the Back Channel, and Wrangell Island. Lands on Wrangell Island have been harvested and are quite visible from this point.

Alternative 1

There would be no change to the existing scenic conditions viewed from this point under Alternative 1.

Alternative 2 and 5

Four harvest units would be located in the seen area of Earl West Cove (Figure 3-9). These units would include 172 acres that would be in the seen area of KVA 4 (Table 3-5). The closest portions of the units that would be seen from Earl West Cove would be approximately 4.5 miles away. Two of the units, that have a prescription calling for a minimum of 70 percent retention, have 152 acres in the seen area. Two additional units have a prescription of clearcut with reserve trees. All the units are in an area with a VQO of Partial Retention. The two units with the clearcut (with reserve trees) prescription would blend well with the landscape because of the distance to the units, the small portion of the view the units represent, and strategic placement of the 10 percent of the trees left for retention. Alternatives 2 and 5 would meet the Partial Retention VQO for KVA 4.

Alternative 3

With Alternative 3, seven harvest units would be located in the seen area of KVA 4 (Figure 3-9). Five of the units would have prescriptions that would leave at least 70 percent of the trees as retention. These units would have 263 acres in the seen area of KVA 4. Two units (J-10 and J-13) would have a clearcut with reserve trees and would have 12 and 17 acres, respectively, located within the seen area.

Table 3-5.
Acres Harvested by VQO in Seen Area of Earl West Cove (KVA 4) for each Alternative by Prescription[1/]

Earl West Cove (KVA 4)—Acres Harvested In Seen Area by Alternative

Unit[2/]	Distance to Closest Visible Part of Unit (miles)	VQO	Acres of Unit in Seen Area				
			Alt.1	Alt.2	Alt.3	Alt.4	Alt.5
J-10	4.5	PR	0	12 (cc)	12 (cc)	12[3/]	12 (cc)
J-13	4.5	PR	0	8 (cc)	8 (cc)	8[3/]	8 (cc)
J-32	5.0	PR	0	25	25	25	25
J-42	4.5	PR	0	127	127	127	127
J-201	4.2	PR	0	0	43	43	0
J-202	4.2	PR	0	0	33	33	0
J-203	4.6	PR	0	0	15	15	0
Total Clearcut Acres in Seen Area				20	20	0	20
Total 70% Retention Acres in Seen Area				152	243	243	152
Grand Total Acres Harvested in Seen Area				172	263	263	172

[1/] Note: cc = clearcut prescription with reserve trees. All other prescriptions are group or individual selection with 70 percent retention (except, see footnote 3).

[2/] Note that the prescription for these two units calls for 50 percent retention.

[3/] Units not included in this table cannot be seen from this KVA due to screening by terrain.

All of the units would be located in an area with a VQO of Partial Retention. Viewers from Earl West Cove would not be able to tell that harvest had occurred in the units that would leave a minimum of 70 percent retention. The two units with clearcut with reserve trees prescription (J-10 and J-13) would not be very noticeable because of the distance from Earl West Cove to the units (approximately 4.2 miles), measures such as feathering the edges and leaving retention trees within the portions of the units in the seen area. Alternative 3 would meet the VQO of Partial Retention for KVA 4.

Alternative 4

Alternative 4 would essentially have the same effect on visual quality from KVA 4 as Alternative 3. The primary difference is that with Alternative 4, the prescriptions for units J-10 and J-13 would leave 50 percent retention rather than be clearcut with 10 percent retention. Alternative 4 would meet and likely exceed the Partial Retention VQO for KVA 4.

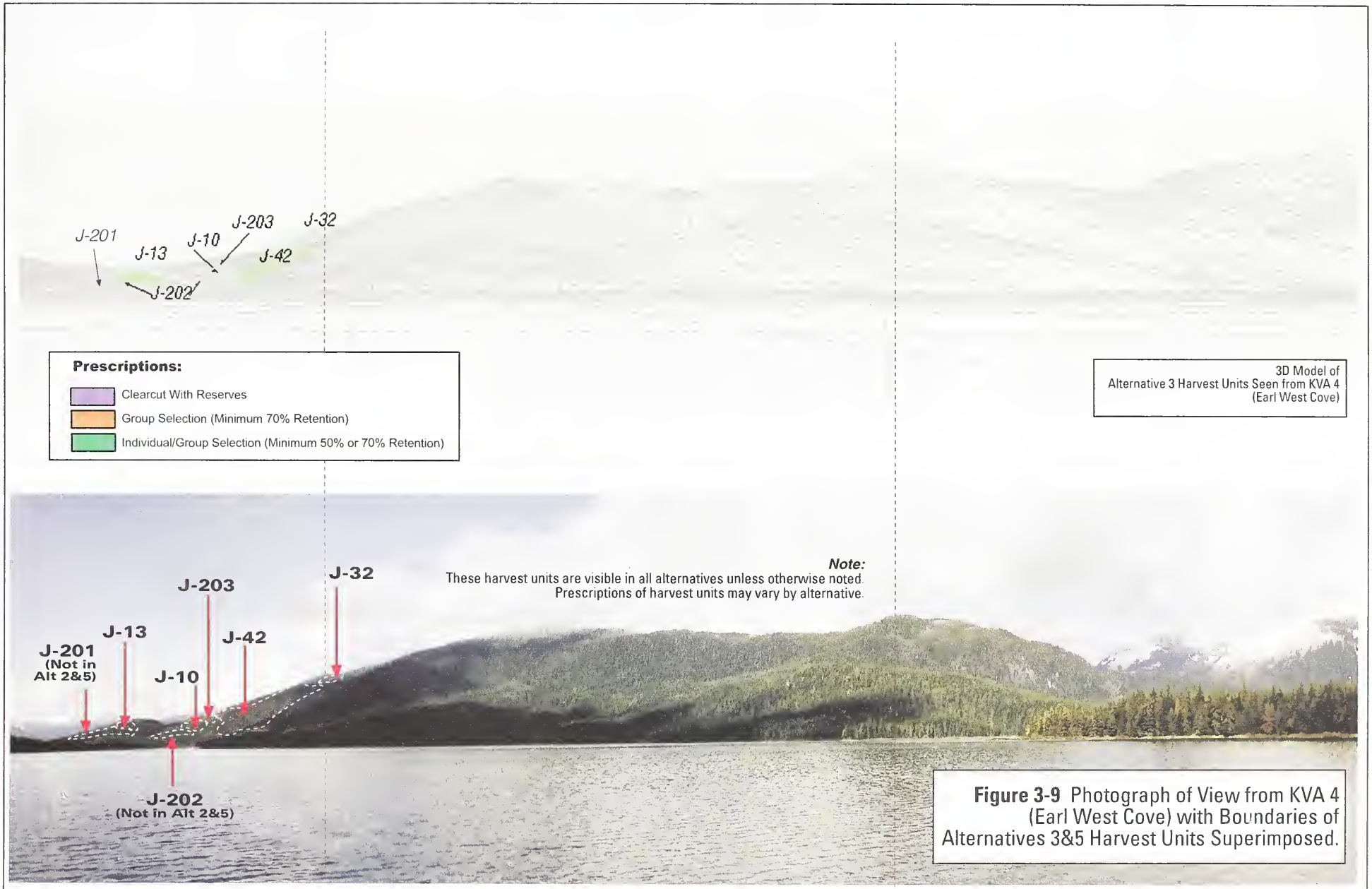


Figure 3-9 Photograph of View from KVA 4 (Earl West Cove) with Boundaries of Alternatives 3&5 Harvest Units Superimposed.

Summary of the Effects of the Alternatives on Visual Quality

Alternative 1 (No Action)

Under Alternative 1, there would be no harvest in the near future within the Project Area and no change in scenic quality. State lands next to Mill Creek could be harvested in the near future, which would change the scenic quality of that part of the Project Area when viewed from the Back Channel and parts of Wrangell Island.

Alternative 2

Alternative 2 is the least responsive alternative for maintaining current scenic quality, although it would still meet established VQOs. By maximizing harvest in the Virginia Lake and Jenkins Cove watersheds, some viewers would be able to notice alteration of the landscape in those watersheds. Viewers would also see changes at the Jenkins Cove LTF site due to the presence of equipment, sorting yards, and roads leading to the LTFs. Alternative 2 would rely more on clearcuts (generally in unseen areas) than the other alternatives and would also leave less retention than the others. Although many of the clearcut units would not be seen from saltwater, they would be much more noticeable from the air than the group selection and individual selection units that would be used more in Alternatives 3 and 4.

Alternative 2 would introduce harvest units into the Moose Creek watershed. Unit M-135 would be the only unit located in an area that would be visible from saltwater. However, it would not be noticeable because of a prescription of group selection, which would require retention of 70 percent of the trees in the unit. The LTF for the Moose Creek drainage would be located just to the east of the mouth of Moose Creek and would be visible from saltwater. The LTF facilities would be sited to maximize screening opportunities to reduce the visibility of the facilities from saltwater. Viewers in boats passing the LTF would, however, see the log slide, barge and some of the clearing of the road to the LTF. For the life of the project, the LTFs would not meet a VQO of Retention. After removal of the LTFs and replanting, the sites would eventually meet a VQO of Retention.

Alternative 3

Alternative 3 is the second most responsive alternative for maintaining current scenic quality. This alternative stays completely out of the Virginia Lake watershed so there would be no change to current scenic quality for viewers recreating at Virginia Lake. It would also reduce road construction near Jenkins Cove compared to Alternatives 2 and 5. This would not have a great effect on preserving scenic quality because roads would not be very visible. Alternative 3 would primarily use individual and group selection and would leave about 70 percent of the trees for retention. The visual effect of the LTFs at Jenkins Cove and Moose Creek and the associated facilities would be the same as with Alternative 2. Although harvest would be less, the degree of visibility of harvest in the Moose Creek drainage would be similar to Alternative 2.

Alternative 4

Alternative 4 would be the most responsive alternative for maintaining current scenic quality. This alternative would stay out of the Virginia Lake watershed and would avoid clearcutting in the area above Jenkins Cove. Because of the emphasis on helicopter harvest, there would be a 0.3-mile road at Jenkins Cove that would be part of the LTF development. The LTF development would be the same as in Alternative 2 (including the equipment ramp), but would have less road near the shoreline between the LTF and the equipment ramp. The Moose Creek drainage would receive less harvest than Alternative 2 and would have slightly less effect on visual quality than Alternative 2.

Alternative 5

Alternative 5 would include the same units and roads as Alternative 2 in the areas above Virginia Lake and Jenkins Cove with the exception of units J-33 and J-36. It would have the same effects on scenic quality in these areas as Alternative 2. Alternative 5 would stay out of the Moose Creek drainage and would have no effect on visual quality compared to existing conditions.

Cumulative Effects on Scenic Quality

When viewed from the Back Channel and locations on Wrangell Island from which the Project Area can be viewed, the various alternatives would meet established VQOs. The units would not be very noticeable to most people. The Madan Sale would add to the cumulative visual effect of past harvest activities on federal and state lands on Wrangell Island for viewers in the Back Channel. Possible future harvest on federal and state lands on Wrangell Island and the mainland in the vicinity of the project would add to the cumulative effect of harvest on visual quality. However, land use policies regarding state lands in the Project Area are being re-examined, and the earliest harvest could occur on any state lands visible in the Project Area would be about 2010 (personal communication, J. Elasier, Alaska Department of Natural Resources, Juneau, Alaska, November 11, 1999). The Madan sale would meet a VQO of between Partial Retention and Retention depending upon location and alternative.

Recreation

Existing Recreation Use and Features

There are two developed and maintained recreation features within the Project Area. They are the Virginia Lake Cabin and the Mill Creek Trail (Figure 3-10). The Virginia Lake Cabin is the most significant recreation resource in the Project Area. Because it is located close to Wrangell (10 air miles) the cabin gets significant use. Table 3-6 depicts the use pattern of the past 10 years. Users include people going to the lake to fish (cutthroat trout), people going simply to get away, and hunters. The cabin is especially popular with hunters during the fall moose hunting season. Because the majority of recreation use that occurs in and near the Project Area is dispersed, the only quantitative information regarding recreational use comes from overnight stays at the Virginia Lake Cabin. The Virginia Lake Cabin is the fourth most popular cabin in the Wrangell District.

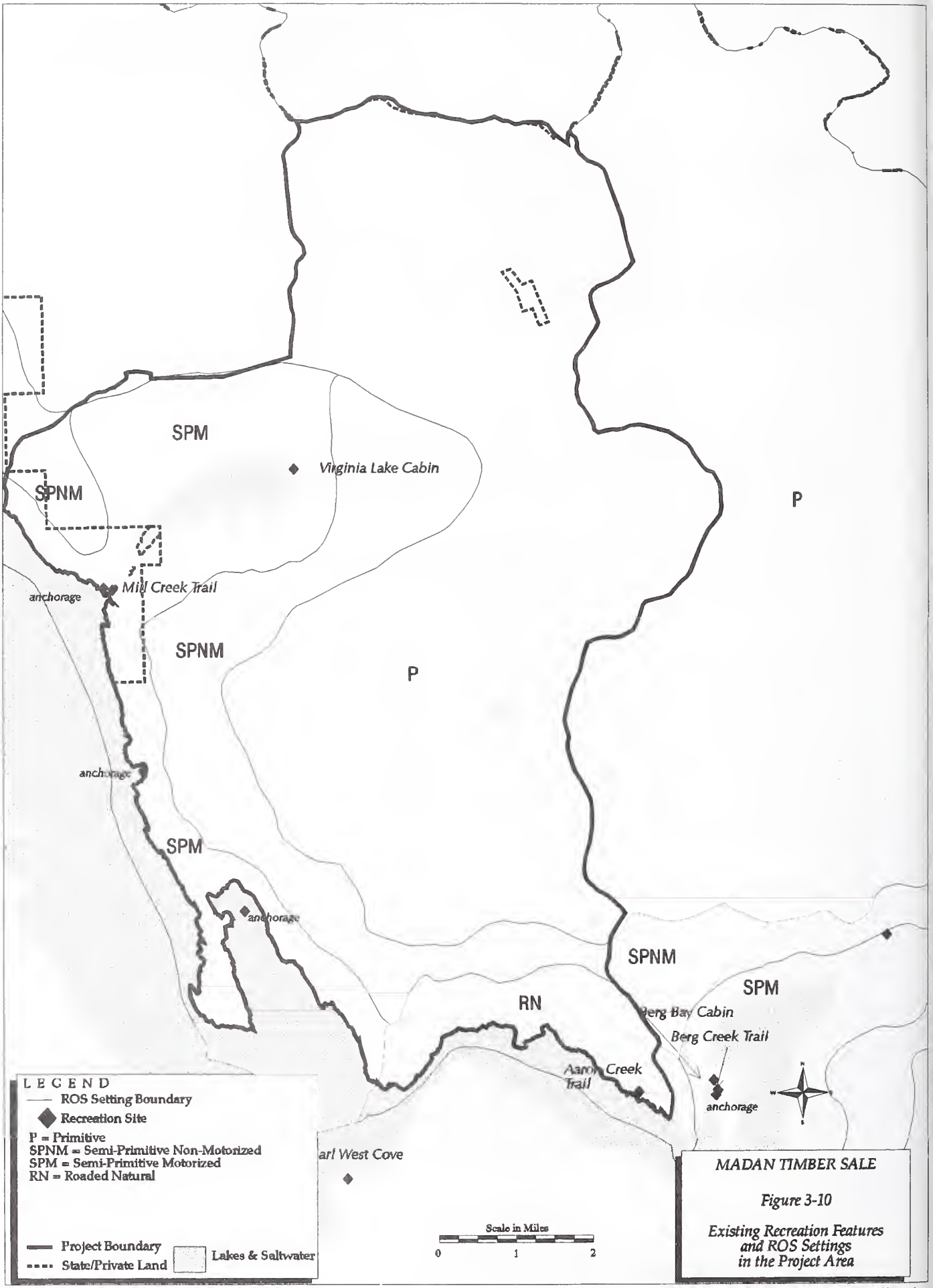

SPM
Virginia Lake Cabin
SPNM
P
anchorage
Mill Creek Trail
SPNM
P
anchorage
SPM
anchorage
SPNM
SPM
RN
Berg Bay Cabin
Berg Creek Trail
Aaron Creek Trail
anchorage
arl West Cove
LEGEND
ROS Setting Boundary
Recreation Site
P = Primitive
SPNM = Semi-Primitive Non-Motorized
SPM = Semi-Primitive Motorized
RN = Roaded Natural
Project Boundary
State/Private Land
Lakes & Saltwater
Scale in Miles
0
1
2
MADAN TIMBER SALE
Figure 3-10
Existing Recreation Features and ROS Settings in the Project Area
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Table 3-6.
Use of the Virginia Lake Cabin (overnight stays) by Year, 1989-1998

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Overnight Stays	33	37	56	65	73	52	43	66	79	89

The Mill Creek Trail is also popular and is used by people for gaining access to Virginia Lake, Mill Creek above the Mill Creek waterfall, or simply as a place to hike. The 0.9-mile long trail allows foot access from saltwater to the southwest end of Virginia Lake. The small saltwater inlet below the Mill Creek waterfall is locally popular, especially for fishing.

Other than the Virginia Lake Cabin and Mill Creek Trail, recreational use in the Project Area is dispersed. Most recreational use occurs along the shoreline (although there is hunting in the Virginia Lake/Porterfield Creek and Moose Creek drainages). Shoreline areas in the Project Area receive varying types and amounts of use. Madan Bay receives some use, especially from boaters that want to anchor in a protected bay. Eastern Passage (locally known as the Back Channel) and the Narrows receive use from private recreational boaters and outfitters/guides passing through to access other areas. Areas that are commonly accessed via the Back Channel include Berg Bay/Aaron Creek (and the Berg Bay Cabin), the Bradfield Canal, and recreational resources such as the Anan Wildlife Observatory, Eagle River, and the Bradfield River. Recreationists also use the Back Channel, the Narrows, and Blake Channel for saltwater fishing.

Besides the Virginia Lake Cabin and Mill Creek Trail, the closest developed recreation feature to the Project Area is the Berg Bay Cabin and the Aaron Creek Trail. Both are located approximately 1.5 miles from the southern edge of the Project Area , but are about 2.5 miles away (and hidden by a ridge) from the nearest potential Madan sale harvest unit.

Earl West Cove is a developed recreation area on Wrangell Island that contains a boat ramp and a camping/day use area. It is used for launching boats and is a popular day-use area for people from Wrangell. It is located approximately 1.5 miles south of the nearest part of the Project Area (the Madan OGR).

Forest Road 6265 is also located on Wrangell Island and is a popular road for residents to drive. The road connects Earl West Cove with Wrangell. An observation point is located at a pullover and provides expansive views of the mainland (including the Project Area) and the Back Channel.

Recreation Opportunity Spectrum (ROS)

The Forest Service developed the ROS system to help identify, quantify, and describe the variety of recreational settings available in National Forests. The ROS system provides a framework for planning and managing recreation resources. The ROS settings are classified using a scale ranging from primitive to urban. Seven elements are used to determine where a particular setting belongs on the scale. The elements are visual quality, access, remoteness, visitor management, on-site recreation development, social encounters, and visitor impacts.

The Project Area contains four ROS settings as displayed in Figure 3-10. Listed from least developed or altered to most developed, these are: Primitive (P), Semi-Primitive Non-Motorized (SPNM), Semi-Primitive Motorized (SPM), and Roaded Natural (RN).

Outfitter and Guide Use of Project Area

Commercial outfitters and guides use the Project Area to some extent. Use of the Project Area by local outfitters and guides includes Mill Creek Trail and the mouth of Mill Creek for sockeye salmon fishing. Guide and outfitter use of the Mill Creek Trail is limited to weekday use and no outfitter or guide use is permitted during moose season in the Virginia Lake area (USDA Forest Service, 1997). Sunrise Aviation (the local aviation company) flies approximately one party per week to the Virginia Lake cabin during the summer months.

Outfitters and guides use areas outside of the project more than within the Project Area. Areas such as Crittenden Creek (approximately 3 miles northwest of the Project Area) and Berg Bay/Aarons Creek are used by outfitters and guides. Outfitters and guides from Wrangell do pass by the Project Area on their way to the Anan Wildlife Observatory and Bradfield Canal. On the way to or from these areas they sometimes stop at locations in the Project Area to show clients features such as seal haulouts or the Mill Creek waterfall.

Effects of Roads on Recreational Opportunity Settings (ROS)

The Project Area is currently unroaded. Most recreational activity occurs along the coast and along the Mill Creek - Virginia Lake corridor. Because of the scarcity of developed facilities in the Project Area, recreational use is relatively light and oriented to primitive and semi-primitive recreation. The introduction of roads into the Project Area would change the current use of the area to varying extents and would change the distribution of ROS settings.

Roads, even if closed, change the remote nature of areas they pass through and change ROS settings. People use roads because they provide easier access into areas that were previously difficult to access. Although motorized vehicles would not be permitted to use most roads under Road Management Option B, people would be able to walk, ride mountain bikes, and cross-country ski on the roads to access interior areas. With Road Management Option A, roads would be maintained to varying standards. Some roads would allow vehicle travel and others would be limited to mountain bikes and foot traffic.

Road Management Option A

Option A would allow motorized and non-motorized access into portions of the Project Area that currently are very difficult to reach due to the lack of established trails or roads. Under this option, roads would be maintained to allow varying kinds of recreational access. Most main roads would be maintained to encourage hiking and mountain biking and accept high clearance and non-highway (ATVs) vehicles (passenger vehicles would not be able to use these roads). Many of these roads would provide access to the uplands above Jenkins Cove and others would provide access into and above the Moose Creek drainage depending on the alternative. These roads would have destination signage at road entrances in conjunction with route markers and would be shown on Forest visitor maps.

In addition to the main roads that would be maintained to encourage hiking (and cross-country skiing), mountain biking, and accept high-clearance and non-highway vehicles, short spur roads would be maintained to accept hiking. Other uses would be discouraged. These roads would be displayed on Forest Visitor maps, but would have only a route marker at the road entrance.

Because of the necessity of using boats to get vehicles and people to trailheads, it can be assumed that use of the roads would be somewhat limited, especially by motorized vehicles. Hunters would probably be the most likely to use vehicles on the roads. It is reasonable to assume that there would be more non-motorized use of the roads than motorized.

Road Management Option B

Motorized access on project roads under Option B would be eliminated and hiking and mountain biking encouraged or accepted. Under this option, most main roads would be maintained to encourage hiking and mountain biking and eliminate use by motorized vehicles. In addition to the main roads, short spur roads would be maintained to accept hiking, discourage mountain biking, and eliminate use by vehicles. Option B would result in less non-motorized use of the roads and less recreational use of roads in general.

The following paragraphs address the effects that the roads and harvest units associated with each alternative would have on ROS settings.

Alternative 1

Under Alternative 1, current recreational conditions would remain in place for the foreseeable future. The interior of the Project Area would remain difficult to access and would be an area that supported non-motorized recreation exclusively. All ROS settings would remain the same (Figure 3-10). Potential future harvest of state lands adjacent to the Project Area could result in LTFs and roads being built that would provide roaded access into areas near the Project Area and would change the ROS settings of parts of the Project Area from unroaded to roaded (Table 3-7). However, state harvest might utilize the Forest Service road system for access, which would not be possible if no roads were constructed under Alternative 1.

Table 3-7.
Changes in ROS Settings

ROS Setting	Original Acres of Settings	Acres of ROS Settings and Percent Each Setting Comprises of National Forest System Lands in Project Area									
	Alt. 1		Alt. 2		Alt. 3		Alt. 4		Alt. 5	
P	25,657	(60%)	20,158	(47%)	22,006	(51%)	21,776	(51%)	24,665	(58%)
SPNM	7,773	(18%)	8,916	(21%)	9,176	(21%)	10,274	(24%)	6,526	(15%)
SPM	7,176	(17%)	6,295	(15%)	6,200	(15%)	6,980	(16%)	5,617	(13%)
RN[1/]	2,197	(5%)	1,674	(4%)	1,758	(4%)	1,674	(4%)	2,197	(5%)
RM	0	(0%)	5,760	(13%)	3,663	(9%)	2,099	(5%)	3,798	(9%)
	42,803		42,803		42,803		42,803		42,803	

1/ Note that RN acres would decline with Alternatives 2, 3, and 4 because of the conversion of lands near the mouth of Moose Creek to RM under these alternatives.

Alternative 2

This alternative would build approximately 21 miles of road in the Project Area. The high country above Virginia Lake and the area north and south of Jenkins Cove would receive approximately 15 miles of road and the Moose Creek drainage, approximately 7 miles. As a result of the 21 miles of road, approximately 5,760 acres of the Project Area would be converted to an ROS of RM (Figure 3-11).

Although most roads would be closed to motorized use at the completion of harvest activities under Road Management Option B some recreationists (most likely hunters) would use non-motorized methods of transportation on the roads to access interior areas, including areas of high country, that are currently difficult to reach. If roads were left open (as under Road Management Option A) such access would be much easier and it would be more common to see use of the interior areas. Even with roads open, however, the extremely rugged nature of the terrain involved is likely to result in recreational use most often occurring near the road system in all action alternatives, with use of the system very limited under both Option A (open) or Option B (closed).

Alternative 3

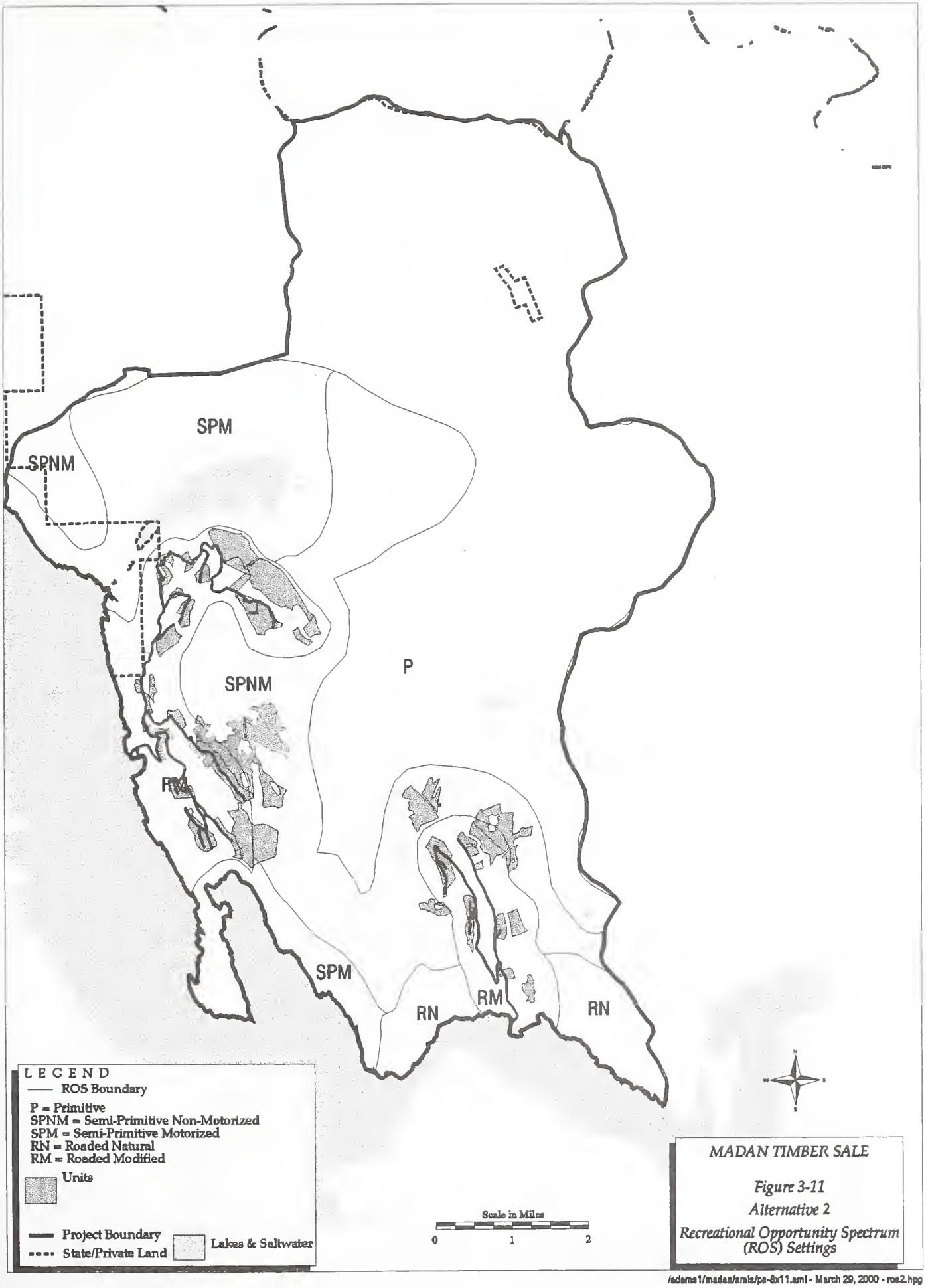
Alternative 3 would result in approximately 9 miles of road being built in the Project Area. Approximately 6 miles of road would be constructed in the area near Jenkins Cove and 3 miles in the Moose Creek drainage. Roads would not be built in the Virginia Lake watershed area. The two road systems would introduce approximately 3,700 acres of RM into the Project Area (Figure 3-12). Although the road systems would not be as extensive as under Alternative 2, the roads would be used by some recreationists to access interior areas, including the high country in the upper Moose Creek watershed and above Jenkins Cove. The amount of such use is likely to be extremely limited very far from the road system because of the density of vegetation and the rugged nature of the terrain. Particularly in the Moose Creek drainage, upper slopes above the road system and harvest units are extremely steep. For these reasons, use is highly likely to be focused on the more gentle terrain near the roads and harvest units.

Alternative 4

Alternative 4 would introduce roads into the Moose Creek watershed. Approximately 7 miles of road would be built in the Moose Creek drainage and would likely be used by people to access the interior and the high country of the upper drainage as under Alternative 2. A short 0.3-mile road and sorting yard would be built at Jenkins Cove. Harvest would stay out of the Virginia Lake watershed and harvest above Jenkins Cove would be by helicopter. Alternative 4 would introduce approximately 2,100 acres of RM into the Project Area (Figure 3-13).

Alternative 5

The effects of this alternative on recreation would be the same as that of Alternative 2 for all areas except the Moose Creek drainage. In the Moose Creek drainage, the effects would be the same as under Alternative 1 because there would be no harvest or road construction. Alternative 5 would introduce approximately 3,800 acres of RM into the Project Area (Figure 3-14).



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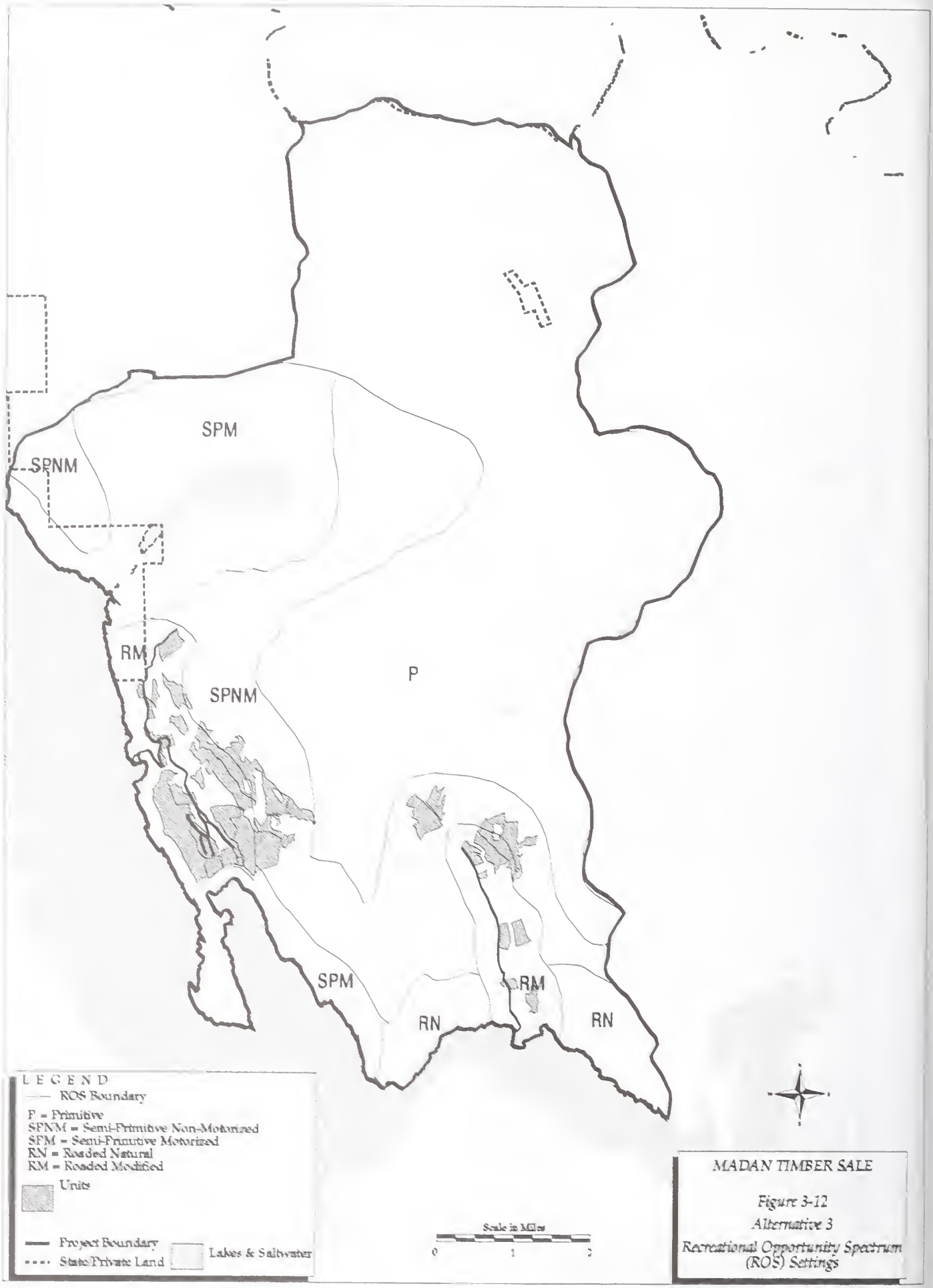
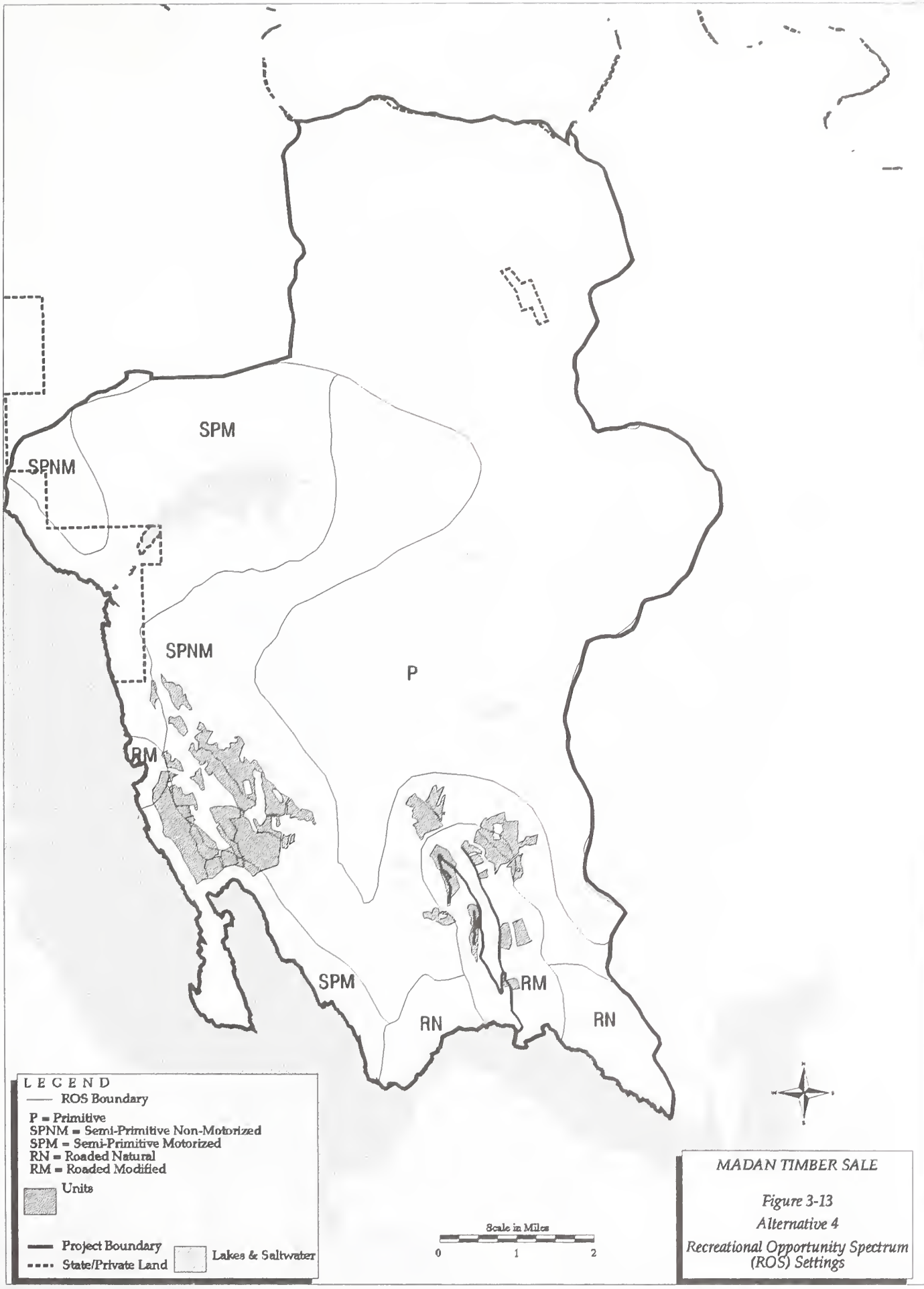

SPM
SPNM
RM
SPNM
P
SPM
RN
RM
RN
LEGEND
ROS Boundary
P = Primitive
SPNM = Semi-Primitive Non-Motorized
SPM = Semi-Primitive Motorized
RN = Roaded Natural
RM = Roaded Modified
Units
Project Boundary
State/Private Land
Lakes & Saltwater
Scale in Miles
0
1
2
MADAN TIMBER SALE
Figure 3-12
Alternative 3
Recreational Opportunity Spectrum (ROS) Settings



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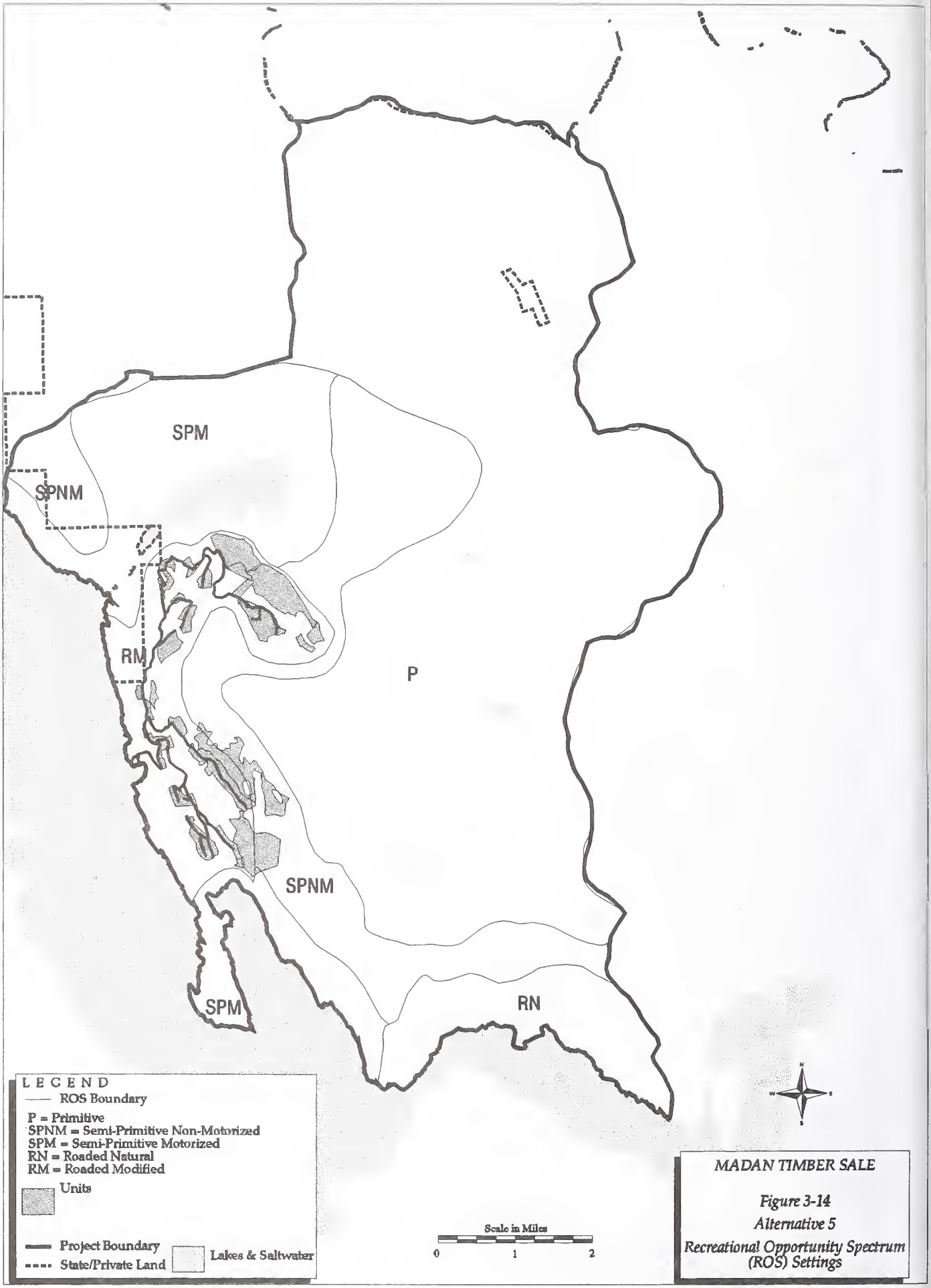

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Effects of the Alternatives on Recreation Experience and Outfitters/Guides

Timber harvest can have temporary and long-term effects on the quality of the recreational experience. The temporary aspect of timber harvest that would affect recreationists and outfitter/guide clients the most, would be noise generated by road building and timber harvest (especially helicopter harvest) activities. Noise would be heard to varying degrees by recreationists and outfitter/guide clients over a period of three to five years. The possible expectation of a quiet, "natural", setting would be broken by timber harvest-related noises. Some recreationists and outfitters/guides may choose to relocate their activities or operations out of the Project Area for the duration of harvest or may avoid certain areas for shorter periods of time. Recreationists and outfitter/guides that pass by the Project Area on their way to other areas would not likely be affected by the sale. Their clients would not likely hear harvest activities as they were being transported in motorized boats.

The primary potential long-term effect associated with timber harvest on recreational experiences and outfitter/guides, is the change in visual quality. The quality of scenery is important to many of the recreationists that use or pass through the Project Area, as well as clients of outfitters and guides. However, timber harvest units in all the alternatives would be subordinate to the surrounding landscape and may not be noticed by casual observers such as outfitter and guide clients (see Scenery). Therefore, the effects of all the alternatives on scenery should not be enough to affect the recreational experience of most recreationists or most outfitter/guide clients.

In summary, the proposed sale would have some minor temporary effects on some recreationists and outfitter/guides, but should not have long-term or significant effects. To some recreationists, the experience and opportunity may be enhanced (see Cumulative Effects). Many people would gain the opportunity to hunt, ski, trap, hike, and bike the road system after sale development. The following discusses the effects that would likely occur on recreation experience and outfitter/guides with each alternative.

Alternative 1

Alternative 1 would have no effect on the recreation experience or on the clients of outfitters and guides. If Alternative 1 were selected, it is possible that harvest of the state lands adjacent to the Project Area would be delayed, because the state would likely rely on the Jenkins Cove LTF site and roads from it to access state lands for timber harvest. If that were the case, the visual and other effects associated with timber harvest that would occur on state lands would not occur or would be delayed.

Alternative 2

Road building and timber harvest activities would be heard by recreationists using Virginia Lake, the coastline near Jenkins Cove, Madan Bay, and the portion of Blake Channel near Moose Creek. The noise and activity generated by harvest would last for varying periods of time over the three (and up to five) years of harvest. Opportunities for solitude and quiet would be temporarily lost for periods of time. The recreationists most affected would be people recreating at Virginia Lake, Madan Bay, Earl West Cove and to some extent, people using or accessing the Berg Bay area.

Alternative 3

Because there would be no harvest in the Virginia Lake watershed, recreationists using Virginia Lake would not hear road building or harvest activities. Recreationists using saltwater areas near Madan Bay and Earl West Cove would likely hear more noise with Alternative 3 compared to Alternative 2, because Alternative 3 harvest would be much more reliant on helicopter harvest.

Alternative 4

As in Alternative 4, recreationists near Madan Bay and Earl West Cove would hear more noise from harvest activities compared to Alternative 2 because of the use of helicopters for harvest and the presence of a log barge at Madan Bay.

Alternative 5

The effects of this alternative on recreation would be the same as that of Alternative 2 for all areas except the Moose Creek drainage. In the Moose Creek drainage, the effects would be the same as under Alternative 1 because there would be no harvest or road construction.

Cumulative Effects on Recreation Values

The vast majority (86 percent) of the area on the mainland between the Stikine River to the north, the Canadian border to the east, and Behm Canal to the south, consists of National Forest System lands that have unroaded ROS settings (P or SPNM). Approximately 185,865 acres have an ROS setting of P and 14,252 acres have an ROS setting of SPNM, for a total of 200,117 acres of unroaded ROS setting. Up to approximately 4,360 acres of unroaded ROS settings would be changed to roaded settings as a result of the project. From a regional or cumulative perspective, this 2 percent reduction is considered to be insignificant.

The various alternatives would reduce the area of unroaded ROS settings from approximately 1,380 acres (Alt. 4) to 4,360 acres (Alt. 2). Changing the ROS settings from unroaded to roaded would decrease the amount of unroaded area along Eastern Passage and increase the amount of areas accessible by road for people willing to walk, ski, or mountain bike along the roads.

From a regional perspective, the conversion of up to 4,360 acres of unroaded to roaded ROS settings would be insignificant. From a localized perspective, the Madan sale would have a slight effect on recreation. Together with the level of timber harvest that already has occurred on federal and state lands along the Eastern Passage, the character of the Eastern Passage will become somewhat less pristine and may slightly affect the quality of recreational experiences possible along the Eastern Passage. The Madan sale would slightly contribute to the change in character of the Eastern Passage. However, because of the efforts that were taken to reduce the visual impacts of the Madan sale under all alternatives, the contribution of the Madan sale to the change in visual quality and recreation experience along the Eastern Passage would be minor. Many of the harvest units would be very difficult to see, and the ones that would be noticeable would meet VQOs and would be subordinate to the landscape. Compared to the harvest along the Eastern Passage on federal and state lands, the harvest associated with the Madan sale

would have very little incremental effect on visual quality. The primary cumulative effect of the alternatives on recreation is that they would introduce approximately 7 to 21 miles of roads into an unroaded area. Under Road Management Option A, most of the road miles would be maintained to allow high clearance and non-highway (ATV) vehicles. Other roads under Road Management Option A and most under Option B would allow non-motorized access into areas that are currently without roads and developed trails and are difficult to access. The introduction of the new roads would be perceived as a negative situation by some recreationists and as a positive one by others.

Issue 2: Timber Management and Economics

The potential for the project to affect employment and the economy of local communities was brought up as an issue during public scoping. There was much concern regarding the economic viability and amount of volume in the planned sale. Public comments indicated concern about current changes in the timber industry and question the need for this sale in light of the perceived market decline. Comments ranged from voicing strong support for harvesting timber in the Project Area to questioning the need for the sale given recent mill closures in the area. The amount of wood harvested and any infrastructure developed with this entry may affect the amount of available timber and costs associated with future entries for timber harvest. Roads constructed for timber harvest may make future sales more economical, but the access they provide between sales is a concern due to other issues, such as increased vulnerability of wildlife to hunting and other disturbances.

Forest Ecology and Disturbance

Four commercial tree species are common in the Project Area. They are western hemlock, mountain hemlock, yellow-cedar, and Sitka spruce. Western redcedar is also present as an occasional tree. Each of these species possesses certain characteristics that determine its location and abundance on the landscape. Each species forms plant communities or plant associations with other trees, shrubs, and forbs. The species composition of a plant association reflects the soil, climate, and disturbance history of a site. These are described in the Timber/Silviculture Resource Report (Iozzi, 1999).

The predominant agent of natural disturbance in the Project Area is wind. It occurs in two forms: small-scale and large-scale. Most of the Project Area is subject to small-scale windthrow events. Individual trees or small groups of trees blow over during windstorms, opening the canopy and allowing young trees to grow to fill the openings. Wind events capable of causing this type of blowdown occur regularly, usually in the fall or winter. The winds generally come from the southeast to southwest or from the mountains east of the Project Area. Some areas, those not protected by topographic barriers from infrequent, major storms, are also subject to catastrophic blowdown. Recent studies have documented that entire stands have blown down in Southeast Alaska (Nowacki and Kramer, 1998). The result of windthrow on the forest landscape is a mosaic of stands of different ages and types. Forest development following disturbance is described in Forest Stand Dynamics (Oliver and Larson, 1996) and is summarized in the Timber/Silviculture Resource Report (Iozzi, 1999).

All action alternatives mimic natural disturbance on two levels: the stand level and the landscape level. At the stand level, the pattern of repeated partial disturbance described above, would be mimicked by creating harvest units with three or more age classes of trees. These units would closely resemble the understory reinitiation stage following partial disturbance. In addition, the complete stand-replacing event would be mimicked by creating units with few trees left, moving the units to the stand initiation stage. At the landscape level, the natural patchy pattern of stands existing after windthrow events that leave some stands completely blown down while other nearby stands are only partially blown over would be maintained.

The tools that are available for use in maintaining natural disturbance processes at the stand level are discussed in the Forest Plan FEIS, Appendix G (1997). This appendix lists three groupings of silvicultural systems (or ways of managing forests for clearly defined goals). They are even-aged, two-aged, and uneven-aged systems. Even-aged and uneven-aged systems are proposed for each action alternative.

Silvicultural Treatments

Silvicultural systems are used to tend, harvest, and re-establish forest stands. Treatments are applied throughout the life of the stand for the purpose of reaching a desired future condition. Treatments include the harvest or regeneration of the stand, intermediate cuttings, and other cultural treatments necessary for the replacement and development of the forest stand. No single silvicultural system can produce all desired combinations of products and amenities from a particular stand or project area. A prescription is a written record that includes treatments prescribed for the stand. Silvicultural systems can produce even-aged, two-aged, or uneven-aged stands.

Even-aged Systems

Even-aged systems produce stands that consist of trees of the same or nearly the same age. This system mimics the results of stand replacing disturbance events (USDA Forest Service, 1997) and moves units to the stand initiation stage. Clearcutting is the most commonly used method in Southeast Alaska to achieve even-aged results. Clearcutting with reserve trees would be included in all alternatives to varying degrees, to maintain a mixture of stand development stages at the landscape level and for logging practicality.

The clearcut harvest method removes virtually the entire stand in one cutting with the exception of some reserve trees. The objective of this method is to create a fast-growing, even-aged stand of mistletoe-free trees to maximize wood fiber production. At least 10 percent of the trees over 9 inches DBH would be retained as a biological legacy to improve the structural and biological diversity in the new stand. These reserve trees would generally be large, defective trees with little commercial value. They would not be managed for fiber in the next stand. Reserve trees would be unevenly distributed (e.g., in clumps or groups), their location depending largely on the capability of the yarding system. They would generally be located along unit or setting boundaries, in areas harvested with cable yarding systems. They can generally be left anywhere within the unit in areas harvested with a helicopter yarding system.

The clearcut areas are expected to regenerate naturally, as have other stands in the general area. This stand initiation stage is expected to last 20 to 30 years. A mixture of shade tolerant species, such as western hemlock and red cedar, and shade-intolerant spruce would become established. The regenerated second-growth stand would remain in the stem exclusion stage throughout most of the rotation, expected to be 100 to 150 years on most sites. Tree density and species composition can be adjusted by precommercial thinning to maintain a fast-growing, productive stand. Thinning can also minimize the length of time the stand is in the stem exclusion stage by delaying canopy closure. This would also extend the period during which the stand produces forage for deer. Reserve trees would remain throughout the rotation, but some mortality is expected from blowdown and other causes.

Clearcutting with reserve trees is recommended for some units under some alternatives. Unit specific justifications for clearcut and non-clearcut prescriptions can be found in the

unit cards. When used, clearcutting is selected on a unit specific basis in situations where: units are visually screened, and/or sized appropriately to the VQO of the area; where soils and slopes would not be adversely affected by use of the prescription; and where the prescription was appropriate to meet, or not unduly impact, wildlife, watershed, and other resource values specific to the unit being considered. When these conditions are met, and where units can be reached from the road for cable harvesting, units have a clearcut prescription to optimize regeneration potential of the site for fiber production and to optimize the economics of harvest, consistent with maintenance of other resource objectives. See the unit cards in Appendix B for a summary of the conditions and objectives that have lead to the selection of the prescription for each unit in each alternative. Table 3-8 summarizes the acres proposed by prescription for each alternative.

Uneven-aged Systems

Uneven-aged systems are methods of maintaining a multi-aged stand with differing tree heights and layers by removing some trees in all age groups either singly, in small groups, or in patches or strips. Variations of this system would be used to harvest timber while meeting VQOs in most of the Project Area that is visible from priority use recreation areas.

Uneven-aged management techniques include removing individual trees, groups of trees, and a fixed percentage of trees in a stand. In the Madan Timber Sale, prescriptions calling for the removal of individual trees, small groups of trees (up to 2 acres), and patches (2 to 5 acres) would be used (see Chapter 2). Approximately 25 to 30 percent of the merchantable volume of the stand would be removed in the units that have individual/group selection and group selection. The removal of 25 to 30 percent on an individual tree basis will likely leave more than 70 to 75 percent of the trees in the stand in place after harvest. Approximately 30 to 40 percent of the trees would be removed in units that have patch cuts. The intent is to have 3 entries which each harvest about 30 percent of the stand, with 10 percent remaining as permanent retention. Some areas that are largely not visible may have up to 45 percent of the stand removed in each of two entries. The resulting stands would mimic many of the characteristics of stands that develop in areas where small-scale blowdown predominates.

The treated stands would have a high level of structural diversity, especially the individual/group and group selection harvest units. Enough of the overstory would be removed to allow younger trees to grow and seedlings to become established. Shade-tolerant species, such as western hemlock and cedar, would be favored, though spruce would grow in the larger openings.

When used, this prescription would allow for harvest on visible slopes within the Scenic Viewshed in such a way as to meet long-term visual quality management objectives while providing wood products. Rotation lengths are likely to be about 150 years under these systems and thus there is some reduction in fiber production as compared to even aged systems (like clearcuts) which commonly have rotation lengths of about 100 years in the Madan area. However, these prescriptions allow for harvest in the Madan project area that would otherwise be difficult or impossible to screen. Uneven-aged systems in these situations allow for harvest from lands available for harvest under the Forest Plan that might not be compatible over a full rotation with VQOs if managed using even aged systems. The unit cards in Appendix B have a unit by unit description of the basis for the use of these type prescriptions. Table 3-8 summarizes the acres proposed by prescription for each alternative.

Table 3-8.
Proposed Silvicultural Prescription and Logging Systems (acres)

Prescription	Logging System	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Clearcut w/reserves	Cable	0	719	356	283	436
Clearcut w/reserves	Helicopter	0	72	25	0	72
Patch Cut	Cable	0	0	0	0	0
Patch Cut	Helicopter	0	264	264	264	0
Group Selection	Cable	0	129	0	0	129
Group Selection	Helicopter	0	628	24	30	423
Individual/Group Sel.	Cable	0	0	21	0	0
Individual/Group Sel.	Helicopter	0	293	1,029	1,192	293
Total		**0**	**2,105**	**1,719**	**1,769**	**1,352**

Forest Land Classification

The Project Area contains approximately 44,179 acres, consisting of 42,803 acres of National Forest System lands and 1,376 acres of state and private lands. The forests of the Project Area can be divided into a productive and an unproductive component, based on the ability of specific areas to grow trees of a certain size (Tongass National Forest Land and Resource Management Plan FEIS, 1997). Approximately 19,366 acres, or 45 percent of the National Forest System lands in the Project Area, are covered with productive forestland. Productive forest is divided into three strata based on timber volume: high, medium, and low. The Project Area National Forest System lands contain approximately 8,578 acres of high volume late-seral forest, approximately 7,416 acres of medium volume late-seral forest, and approximately 3,391 acres of low volume late-seral forest.

Approximately 9,917 acres, or 51 percent, of the productive forestland are considered tentatively suitable for timber management. The rotation age is approximately 100 years for the timber LUDs. The tentatively suitable land has an estimated volume of approximately 240 million board feet (MMBF). Virtually all forests in the Project Area are considered old growth; however, approximately 31 acres within the Project Area have been harvested. Most of this harvested area is within the beach fringe and is no longer considered suitable for programmed timber harvest.

Approximately 2,606 acres, representing 26 percent of the tentatively suitable forestland and 13 percent of the productive forestland in the Project Area, are being considered for harvest at this time. These 2,606 acres have an estimated volume of approximately 81 MMBF of timber. This area makes up the unit pool from which the harvest alternatives were developed.

Proposed Timber Management

Alternative 1 would not have any direct effects on vegetation at this time. Natural processes would continue until another timber sale is planned. At that time, effects are likely to be similar to those described below. There would be no change in suitable acres since OGR boundaries would not change.

Alternative 2 would result in approximately 2,105 acres being treated (Table 3-8). Approximately 791 acres would be converted into single-aged stands of young trees. The

remainder would be a mosaic of small openings and older forest and would continue to develop as an uneven-aged forest. Approximately 56 percent of the acreage treated would be from the high volume stratum and 95 percent would be from normal operability lands (NIC 1) (Table 3-9). Approximately 1,084 additional acres of suitable land would be included in the expanded OGRs and would no longer be considered suitable.

Table 3-9.
Harvest Volume and Acreage by Volume Strata and Non-Interchangeable Component (NIC)

Attribute	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Harvest Volume (MBF)	0	32,169	19,053	19,491	20,646
Non-Interchangeable Component (acres)					
NIC 1	0	2,000	1,679	1,729 1/	1,352
NIC 2	0	105	40	40 1/	0
Volume Strata (acres)					
High	0	1,179	810	847	757
Medium	0	621	567	576	386
Low	0	297	338	342	204
Other	0	8	4	4	6
Total	0	2,105	1,719	1,769	1,353

1/ However, approximately 620 acres of NIC 1 would be managed as though it were NIC 2, because roads would not be built and harvest would be conducted by helicopter.

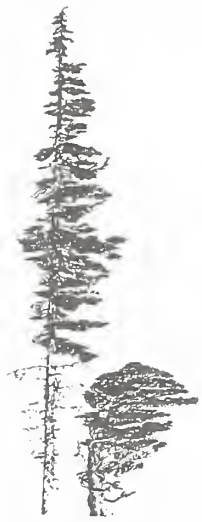
Alternative 3 would result in approximately 1,719 acres being treated (Table 3-8). Approximately 381 acres would be converted from mature forest to single-aged stands of young trees. The remainder would be a mosaic of small openings and older forest and would continue to develop as an uneven-aged forest. Approximately 47 percent of the acreage treated would be from the high volume stratum and 98 percent would be from lands with normal operability (NIC 1) (Table 3-9). As in Alternative 2, approximately 1,084 additional acres of suitable land would be included in the expanded OGRs and would no longer be considered suitable.

Alternative 4 would result in approximately 1,769 acres being treated (Table 3-8). Approximately 283 acres would be converted into single-aged stands of young trees. The remainder would be a mosaic of small openings and older forest and would continue to develop as an uneven-aged forest. Approximately 48 percent of the acreage treated would be from the high volume stratum and 98 percent would be from lands considered normal operability lands (NIC 1) in the Forest Plan (Table 3-9). However, Alternative 4 would manage the Jenkins Cove area using helicopter yarding only. No roads would be built at this time. This would result in nearly 60 percent of the harvest acres in the Jenkins Cove area being managed as though it were not normal operability lands (NIC 2). As in Alternative 2, approximately 1,084 additional acres of suitable land would be included in the expanded OGRs and would no longer be considered suitable.

Alternative 5 would result in approximately 1,353 acres being treated (Table 3-8). Approximately 508 acres would be converted from mature forest to single-aged stands of young trees. The remainder would be a mosaic of small openings and older forest and would continue to develop as an uneven-aged forest. Approximately 56 percent of the acreage treated would be from the high volume stratum and 100 percent would be from

lands with normal operability (NIC 1) (Table 3-9). As in Alternative 2, approximately 1,084 additional acres of suitable land would be included in the expanded OGRs and would no longer be considered suitable (Tables 3-8 and 3-9).

Timber Supply and Demand



Timber demand in Southeast Alaska varies dramatically on an annual basis. The level of demand is difficult to predict with precision. Many factors influence the demand, including interest rates, housing construction, value of the dollar, import tariffs, export policies, business cycles in the United States and overseas, mill capacity, regional and world timber markets, and timber availability and cost. The timber supply and demand for the Tongass National Forest has been studied in detail (Appendix A). Appendix A explains why timber is offered for sale, expectations on market demand, predictability, as well as other topics.

There are both short- and long-term effects for each alternative on the supply and demand of timber. The short-term effect would simply be that the volume of timber harvest would be added to the local timber supply and, therefore, would reduce the demand by that same amount. From the short-term approach, Alternative 2 would contribute markedly more volume than other alternatives to the area timber supply. Alternative 2 would contribute 32 MMBF to the area timber supply, which is 56 to 69 percent more timber volume than any of the other action alternatives.

The long-term timber supply is also affected by the percent of tentatively suitable acres harvested during this entry in the Project Area. The action alternatives would result in 13 to 21 percent of the existing suitable timber being harvested. However, with implementation of any of the action alternatives, the suitable timber supply would be reduced by about 1,914 acres due to OGR expansion; therefore, the action alternatives would harvest from 15 to 24 percent of the new suitable base (Table 3-10).

Table 3-10.
Harvest Acres by Alternative as Percent of Suitable and Available Harvest Acres in Project Area

Timber Harvest (acres)	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Acres available for harvest (1)	9,917	8,833	8,833	8,833	8,833
Treatment acres	0	2,105	1,719	1,769	1,352
% of suitable and available acres treated	0%	24%	19%	20%	15%

Each alternative also has potential to affect the long-term supply and demand of timber products. Road access is important to the economic feasibility of timber harvesting and alternatives with more road construction provide more opportunities for future economical harvest operations (using conventional yarding techniques) and have a greater potential to contribute to the timber supply in the next entry. Therefore, the effect of an alternative on the intermediate-term supply and demand can be measured by the length of permanent road construction (Table 3-11).

Alternative 2 has the most miles of permanent roads, and has the greatest potential for future contributions to the economic supply of timber in the next entry. Alternative 5 is a

distant second place in terms of miles of permanent road, because no operations are planned in the Moose Creek Drainage.

Table 3-11.
Miles of Permanent Road by Alternative

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles of New Permanent Road Construction	0.0	18.6	8.4	5.9	12.9

Economic Comparison

The economic analysis displays an economic comparison among the five alternatives in the Madan Project Area. In the analysis, the revenues of the alternatives are calculated and then the costs of producing the revenue are subtracted giving a net "stumpage" for each alternative. The economic analysis is done on a *per MBF* basis to compare the harvest system efficiency of each alternative, and accordingly, the volume of timber harvested in an alternative has minimal impact on the economics of the alternatives. The costs associated with administration and permitting are not considered in the analysis. All of the revenues and costs are in 1998 dollars.

Each alternative was evaluated economically using a High Market Value and a Low Market Value of the timber. Present selling values are relatively low and are used to represent the low market value. The High Market Value is represented by the prices of timber products in 2nd Qtr of 1995. Refer to the Resource Report for a detailed explanation of the economic analysis (Urstadt and Barnhart, 1999).

The net stumpage is calculated by subtracting the costs of logging, road construction, yarding, and transporting the logs from the stump to the mill from the revenues received by selling the logs at the mill.

The main factors influencing economics in this analysis are:

- the logging system,
- the amount of road construction,
- the haul route,
- the species and quality of the timber,
- and the prescription.

Tables 3-12 and 3-13 summarize timber revenues and costs to a timber operator of average efficiency, and net stumpage to the government, under the Low Market and the High Market scenarios. Further detail is provided in Urstadt and Barnhart (1999).

Both the Low Market and High Market analysis tables illustrate that Alternative 5 has the best economics, and Alternative 2 has the second best economics. All alternatives have negative stumpage values under the Low Market scenario, and positive values under the High Market scenario. These figures are presented for comparison purposes only, because sales would be advertised no lower than base rates and, depending on the market at the time, they may be sold at a much higher value.

Table 3-12.
Economic Comparison of Alternatives (Low Market Value)

Economic Factor	Alternative				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Total volume (Mbf)[1/]	0	32,169	19,053	19,491	20,646
Revenues ($/Mbf)					
Low market pond value (Mbf)[2/]	0.00	124.07	116.52	115.47	140.36
Cost ($/Mbf)					
Stump to truck[3/]	0.00	221.40	273.22	296.90	219.50
Transportation[4/]	0.00	29.55	27.24	24.68	30.16
Temporary road construction	0.00	9.70	3.15	4.31	9.3
Specified road work and LTF costs	0.00	99.15	78.29	53.77	108.07
Profit & risk (60%)	0.00	20.25	21.45	22.73	20.28
Total Costs ($/Mbf)	0.00	380.03	402.35	402.38	387.30
Net Stumpage ($/Mbf)	0.00	-255.96 [5/]	-286.83 [5/]	-286.91 [5/]	-246.94 [5/]

1/ Does not include ROW volume outside of units.

2/ The low market pond value is based on USFS 4th Quarter of 1998 values.

3/ Includes felling, yarding, sorting & loading, and general logging overhead; barge costs were added to Alt 4.

4/ Includes truck haul & delay, dump & raft, and tow to Wrangell.

5/ These figures are presented for comparison purposes only; sales would not be advertised at lower than base rates.

Table 3-13.
Economic Comparison of Alternatives (High Market Value)

Economic Factor	Alternative				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Total volume (Mbf)[1/]	0	32,169	19,053	19,491	20,646
Revenues ($/Mbf)					
High market pond value (Mbf)[2/]	0.00	577.71	568.17	565.21	603.94
Cost ($/Mbf)					
Stump to truck[3/]	0.00	221.40	273.22	296.90	219.50
Transportation[4/]	0.00	29.55	27.24	24.68	30.16
Temporary road construction	0.00	9.70	3.15	4.31	9.3
Specified road work and LTF costs	0.00	99.15	78.29	53.77	108.07
Profit & risk (60%)	0.00	82.39	83.58	84.80	82.02
Total Costs ($/Mbf)	0.00	442.18	465.48	464.44	449.05
Net Stumpage ($/Mbf)	0.00	135.53	102.69	100.76	154.89

1/ Does not include ROW volume outside of units.

2/ The high market pond value is based on USFS 2nd Quarter of 1995 values.

3/ Includes felling, yarding, sorting & loading, and general logging overhead; barge costs were added to Alt 4.

4/ Includes truck haul & delay, dump & raft, and tow to Wrangell.

Because Alternatives 2 and 5 are similar except for the Moose Creek area (and some long helicopter yarding in Alternative 2), it appears that the Moose Creek area is less economical than the Jenkins Cove area. The reasons are that: (1) the Jenkins Cove option accesses the Virginia Lake area, which has higher value timber and (2) there is a higher percentage of helicopter yarding in the Moose Creek area.

Alternative 3 is the third best economically. Alternative 4 ranks lowest in terms of economics. The main reason for the poorer economics of these alternatives is the high proportion of volume that is planned for helicopter yarding. Alternative 4 ranks lowest mainly due to longer flight distances because there is no road system to serve as landing sites in the Jenkins Cove area.

The economic differences among many of the alternatives is even more accentuated when one considers the long-term effects associated with the amount of infrastructure development on the costs of future entries. Alternative 2 would result in full development of the road system and LTFs in both the Jenkins Cove-Madan Bay, Virginia Lake and Moose Creek areas. Thus, future entries would have the lowest costs if this alternative is implemented now. Alternative 5 would be similar to Alternative 2 for the area served by the Jenkins Cove LTF. However, in the Moose Creek drainage, future entry costs would be highest because no development would occur there under Alternative 5. Alternatives 3 and 4 would have much higher future entry costs in the areas served by the Jenkins Cove LTF, compared with Alternatives 2 and 5. Costs associated with Alternative 3 would be substantially lower than for Alternative 4 because of the lack of roads to be developed under Alternative 4. In the Moose Creek drainage, future entry costs would be lowest for Alternative 4 (which would be similar to Alternative 2), slightly higher with Alternative 3, and substantially higher with Alternative 5.

Public Investment and Jobs Produced

The public investment analysis uses net stumpage values from Tables 3-12 and 3-13. The average Region 10 allocation costs and management expenses are subtracted from net stumpage revenues to determine net value. The costs and management expenses include NEPA planning, sale preparation, harvest administration and engineering support. The estimated costs and net value of each alternative are displayed in Table 3-14.

Analysis of the "High Market" indicates that all alternatives would generate a negative monetary return to the public ranging from -$1.3 million for Alternative 1 to +$1.1 million for Alternative 2. The range in net value correlates to the volume harvested and the costs to implement, prepare, and administer these alternatives. The main reasons that all alternatives have negative values are (1) the majority of the timber volume is hemlock and not Sitka spruce or Alaska yellow-cedar, and (2) specified road construction is treated as a direct cost of logging instead of being treated as an asset that can increase future harvest values. Although Alternative 1 is the no-action alternative, it has a negative return due to the NEPA investment costs. The NEPA cost is the same for each alternative and based on the volume of Alternative 2.

The net values of all alternatives are expected to be less than the returns from future harvest entries that could use the road system constructed under these alternatives. Alternative 2 is the only alternative that creates both the Jenkins Cove and Moose Creek LTF sites and road systems and would, therefore, contribute the most to future harvest revenues. Since Alternative 3 would also develop both LTF sites, but less road, it would contribute less to future revenues than Alternative 2. Alternatives 4 and 5 would contribute less than Alternative 3, since these alternatives only develop one LTF and one road system. Alternative 1 would contribute nothing to future harvest revenues.

Table 3-15 summarizes the number of jobs produced under each alternative. The number of jobs is directly correlated to the volume of timber harvested. Alternative 2 would produce the highest number of jobs; approximately 65 percent more jobs than the other three alternatives. The number of jobs produced includes sawmill, logging, and road construction jobs.

Forest Service Costs

Sale Administration

Sale Administration costs include the costs of the NEPA process, sale preparation, sale administration, and engineering costs. The sale administration costs are summarized in Table 3-14. Sale administration costs are based on the Region 10 average budget allocation costs.

Table 3-14.
Public Investment Analysis by Alternative

Volume (Mbf)	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
	0	32,169	19,053	19,491	20,646
Revenues					
"High" market stumpage value	$0	$4,359,855	$1,956,517	$1,963,979	$3,197,880
Costs [2/]					
NEPA [3/]	$1,318,917	$1,318,917	$1,318,917	$1,318,917	$1,318,917
Sale preparation	$0	$739,880	$438,216	$448,297	$474,853
Sale administration	$0	$289,518	$171,476	$175,420	$185,812
Engineering support	$0	$900,724	$533,480	$545,752	$578,082
Total costs	$1,318,917	$3,249,040	$2,462,089	$2,488,387	$2,557,664
Net value					
"High" market value	-$1,318,917	$1,110,815	-$505,572	-$524,408	$640,216

1/ Net stumpage value from Tables 3-12 and 3-13. Only high market is used for comparison because low market stumpage values are below base rates.

2/ Forest Service costs per Mbf based on the Region 10 average budget allocation of:

$41/Mbf for NEPA

$23/Mbf for sale preparation

$9/Mbf for sale administration

$28/Mbf for engineering

3/ The NEPA costs are estimated using the volume in Alternative 2, but would be the same regardless of the alternative selected.

Table 3-15.
Number of Jobs Produced by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Volume (Mbf)	0	32,169	19,053	19,491	20,646
Number of jobs produced	0	170	101	103	109

1/ Based on 3.33 sawmill and 1.95 logging jobs created per MMbf. Road construction jobs are included in this figure (USDA Forest Service, 1997b, Table 3-145). Total jobs produced is estimated at 5.28 per MMbf.

Opportunities for Small Sales

Small sale opportunities are an issue that responds to the desire to have small timber sales for local operators. The multi-year plan in Appendix A describes the issue of small sales in more detail and from a regional perspective. Generally these sales are to be harvested with a conventional yarding system (preferably shovel) to an existing road. Since there are no existing roads in the Project Area, there are currently no opportunities for small sales.

Under the action alternatives, opportunities for small sales would be created within the Project Area. The decision regarding the size of sales and how many sales to offer from a project is an administrative decision that is made on an annual basis after the Record of Decision is signed. The decision is based on the current market and the demand for timber. To facilitate the development of competitive markets, the Forest Service and the Small Business Administration agree on an annual set-aside goal for the Tongass National Forest (Forest Plan FEIS, 1997: p. 3-291). Because small sales normally do not involve helicopter yarding, the greatest opportunities with small sales would occur with Alternatives 2 and 5.

Cumulative Effects

The Forest Service does not have any other timber activities planned for the Madan Project Area in the foreseeable future and past timber management has been virtually non-existent (only 31 acres near the mouth of Moose Creek have previously been logged). Although the State of Alaska owns lands both south and north of Mill Creek there are no timber management plans for these areas within the next 10 years.

Although no activities are planned for the next 10 years, state lands south of Mill Creek could more easily be developed under Alternatives 2, 3, and 5. Therefore, these alternatives could provide more opportunities for economic development in the future.

Issue 3: Wildlife Habitats and Species of Concern

The conservation of biological diversity incorporates two strategies for addressing both individual species as well as entire ecosystems (Marcot et al., 1994). The traditional species-by-species approach is important for featured Management Indictor Species (MIS), and sensitive or threatened and endangered species. This strategy relies on avoiding harvest in important habitats for selected species and using silvicultural practices to provide for species habitat, such as retaining snags and green trees within harvest units.

The second strategy focuses on conserving the entire ecosystem by facilitating the maintenance of a functional and interconnected natural forest mosaic. This, in part, relies on a system of reserves to ensure the maintenance of viable, well-distributed populations. Maintaining corridors between reserves and managing the "matrix" or habitat between the reserves adds to the strategy.

The location and density of roads has an effect on certain wildlife species. Roads can act as dispersal barriers to small mammals and amphibian populations. Roads on the mainland will provide interior access to game animals and furbearers that are currently only accessed by shore. The area along the shoreline between the Narrows and Crittenden Creek (just north of the Project Area) contains high value deer winter range relative to what is available throughout the Project Area. This same area serves as a forested connection between the two small Old Growth Reserves (OGRs). Some commenters have stated that Moose Creek has importance as habitat for moose and mountain goat populations.

Wildlife Habitats

Habitat provides the essentials—food, water, and cover—that a species must have to survive and reproduce successfully. Wildlife species are known to select habitat in accordance with certain criteria that relate to microclimate, physiography (slope, elevation, aspect), prey densities, protection from predators, and a variety of vegetative features. Wildlife habitats in the Project Area are described using data contained in the Forest Service GIS layers. The GIS database was developed based on timber stand exams, aerial photo interpretation, and field studies. Some data layers were corrected based on site visits. Wildlife habitats in the Project Area include beach fringe, wetlands, riparian areas, old-growth forest, and other non-forest habitats.

Beach and Estuary Fringe

Affected Environment

Beach and estuary fringe represents the area within 1,000 feet of the coastal zone that is transitional between land and water, salt and fresh water, and vegetated and non-vegetated conditions. Forested areas in this transition zone typically receive high use by species with high economic, recreational, subsistence, and esthetic values including black bear, river otter, bald eagle, black-tailed deer, and Vancouver Canada goose. Many of these species are abundant in mature and old-growth stands. Approximately 6,343 acres of beach and estuary fringe occur in the Project Area (Table 3-16).

Table 3-16.
Acres of Wildlife Habitat in the Project Area and in the Harvest Units of Each Alternative[1/]

Habitat Type[2/]	Project Area	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Productive Old Growth[3/]	19,385	2,073 (62%)[1/]	1,690 (78%)[1/]	1,740 (84%)[1/]	1,346 (62%)[1/]
Beach and Estuary Fringe[4/]	6,343	0	0	0	0
Riparian[5/]	2,663	0	0	0	0
Alpine/Subalpine	4,351	0	0	0	0
Ice/Snow Fields	332	0	0	0	0
Slide zones[6/]	3,714	25	25	25	0
Wetland[7/]	7,872	360	424	419	281
Regeneration	34	0	0	0	0

1/ Values in parentheses ( ) are the percentage of acres with selection harvest prescriptions using 50 percent - 70 percent volume retention.

2/ Some acres of habitat are not mutually exclusive. For example, some riparian habitat is also considered beach fringe.

3/ These values represent the acres of productive old growth (POG) (low, medium, high volstrata GIS data) within the units, therefore, they do not take into account that some POG is left in retention areas within the harvest units.

4/ Beach and estuary fringe represents an area approximately 1,000 feet of the coastal zone that is the transition between land and water.

5/ Riparian areas represent the zone of interaction between the aquatic and terrestrial ecosystems. The acreage is the area of Riparian Management Areas as defined by the stream channel process group direction in the Forest Plan.

6/ Some slide zone inclusions occur in the upper elevations of proposed helicopter harvest units. No harvest would actually occur within these inclusions.

7/ Wetland acres are from the National Wetland Inventory data (i.e., palustrine forested, palustrine scrub-shrub, and palustrine emergent).

Environmental Effects

No timber harvest would occur in the beach and estuary fringe under any of the alternatives based on the Forest Plan standards and guidelines. Alternatives 2, 3, and 4 would construct LTFs and sort yards at both Jenkins Cove and the mouth of Moose Creek. Alternative 5 would only construct the Jenkins Cove LTF. The maximum area cleared for construction of these facilities would be less than 10 acres of beach fringe land per site. This is less than 1 percent of the beach fringe occurring in the Project Area.

Wetlands

Affected Environment

Wetland habitats are categorized by the U.S. Fish and Wildlife Service classification system (Cowardin et al., 1979). Wetland systems are described in detail and acreage values are provided in the *Wetlands and TES Plants* Resource Report (Kershke and Arnett, 1999). The palustrine wetland system is divided into three classes: (1) forested; (2) scrub-shrub; and (3) emergent. In the Project Area, wetland classes are typically mixed. Large areas are classified as mixed emergent forested and mixed emergent scrub-shrub. Scrub-shrub and emergent wetlands typically have the greatest value as habitat for wetland-associated species. In Southeast Alaska, emergent wetlands that have a ground cover high in sphagnum mosses and/or sedges are called "muskegs" (USDA Forest Service, 1997a). These wetland types can contain a variety of plant communities, and the water table is at or near the surface and numerous small ponds are scattered throughout. Furbearers, certain waterfowl and numerous other wildlife species tend to concentrate in wetland habitats. The Project Area has approximately 7,872 acres of wetlands (Table 3-16).

Environmental Effects

Due to the lack of commercial timber within muskegs or other non-forested/scrub-shrub wetland habitats, these areas would not be harvested. Wildlife using these muskegs may be temporarily affected due to disturbance. Harvest activities would mainly impact forested wetland sites. The greatest wetland area within harvest units occurs under Alternatives 3 (424 acres) and 4 (419 acres) and the least occurs under Alternative 5 (281 acres) (Table 3-1). However, Alternatives 3 and 4 also have the highest proportion of selection harvest (50-70 percent retention) and harvest by helicopter which will have the least impact on wetlands.

The construction of roads would permanently remove wetland habitat. The largest impact would occur under Alternative 2 (6.5 miles/39.4 acres) and the least impact would occur under Alternative 4 (0.1 mile/0.6 acre). These acreage values are less than 1 percent of the existing wetland acreage in the Project Area. The wetlands affected by roads are primarily forested wetlands, as the roads are located to avoid high value wetlands. (See wetland section for a full discussion of wetlands and roads).

Riparian Areas

Affected Environment

Riparian areas encompass the zone of interaction between the aquatic and terrestrial ecosystems, and include riparian streamsides, lakes, and flood plains with distinctive resource values and characteristics (USDA Forest Service, 1997b). Riparian areas often contain both hardwood (e.g., alder) and coniferous forest types and, therefore, generally support a relatively high diversity of wildlife species. Riparian areas also provide important linkages to other habitat areas within a watershed, and may act as travel corridors for certain wildlife.

Based on the Tongass Timber Reform Act of 1990, the Forest Plan Riparian standards and guidelines state as a minimum, no commercial timber harvest is allowed within 100

feet horizontal distance either side of Class I and Class II streams which flow directly into a Class I stream (USDA Forest Service, 1997b). The standards and guidelines also establish that no programmed commercial timber harvest shall occur within the Riparian Management Area (RMA). The Forest Plan prescribes specific slope distances for RMAs based on stream channel process groups. These variable width no-harvest buffers apply to Class I, II, and III streams. The acreage of riparian habitats is considered to be equal to the area of RMAs as delineated by the stream channel process group direction (USDA Forest Service, 1997b). Within the Project Area, high and medium volume old-growth forest are the predominant cover types in riparian areas.

Environmental Effects

No timber harvest would occur within RMAs. Riparian habitat and function will be maintained because of these buffers. Some riparian habitat that occurs along Class IV streams may be harvested. The acreage of riparian habitat outside RMAs is considered to be insignificant.

Old-Growth Forest

Affected Environment

Old-growth forests are ecosystems distinguished by old and large trees and related structural attributes (USDA Forest Service, 1997a). Old growth encompasses the later stages of stand development, which typically differ from earlier stages in a variety of ways: larger tree sizes, more variation in size and spacing; large dead standing or fallen trees; broken or deformed tops, bole and root decay; multiple canopy layers; and canopy gaps and understory patchiness (USDA Forest Service, 1997a). In general, old-growth forests can be divided into productive and unproductive types, based on the ability of specific areas to grow trees of a certain size (USDA Forest Service, 1997a). Productive old growth (POG) is divided into three volume strata: high, medium, and low. A brief description of these classes, and their value as wildlife habitat, follows.

High Volume Strata Old-Growth Forest. These forests have an average timber volume of 35 MBF per acre (USDA Forest Service, 1997a). The average height of co-dominant trees is greater than 100 feet. Canopy closure is 65-95 percent, with western hemlock and/or Sitka spruce dominating most sites. Stands are typically uneven-aged, with small gaps in the overhead canopy. Understory production is moderate, but snow interception is high, making forage (for deer) more readily available during winter. *Vaccinium* is the dominant shrub; herb cover is 20-30 percent, and fern cover is 15-30 percent. The Project Area has approximately 8,575 acres of high volume old-growth forest (Table 3-17).

Coarse-structured (multi-aged, large trees), low elevation forest is important for several wildlife species including deer, goshawk, and forest songbirds. High volume forest (measured in these analyses) incorporates the majority, if not all, of the coarse-structured forest stands; however, other forest structure types (for example, even-aged stands), may also be classified as high volume.

Table 3-17.
Total Acres of Productive Old Growth in the Project Area and Acres Remaining After Harvest by Alternative[1/]

Timber Volume (Volstrata)	Project Area Acres (Alt. 1)	Alternative 2 Acres	2 % change	3 Acres	3 % change	4 Acres	4 % change	5 Acres	5 % change
Low	3,386	3,793	12	3,815	13	3,892	15	3,627	7
Medium	7,418	7,705	4	7,598	2	7,562	2	7,646	3
High	8,575	7,880	-8	7,966	-7	7,925	-8	8,105	-5

1/ Results by alternative reflect the retention left within harvest units by determining post-harvest volume within each unit.

Medium Volume Strata Old-Growth Forest. These forests have an average timber volume of 25 MBF per acre (USDA Forest Service, 1997a). The average height of co-dominant trees is 70-100 feet and canopy closure is 40-75 percent. Western hemlock and/or Sitka spruce are still the dominant species [but cedars and mountain hemlock can be significant components as well]. The stands are uneven-aged, with numerous gaps in the overhead canopy. The more open canopy results in a more abundant understory, but it is subject to burial by snow in the winter. *Vaccinium* and forbs are more abundant in these forests, ferns are less common. Winter thermal cover for wildlife is moderate. The Project Area has approximately 7,418 acres of medium volume old-growth forest (Table 3-17).

Low Volume Strata Old-Growth Forest. These forests have an average timber volume of 16 MBF per acre (USDA Forest Service, 1997a). Tree height is typically less than 60 feet, and canopy closure is 20-50 percent. Western hemlock and cedars predominate. The understory is very brushy, dominated by tall thickets of *Vaccinium* and rusty menziesia (*Menziesia ferruginea*) which tend to diminish the production of ferns, herbs, and forbs. Lichens are relatively abundant. Thermal cover for wildlife is poor. The Project Area has approximately 3,386 acres of low volume old-growth forest (Table 3-17).

Environmental Effects

Table 3-17 shows the acres of high, medium, and low volume strata old-growth forest potentially harvested under each alternative. The values under each alternative reflect the amount of retention left within each unit by determining the amount of post-harvest volume in each unit based on the prescription. For clearcuts it is assumed all volume is removed. For the group selection and individual tree/group selection prescriptions which retain 50 to 70 percent, the high volume was reduced to medium volume, medium volume was reduced to low volume, and low volume remained in the low volume category. These classifications were based on the average strata volumes and the percent removal in each unit. Under all alternatives, the net effect is to decrease the acreage in the high volume strata stands and increase the acreage in the medium and low volume strata stands.

Alternative 2 has the greatest effect on high volume forest with the loss of 694 acres (8 percent) and Alternative 5 would have the least effect with the loss of 469 acres (6 percent) (Table 3-17). Low volume strata stands are increased between 7 and 15 percent in Alternatives 5 and 4, respectively.

Other Habitats

Affected Environment

Other wildlife habitats in the project area include alpine/subalpine areas (4,351 acres), ice/snow fields (332 acres), and recurrent slide zones (3,714 acres) (Table 3-16). Alpine/subalpine roughly corresponds to the zone near or above tree line (generally about 2,500 feet). This habitat type includes areas identified in the GIS database as low productivity forest due to high elevation as well as high-elevation non-forest types. This zone is important habitat for mountain goats, as well as important summer range for deer and bear and resting or brooding habitat for geese. Recurrent slide zones are important spring and summer habitats for both mountain goats and bear. Approximately 34 acres in one stand at the mouth of Moose Creek was harvested in the project area in the 1950s.

Environmental Effects

Some slide zone inclusions occur in the upper elevations of proposed helicopter harvest units in upper Moose Creek. The units that show small inclusions of slide zones have harvest prescriptions that call for avoiding slide areas as well as the adjacent areas. Therefore, no harvest would actually occur within any known slide zone area.

Other habitats important to wildlife are not expected to be affected by the proposed project. No timber harvest would occur in these habitats (Table 3-16).

Forest Fragmentation

Affected Environment

Forest fragmentation is used to describe a process in which a forest block becomes subdivided into smaller more isolated units. Fragmentation has the potential to isolate small populations, contribute to decreased population distribution, and increased likelihood of local extinction. However, fragmentation should be viewed from the organisms perspective, if movement between populations is not altered, then fragmentation has not occurred.

The Tongass National Forest is characterized by fragmentation at many scales and is fragmented by different processes. On a small scale, single tree gaps within a 400-year-old Sitka spruce stand provide habitat for forest interior birds such as the hairy woodpecker. On a broader scale, large patches of wind disturbance of 10 acres or more can create nesting habitat for songbirds such as the orange-crowned warbler. From a regional perspective, the Tongass National Forest is highly fragmented due to numerous islands and dramatic topographic relief. Across the Project Area, at a landscape level, the natural distribution of productive old-growth forest is quite patchy, being fragmented by muskegs and non-productive forested wetlands.

Impacts of fragmentation include isolation and edge effects. Patches of old-growth forest can be simplistically characterized as having two zones: a boundary zone between the forest and the adjacent habitat (referred to as "edge" forest habitat) and an interior zone that is not significantly influenced by adjacent habitat (referred to as "interior" forest habitat). Interior habitat retains moisture, temperature, and vegetation conditions that are unique to old-forest conditions. Old-growth dependent species typically thrive in interior

forest habitat conditions, and tend to be sensitive to the influence of the encroachment of edge habitat (i.e., "edge effects"). The "edge effect" can extend 100 meters or more into the forest. When fragmentation occurs in a forested environment there is an increase in the amount of edge habitat and a decrease in the interior forest habitat, thereby making patches less suitable for old-growth dependent species.

Timber harvesting adds to the level of fragmentation or edge that is occurring naturally. The effect of clearcut harvest-level fragmentation varies with the placement of units and their proximity to large existing forest blocks. Simulation studies have indicated that when 50 percent of a watershed is harvested with a staggered setting design, little if any forest interior remains. Whether a particular patch pattern and degree of fragmentation is beneficial or deleterious largely depends on the characteristics of the species using the landscape (Morrison et al., 1992).

Within the Project Area there are three main large blocks of old-growth forest; the area south and southeast of Virginia Lake, the area north and east of Madan Bay, and the Moose Creek drainage (Figure 3-15). The area southeast of Virginia Lake is mostly medium and high volume old-growth, approximately two-thirds of which is included in the proposed Virginia Lake OGR. Also about two-thirds of the block north and east of Madan Bay is included in the proposed Madan Bay OGR. This block extends north towards the Jenkins Cove area where it becomes more naturally fragmented by muskegs (Figure 3-15).

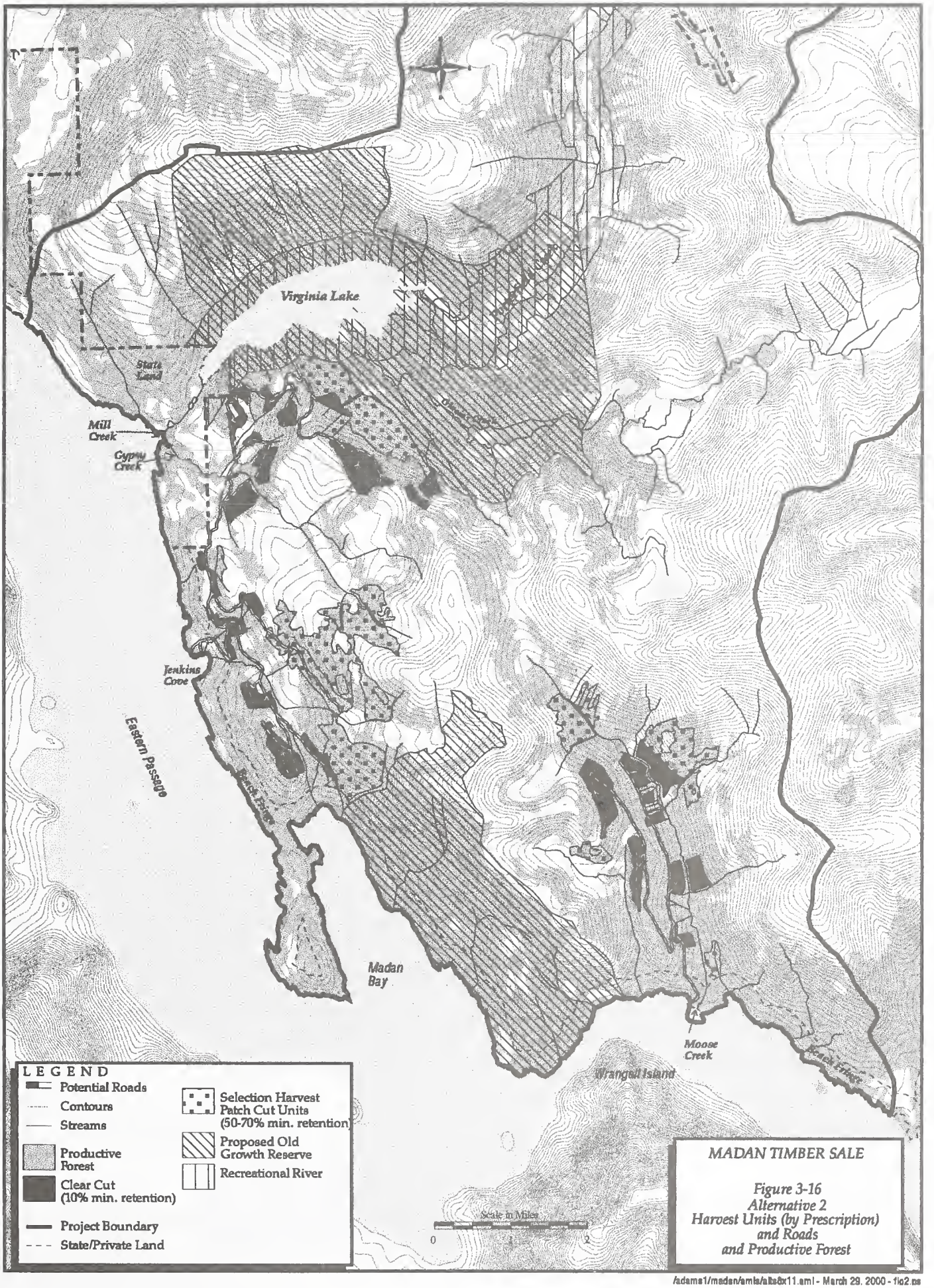
The Moose Creek block extends approximately 3.5 miles up Moose Creek to the north and also extends to the southeast out of the Project Area towards Berg Bay.

Environmental Effects

For the Madan Timber Sale, four harvest prescriptions described below would be implemented in some combination for each of the alternatives (Figures 3-16 through 3-19).

- Clearcut with minimum 10 percent retention—Up to 90 percent of the volume of the merchantable trees greater than 9 inches diameter at breast height will be harvested.
- Patch cut with minimum 60 percent retention—This prescription involves clearcuts up to 5 acres in size, scattered throughout the unit. Approximately 30 percent of the volume of the unit will be targeted for harvest, but harvest may reach 40 percent.
- Group selection with minimum 70 percent retention—Harvest groups up to 2 acres in size, scattered throughout the unit. Approximately 25 percent of the volume of the unit will be targeted for harvest, but harvest may reach 30 percent.
- Individual/Group selection with minimum 70 percent retention—Harvest individual trees and/or small groups up to 2 acres in size, scattered throughout the unit. Approximately 25 percent of the unit will be targeted for harvest, but harvest may reach 30 percent. A variation of this prescription is used on three units in Alternative 4. Retention percentage is reduced to 50 percent in these units because they are largely not visual concerns.

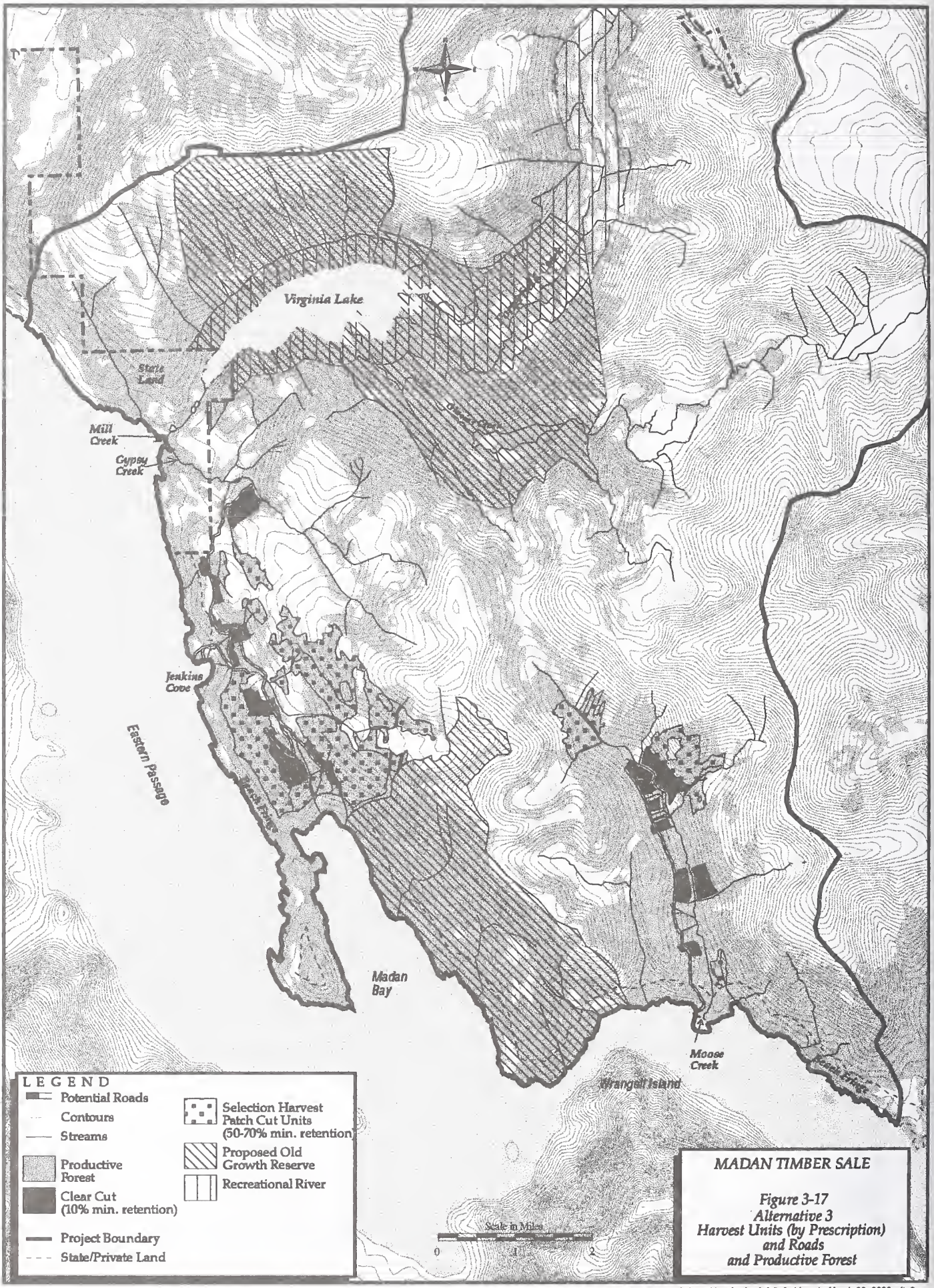

Virginia Lake OGR
Madan OGR
LEGEND
Potential Travel Corridor
Contours
Streams
Current OGR Boundary
Proposed OGR Boundary
Wild & Scenic River
Productive Old Growth Forest
Project Boundary
State/Private Land
Beach Fringe
Lakes & Saltwater
Scale in Miles
0
1
2
MADAN TIMBER SALE
Figure 3-15
Old-growth Blocks, Potential Corridors and Current and Proposed Boundaries of Old-growth Habitat Reserves
/adama1/madan/amla/pe-connectivity.aml - March 29, 2000 - connect.ps



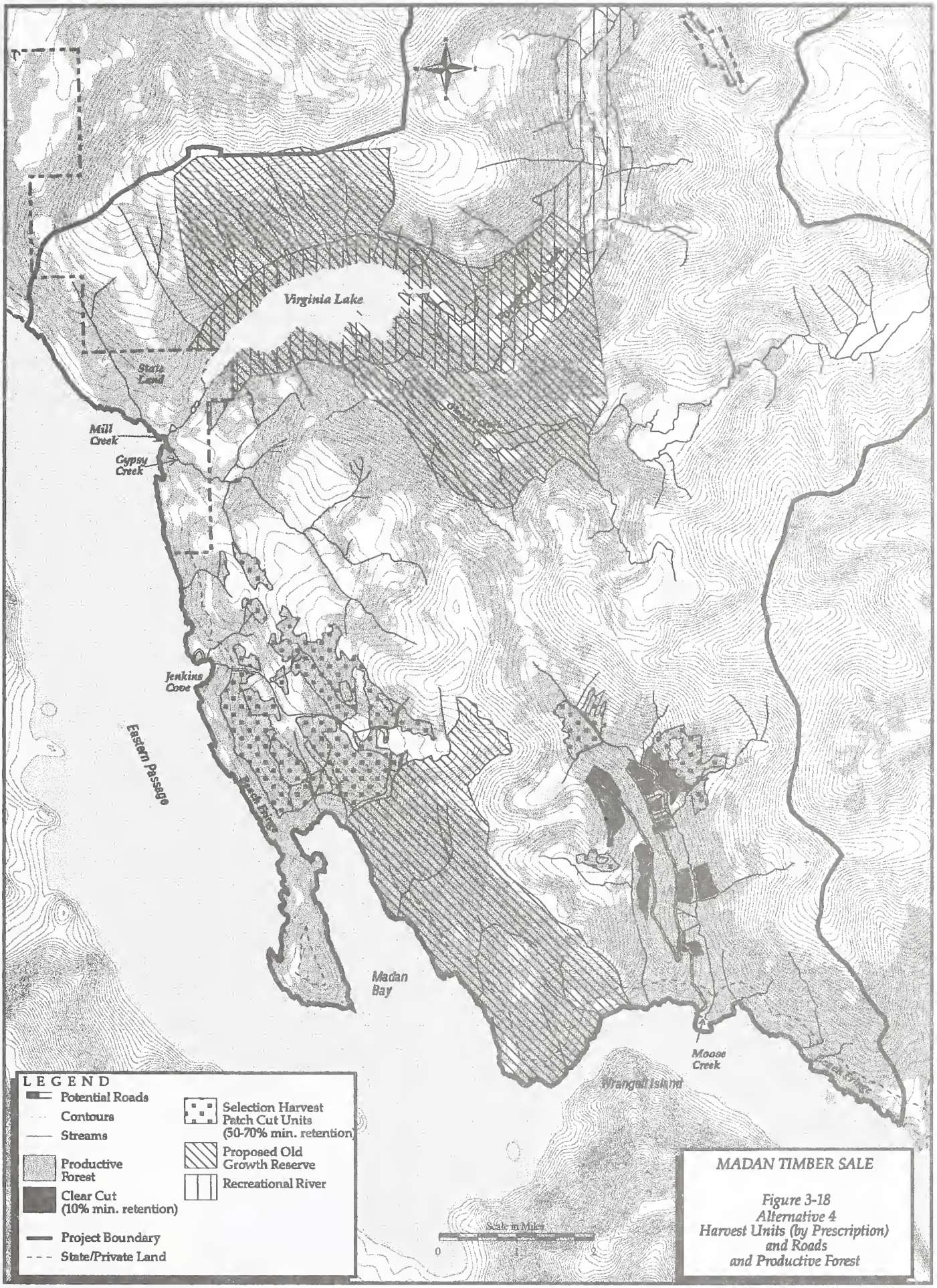
MADAN TIMBER SALE

Figure 3-16
Alternative 2
Harvest Units (by Prescription)
and Roads
and Productive Forest

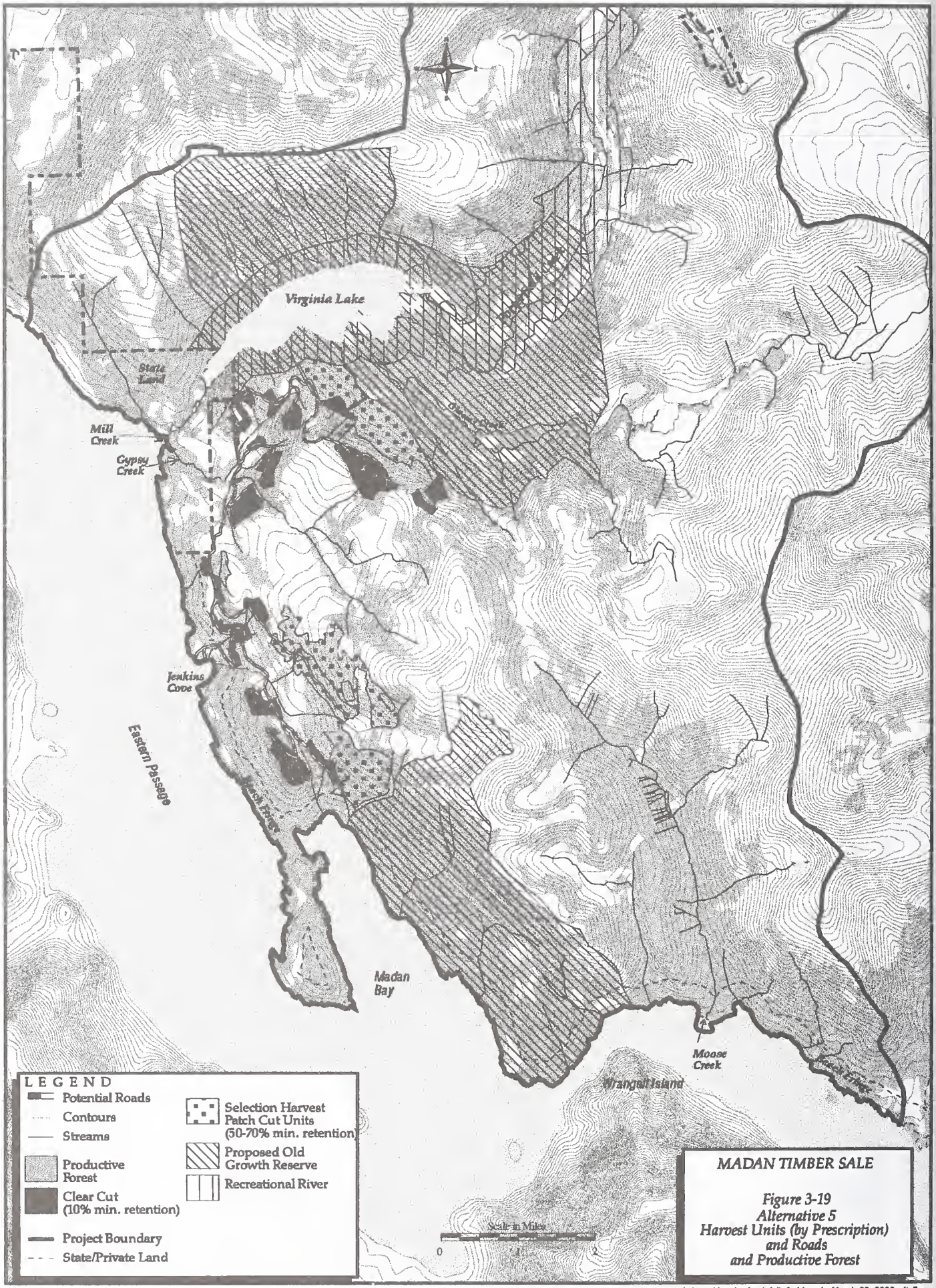
/adams1/madsn/amls/alts8x11.aml - March 29, 2000 - fig2.ps



/adams1/madan/amla/alts8x11.aml - March 29, 2000 - fig3.ps



/adams1/madan/amla/alts6x11.aml - March 29, 2000 - fig4.ps



/adams1/madan/amis/alts8x11.aml - March 29, 2000 - fig5.ps

Due to the high degree of natural fragmentation and the various selection harvest prescriptions that do not result in clearcut areas, but instead leave 50 to 70 percent retention, it is difficult to determine what constitutes edge or fragmentation in the Project Area. Across the Project Area, Alternative 2 would have the greatest effect on fragmentation of the landscape because harvesting would occur across a greater area in the Moose Creek and Virginia Lake drainages as well as in the Jenkins Cove area. Alternative 2 would also have the highest number of acres of created openings because, not only would more overall acres be affected, but a higher proportion of those acres would be clearcut (38 percent) (Table 3-18). Alternatives 3, 4, and 5, each include at least one block that is not harvested (i.e., no harvest occurs in the Virginia Lake area under Alternative 3 and 4; no harvest occurs in the Moose Creek drainage under Alternative 5). Fewer clearcut openings are created with Alternative 4. Although more acres would be harvested in this alternative than for Alternatives 3 and 5, this alternative has the smallest proportion of acres being clearcut (16 percent) (Table 3-18).

Table 3-18.
Clearcut Harvest Area (acres) and Percentage of Total Treated Area to be Clearcut by Old-growth Block

	Alternative 2		Alternative 3		Alternative 4		Alternative 5	
Old-growth Block	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Jenkins Cove	246	26	225	18	0	0	246	32
Virginia Lake	262	46	0	0	0	0	262	46
Moose Creek	283	47	157	35	283	47	0	0
All Blocks	**791**	**38**	**381**	**22**	**203**	**16**	**508**	**38**
Total Treated Area	**2,105**	**---**	**1,719**	**---**	**1,769**	**---**	**1,352**	**---**

The block of old growth southeast of Virginia Lake would largely (approximately 75 percent) be protected under all alternatives due to the proposed Virginia Lake OGR. Alternatives 3 and 4 would not harvest in the Virginia Lake area and, therefore, would have no effect on this block of old growth. Alternatives 2 and 5 have the same level of harvest in this area and would add to the natural fragmentation of the 25 percent of this block not contained in the proposed OGR.

Northeast of Madan Bay would also largely (approximately 75 percent) be protected under all alternatives due to the proposed Madan OGR. Harvest would occur in the northern portion of this old-growth block under all alternatives. Alternatives 2 and 5 have the same level of harvest over a smaller area than Alternatives 3 and 4; however, Alternatives 3 and 4 have more units with prescriptions that have 50 to 70 percent minimum retention.

The block of old growth in Moose Creek would not be affected under Alternative 5. Approximately half of this block (the west side of Moose Creek) would not be affected under Alternative 3. Alternatives 2 and 4 would have the same level of harvest and would reduce the size of this old-growth block by 283 acres and reduce interior forest by an even greater amount.

Wildlife Corridors

Affected Environment

Low elevation passes, beach fringe, and stream corridors provide natural connections between forested blocks and are important areas for migrating and dispersing wildlife. Corridors can be protected by not harvesting within them or by managing the matrix of habitat between the reserves (Suring et al., 1992a). Under the Forest Plan, maintaining forested corridors between small reserves is important for maintaining viable wildlife populations on the Tongass National Forest because the majority of the habitat matrix between the reserves is scheduled to be harvested (USDA Forest Service, 1997b).

In general, the beach fringe zone is believed to be an important wildlife travel corridor (Figure 3-15), providing low-elevation connectivity between watersheds that are separated by very steep sides and non-forested ridgetops. Riparian areas are frequently important travel corridors within watersheds, while forested corridors along slopes are used for the seasonal movement of certain wildlife species between summer and winter range. Low-elevation passes are also used by wildlife for movement between watersheds (Figure 3-15).

Within the Project Area, the principal concern is maintaining an effective wildlife corridor connecting the Madan OGR to the south and the Virginia Lake OGR to the north of the Project Area (Figure 3-15). Currently, the beach fringe is an effective travel corridor for old-growth dependent species; however, possible future harvest on state lands near the mouth of Mill Creek could disrupt this connectivity and, thus, the effectiveness of the beach fringe as a travel corridor. The principal north-south stream corridors are Moose Creek and Porterfield Creek. A relatively low elevation pass connects these two stream corridors (Figure 3-15).

From a landscape perspective, the small OGRs in the Project Area provide some connectivity or linkages to other reserves or old-growth protection LUDs outside the Project Area. Approximately 2 miles north of the Porterfield Recreation River corridor is the Stikine-Leconte Wilderness (Figure 3-4). Also, a Semi-Remote Recreation LUD is located approximately 1.5 miles to the east of this Recreation River LUD. The Madan OGR is also approximately 2 miles from the Semi-Remote Recreation area to the east and is connected to this area by the beach fringe buffer. The larger mainland geographic area bounded by the Stikine River, Bradfield Canal and River, and the Canadian border has approximately 154,084 acres (70 percent of the area) of land designated as non-development LUDs, such as Wilderness, Semi-remote, Recreation, and Remote Recreation.

Environmental Effects

There is no direction to ensure connectivity among all small reserves or between small reserves and non-development LUDs including medium and large reserves (USDA Forest Service, 1998a). However, planning efforts should consider opportunities to maintain connectivity. In the future, if the state lands are harvested, the beach fringe corridor connecting the Madan and Virginia Lake OGRs may be compromised. All of the action alternatives include harvest units near the state lands boundary; however, Alternative 4 would have only a slight effect on this corridor because it includes only two harvest units within 0.5-mile of the state lands, neither of which would be clearcut (Figure 3-15). In particular, Units J-49 and J-53 are not included in Alternative 4. Under Alternative 5, the

low elevation pass corridor would remain intact because there would be no harvest in the Moose Creek drainage. In Alternatives 2, 3, and 4, Units M-156 and M-161, which are patch cuts with up to 5-acre openings and a minimum of 60 percent retention over the entire unit, may restrict, this corridor at the upper reaches of Moose Creek. Alternatives 2 and 4 have the greatest amount of harvest in the Moose Creek drainage; therefore, these alternatives may have the greatest effect on this corridor.

Connections to areas outside the Project Area would be maintained in the southern portion of the Project Area by beach fringe under all alternatives. In the northwestern portion of the Project Area, habitat connectivity to the area north of Virginia Lake may be affected due to timber harvest on state lands in the future although there are no harvest plans for the next 10 years. This potential future harvest on state lands would make the connection in the northeastern portion of the Project Area, along the Porterfield Creek Recreation River corridor, more crucial (Figure 3-15). None of the alternatives greatly influence the connectivity to outside the Project Area, although Alternative 5 with no harvest in the Moose Creek area would have no effect on the connectivity to the Semi-Remote Recreation area to the east.

Old Growth Habitat Reserves

A system of large, medium, and small Old-Growth Habitat Reserves has been identified and mapped in the Forest Plan as part of a forest-wide old-growth habitat conservation strategy. These reserves in combination with other non-development LUDs, are to provide old-growth habitats to maintain viable populations of fish and wildlife species. The size, spacing, and habitat composition of these areas have been considered in addressing issues of large-scale fragmentation. Currently, there are two small reserves located in the Project Area: one north of Virginia Lake in VCU 502 (Virginia Lake OGR), and the other north of The Narrows along Madan Bay in VCU 504 (Madan OGR) (Figure 3-15). Forest Plan standards and guidelines state that the design of reserves (size, spacing, and habitat composition) should be evaluated at the project level. Small reserves require a contiguous landscape of at least 16 percent of the total VCU area; 50 percent of this area must be in productive old growth (USDA Forest Service, 1997b). The Forest Plan also states that the acres found in LUDs that provide old-growth protection should be counted towards fulfilling the requirements of these standards and guidelines for small reserves (USDA Forest Service, 1997b).

From a landscape perspective, the existing reserve locations do provide some connectivity or linkages to other reserves or old-growth protection LUDs. The existing Virginia Lake OGR is located approximately 3 miles south of the Stikine-Leconte Wilderness Area. Although the Recreation River LUD that is adjacent to this small reserve does not connect with the Stikine-Leconte Wilderness, it does come within 2 miles of it. Also a Semi-Remote Recreation LUD is located approximately 1 mile to the east of this Recreation River LUD. The existing Virginia Lake OGR is less than 4 miles from another small reserve that is located to the northwest, and approximately 6 miles north of the small Madan OGR in VCU 504. The existing Virginia Lake and the Madan small reserves are connected by the beach fringe buffer and the Recreation River LUD. The Madan OGR provides an important dispersal/movement corridor between the mainland and Wrangell Island through The Narrows, which is a saltwater channel approximately 0.25-mile wide. The Madan OGR is also approximately 1 mile from the Semi-Remote Recreation area to the east and is connected to this area by the beach fringe buffer. The proposed revisions to the small reserves will further enhance the connectivity between these reserves, especially over the low elevation pass between Moose and Glacier Creeks.

Along with the general criteria of size, productive old-growth, and connectivity, the design of each reserve should also be based on the wildlife concerns specific to the area. Criteria that are commonly used in designing small reserves include: important deer winter range, high probability goshawk nesting habitat, probable marbled murrelet nesting habitat, large forest blocks, rare plant associations, and landscape linkages (Iverson, 1996).

The Forest Plan (USDA Forest Service, 1997b) provides for further evaluation and possible adjustment of the location of small reserves. The Forest Service IDT biologist and biologists from ADF&G and the USFWS worked together to evaluate the location and composition of the existing small reserves as mapped in TLMP. Biologists from these three agencies and Foster Wheeler Environmental developed recommendations for proposing new locations of the small reserves in the Madan Project Area. Where feasible the boundaries of the proposed small reserves follow geographic features so that the boundaries can be recognized in the field. The following is a discussion of the existing and the proposed small reserves.

Virginia Lake Old Growth Reserve

Existing Virginia Lake OGR

The Virginia Lake OGR is in VCU 502, which is approximately 28,715 acres in size. Of this area, 10,710 acres are in productive old-growth. The existing Virginia Lake OGR is approximately 1,402 acres, of which approximately 946 acres is productive old growth (Table 3-19, Figure 3-15). The adjacent Recreation River LUD has a total area of 2,603 acres of which 1,992 acres are in productive old growth. By combining these old-growth protection LUDs, this small reserve meets the criteria for acres of productive old growth; however, it does not meet the overall total size requirement. This is the case for portions of the Recreation River LUD along Porterfield Creek; therefore, this area may not contribute to the old-growth strategy in the future if harvested. Note also that Recreation Rivers allow timber harvest if the adjacent LUD allows for timber harvest. However, because most of the adjacent area is in Scenic Viewshed and roading opportunities appear limited, it is believed to be unlikely that any appreciable harvest would take place in this area. In order to meet the size requirement (16 percent of total area), the Virginia Lake reserve would need to add at least 3,192 acres.

Table 3-19.
Total Size, Area of Productive Old Growth (POG), and Suitable Lands for the Existing and Proposed Virginia Lake Old Growth Reserve (in acres)

Virginia Lake OGR	Size (4,594 Acres Required)	POG (2,297 Acres Required)	Suitable Lands
Existing (TLMP) OGR[1/]	1,402	946	402
Proposed OGR	5,085	3,959	1,133[2/]

[1/] These values do not include the acreages in the adjacent Recreation River LUD.

[2/] This value does not include potentially suitable land that was originally designated as Recreation River LUD (998 acres); this land is considered a non-development LUD in the 1999 ROD. Also, because most of the adjacent area is in Scenic Viewshed and roading opportunities appear limited, it is believed to be unlikely that any appreciable harvest would take place in this area.

The terrain in much of the current small reserve is very steep with roughly half the reserve in slopes of 50 percent or greater. However, the Recreation River portion of the small reserve is much lower in slope and includes substantial acreage of river bottom forest. The northern boundary of the OGR is high elevation, non-forest. The forested habitat is mapped mostly as low and medium volume strata. Currently, half the reserve is not suitable deer winter habitat based on the 1997 Tongass HCM Deer Model. The Recreation River LUD in the area south of the reserve, along Virginia Lake, has large patches of medium value (HSI=0.5) deer winter habitat. This same area also consists almost entirely of high probability goshawk nesting habitat.

Proposed Virginia Lake OGR

The Madan project proposes, under all action alternatives, to change the boundaries of the existing Virginia Lake OGR in order to meet the size and POG requirements and enhance the utility and connectivity of this small reserve. The new small reserve encompasses much of the lower portions of the Porterfield and Glacier Creek watersheds, as well as the existing small reserve (Figure 3-15). The proposed small reserve provides a large variety of habitats for wildlife. This includes the lower reaches of Glacier and Porterfield Creeks; both are Class I fish streams and both are potentially important brown bear foraging streams. Also included are large areas of lower elevations, low relief riparian zones, a variety of timber types and strata, including higher volumes, as well as a variety of aspects and slopes. The proposed Virginia Lake OGR is concentrated below the 800-foot elevation which is optimal for most species of concern including deer and goshawk. Marbled murrelets were also observed flying up the Porterfield Creek drainage and along both sides of the eastern portion of Virginia Lake during 1998 field surveys (see the *Marbled Murrelet* section of this report). There are medium HSI deer winter habitat values in the Glacier Creek drainage, which is some of the best habitat in the northeastern portion of this VCU. This area is also likely to provide important winter habitat for mountain goats known to occur at the head of Glacier Creek and on Berg Mountain. This area also contains a wetland complex with unique wildlife habitat values. Extensive moose and beaver sign, as well as wolf sign, were observed throughout this area during 1997 field studies.

The proposed revision of the Virginia Lake OGR would have approximately 5,085 acres of which 3,959 acres would be productive old growth (POG), which exceeds both the TLMP recommendations for size and acres of POG (Table 3-19). Although this proposed small reserve includes 3,959 acres of POG, not all this timber is considered suitable for harvest. Based on GIS analysis, 1,828 acres of the proposed POG are considered not suitable for timber harvest mostly due to unstable soils, stream buffers, and floodplains. Another 998 acres are in the Recreation River LUD, which is considered a non-development LUD in the 1999 ROD. Therefore, the remaining 1,133 acres of suitable timber would be removed from timber production. Much of the area in this expansion is in the area surrounding Virginia Lake and Porterfield Creek. Due to the recreational use of Virginia Lake and the Virginia Lake cabin, future timber harvest in this area would require significant mitigation to preserve scenic qualities as viewed from the lake and cabin.

In the future, road access through the Virginia Lake OGR may be necessary to reach Scenic Viewshed and Modified Landscape timber areas in the upper Porterfield drainage. Any road going through the proposed small reserve would pass through the relatively high-use recreation area of Virginia Lake. Such a road would likely need at least two major stream crossing, both requiring substantial bridges.

Madan Old Growth Reserve

Existing Madan OGR

The Madan OGR is in VCU 504, which is approximately 16,782 acres. Of this acreage, 11,017 acres are in POG. The existing Madan OGR is approximately 1,791 acres of which approximately 1,454 acres is POG (Table 3-20, Figure 3-15). No other old growth protection LUDs occur in this VCU. Although the existing small reserve meets the criteria for acres of POG it does not meet the overall total size requirement. In order to meet the size requirement (16 percent of total VCU area), 894 acres would need to be added.

Table 3-20.
Total Size, Area of Productive Old Growth (POG), and Suitable Lands for the Existing and Proposed Madan Old Growth Reserve

Madan OGR	Size (2,685 Acres Required)	POG (1,343 Acres Required)	Suitable
TLMP OGR	1,791	1,454	818
Proposed OGR	2,685	2,118	1,171

In the existing small reserve, the elevation ranges from sea level to approximately 2,000 feet. It consists of steep terrain including many cliff areas, but also contains areas with gentler slopes, especially along the beach fringe. Forest habitat is mostly low-medium volume, with a small patch of high volume on the eastern boundary along a cliff ridge. Much of the lower elevation band along the coast has high probability for goshawk nesting habitat. The deer winter habitat model shows small patches of high (0.8) HSI value habitat mostly along the saltwater in the beach fringe. Medium-high HSI values (0.5 - 0.7) habitat occur at lower elevations running north-south near the western boundary.

Proposed Madan OGR

The Madan project proposes, under all action alternatives, to change the boundaries of the existing Madan OGR in order to meet the size requirement and enhance the utility of this small reserve. The proposed Madan OGR eliminates the eastern part of the existing small reserve and adds the area along the east shore of Madan Bay (Figure 3-15). This area includes south and west-facing slopes and the largest portion of the highest (0.6 - 0.8) deer winter habitat HSI values in the Project Area. Almost all the lower elevations of this small reserve are considered high probability goshawk nesting habitat. In 1999, an active goshawk nest was located in the proposed small reserve area by Forest Service biologists. (See the Wildlife Resource Report: Griffin, 1999.) This proposed small reserve also maintains significant wildlife habitat on the mainland side of The Narrows to provide a possible dispersal/movement corridor between the mainland and Wrangell Island.

The proposed Madan OGR would be approximately 2,685 acres of which 2,118 acres are POG, which meets both the TLMP recommendations for size and acres of POG. Based on GIS analysis, 947 acres of the 2,118 acres of POG are not suitable for timber production mostly due to beach fringe, unstable soils, and stream buffer requirements. Therefore, the remaining 1,171 acres of suitable timber would be removed from timber production.

Management Indicator Species

Management Indicator Species (MIS) are species whose response to land management activities can be used to predict the likely response of other species with similar habitat requirements. All 13 of the MIS identified in the Forest Plan occur within the Project Area and have been discussed in the Wildlife Resource Report (Griffin, 1999). The hairy woodpecker (*Picoides villosus*), red-breasted sapsucker (*Sphyrapicus ruber*), brown creeper (*Certhia americana*), Vancouver Canada goose (*Branta canadensis fulva*), river otter (*Lutra canadensis*), and red squirrel (*Tamiasciurus hudsonicus*) are not discussed in detail in this document. Although the project is likely to affect some habitat of these species, the proposed OGRs, the proposed alternatives to clearcutting, and the Forest Service standards and guidelines are expected to provide significant old-growth habitat for these species. These species are discussed in detail in the Wildlife Resource Report (Griffin, 1999).

The following seven MIS species are discussed below: bald eagle, black bear, brown bear, marten, Sitka black-tailed deer, mountain goat, and Alexander Archipelago wolf.

Bald Eagle (Haliaeetus leucocephalus)

Affected Environment

The USFWS and Forest Service maintain an interagency agreement for bald eagle habitat management in the Alaska Region. A 330-foot radius protective management zone surrounds all identified nest trees. According to USFWS surveys, 19 bald eagle nest sites have been documented along the shoreline of the Project Area. Five of these nests were not found by USFWS biologists during the 1998 survey or during our surveys in 1997 and 1998. Two new active nests were discovered during our 1998 field surveys. One nest is located at the tip of the Madan OGR along The Narrows. One other nest located at the north end of Madan Bay. This nest could potentially be near the helicopter flight path in some alternatives. A nest located on the south side of Jenkins Cove may also be within helicopter flight paths in some alternatives. The nests thought to exist in the Moose Creek area either no longer exist or have not been active for the last two years according to field surveys in 1997 and 1998. Eagle nest locations and associated ¼ mile timing buffers are displayed on the unit maps in Appendix B.

Environmental Effects

The Forest Plan standards and guidelines maintain buffers along shorelines, estuaries, and around all Class I and II streams. Also, the standards and guidelines maintain buffers around all known nest sites so if nests are located during project implementation these sites would be protected. All nests identified in the project area are within the no-harvest beach fringe. Therefore, effects on the habitat of bald eagles would be minimized under all alternatives.

Disturbance to nesting bald eagles could occur from helicopter logging or transportation of crews and equipment by helicopter to various areas. If nests are found to be active, timing restrictions on flight paths may be necessary, especially in the Moose Creek, Jenkins Cove, and Madan Bay areas. Alternative 4, which includes all helicopter harvesting in the Jenkins Cove Block and has a barge drop in Madan Bay could potentially disturb nesting eagles in the area. Also, any transportation of equipment or

crews to the mouth of Moose Creek and Jenkins Cove could potentially disturb nesting eagles in the area. Helicopter activities for this timber sale would be restricted within ¼ mile of active eagle nests (USDA Forest Service, 1997a). All Forest Plan Standards and Guidelines would be implemented to mitigate potential effects to bald eagles.

Black Bear (Ursus americanus)

Affected Environment

Black bears are present throughout the mainland and on the islands south of Frederick Sound (USDA Forest Service, 1997a). They use habitats from sea level to alpine. Estuarine, riparian, and forested coastal habitats receive the highest use by black bears and appear to have the highest habitat values (USDA Forest Service, 1997a). Within forested areas, both early and late (old-growth) successional stages provide good forage and/or cover for black bears. Black bears prefer anadromous fish streams to resident fish streams (USDA Forest Service, 1997a). They are very mobile on land, and are not known to have specific vegetation corridor requirements (USDA Forest Service, 1997a).

Visual observations of black bear and their signs (tracks) were made throughout the Project Area in 1997 and 1998.

Environmental Effects

Preferred habitat for black bear include coastal, estuarine, and riparian areas. The Forest Plan standards and guidelines maintain buffers with no programmed timber harvest along all of these areas.

Road densities within the Project Area would increase from 0 to between 0.2 and 0.6 mile per square mile (Table 3-21). Alternative 4 would have the least miles (6.7 miles) of road because no roads would be built in the Jenkins Cove area; this area would be logged by helicopter. Alternatives 2, 3, and 5 would all affect the Jenkins Cove area the most, both in miles of road and road density (Table 3-19). Under Alternative 4, the Moose Creek area would be affected the most. The Virginia Lake area would not be affected under Alternatives 3 and 4 and the Moose Creek area would not be affected under Alternative 5. Under Road Management Option A most roads would remain open after timber harvest and would allow limited use by high-clearance highway vehicles and full use by non-highway vehicles, mountain bikes, and hikers. This new road access into the area could affect black bear populations by increasing hunter success. Under road management Option B, roads would be closed after timber harvest and would not allow use by motorized vehicles but would allow full use by mountain bikers and hikers. Although vehicle traffic would essentially be non-existent there could still be an increase in hunter success due to increased accessibility for walk-in hunters although any potential affect would be less than under Option A.

Based on habitat protection in OGRs and Forest Plan standards and guidelines buffers on beach fringe and streams, as well as alternatives to clearcutting, and the implementation of the road access management strategy, the project is not expected to have significant effects on the black bear.

Table 3-21.
Road Miles and Density for Groups of Watersheds that are Affected by Either Roads or Harvest by Alternative[1,2/]

Watershed Groups[3/]	Alt. 1		Alt. 2		Alt. 3		Alt. 4		Alt. 5	
	Miles	Density	Miles	Density	Miles	Density	Miles	Density	Miles	Density
Jenkins Cove	0	0.0	8.3	1.3	5.8	0.9	0.2	<0.1	8.3	1.3
Virginia Lake	0	0.0	6.4	0.3	0.5	<0.1	0	0	6.4	0.3
Moose Creek	0	0.0	6.5	0.6	2.6	0.3	6.5	0.6	0	0
Total	0	0.0	21.4	0.6	9.0	0.2	6.7	0.2	14.7	0.4

[1/] This table only represents those watersheds in the project area that actually have roads or harvest activities within them.

[2/] Under Road Management Option A roads would remain open and allow limited use by high-clearance vehicles. Road Management Option B would close roads to motorized vehicles, therefore, the open road density would drop to zero.

[3/] The watersheds that make up each Watershed Group are fully described in the Wildlife Resource Report (Griffin 1999).

Brown Bear (Ursus arctos)

Affected Environment

Records indicate that the current and historical distributions of brown bear in Southeast Alaska are the same; some of the highest brown bear population densities in the world are found in the Tongass National Forest. Brown bear use sea level to alpine habitats and require large expanses of habitat and protection from human disturbances. The late summer season has been identified as the most critical or limiting period for brown bear (Schoen et al., 1989). During this season, bears concentrate along low-elevation valley bottoms and coastal salmon streams. These are the same areas of highest human use and most resource development activities. Although brown bear are known to occur in the Project Area (sightings and tracks observed during fieldwork in 1997 and 1998) the extent of use of the area is not known.

Current standards and guidelines for brown bear include the provision to evaluate the need for additional protection of brown bear habitat by potentially establishing additional forest buffers on important foraging areas (i.e., certain Class I anadromous fish streams) where a large amount of feeding on salmon occurs. There are three creeks in the Project Area that may fall into this category, Porterfield Creek, Glacier Creek, and Moose Creek. Both Porterfield Creek and the lower portion (i.e., 1/4 mile from Virginia Lake) of Glacier Creek are within the Recreation River LUD and both are within the proposed Virginia Lake OGR.

Porterfield and Glacier Creeks are known to have coho, sockeye, and pink salmon, cutthroat trout, and Dolly Varden char. Fish-bearing waters in Porterfield Creek begin at the mouth of the creek at Virginia Lake and continue upstream approximately 11.5 miles. Anadromous species are blocked at approximately River Mile 3.3. This portion is a low gradient alluvial channel with the potential for heavy brown bear use. Glacier Creek has approximately 10.5 miles of fish-bearing waters; approximately 3.3 of these miles are anadromous waters. Also, approximately 2 miles upstream the stream changes from a high gradient narrow channel to a low gradient meandering channel that flows through a well-developed floodplain. This wide valley and floodplain area has the potential for good spawning habitat and thus, bear foraging activity. The brown bear population in

ADF&G Game Management Unit 1B appears to be increasing; however, level of use of the Porterfield and Glacier Creeks area is unknown (personal communication, E. Crane, Area Wildlife Biologist, ADF&G, November 13, 1997).

Moose Creek is known to have coho, pink, and chum salmon, as well as trout species. There is a fish barrier approximately 0.8-mile upstream which limits all anadromous species (ADF&G, 1978), but the creek has approximately 3.3 miles of fish-bearing waters. Moose Creek has limited instream shelter and spawning habitat in the lower reaches and consists of a mostly moderate gradient narrow channel in the upper segments. The overall assessment of fish habitat value in the upper reaches (segments 2-4 miles) of Moose Creek is fair/poor (see the Fisheries and Watershed Resource Report). No fish were observed during field surveys. The lower 1,000 feet or more of Moose Creek is protected by the 1,000-foot beach fringe buffer. It appears that the stream above this lower 1,000-foot segment is not used by substantial numbers of anadromous fish and, therefore, does not have potential for important bear foraging activity.

Environmental Effects

The proposed Madan project is expected to have minor, if any, effects on brown bear habitat because this species uses a wide variety of habitats including clearcuts.

Potentially important brown bear foraging streams, Glacier and Porterfield Creeks, are within the proposed Virginia Lake OGR and would be fully protected. The most important reaches for anadromous fish in Moose Creek would be maintained within the 1,000-foot beach and estuary buffer. No additional buffers would be needed to maintain brown bear foraging areas.

Roads and other human disturbances (i.e., facilities) may lead to an increase in bear-human encounters, which in turn may lead to bear population declines and reduced bear densities. See Black Bear Environmental Effects section. Miles of road would vary from 6.7 miles in Alternative 4 to 21.3 miles in Alternative 2 (Table 3-21). Roads may remain open under Road Management Option A, or closed under Option B (see Black Bear Environmental Effects section). Gated roads are less detrimental to bears than are roads open to vehicles, but still result in lower habitat quality due to the potential for increased bear-human interactions.

Based on habitat protection in OGRs and Forest Plan standards and guidelines buffers on beach fringe and streams, as well as alternatives to clearcutting, and the implementation of the road access management strategy, the project is not expected to have significant effects on the brown bear.

Marten (Martes americana)

Affected Environment

Marten habitat use in western coniferous forests is related to canopy cover, availability of suitable resting and denning sites, and prey abundance (Buskirk at al., 1989). Optimal forest cover for marten in Southeast Alaska is generally considered to occur in older forests. This species is considered an indicator of low-elevation, old-growth forests (USDA Forest Service, 1997a). The quantity and quality of winter habitat is the most limiting factor for marten in Southeast Alaska. Open roads through marten habitat

increase opportunities for trappers to harvest this species. High marten populations are usually associated with areas having restricted human access, such as roadless areas, or where trapping pressure is strictly regulated. Martens are easily trapped, thus, their populations decline more drastically when road densities approach 0.6 mile per square mile (Suring et al., 1992b). Although currently there are no roads in the project area, trapping does occur, mostly along the shoreline. Trapping pressure is considered to be low (see Subsistence Resource Report).

Marten habitat is considered to be high volume forest below 1,500 feet in elevation. Currently, in the Project Area there are approximately 7,509 acres of high probability marten habitat.

Marten are expected to occur throughout the lower elevations of the Project Area. A den was found during field surveys in 1998 in the Virginia Lake area.

Environmental Effects

The Forest Plan has specific protective standards and guidelines for marten habitat in high-risk biogeographic provinces. The Madan project does not fall into one of these provinces and does not have significant past harvest; therefore, the Project Area does not have specific Standards and Guidelines for maintaining marten habitat. Table 3-19 shows the acreage of high volume forest below 1,500 feet in elevation in the Project Area and the amount removed by harvest under each alternative. The values for each alternative reflect the retention left within harvest units by determining the post-harvest volume within each unit based on the prescription. For example, a unit with high volume forest with a prescription that has 70 percent retention is reduced to a medium volume stand after harvest. Therefore, any harvesting in high volume strata stands reduces the habitat value below the threshold of what is considered marten habitat. In general, under all selection harvest prescriptions, medium volume strata stands were reduced to low volume and low volume strata stands remained in the low category. The greatest decrease would be under Alternative 2, which would have approximately a 13 percent decrease (980 acres). The smallest decrease would be under Alternative 5, which would have a 9 percent decrease (662 acres) (Table 3-22).

Marten are easily trapped and are prone to overharvest, especially when trapping pressure is high. An increase in road density, particularly when located through marten travel corridors and foraging areas, would increase human access and the risk of trapping mortality. The access management plan is designed to reduce exposure of wildlife populations to increased hunting and trapping resulting from increased road densities. Table 3-21 shows future road miles and densities, however, road densities would drop to zero under the Road Management Plan Option B where roads are closed. Although closed roads are less detrimental to wildlife there would still be increased access to walk-in hunters and trappers.

Table 3-22.
Total Acres in the Project Area and Acres Harvested of High Probability Habitat for Species of Concern by Alternative

Species (High Probability Habitat)	Alternative 1 Acres	1 % Change	2 Acres	2 % Change	3 Acres	3 % Change	4 Acres	4 % Change	5 Acres	5 % Change
Marten (High volume and <1,500 ft elevation)	7,509	0	980	-13	735	-10	718	-10	662	-9
Goshawk (High volume and <1,000 ft elevation and slopes <60%)	5,402	0	277	-5	282	-5	323	-6	245	-5
Marbled Murrelet (Medium and high volume forest)	15,992	0	1,118	-7	779	-5	784	-5	673	-4

[1/] The values for acres of habitat removed under each alternative reflect the retention left within harvest units by determining post-harvest volume within each unit based on the prescription.

*Sitka Black-tailed Deer (*Odocoileus hemionus stikensis*)*

Affected Environment

Sitka black-tailed deer are indigenous to coastal regions of Southeast Alaska and British Columbia and are a major recreation and subsistence species in these areas.

Sitka black-tailed deer use all habitat types within the Project Area; signs of deer activity (i.e., pellets, browse, and tracks) were observed in almost all of the units visited in 1997 and 1998. However, during the winter this species uses lower elevation old-growth forests almost exclusively, especially when snowfall accumulations are high (Suring et al., 1992c).

Winter is the most limiting season for Sitka black-tailed deer (Hanley and McKendrick, 1985, cited in Suring et al., 1992c). The capability of winter habitat to support Sitka black-tailed deer is a function of forage abundance and quality (Hanley et al., 1989), snow interception qualities of the overstory (Hanley and Rose, 1987; Kirchhoff and Schoen, 1987), and climate as influenced by aspect, elevation, and maritime conditions (Hanley and Rose, 1987). Deer populations also respond to predation pressure and hunting mortality. Predation by gray wolves in particular is thought to significantly retard the recovery of the deer herd from mortality resulting from deep-snow winters (Smith et al., 1986).

Severity of the winter is a key factor in determining the capability of the land to support deer populations. The combination of deep-snow winters and large amounts of cleared winter range adversely affects deer populations. Even in unlogged conditions, a deep-snow winter can result in relatively high deer mortality. Cleared areas and second growth greatly exacerbate the impacts of deep-snow winters by providing little snow interception, thus burying the understory forage.

Optimum winter deer habitat during deep-snow conditions includes low-elevation, high-volume old growth situated on well-drained sites that are characterized by large, irregularly spaced trees and an understory of abundant bunchberry (*Cornus canadensis*), five-leaf bramble (*Rubus pedatus*), and *Vaccinium* species. (Kessler, 1982; Hanley et al., 1989). Although deer in Southeast Alaska are generally considered an old-growth dependent species (Suring et al., 1992c; Kessler, 1982), this species forages extensively in young growth, particularly during mild winters (DellaSala et al., 1993), spring, and summer (Kessler, 1982). During the first 10 years after clearing, second-growth forests show a dramatic increase in the production of plants that are the primary food of deer in the winter (Suring et al. 1992c). After approximately 25 years, created openings begin forming a dense, closed-canopy young forest resulting in a rapid reduction of nutritious understory forage for deer, thus, habitat quality declines. An understory begins to develop again as stands reach 120 to 160 years of age (Suring et al., 1991a). The value of these areas as deer habitat continues to increase as the forest matures into old-growth forest.

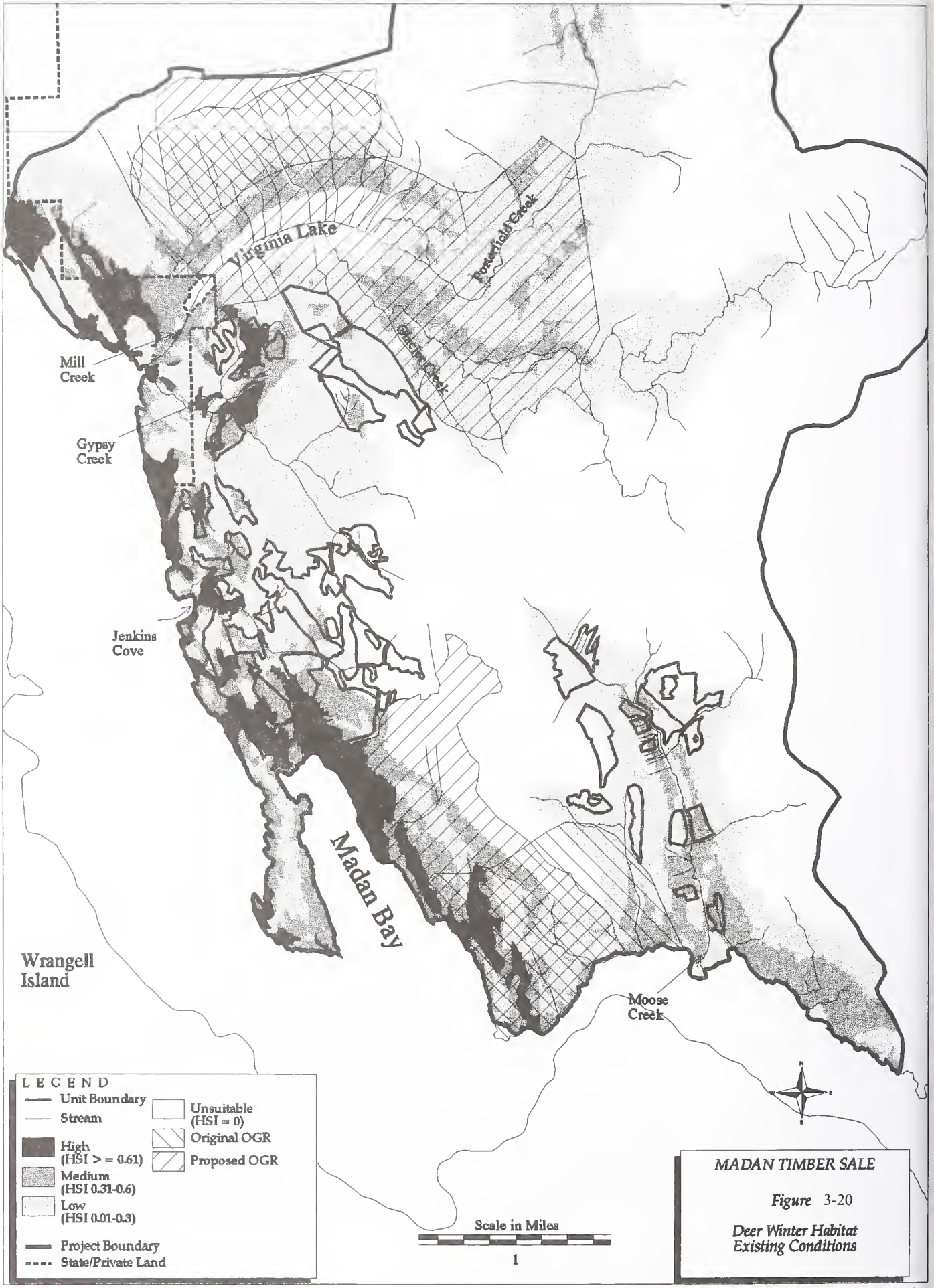
Habitat Capability

The revised deer Habitat Capability model (1997) was used to evaluate the potential quality of winter habitat for Sitka black-tailed deer. The model incorporated the following factors in the analysis: (1) snow conditions, (2) presence of predators, (3) physiographic features including aspect and elevation, and (4) vegetation characteristics including: volume strata of old growth, second growth (25 to 150 years), and clearcut (0 to 25 years). Clearcuts receive low scores in high snow areas such as the mainland but group selection and individual tree selection units provide moderate habitat conditions for deer.

An analysis of deer winter range resulted in Habitat Suitability Index (HSI) values from 0 to 0.80. HSI values were limited to this range because of the interaction of predation and winter severity as determined by the habitat capability model. HSI scores were then grouped into four categories of winter range quality: high (HSI more than 0.6), medium (HSI between 0.3 to 0.6), low (HSI between 0 and 0.3), and unsuitable (HSI = 0). These winter range quality categories, which are based on area-specific model results, are a way to rank habitat quality in a relative sense and were defined for this Project Area only. Based on this ranking system, the project area was evaluated for deer winter range quality. Under existing conditions, approximately 1,395 acres (3.3 percent) of high-quality and 4,381 acres (10.2 percent) of mid-quality winter range exist in the project area. In contrast, there are approximately 14,041 acres (32.8 percent) of low-quality winter range and 22,986 acres (53.7 percent) of unsuitable habitat in the Project Area (Figure 3-20).

A weighted average HSI was determined for each unit before harvest. Post-harvest HSI values were modeled using the volume strata of retention left in each unit based on the silvicultural prescription. Clearcuts were assumed to remove all forest. Under group selection, and individual tree/group selection prescriptions, high volume strata was reduced to medium, medium volume strata was reduced to low, and low retained the low volume category. This is based on expected volumes in each unit post-harvest. Patch cuts HSI scores were modeled to reflect clearcut values in 40 percent of the unit and the original HSI value in the remaining 60 percent of the unit.

The Habitat Capability model was field verified using the Quick-Cruise Method for Assessing Deer Winter Range in Southeast Alaska (Kirchhoff and Hanley, 1992). The



MADAN TIMBER SALE

Figure 3-20

Deer Winter Habitat Existing Conditions

/adams1/madan/amls/pe-8x11.aml - March 29, 2000 - deer.hpg

Wildlife Resource Report provides details of the methods and the results (Griffin, 1999). A linear regression statistical model suggests there is a significant relationship between the model values and the field data, although the relationship is very weak ($P< 0.05$, $r^2 = 0.03$). All completed data forms are located in the project files.

Based on the model and field observations, the largest block of high quality deer winter habitat occurs along the eastern side of Madan Bay (in the proposed Madan OGR) and northward to the head of the bay (Figure 3-20). Scattered small, high quality, patches occur in the lower elevations from Madan Bay north to Virginia Lake. The Moose Creek corridor has medium quality habitat. The north, east, and southeast sides of Virginia Lake also have blocks of medium quality winter habitat. Most of these blocks occur within the proposed Virginia Lake OGR.

Current deer habitat capability for the Project Area was calculated by multiplying the acreage of low-, medium-, and high-value deer winter by a maximum long-term carrying capacity of 125 deer per square mile. The result is not an actual population number but a theoretical long-term carrying capacity for the habitat in the area given normal winter conditions. The number is useful for purposes of comparison. The current estimated deer habitat capability for the project area is 900 deer or 13.5 deer per square mile.

Sitka black-tailed deer is by far the most important, and most "harvested" terrestrial wildlife species for subsistence purposes, and for sport hunting (USDA Forest Service, 1997b). Biologists estimate that 10 percent of a population can be harvested at carrying capacity with the population remaining stable and hunter satisfaction remaining high (Suring et al., 1992c). Harvest data are collected by the ADF&G and are summarized by Wildlife Analysis Area (WAA). The Project Area falls into parts of WAA 1810 and 1811. There currently is no ADF&G documented deer harvest from the Project Area, although a low level of subsistence hunting does occur (see the *Subsistence Resource Report*). Therefore, in terms of ADF&G documented harvest and interview information, the Project Area is considered a low use area for subsistence hunting (Galginaitis and Downs, 1999).

Environmental Effects

Under all action alternatives most of the highest value deer winter habitat would be protected within the proposed Madan and beach fringe. The primary effect on deer under each of the action alternatives would be a reduction in the quality of deer winter range within the project area. Table 3-23 shows the acres of high value deer winter range (HSI values greater than 0.61) remaining post-harvest. Alternatives 2 and 5 remove the least amount (132 acres) of high value deer winter habitat. This is a reduction of 9.5 percent. Alternatives 3 and 4 reduce the amount of high value habitat by 251 acres (18 percent) and 231 acres (17 percent), respectively. These values reflect the fact that, outside of the proposed OGRs, the best high value winter habitat occurs at low elevations mostly in the Jenkins Cove area. Although Alternatives 3 and 4 both use prescriptions with high retention post harvest (e.g. 70 percent), the units are located in some of the highest value habitat. After 25 years, there is a further slight decrease in deer winter habitat under Alternatives 2 and 5 (less than 1 percent). This further slight reduction is due to the clearcut areas growing into the stem exclusion stage, which does not provide good deer habitat. Under Alternatives 3 and 4, there is essentially no change in the deer habitat.

Table 3-23.
Acres of High Value Deer Winter Range (HSI > 0.61) Currently in the Project Area and Post-harvest by Alternative

	Alternatives				
	1	2	3	4	5
Acres remaining post harvest[1/]	1395	1263	1143	1163	1263
Percent decrease	0%	10%	18%	17%	10%
Acres remaining 25 years post harvest[1/]	1395	1263	1143	1163	1263
Percent decrease	0%	9%	18%	17%	9%

1/ Results for alternatives reflect the retention left within harvest units by determining post-harvest volume within each unit based on the prescription.

Declines in deer habitat capability as a result of the proposed project would reduce deer habitat capability between 3.7 percent (Alternatives 4 and 5) and 4.9 percent (Alternative 2) compared to existing conditions (Table 3-24). After approximately 25 years, created openings begin forming a dense, closed-canopy young forest with limited forage for deer. Therefore, deer habitat capability would show a further slight decline between 1 and 2 percent compared to values immediately post-project (Table 3-24).

Table 3-24.
Habitat Capability for Sitka Black Tailed Deer Immediately After and 25 Years After the Project

	25 Years After Project Alternative				
	1	2	3	4	5
Number of Deer	900	856	861	867	867
Percent Decrease	0.0	4.9	4.4	3.7	3.7
Deer per square mile	13.5	12.8	12.9	13.0	13.0

	25 Years After Project Alternative				
	1	2	3	4	5
Number of Deer	900	843	853	867	853
Percent Decrease	0.0	6.3	5.2	3.7	5.2
Deer per square mile	13.5	12.6	12.8	13.0	12.8

Some increased deer harvest would occur from increased hunter access to high elevation habitats via the roads that would be constructed (see Subsistence section). Although no specific recommendations exist for Southeast Alaska, black-tailed deer models developed in Washington indicate that road densities should be maintained below 2.5 miles per square mile to maintain habitat capability (Washington Department of Wildlife, 1987).

Road densities under all alternatives would be less than 0.1mile per square mile for any VCU (Table 3-21). Under Road Management Option A the roads would be open which may increase hunter success due to accessibility. Road Management Option B would close the road to motorized traffic.

Mountain Goat (Oreamnos americanus)

Affected Environment

Mountain goats represent species that use cliffs, alpine and subalpine, and old-growth forest habitats. The quantity and quality of winter habitat is the most limiting factor for mountain goats in Southeast Alaska (USDA Forest Service, 1997a). Old-growth trees have the highest value because they intercept snow and provide understory forage plants. Behavioral strategies of mountain goats to avoid predators, particularly wolves, also affect habitat use by mountain goats. The need for escape terrain in close proximity is a critical factor in describing habitat for mountain goats. Mountain goats move into steep and broken terrain when approached by wolves. Mountain goats are known to occur on Berg Mountain and associated ridges, east of the project area, and at the head of Porterfield and Glacier creeks. No known kidding areas occur within the Project Area.

Populations of mountain goats are very sensitive to human disturbance, especially those populations that are hunted. As human access increases into suitable mountain goat habitat, goats are less likely to use the habitat (Chadwhich, 1973; McFetridge, 1977; as cited in Suring et al., 1988).

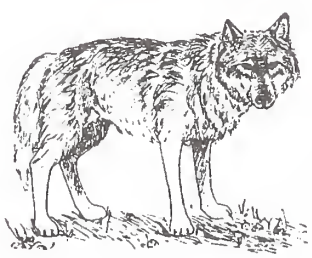
Environmental Effects

The project is not expected to have significant effects on mountain goat winter habitat. The areas with the greatest potential for winter habitat, the forested ridges along the upper reaches of Glacier and Porterfield creeks, are within the proposed Virginia Lake OGR. No proposed timber harvest occurs near these areas. Timber harvest in the area east of the upper reaches of Moose Creek could potentially have a minor effect on goat winter habitat. However, the units in this area (M-127 and M-128) both have silvicultural prescriptions (patch cuts by helicopter) that would minimize potential effects on goat habitat.

The greatest potential impact to mountain goats is from increased access to hunters. Alternatives 2, 3, and 4 could theoretically increase accessibility to Berg Mountain. However, the likelihood that the roads, whether open or closed, would significantly increase access to mountain goats is extremely small. This is because the area between the proposed roads and Berg Mountain is extremely rough with slopes over 100 percent and with many cliffs. The easier access route from Berg Bay up a gentler ridge would likely remain the most commonly used route regardless of whether roads are built in Moose Creek and regardless of how the roads are managed. Effects on mountain goats under all alternatives are expected to be negligible.

Alexander Archipelago Wolf (Canis lupus ligoni)

Affected Environment



Two Alaskan subspecies of the gray wolf are currently recognized. The wolf found in Southeast Alaska is known as the Alexander Archipelago wolf. It inhabits the mainland and the islands south of Frederick Sound. The total population is estimated at fewer than one thousand individuals in all of Southeast Alaska with approximately 200 being harvested annually (Kirchhoff, 1991). Although wolves are listed as threatened in the contiguous 48 states, they are not listed in Alaska. They are a Species of Concern and a MIS on the Tongass National Forest. The commitment of the Forest Service to revise its Tongass Land Management Plan to adequately protect habitat for the Queen Charlotte goshawk and other species associated with old-growth forest was an important element in the USFWS decision not to list the wolf in Alaska.

Two viability concerns for the wolf were addressed in the Forest Plan in Tongass National Forest: (1) short-term increases in harvest; and (2) long-term, large reductions in deer habitat capability (USDA Forest Service, 1997b). Roads increase the risk to wolf population viability due to the high level of hunting, trapping, and poaching that can occur along roads. Pletscher (1994) recommends a road density threshold for wolves, of no more than 1 mile of open road per square mile. According to the Forest Plan, open road densities of 0.7 mile per square mile or less are to be maintained. Currently, there are no roads in the Project Area.

Wolves in Southeast Alaska prey on Sitka black-tailed deer, moose, mountain goat, beaver, black bear, spawning salmon, and geese. Deer habitat capability is believed to be a significant factor affecting the viability of wolf populations. Current deer habitat capability in the Project Area is estimated to be approximately 13.5 deer per square mile (see discussion of Sitka black-tailed deer).

According to the Wolf Standards and Guidelines Implementation Policy Clarification (USDA, Forest Service, 1998a) to meet both sustainable wolf populations and human deer harvest demands, a habitat capability of 17 deer per square mile is recommended. Note that these values should be used to make relative comparisons between alternatives not as actual population estimations. The current habitat capability is 13.5 deer per square mile within the Project Area. Although this is less than the recommended level to sustain a viable population of wolves it is the natural habitat capability of the area. The 17 deer per square mile recommendation was derived for island populations; deer densities on the mainland are considered to be much lower due to winter conditions. Also, on the mainland, the wolf prey base is augmented by the presence of other ungulates, such as mountain goats and moose, as well as beaver and salmon (personal communication G. DeGayner, USDA Forest Service, Wildlife biologist, Petersburg, AK, March 23, 1998). Therefore, the deer habitat capability needed to sustain viable wolf populations on the mainland is expected to be lower than the recommended 17 deer per square mile.

Wolf sign (scat and tracks) was found during wildlife surveys in 1997 and 1998 in the Virginia Lake OGR near Glacier Creek and along Moose Creek.

Environmental Effects

The effect of the Madan project on the wolf population is displayed by analyzing the impact on the deer population and the level of roading by alternative. Deer habitat capability values would range from a low of 12.9 deer per square mile under Alternative 2 to a high of 13.1 under Alternatives 4 and 5 (see discussion of Sitka black-tailed deer). Currently hunting access is mostly restricted to the shoreline. Hunting of wolves is expected to increase with the increase in accessibility. Road closures under Road Management Option B would reduce the potential wolf harvest; however, even closed roads provide walking corridors that would be used by hunters. Alternative 2 would have more miles (21.3 miles) of road and the highest road density (0.6 mile per square mile) than other alternatives (Table 3-21). Although the project is not expected to have significant effects on prey species, in particular Sitka black-tailed deer, wolves may be affected by the increase in access for hunters. Based on potential impacts on deer populations and the levels of roading, Alternative 2 would have the greatest effect on wolves, followed by Alternatives 5, 3, and 4, in that order.

Forest Service Sensitive Species

Forest Service Region 10 Sensitive Species are those species that are identified by the Regional Forester for which population viability is a concern on National Forest System lands within a region. A viability concern is evidenced by either a significant current or predicted downward trend in the population or in habitat capability that would reduce a species' existing distribution. It is Forest Service policy to identify and manage Sensitive species and their habitats to prevent the species from becoming listed as threatened or endangered (USDA Forest Service 1997b).

Wildlife

Four Sensitive wildlife species are suspected or known to occur within the Project Area. Two of these species, the trumpeter swan (*Cygnus buccinator*) and the osprey (*Pandion haliaetus*) have standards and guidelines in the Forest Plan that provide protection of nest sites and significant wetland habitats, if found; therefore, these species will not be addressed in this document. More detailed discussion can be found in the Wildlife Resource Report (Griffin, 1999).

One species, the Peale's peregrine falcon (*Falco peregrinus peali*) is extremely difficult to distinguish from the American peregrine falcon (*F. p. anatum*) which was recently delisted from an endangered or threatened species (50 CFR Part 17, August 25, 1999). Because of the similarity of appearance both species are discussed here. Peregrine falcon nest sites are closely associated with large seabird colonies on high cliffs. The American peregrine falcon potentially passes through the region on spring and fall migration flights; however, neither species is known to nest or forage in the Project Area. Peregrine falcons are not expected to be affected by the project.

The Queen Charlotte goshawk is discussed below because this species is known to nest within the Project Area.

Queen Charlotte (Northern) Goshawk (Accipiter gentilis)

Affected Environment

The northern goshawk inhabits forested lands throughout North America, favoring dense stands of conifer or deciduous old growth for nesting habitat (USDA Forest Service, 1997a). The Queen Charlotte goshawk is recognized as a distinct subspecies found only in the coastal areas of British Columbia and Southeast Alaska. Eighty-one percent of the confirmed and probable nest sites of this subspecies in Southeast Alaska are south of Frederick Sound (Queen Charlotte Goshawk Status Report for R10 Sensitive Species Consideration, USDA Forest Service, 1991). In Southeast Alaska, the goshawk appears to be non-migratory, although it may occupy different, or overlapping, breeding and winter territories (USDA Forest Service, 1997a).

The Queen Charlotte goshawk is both a Forest Service Sensitive species and former candidate species. Concern exists over the viability of goshawk population in Southeast Alaska due to reductions in the amount of this species preferred habitat – mature and old-growth forests – as a result of timber harvesting (USDA Forest Service, 1997a). In 1994, the USFWS received a petition to list the Queen Charlotte goshawk under the ESA. The USFWS decided not to list the goshawk at that time, and again in 1997, largely on the basis of protective measures included in the Forest Plan.

Goshawks make extensive use of productive old-growth forests for foraging and nesting in Southeast Alaska. Landscape factors such as slope and elevation along with beaches, riparian, and estuaries are important to goshawk habitat suitability. Riparian zones ranked as the most important landscape component used by radio-collared goshawks (Iverson et al., 1996). Radio-tracking results also indicate that goshawks make extensive use of areas within 1,000 feet of beaches and estuaries (Titus, ADF&G, unpublished data cited in USDA Forest Service, 1998b). Beach, estuary, and riparian habitats generally support greater prey diversity and net prey productivity, features which are important to goshawk habitat quality (USDA Forest Service, 1997b).

Estimates of goshawk home range size vary considerably. Crocker-Bedford (1990) estimated home range size to range from 6,000 to 8,000 acres. Iverson et al. (1996) reported female and male use areas ranging from 9,469 to 11,425 acres.

Forest Plan standards and guidelines require maintenance of at least 100 acres of productive old-growth generally centered around the nest tree (USDA Forest Service, 1997b). Iverson et al. (1996) evaluated a variety of silvicultural techniques and concluded that goshawk habitat theoretically could be maintained across the landscape under a 300-year rotation. Recommended conservation options for the goshawk, as set forth during the Viability Synthesis Workshop in June 1995, include (1) the maintenance of productive old growth within large watersheds such that at least 33 percent of the watershed has 100-200 year old stands and 33 percent has 200-300 year old stands, and (2) the maintenance of at least 600 acres of nesting habitat in each 10,000-30,000 acre watershed (USDA Forest Service, 1997b).

A "coarse filter" analysis of GIS data layers was conducted to quantify the amount of high probability goshawk nesting habitat, which currently exists in the Project Area. High probability goshawk nesting habitat was defined as: (1) high volume strata forest, (2) less than 1,000 feet elevation, and (3) slopes less than 60 percent. Approximately 5,402 acres of high probability goshawk nesting habitat currently exist in the Project Area (Table 3-

22). Most nesting habitat is located along the shoreline, in the Glacier Creek drainage, Madan Bay, and in the lower Moose Creek drainage.

Surveys were conducted in the Project Area according to the Region 10 protocol in 1997 and 1998. An active nest was located in the Madan OGR (personal communication, P. Robertson, Wildlife biologist, USDA Forest Service, Wrangell R.D., April 22, 1999). See the Wildlife Resource Report (Griffin, 1999) for details. All completed data forms are located in the project files.

Environmental Effects

The Forest Plan has specific protective standard and guidelines to address goshawk habitat in VCUs where more than 33 percent of the productive old-growth forest has been harvested. The Forest Plan also provides for goshawks on a Forest-wide basis, through the old-growth reserve system. This system of large, medium, and small OGRs is intended to broadly provide sufficient habitat for goshawks within the Tongass National Forest. The Madan Project Area does not have significant past harvest, and therefore, does not have specific standards and guidelines for maintaining goshawk habitat. The known nest site within the proposed Madan OGR would be fully protected beyond the Forest Plan standards and guidelines for nest protection because of the added protection of being located within the OGR under all action alternatives. Any newly discovered goshawk nests will be protected by the standards and guidelines for nesting habitat in the Forest Plan. Loss of high probability goshawk nesting habitat associated with the alternatives would range from 345 acres (5 percent) in Alternative 5 to 323 acres (6 percent) in Alternative 4 (Table 3-21). These values for each alternative reflect the retention left within units by determining post-harvest volume within each unit based on the prescription.

Plants

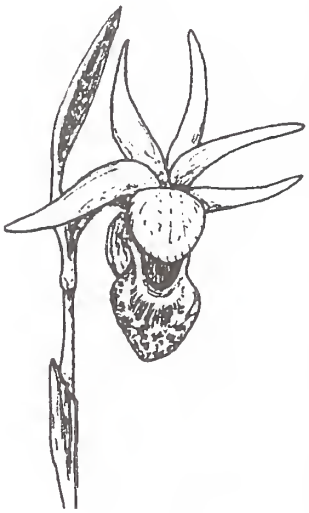
Affected Environment

Eight plant species listed as Sensitive in Region 10 are known or suspected to occur in the Wrangell Ranger District of the Tongass National Forest. These are listed in Table 3-25.

Table 3-25.
Sensitive Plant Species Known or Suspected to Occur in the Wrangell Ranger District

Common Name	Scientific Name	Occurrence[1/]
Goose-grass sedge	*Carex lenticularis* var. *dolia*	S
Edible thistle	*Cirsium edule*	S
Davy mannagrass	*Glyceria leptostachya*	K
Wright Filmy fern	*Hymenophyllum wrightii*	K
Truncate quillwort	*Isoetes truncata*	S
Calder lovage	*Ligusticum calderi*	S
Bog orchid	*Platanthera gracilis*	S
Loose-flowered bluegrass	*Poa laxiflora*	S

[1/] S = Suspected, K = Known



Environmental Effects

Field surveys in 1997 and 1998 located two populations of Choris bog orchid (*Platanthera chorisiana*) (recently removed from the Forest Service Sensitive Species list) and one population of plants tentatively identified as slender bog orchid (*Platanthera gracilis*) within the Project Area. The identification of this specimen was inconclusive.

All known occurrences of Sensitive plant species and the suspected Sensitive plant species occur outside of proposed road corridors, timber harvest units, and log transfer facilities. Consequently, no direct or indirect effects on Sensitive plant species are expected to occur. However, because several of these species are fairly widespread, yet-undiscovered populations may be affected by the project. Impacts to unknown individual plants might occur; however, it is unlikely that any such impacts would lead to the listing of any plant species.

Threatened & Endangered Species

Wildlife

Affected Environment

The humpback whale (*Megaptera novaeangliae*) and the Steller's sea lion (*Eumetopas jubatus*) are the only two federally-listed species that occur within the boundaries of Tongass National Forest in the vicinity of the Project Area.

Humpback whales are found in coastal areas or near oceanic islands and appear to occur primarily in nearshore waters, especially the highly productive fjords of Southeast Alaska and Prince William Sound (Calkins, 1986). Humpbacks remain in the Gulf of Alaska through the summer and fall and begin their migration in November; however, some humpbacks have been reported to winter in Southeast Alaska waters (Calkins, 1986). Critical habitat has not been designated for this species; however, Frederick Sound, located approximately 15 miles north of the project area, is an area heavily used by humpbacks during the summer and fall (USDA Forest Service, 1997a). Humpback whales have been observed in the Eastern Passage/Back Channel, between Wrangell Island and the mainland.

The Steller sea lion is widely distributed over the continental shelf and throughout the coastal waters of the Gulf of Alaska (Calkins, 1986). Steller sea lions are known to use the waters of Clarence Strait on the southwest side of Zarembo Island, which is approximately 10 miles west of the Project Area. Steller sea lions have also been observed in the Eastern Passage, between Wrangell Island and the mainland.

Environmental Effects

No Steller sea lion haul-outs and no concentrations of humpback whales have been documented in the project area. There is a low probability that humpback whales and/or Steller sea lions could be temporarily disturbed by the increased boat and barge activity in the areas of the LTFs during implementation of the project. However, because none of these species are known to breed or have significant foraging activity in the Project Area, no adverse effects would be expected as a result of the Madan project.

Plants

Affected Environment

No Threatened or Endangered plant species are known or suspected in the Project Area. Field surveys conducted in the project area in 1997 and 1998 also did not detect any Threatened or Endangered plant species (Wetlands and TES Plants Resource Report, Kerschke and Arnett, 1999).

Environmental Effects

Because no Threatened or Endangered plant species are known or suspected in the project area, no direct or indirect effects on Threatened or Endangered plant species are expected (Wetlands and TES Plants Resource Report, Kerschke and Arnett, 1999).

Other Wildlife Species

Other wildlife species of interest include former candidate species under the ESA and species valued highly by the public. Five former candidate species are known or suspected to occur within the project area. Four of these species, the spotted frog (*Rana pretiosa*), the Kittlitz's murrelet (*Brachyramphus brevirostris*), the harlequin duck (*Histrionicus histrionicus*), and the olive-sided flycatcher (*Contopus borealis*) are discussed in the Wildlife Resource Report (Griffin, 1999). One species, the marbled murrelet, is discussed below because surveys indicate that nesting could occur in the project area. Other wildlife species of interest are discussed in the Wildlife Resource Report; these species with high public interest include the great blue heron (*Ardea herodias*), waterfowl, neotropical migratory birds, and moose (*Alces alces*).

Marbled Murrelet (Brachyramphus marmoratus)

Affected Environment

The marbled murrelet is a small seabird found throughout the North Pacific. Murrelets feed on small fish and invertebrates in near-shore ocean areas, inland saltwater and occasionally on inland freshwater lakes. During the breeding season murrelets are more dispersed but will still concentrate in feeding areas during the day. Murrelets are highly mobile in their search for foraging areas suggesting a high level of population interaction.

The marbled murrelet is listed as a threatened species in Washington, Oregon and California. Concern for this species in Alaska is increasing. The Forest Plan states "The listing of this species in Washington, Oregon and California and the reductions in habitat from timber harvesting, have raised concerns for the viability of this species in Southeast Alaska" (USDA Forest Service, 1997b). Population trends are considered to be downward for all populations that rely on large, commercially-valuable conifers for nesting. Estimates of murrelet numbers in Southeast Alaska range from 45,000 to 250,000 (DeGange, 1996).

Marbled murrelets generally select old-growth stands and large diameter trees as nest sites (Ralph and Miller, 1995, DeGange, 1996). A small percentage (less than 10 percent) of birds may nest on the ground (DeGange, 1996). Large limbs of old-growth trees are the

preferred area for nest placement. The importance of canopy cover is unclear. High canopy cover within the stand may limit ease of access to the nest. However, high canopy cover at the nest site is believed to contribute to nest success by concealing nests from predators. Therefore, mid-volume stands with large trees may receive a high amount of use. Due to the difficulty in finding nests, marbled murrelet nesting requirements are not well established in Southeast Alaska. Tree diameters for two nests discovered on Prince of Wales Island ranged between 31 inches to 80 inches dbh (DeGange, 1996). In general, the "best or most important habitat is found within large contiguous blocks of high-volume, low-elevation old growth forest" (USDA Forest Service, 1997b).

The importance of beach and riparian areas to marbled murrelets is largely unknown. Some researchers have found a preference for riparian corridors, indicating that birds may be following stream (openings) to the nest. Three nests located on Prince of Wales varied in their distance from saltwater (0.3mile, 3.9 miles, 8.1 miles). One study in Southeast Alaska reported the greatest amount of murrelet activity occurring between 1 and 7 km (0.62 and 4.34 miles, respectively) from the coast (DeGange, 1996). Riparian and beach fringe buffers, due to their linear nature and high amount of edge, may be less suitable for nesting (USDA Forest Service, 1997b).

The Forest Plan Standards and Guidelines require protection of nesting habitat around identified murrelet nests. A 600-foot radius buffer is to be maintained around all known nest sites (USDA Forest Service, 1997b). This may be a relatively ineffective management strategy given the difficulty in finding nests (DeGange, 1996). Roads can enter this buffer if unavoidable, but every effort should be made to protect the nest site. Road building and fragmentation of forested areas is believed to increase predation as a result of increased access to marbled murrelet nesting stands by avian predators, especially jays, crows, and ravens (DeGange, 1996).

A "coarse filter" analysis of GIS data layers was conducted to quantify the amount of suitable marbled murrelet habitat that currently exists in the project area. Suitable marbled murrelet habitat was defined as medium and high volume forest. Approximately 15,992 acres of suitable marbled murrelet habitat currently exist in the Project Area.

Marbled murrelet surveys, which followed the standards in Surveying Marbled Murrelets at Inland forested Sites: A guide (Paton et al., 1990), were conducted in the project area in June 1998. Marbled murrelets were detected at the four survey locations; the mouth of Moose Creek, the head of Madan Bay, Jenkins Cove, and at the mouth of Porterfield Creek. All locations except for at the head of Madan Bay had detections flying inland over forest habitat. See the Wildlife Resource Report for more details (Griffin, 1999). All completed data forms are located in the project files.

Environmental Effects

Based on survey results, the marbled murrelet appears to nest in old-growth stands in the Project Area, although not in extremely high numbers. Therefore, timber harvest would reduce the available nesting habitat. Loss of medium and high volume old-growth associated with the alternatives could range from 673 acres in Alternative 5 to 1,118 acres in Alternative 2 (Table 3-22). These acreage values represent a decrease in habitat between 4 and 7 percent, respectively. The values for each alternative reflect the retention left within units by determining the post-harvest volume within each unit based on the prescription. The proposed OGRs, as well as beach fringe and riparian buffers would also provide habitat for marbled murrelets.

Issue 4: Road Access Management

Public concerns were received which questioned the need for road development, as well as road location, design, and access management. Both the direct effects of road building on soils, water, fish, wildlife, and visual quality, and the indirect effects on wildlife, subsistence, and recreation are included in the issue.

Forest roads are classified as either permanent roads (Forest Development Roads) or temporary roads. Permanent roads are developed and operated for long-term resource management purposes. These roads receive constant or intermittent use depending upon the timing of timber harvest. Permanent roads form the primary transportation network in the Project Area. A temporary road is a short-term road developed and maintained for a limited time period. Current timber sale contracts require closure of temporary roads. This is an erosion control obligation of the timber buyer and cannot be waived. Closure is achieved by blocking access, removing culverts and bridges, restoring the natural surface drainage patterns, and/or putting the roadway back into vegetative production.

Less than 10 percent of the Project Area has a Timber Production LUD under the Forest Plan. Management direction includes planning a transportation system that will eventually access most of the suitable timberlands for standard logging or helicopter systems.

Existing Condition

Currently, there are no existing roads in the Madan Project Area. The Stikine-LeConte Wilderness is located to the northeast and a semi-remote recreation LUD is located to the east of the Project Area. The Project Area is part of a vast mainland area, which has no previous road development. There is concern that developing a road system on the mainland in a previously unroaded area will increase hunting pressure on wildlife, potentially deliver sediment to streams, and affect visual and recreation resources. Based on information gathered during subsistence studies, very little hunting occurs in the Project Area. Most of the hunting occurs along the beach fringe area and near the east end of Virginia Lake (see Subsistence Section). Currently, the only publicly-maintained facilities are the float plane dock and cabin at the east end of Virginia Lake and the Mill Creek Trail between saltwater, at the mouth of Mill Creek, and Virginia Lake.

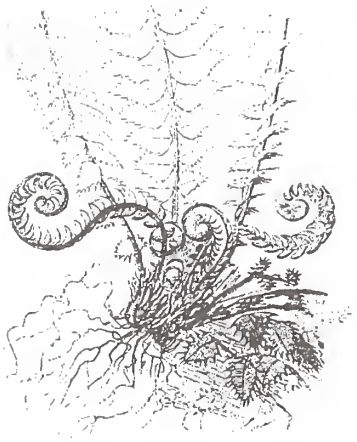
The Madan Roadless Area (Roadless Area 204) contains 69,757 acres. All of the Project Area is contained within this Roadless Area.

The Forest Plan assigned various LUDs to the area that includes the Madan Roadless Area that would allow varying amounts of road development. The LUDs include Old Growth Habitat, Remote Recreation, Semi-Remote Recreation, Wild, Scenic, and Recreation River, Scenic Viewshed, Modified Landscape, and Timber Production.

Road Management

Traffic Management Strategy

The Forest Service generally implements one or more of five traffic management strategies, as appropriate. These strategies are as follows:



1. **Encourage.** The Forest Service would include destination signing at the entrance to the road in conjunction with a route marker. The road would be shown on Forest visitor maps. Roads having this strategy would be maintained at Level 2.

2. **Accept.** The Forest Service would provide only a route marker at the road entrance. If map clarity can be maintained, we would show the route on Forest visitor maps. Roads having this strategy would be maintained at Level 2.

3. **Discourage.** Normally this would be accomplished by warning or information signs. Roads having this strategy would be maintained at Level 2 or Level 1.

4. **Eliminate**. The road would be physically blocked to traffic by culvert removal, gates, or berms. Roads having this strategy would be maintained at Level 1.

5. **Prohibit.** In addition to physically blocking the road to traffic, the closure would be legally enforced. Roads having this strategy would be maintained at Level 1.

Traffic management strategies for individual roads in the Project Area are displayed in Appendix F.

Road Maintenance Strategy

Road maintenance includes the repair or upkeep of a road necessary to retain the road's traffic service level. The amount and level of maintenance is dependent upon traffic management objectives and maintenance criteria.

After construction, roads may be maintained at one level during project implementation and maintained at a different level after the Project. The operational maintenance level is the maintenance level currently assigned to a road considering today's needs, road condition, budget constraints, and environmental concerns; in other words, it defines the level to which roads in the Madan area would be maintained during the timber sale. The objective maintenance level is the maintenance level to be assigned after timber harvest, considering future road management objectives, traffic needs, budget constraints, and environmental concerns.

Maintenance levels that would be assigned to roads in the Project Area include Level 1 and Level 2 (see below).

1. **Level 1.** This level is assigned to roads during the time they are closed to vehicular traffic.

2. **Level 2.** This level is assigned to roads open for use by high clearance vehicles such as pickup trucks and logging traffic. Passenger car traffic is not a consideration. Traffic is usually minor, usually consisting of one or a combination of log haul, administrative, permitted, dispersed recreation, or other specialized uses.

Included in the maintenance strategy are treatments that would be assigned to the roads. One of these treatments is road storage, which is the process of putting a road into a closed condition, which protects resources including soils, water quality, fisheries, and

wildlife. Another treatment is stormproofing, which is a process that leaves drainage structures in place, but provides waterbars, rolling dips, outslopes, and other features to ensure controlled runoff until any needed maintenance can be performed on the primary drainage system.

Road maintenance levels including road storage and stormproofing assigned to individual roads in the Project Area are included in the traffic management strategy displayed in Appendix F.

Effects

All of the alternatives, except Alternative 1, would introduce roads into the Madan Roadless Area and would be consistent with the Forest Plan. Alternative 2 would change the greatest amount of unroaded area and Alternatives 3 and 4 would change the least (see Issue 1: Scenic Quality and Recreation Values).

The proposed road network would be built and maintained for timber management and would not connect to any towns or villages or other road systems. Access to these roads from Wrangell and other outside areas would be by boat or float plane for non-motorized users. Access for highway vehicles would be by tug and barge or landing craft, and access for non-highway vehicles could be provided by boat. New road construction could mean an increase in access to the area for hunters and changes in the patterns of hunting in the Project Area. Hunting and other road-related disturbances could have an adverse impact on species sensitive to human disturbance. Even closed roads would increase walking use of the area, which could increase hunting pressure, disturbance to some species, and increase chances of human/bear interactions (see Issue 3: Wildlife Habitats and Species of Concern).

Alternative 2 would construct the greatest length of road and Alternative 4 would build the least among the action alternatives (Table 3-26). Temporary roads would represent approximately 7 to 13 percent of the road totals.

Table 3-26.
Miles of Proposed Roads by Road Type and Alternative

	Alternative				
Road Type	**1**	**2**	**3**	**4**	**5**
Specified	0.0	18.6	8.4	5.9	12.9
Temporary	0.0	2.7	0.6	0.8	1.8
Total	0.0	21.3	9.0	6.7	14.7

Road Management Options

Two road management options are being considered for each of the permanent roads in the Project Area. These options incorporate applicable road management and road maintenance strategies. One or more of the options may be assigned to each road. The options are described as follows:

1. **Road Management Option A.** Leave most of the road system open, with selective road closure for short segments of the system. Roads left open following the sale would be stormproofed by providing driveable waterbars/rolling dips where necessary. Roads scheduled for closure would be placed in storage with drainage structures removed and natural drainage patterns reestablished. Roads would be routinely inspected and maintenance

would be performed at Maintenance Level 1 or 2 as indicated on the Road Management Objective form.

2. **Road Management Option B.** All system roads would be closed after timber harvest, either by barrier berm or by placing in storage. Roads closed by berms would be stormproofed by providing driveable waterbars/rolling dips where necessary. Roads would be routinely inspected and maintenance would be performed at Maintenance Level 1.

Table 3-27 shows, by alternative, the traffic management strategy measured in miles for each alternative. Option A leaves most roads open for traffic. Option B closes all roads to public traffic after timber harvest.

Operations and Maintenance Costs

The long-term (30 years) operations and maintenance costs for the proposed roads are identified in Table 3-28. In general, costs are proportional to the number of permanent road miles constructed under each alternative; therefore, among the action alternatives, Alternative 2 would be the most expensive and Alternative 4 would be the least expensive. Option A and Option B costs would be similar; Option A would result in higher storage and related costs.

Geographic Summary

The sections below summarize the potential effects of the various geographic portions of the proposed road system: Moose Creek, Jenkins Cove, and Virginia Lake.

The Moose Creek Area

This road system, which includes the Moose Creek Road (Road 20), extends approximately 3 miles from the LTF near the mouth of Moose Creek up the west side of the creek. It parallels the creek at a distance of about ¼ mile. The Mountain View Road (Road 2010) forks off about 1 mile up the road and climbs the ridge to the west to access the higher elevation units on the west side of the drainage. Alternatives 2 and 4 would build the entire 6.5 miles of road in the Moose Creek drainage. Alternative 3 would not build the Mountain View Road segment that extends to the west to access the upper drainage (Road 2010); therefore, only 2.6 miles of road would be built. Alternative 5 would not build any roads in the Moose Creek drainage.

No fish-bearing streams are crossed by these roads. This road system may provide access to hunters into areas that have been difficult to access in the past. This may increase hunting pressure, in particular, on mountain goats on Berg Mountain. However, this effect should be very slight because even using this road system, to actually reach Berg Mountain would require extreme cross-country hiking for several miles. During project implementation there may be a short-term increase in the use of roads by motor vehicles for recreation or hunting by the crews. However, there would not be a workers camp in this area which is likely to limit road use after work hours.

Table 3-27.
Miles of Road Managed According to Each Traffic Management Strategy for Options A and B under Each Alternative

		Encourage (miles)	Accept (miles)	Discourage (miles)	Eliminate (miles)	Prohibit (miles)
Alternative 2						
Mountain Bikes (BB)	Option A	14.98	0	4.32	0	0
	Option B	14.98	0	4.32	0	0
Hikers (H)	Option A	14.98	4.32	0	0	0
	Option B	14.98	4.32	0	0	0
Non-highway vehicles (NHV)	Option A	0	14.98	4.32	0	0
	Option B	0	0	0	19.3	0
High Clearance Highway Vehicles (HCV)	Option A	0	14.98	0	4.32	0
	Option B	0	0	0	19.3	0
Passenger Highway Vehicles (PV)	Option A	0	0	0	19.30	0
	Option B	0	0	0	19.30	0
Alternative 3						
Mountain Bikes (BB)	Option A	7.35	0	1.09	0	0
	Option B	7.35	0	1.09	0	0
Hikers (H)	Option A	7.35	1.09	0	0	0
	Option B	7.35	1.09	7.35	0	0
Non-highway vehicles (NHV)	Option A	0	7.35	1.09	0	0
	Option B	0	0	0	8.44	0
High Clearance Highway Vehicles (HCV)	Option A	0	7.35	0	1.09	0
	Option B	0	0	0	8.44	0
Passenger Highway Vehicles (PV)	Option A	0	0	0	8.44	0
	Option B	0	0	0	8.44	0
Alternative 4						
Mountain Bikes (BB)	Option A	4.64	0	1.52	0	0
	Option B	4.64	0	1.52	0	0
Hikers (H)	Option A	4.64	1.52	0	0	0
	Option B	4.64	1.52	0	0	0
Non-highway vehicles (NHV)	Option A	0	4.64	1.52	0	0
	Option B	0	0	0	6.16	0
High Clearance Highway Vehicles (HCV)	Option A	0	4.64	0	1.52	0
	Option B	0	0	0	6.16	0
Passenger Highway Vehicles (PV)	Option A	0	0	0	6.16	0
	Option B	0	0	0	6.16	0

Table 3-27. (continued)
Miles of Road Managed According to Each Traffic Management Strategy for Options A and B under Each Alternative

		Encourage (miles)	Accept (miles)	Discourage (miles)	Eliminate (miles)	Prohibit (miles)
Alternative 5						
Mountain Bikes (BB)	Option A	10.25	0	2.66	0	0
	Option B	10.25	0	2.66	0	0
Hikers (H)	Option A	10.25	2.66	0	0	0
	Option B	10.25	2.66	0	0	0
Non-highway vehicles (NHV)	Option A	0	10.25	2.66	0	0
	Option B	0	0	0	12.91	0
High Clearance Highway Vehicles (HCV)	Option A	0	10.25	0	2.66	0
	Option B	0	0	0	12.91	0
Passenger Highway Vehicles (PV)	Option A	0	0	0	12.91	0
	Option B	0	0	0	12.91	0

Table 3-28.
Long-term Operation and Maintenance Costs for Proposed Roads

Maintenance Level 1	$211/mile/year	Stormproofing	$5,000/mile
Maintenance Level 2	$353/mile/year	Gate Installation	$3,000/gate
		Road Storage	$15,000/mile
		Reopening of Roads	$30,000/mile
		Reconditioning of Roads	$3,000/mile

Jenkins Cove Area

This road system includes all the roads in the Jenkins Cove area south of Gypsy Creek. Alternatives 2 and 5 would build the entire 8.3 miles of road. Alternative 3 would build 6.2 miles of road, which is all but the Upper Madan Road that accesses the upper reaches of the drainage (Road 1020). Alternative 4 would only build 0.2 mile of the road at the LTF and sort yard.

In Alternatives 2, 3, and 5, one Class II and two Class III streams would be crossed. This road system would provide access to hunters after project implementation. This may increase hunting and fishing pressure on fish-bearing streams. During project implementation, motor vehicle use of the road for recreation and possibly hunting by crews could increase disturbance to some wildlife. However, there would not be a workers camp in this area which is likely to limit road use after work hours.

Virginia Lake Area

This road system is a continuation of the road from Jenkins Cove and extends north and east beyond Gypsy Creek into the Virginia Lake area. Alternatives 2 and 5 would build the entire 6.4 miles of road. Alternatives 3 and 4 would not build these roads.

Three Class II streams, including Gypsy Creek, and two Class III streams would be crossed. This road system would provide access to hunters after project implementation. This may increase hunting and fishing pressure and increase general access in the area bordering the Virginia Lake Old-Growth Reserve. The Virginia Lake Reserve, as an undeveloped and unroaded area, would buffer the effects of hunting and trapping in the Project Area. As in the Jenkins Cove area, during project implementation, motor vehicle use of the road for recreation and possibly hunting by crews could have an increased effect on disturbance to species. This would be a short-term impact while timber harvesting occurred. Under Option B, after project implementation the road would be closed and the access would be limited to walk-in and non-highway vehicles although use of non-highway vehicles would be discouraged.

Cumulative Effects

From a cumulative perspective, the introduction of roads into the Project Area would not have a great effect on unroaded areas in the Tongass National Forest. Although the Forest Plan did not recommend any Roadless Areas for Wilderness designation, 90 percent of all currently unroaded areas will still be unroaded at the time of the next Forest Plan revision, assuming that all roadless areas become roaded in the same proportion as in the past. Therefore, the alternatives examined for the Madan Timber Sale would add little cumulatively, to the loss of unroaded areas in the Tongass National Forest.

Other Environmental Considerations

In addition to the significant issues addressed in the previous sections, a number of other issues were identified during scoping. The effects of the project relative to these issues are briefly described in the following subsections. More detailed descriptions of these effects can be found in the relevant Resource Reports cited in the appropriate sections.

Geology and Mineral Resources

The geology of the Project Area includes metamorphosed mudstones, siltsones, and sandstones, some quartzite interlayered with marble and volcanic rocks, and granitic and metamorphosed granitic-type rocks. The landforms in the area can be characterized by glaciated u-shaped valleys typical of most mainland watersheds. Valley sideslopes are generally steep and are frequently dissected by deeply incised v-notch drainages. Mineral development potential within the Project Area is associated with the granitic-type rocks and includes silver, lead, and zinc. Several active and inactive mines are located in the Porterfield Creek drainage and Glacier Creek drainage.

Effects of Alternative 1

There would be no direct or indirect effects to mineral exploration and existing mining claims in the Project area under the No Action Alternative.

Effects of Alternatives 2, 3, 4, and 5

With the exception of rock quarries needed for project-related roads, mining is not part of any of these alternatives. All recorded mining activity currently occurs in the Porterfield and Glacier Creek drainages. The effects of the action alternative on mining activity are related to the development of road access. Under all alternatives, there is no road construction proposed in or near the Porterfield drainage and very limited road development proposed in the Glacier Creek drainage under Alternatives 2 and 5. There would be no direct effect of timber harvest or road construction on mining claims.

Exposed rock formations in road excavations and quarries resulting from road construction would enable mining interests to conduct more reliable examination of the area. This could be an indirect effect of the project. Whether or not this advantage would result in more mining claims or a change in mining activity could not be determined until the rock is examined.

Cumulative Effects

The extension of the road network in the future may increase the potential for mineral development in the Porterfield and Glacier Creek drainages as accessibility to the watershed increases. In addition, accessibility by roads increases the opportunity for mining claims within the Project Area. Any future mineral development in the Project Area would be subject to Forest Plan standards and guidelines, including environmental review.

Karst and Cave Resources

Geologic mapping done by David Brew (1997) identified marble bedrock in the Project Area, which suggested that karst terrain was present. Karst and cave inventories conducted in the area have identified numerous caves from sea level to the alpine and additional areas with marble. Many of the caves have been surveyed though cooperative efforts of the Forest Service and the Tongass Cave Project (unpublished reports).

In planning the Madan timber sale, reconnaissance surveys were conducted during the course of road location and unit design by road locators, timber sale layout crews, and resource specialists, including geologists. Detailed karst and cave surveys were conducted during 1998 and 1999 by Forest Service personnel and members of the Tongass Cave Project. These surveys identified areas that are underlain by carbonate rock in the form of marble. Some of these areas contain karst features and caves (Landau, 1999). A vulnerability assessment was made for all areas underlain by carbonate bedrock. Some areas were determined to have a high vulnerability rating, and under Forest Plan standards and guidelines (1997) will be removed from the suitable timber base.

The vulnerability rating system is described in Appendix I of the Forest Plan, as amended (1999). The High vulnerability areas have well developed karst with known caves and associated archeological and paleontological resources. Moderate vulnerability was assigned to areas with karst surface features (e.g. sinkholes). There are no known caves in the area with a Moderate vulnerability rating. A Low vulnerability category was assigned in areas where there were no apparent dissolution features, and little or no surficial evidence of the carbonate bedrock. A vulnerability map is included in the planning file for this project.

In general, the marble that forms the karst landscape, in the Project Area, is in thin bands within larger bodies of metasedimentary rocks. The marble is found intermittently across the Wrangell Ranger District, from the mainland, south of Blake Island in the back channel, north to LeConte Bay. Marble outcrops in the alpine areas are easier to locate than at low elevations where it is covered by dense vegetation. Additionally, low elevations have typically been overridden by glaciers, depositing a layer of glacial till over the underlying bedrock.

The karst in the Madan area is unique in part because of its rarity in the area. In comparison extensive areas of karst found on Prince of Wales Island and the smaller islands to the west, the acreage of karst in the Madan Project Area is only 460 acres. Even so, significant paleontogical remains have been found in one of the caves. In addition, a plant species new to the Wrangell Ranger District was located in unit V-112. Northern golden-carpet (*Chrysosplenium tetrandra)* was found growing on a marble outcrop below a large sink hole. This is one of three known locations for the plant on the Tongass National Forest (personal communication with Mary Stensvold, Region 10 Botanist, July, 1999). Resurgent seeps are common in unit V-112 at the contact of the marble and a non-carbonate metasedimentary rock.

Effects of Alternative 1

No direct or indirect effects on caves or other karst features would occur under Alternative 1. The areas identified as high vulnerability karst lands would be managed as such and removed from the timber base.

Effects of Alternatives 2, 3, 4, and 5

No harvest or road construction would occur in the areas identified as high vulnerability karst. However, some individual karst features, not in areas designated as high vulnerability karst, occur in areas potentially affected by the action alternatives. These karst features include a small stream flowing into a sink hole with resurgence down slope 50 feet, along the 2010 road (Moose Creek drainage). Numerous sinkholes were located in harvest unit V-112 near the boundary of V-111, V-97 and V-78, though no caves were found. The area with identifiable karst features will be excluded from timber harvest this entry.

In Alternatives 2, 4 and 5, the sink hole/resurgent stream may be affected by road construction-related disturbance. In Alternative 3, the 2010 road would not be constructed, so the karst features would not be affected. During construction of the 2010 road, special measures would be taken to avoid sedimentation of the small stream (a trickle at low flows). Appropriate erosion control BMPs would be implemented to minimize impacts to the resurgent stream. Units V-78, V-97, V-111 and V-112 would receive additional field verification to confirm location of karst features and appropriate mitigation.

Cumulative Effects

No cumulative effects on karst and cave resources are expected because of the identification and mapping of high vulnerability karst lands and karst features and the mitigation of individual karst features within the Project Area.

Soil Resources

While soils provide the foundation for forest growth and ecosystem health, they can also damage valuable aquatic resources when transported into streams and rivers. Timber harvest and road building can damage the ability of soils to support the forest. For this reason soils, and the geomorphic processes that transport soils to the aquatic environment, are discussed together. Geomorphic processes in the forest include a variety of landslide types (mass wasting) and erosion of exposed soil (surface erosion). These processes occur naturally in the forested mountains of Southeast Alaska; however, timber harvest and logging roads can increase the frequency and magnitude of mass wasting and surface erosion. For mass wasting to impact the aquatic environment, the debris must be delivered to water bodies. This link between mass wasting features and water bodies is termed "deliverability."

Soil Productivity

Soil productivity is the inherent capacity of a soil to support the growth of specific plant communities (FSM 2554.03); it is critical to the forest because it affects the productivity of most other forest resources. Soils provide the foundation for plant growth and timber

health. Soils with particular physical, chemical, and biological characteristics generally support a certain plant community type or association. Deep, well-drained mineral soils are the most productive sites for tree growth even though tree rooting is generally shallow. In Southeast Alaska, site productivity generally decreases with increasing soil moisture or shallow water tables. Timber site productivity on poorly to very poorly drained organic soils is generally much lower than on well-drained mineral soils. As very little quantitative information exists on the long-term timber productivity of certain organic soil, the Forest Plan (1997) identifies the Kaikli, Karheen, Kitkun, and Maybeso soils as problematic and to be avoided in timber sale planning and layout. Until further information is available, timber harvest will be avoided on these soils in the Project Area.

Timber management activities can influence soils productivity and its related nutrient content in a number of ways. Landslides, surface erosion, severe logging disturbance, or displacement by roads, skid trails, landings or rock pits can cause removal of soil. Soil damage can also result from compaction or puddling, which impairs porosity and drainage and reduces productivity.

Surface Erosion

Because forest soils are protected by a dense layer of living vegetation and a thick organic layer, surface erosion is virtually nonexistent under natural conditions in Southeast Alaska forests with some exceptions. However, in unstable areas where mass wasting has exposed soils, surface erosion does occur under natural conditions. Additional areas where natural surface erosion may occur include exposed soil from root masses of windthrown trees and exposed soil in abandoned beaver impoundments with failed dams.

Mass Wasting

Mass wasting in all its various forms (debris avalanches and flows, landslides, rock fall, soil creep, etc.) are natural processes in the Tongass National Forest that may deliver soil, rock, and debris to the aquatic environment. They occur in undisturbed areas and will continue to do so in the future. Landslides generally occur near the surface and are shallow-rapid failures affecting the soil and overlying vegetation. Shallow-rapid failures often occur when the soil is saturated and its natural effective strength is reduced by high soil pore-water pressure. Heavy rainfall often triggers shallow-rapid failures and they usually originate in mid- to upper-slope positions, at the upper ends of small drainages. Deep-seated landslides involve failure of the bedrock underlying the soil and, while larger, they are infrequent. Deep-seated landslides are generally not affected by timber management.

Management activity such as timber harvest and road construction can trigger mass wasting many years following harvest, as tree roots decay. Tree roots contribute to the stability of hillslopes by adding strength to the soil by vertically anchoring the soil mantle to fractured bedrock or other stable substrate. Small roots near the surface reinforces the upper soil layer so that it acts as a membrane to provide lateral strength and increased slope stability. After timber harvest, the roots decay reducing soil strength and the stability of shallow soils on steep slopes. Logging roads can also be a major source of landslides, often because of improper road drainage. Approximately 25 percent of the Project Area occurs on very steep slopes (>72 percent). Much of this area is in the Porterfield Drainage which does not include any proposed timber harvest. The Forest Plan considers these slopes as unsuitable for harvest unless a site-specific risk assessment has been completed. Cliffs, bedrock exposures, landslides, and avalanche tracks are

common on these slopes. Planning for the Madan Timber Sale avoided these areas in general, although some units contain short segments of slopes greater than 72 percent within areas of lesser slopes.

Approximately 25 percent of the Project Area is classified as having very high (MMI4) slope stability hazard (MMI4) and 11 percent as high slope (MMI3) stability hazard (MMI3). The rating reflects the natural stability or instability of a slope under normal conditions. Soils with an extreme rating are excluded from the suitable forest land base of the Tongass National Forest.

Effects of Alternatives 2, 3, 4, and 5 Due to Mass Wasting:

Landslides are most likely to occur when timber harvest and road construction occur on soils with high to extreme hazard ratings. The pre-field and field verification processes eliminated most areas from the harvest unit pool that were on slopes with the very high slope stability hazard (MMI4). A few harvest units contain patches of MMI4 soils; however, no timber harvest would occur in these areas of MMI4 soils. There are approximately 185 to 524 acres of proposed harvest on slopes with a moderate slope stability hazard. Alternative 4 has the greatest acreage of high hazard (MMI3) area proposed for harvest followed by Alternatives 2, 3 and 5, respectively (Table 3-29).

There are no roads proposed to be constructed on slopes with very high slope stability hazard (except for very short segments). However, there are some roads proposed to be constructed on MMI 3 soils in Alternatives 2, 3, and 5 (Table 3-29). Appropriate BMPs would be implemented to reduce potential road failures in these mass-wasting sensitive areas.

Timber Harvest–related Soil Disturbance

Soil disturbance during timber harvest can reduce the ability of the organic mat and the mineral soil to absorb water, thereby making increased surface erosion possible. Soil disturbance and associated soil erosion can contribute to reduced soil productivity. Alternative 2 would have the highest ground disturbance associated with harvest activity and Alternative 5 would have the least. In general, surface erosion that occurs within timber harvest units has a limited potential for contributing sediment to streams. The main BMPs to minimize soil disturbance near Class III streams are buffers, controlled felling of trees away from streams, and yarding these trees away from streams (split yarding).

Road Construction-related Soil Disturbance

The construction of roads, landings, and excavation of quarries removes soil from the forest land base. Table 3-29 shows the acres of road-associated disturbance, including quarries and landings, for the action alternatives. Alternative 2 has the highest acreage of road associated disturbance (145 acres) and Alternative 4 has the least (46 acres).

Table 3-29.
Soil Effects Summary

	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Acres of Harvest	2,105	1,719	1,769	1,352
Acres of Harvest-related Ground Disturbance[1/]	66	41	37	36
Miles of Road	21.3	9.0	6.7	14.7
Acres of Road-related Ground Disturbance[2/]	145	61	46	100
Road-Stream Crossings	39	19	10	29
Miles of Road on Very High Slope Stability Hazard (MMI 4)	0	0	0	0
Miles of Road on High Slope Stability Hazard (MMI 3)	4	3	0	0
Harvest Acres on Very High Slope Stability Hazard (MMI 4)	0	0	0	0
Harvest Acres on High Slope Stability Hazard (MMI 3)	478	524	547	185

1/ Harvest related disturbance was calculated based upon acres of potential harvest, harvest prescription, and logging system (Landau, 1999)

2/ Road related disturbance was calculated based upon assumption that 6.8 acres of soil are disturbed per mile of the road corridor (assuming a 50-foot width)

Road-related Surface Erosion

While surface erosion is not a pervasive problem on the Tongass National Forest, erosion associated with roads can occur and can result in sediment delivery to streams where roads cross them. These effects are both short-term, associated with road construction activity, and longer-term as erosion of roads and their cut-and-fill slopes occur. Some short-term construction-related erosion is unavoidable and would be mitigated through the application of erosion control measures and BMPs. Long-term erosion of the road prism and associated fill slopes is generally not a concern because the roads are typically constructed of rock borrow excavation. This and the more significant potential for erosion of cut slopes and road surfaces would be addressed by post-construction BMPs that include revegetation, road maintenance, storm proofing, road storage, and decommissioning.

Relative indicators of both short-term and long-term surface erosion include the miles and density of roads and the number of stream crossings (Table 3-29). Alternative 4, with the fewest miles of road, would result in the least short-term impact of the four action alternatives. In contrast, Alternative 2, with the most miles of road, would have the greatest construction-related effect.

Long-term effects take into account the number of road-stream crossings and the potential for failure. Under Road Management Option A, most roads would be left open for public use and periodic maintenance would be required to maintain drainage structures and ditches. Roads left open would be stormproofed and roads scheduled for closure would be placed in storage with drainage structures removed and natural drainage patterns restored. Under Road Management Option B, all roads would be closed to motorized traffic after harvest, including 4-wheelers and snow machines, and most would be placed in storage; they would be maintained to the degree necessary to protect improvements and resource values only. Closures would be implemented using berms or by drainage structure removal. Roads closed would be storm proofed. Stream crossings increase the risk of sediment delivery to streams because of the failure potential of culverts. Alternative 2 has the greatest number of road stream crossings (39) while Alternative 4 has the least number (10) (Table 3-29). The potential failure of the culverts could pose the greatest risk to aquatic resources in the long term. Placing roads in storage virtually eliminates the long-term risk at stream crossings because of drainage structure removal. Storm-proofing and routine inspection would be used to reduce risk to other roads.

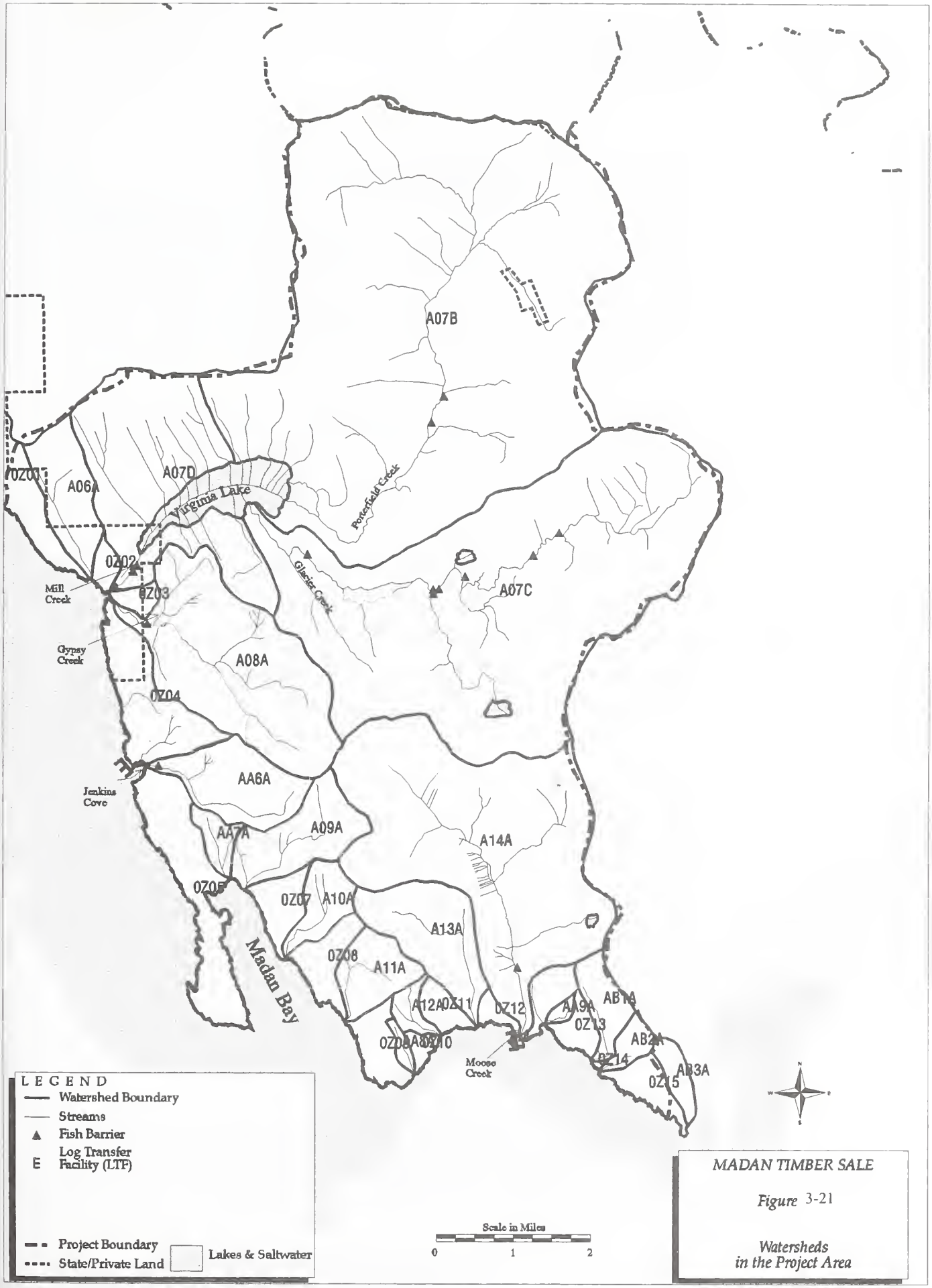
Cumulative Effects

Cumulative effects from roads and associated landings and quarries would have the greatest potential for impacts on soil productivity, mass wasting, and water resources. The proposed project would build up to 21.3 miles of new roads in the Project Area in at least 8 watersheds. Cumulative effects from road surface erosion and potential mass wasting could occur in the Moose Creek (A14A) watershed and Gypsy Creek watershed which have the most roads and stream crossings of any of the other watersheds. There are no anticipated adverse effects, however, if appropriate BMPs are implemented during construction, maintenance, and post sale management.

Watershed and Fish Resources

Seven watersheds were selected for evaluation as part of this resource analysis. The selected watersheds include: Porterfield Creek (A07B), Glacier Creek (A07C), Virginia Lake (A07D), Gypsy Creek (A08A), Jenkins Creek (AA6A), Madan Bay (AA7A and A09A), and Moose Creek (A14A) (Figure 3-21). As would be expected, watershed and fisheries resource conditions varied greatly between review watersheds due to the natural variation in drainage area size, land form and cover type, elevation range, stream channel type, and fish access/distribution. Refer to the Madan Watershed and Fisheries Resource Report (Gagner, 1999) for further discussion of watershed selection and greater detail on the watershed and fish resources of the Project Area.

Although watershed and fisheries resource conditions display predictable diversity in the Project Area, past land management activities have been very limited in their scope and relative impact on the existing resource conditions. When compared to other previously managed areas in Southeast Alaska, the watershed and fisheries resource conditions within the Madan Project Area can be characterized as relatively undisturbed by past management.



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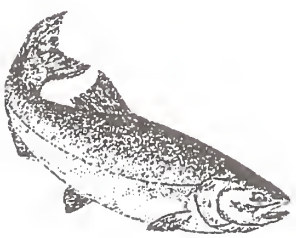
Porterfield Creek Drainage (A07B)

The Porterfield Creek drainage is the largest watershed in the study area measuring just less than 14,000 acres in size (Table 3-30). On a landscape level, the watershed can be described as a relatively flat floodplain bench draining to Virginia Lake, that quickly increases in elevation and forms a steep-sided, u-shaped valley as it extends to the northeast. The drainage density of mapped streams in the Porterfield Creek drainage is 1.52 stream miles/mi^2, which is the lowest of all review watersheds (Table 3-31). In comparison to other study area watersheds, the Porterfield Creek drainage contains the highest percentage of soils/land type units that have high to extreme landslide potential (i.e., MMI 3 and MMI 4) (Table 3-30).

Limited human disturbance has occurred within the Porterfield Creek drainage. The only known disturbance activity within the drainage has been a limited amount of exploration mining. No timber harvest, road construction, or channel modifications are known to have occurred within the drainage.

The Porterfield Creek drainage contains 11.5 miles of fish-bearing waters (i.e., Class I and II), which is more than any other watershed in the Madan Project Area (Table 3-31). Upstream passage for anadromous species is blocked at approximately River Mile 3.3 by a series of natural bedrock falls and cascades; above these falls increased channel gradient and coarse channel substrate greatly reduce the quality of fish habitat (Figure 3-21). The watershed as a whole supports a diverse population of managed fish species including: coho, sockeye, and pink salmon, cutthroat trout, and Dolly Varden char (Dennis Reed, personal communication, USDA Forest Service, Fisheries Biologist, Wrangell Ranger District, 1999). A 1978 ADF&G habitat survey reported water temperature, substrate size, riffle to pool ratio, pool depth, and instream cover all to be within acceptable ranges for providing "good" spawning and rearing habitat in the lower 1.5 miles of Porterfield Creek (see Gagner, 1999).

Glacier Creek Drainage (A07C)



The Glacier Creek drainage is the second largest watershed in the Madan Project Area encompassing approximately 9,022 acres (14.1 sq. mi.) and draining much of the central and eastern portions of the study area. Glacier Creek, along with Porterfield Creek, is one of the two major inflow contributors to Virginia Lake. Stream density in Glacier Creek drainage is just slightly higher than that found in Porterfield Creek drainage at 1.74 mi./sq. mi. Similar to the Porterfield Creek drainage, the Glacier Creek drainage contains a relatively high percentage of MMI 4 (31.3 percent) and MMI 3 (7.6 percent) soils/land types which have high to very high landslide potential (Table 3-30).

No timber harvest, road construction, or channel modifications activities are known to have occurred within the Glacier Creek drainage. Limited exploration mining has occurred within the drainage, but there are no visible signs of impact from these activities to watershed or fisheries resources in the drainage (see Landau, 1999a, for further discussion).

The Glacier Creek drainage contains 10.5 miles of fish bearing waters (i.e., Class I and II), which is second only to the Porterfield Creek drainage in the Madan Project Area (Table 3-31). Upstream fish passage within mainstem Glacier Creek is blocked at approximately River Mile 3.3 by a large (approximately 100 vertical feet) natural bedrock

Table 3-30.
Comparison of Drainage Area Size and Acres of MMI 3 and 4 Soil/land Type for the Review Watersheds in the Madan Project Area

	Drainage Area		MMI 3 and 4 Soil/Land Type		
Watershed Name	(acres)	(sq. miles)	MMI 3	MMI 4	Percent MMI 4
Porterfield Creek (A07B)	13,959	21.8	1053.5	4873.3	34.9
Glacier Creek (AO7C)	9,022	14.1	673.5	2755.4	30.5
Moose Creek (A14A)	5,050	7.9	851.6	1357.6	26.9
Gypsy Creek (AO8A)	2,812	4.4	314.1	76.0	2.7
Virginia Lake (A07D)	2,718	4.2	411.3	532.1	19.6
Madan Bay (A09A, AA7A)	1,050	1.6	201.6	196.5	18.7
Jenkins Cove (AA6A)	905	1.4	90.3	0.0	0.0
Total	21,557	13,992.6	2567.2	5975.1	27.6

Table 3-31.
Stream Classes I-III Miles and Stream Density for Each of the Review Watersheds in the Madan Project Area

	Stream Length (miles)				
Watershed Name	Class I	Class II	Class III	Total	Density
Porterfield Creek (A07B)	7.8	3.7	21.6	33.2	1.52
Glacier Creek (AO7C)	4.9	5.6	13.6	24.0	1.7
Moose Creek (A14A)	0.9	2.4	7.0	10.3	1.3
Gypsy Creek (AO8A)	0.5	4.0	4.5	9.1	2.1
Virginia Lake (A07D)	0.6	0.6	10.5	11.7	2.8
Madan Bay (A09A, AA7A)	0.2	0.0	3.5	3.4	2.4
Jenkins Cove (AA6A)	0.0	1.3	1.2	2.4	1.7
Total	14.9	17.6	61.9	94.1	Ave. = 1.7

falls (Figure 3-21) (ADF&G, 1978). The Glacier Creek watershed supports managed fish species including: sockeye and cutthroat trout (Dennis Reed, personal communication). Spawner surveys conducted by the Forest Service since 1989 have documented extensive use of lower (approximately 1,000 feet) Glacier Creek by spawning sockeye. Project surveys in 1997 of lower Glacier Creek reported substrate size, habitat composition, water depth, and instream cover all to be within acceptable ranges for providing "good" spawning and rearing habitat in the lower ¼ mile of Glacier Creek (Gagner, 1999).

Virginia Lake and Mill Creek (A07D)

The Virginia Lake and Mill Creek drainage is the fifth largest of the eight review watersheds in the Madan Project Area encompassing approximately 2,718 acres (Table 3-30). Virginia Lake itself is the dominant feature within the watershed with a surface area of 636 acres. The lake contains one small (2.5-acre) forested island located in the

southwestern corner near the Glacier Creek inlet (Figure 3-21). The Virginia Lake drainage receives all stream flow discharge from the Porterfield and Glacier Creek watersheds. Water exits Virginia Lake via Mill Creek, at the western end of the lake, and flows for approximately 0.6 miles before entering saltwater in Eastern Passage. Stream density in the Virginia Lake drainage is the highest of all review watersheds at 2.83 mi./sq. mi. (Table 3-31). Steep valley sideslopes and unconsolidated soils result in 35.5 percent of the watershed area being classified as MMI 3 or MMI 4 soil/land type (Table 3-30).

As with most of the Madan Project Area, very little negative ecosystem disturbance has affected the natural systems within the Virginia Lake and Mill Creek drainage. Historically, timber harvest in the watershed has been limited to hand logging of nearshore areas along the Eastern Passage and within the lowermost reaches of Mill Creek. Forest regrowth has replaced harvested trees leaving very little trace of past management activities. No roads are currently present within the watershed.

Virginia Lake is a moderately sized pristine lake known for its scenic beauty and recreational value. Results of limnological investigations of Virginia Lake in 1986 indicated that the combination of good summertime water quality, adequate food sources, and sufficient spawning area justified the enhancement of the small sockeye fishery that the lake supported at that time (NSRA, 1986). Subsequent fishery enhancement projects undertaken in the drainage have included: construction of a combination steeppass and pool-and-weir fishway in 1988 to increase fish passage into Virginia Lake; annual limnological and sockeye survival monitoring, annual release of sockeye fry; and annual adult escapement surveys. Although adult sockeye escapement has shown a significant improvement from pre-enhancement estimates, adult returns remain well below the estimated 20,000 to 30,000 sockeye originally expected from the enhancement measures (ADF&G, 1997). Virginia Lake is also regionally recognized as providing one of the top recreational cutthroat trout fisheries in Southeast Alaska and there is a locally important subsistence sockeye fishery at the mouth of Mill Creek.

Gypsy Creek (A08A)

The Gypsy Creek drainage is the fourth largest watershed in the Madan Project Area encompassing approximately 2,812 acres draining much of the west-central portion of the study area (Table 3-30). Stream density in Gypsy Creek drainage is the second highest of the review watersheds at 2.48 mi./sq. mi. (Table 3-31). The Gypsy Creek drainage contains one of the lowest percentages of MMI 3 and MMI 4 soil/land types with 11.2 percent and 2.7 percent, respectively (Table 3-30).

Similar to the Virginia Lake watershed, historical timber harvest in the watershed has been limited to hand logging of nearshore areas along the Eastern Passage and within the lowermost reaches of the drainage. Forest regrowth has replaced harvested trees leaving very little trace of past management activities.

The Gypsy Creek drainage contains approximately 4.25 miles of fish-bearing waters, which is the third highest of all watersheds reviewed in the Madan Project Area (Table 3-31). Upstream fish passage within mainstem Gypsy Creek is blocked at approximately River Mile 0.25 by a large (approximately 45 vertical feet) natural bedrock falls (Figure 3-21). Pedestrian surveys completed during the 1997 field investigation qualitatively rated lower Gypsy Creek as "good" for resident trout; however, the number of cascades and small falls severely limits fish movement within the lower reach (Gagner, 1999).

Jenkins Creek (AA6A)

The Jenkins Creek drainage is the smallest (the two watersheds that comprise Madan Bay are individually smaller than the Jenkins Creek watershed, but have a larger composite drainage area) of the seven watersheds reviewed in the Madan Project Area encompassing approximately 905 acres (Table 3-30). The density of streams in Jenkins Creek drainage is similar to the Gypsy Creek watersheds at 2.23 mi./sq. mi. (Table 3-31). The Jenkins Creek drainage contains no MMI 4 soil/land type and only about 10 percent of the total area classified as MMI 3 soil/land type (Table 3-30).

The current condition of watershed and fisheries resources found within the Jenkins Creek drainage are representative of an undisturbed/unmanaged ecological system. There has been no known timber harvest, road construction, or mining activity within the Jenkins Creek drainage.

The Jenkins Creek drainage contains approximately 1.3 miles of fish bearing waters (Table 3-31, Figure 3-21). Approximately 300 to 400 feet upstream from the mouth of Jenkins Creek, anadromous fish passage is blocked by a natural bedrock falls (approximately 12 feet vertical height) (Figure 3-21). Resident fish, assumed to be cutthroat trout and/or Dolly Varden char, were observed in the MM channel type section of Jenkins Creek. No anadromous or resident fish were observed during electrofishing surveys completed in 1998 below the lowermost falls on Jenkins Creek. Stream channel substrate size, water depth, instream cover, and habitat composition appear to be sufficient to provide "average" to "good" spawning and rearing habitat for resident fish in the middle portion of Jenkins Creek (Gagner, 1998).

Madan Bay (A09A, AA7A)

The Madan Bay drainage, the second smallest of the seven watersheds reviewed, encompasses approximately 1,050 acres (Table 3-30). The composite stream density in the Madan Bay drainage is the highest of all review watersheds at 2.79 mi./sq. mi. (Table 3-31). The percent of the watershed classified as MMI 3 and MMI 4 soil/land type is 19.3 and 18.7 percent, respectively (Table 3-30).

Similar to the Jenkins Creek watershed, current Madan Bay watershed and fisheries resource condition is representative of an undisturbed/unmanaged ecological system. There has been no known timber harvest, road construction, or mining activity within the Madan Bay watershed.

The Madan Bay drainage contains only 0.2 mile of fish-bearing waters (Class I and II) (Table 3-31). Steep channel gradient and lack of suitable habitat has restricted the distribution of resident and anadromous fish species in the watershed to the lowermost reach of drainage basin A09A.

Moose Creek (A14A)

The Moose Creek drainage is the third largest watershed in the Madan Project Area encompassing approximately 5,004 acres, and draining much of the south and central portion of the study area. Stream density in Moose Creek drainage is just slightly less than the average for all review watersheds at 1.75 mi./sq. mi. (Table 3-31). The Moose Creek drainage contains the highest composite percentage of MMI 3 (17 percent) and MMI 4 (27 percent) soils/land types with approximately 44 percent of the watershed area classified as having high to extreme landslide potential (Table 3-30).

Past land management activities within the Moose Creek drainage have been restricted to the clear-cut harvest of approximately a 30-acre area adjacent to the lower 0.25-mile section of Moose Creek in 1960 (ADF&G 1978). Although extensive regrowth of the harvested area has occurred, the primary regeneration species is alder with a much smaller fraction of spruce than that of surrounding, unharvested areas (Gagner, 1999). No roads or active mining claims are currently present within the watershed.

The Moose Creek drainage contains approximately 3.3 miles of fish bearing waters (i.e., Class I and II), which is the third highest of all watersheds reviewed in the Madan Project Area (Table 3-31). Upstream fish passage within mainstem Moose Creek is blocked near River Mile 0.8 by a large (approximately 35 vertical feet) natural bedrock falls (Figure 3-21).

Pedestrian surveys completed in 1978 by ADF&G rated the lowermost section of Moose Creek as "good" for salmonid habitat with sufficient spawning areas and appropriately sized spawning gravel substrate (ADF&G 1978). Salmonid fish habitat in upper Moose Creek is characterized as "poor" to "average" due to coarse channel substrate, lack of instream cover, and a low pool to riffle ratio (Gagner, 1997). Adult escapement surveys of Moose Creek have been conducted sporadically since 1976 by ADFG. Escapement estimates for Moose Creek have ranged from a low of zero pink salmon in 1976 to a high of 1,400 pink salmon in 1979 (ADF&G).

General Watershed and Fish Resource Effects

In general terms, activities associated with the management of forest resources may affect the amount of geomorphic products produced and the timing of delivery to the aquatic environment (i.e., increased erosion, changes in water available for runoff, altering wood loading and nutrient cycling to streams, or altering stream temperature by removing shade). Additionally, the movement or flow of both aquatic organisms (e.g., fish, invertebrates, amphibians) and terrestrial inputs (e.g., sediment, large and small woody debris, and particulate matter) can be restricted or completely blocked by improperly designed or constructed stream crossing structures. Since each watershed possesses distinct environmental conditions, resource characteristics, and sensitivities to disturbance, analysis of management activities relies on defining the proposed activities within each watershed and assessing potential impacts to existing resource conditions.

Changes in the quantity and timing of geomorphic inputs, if large enough, may express themselves in stream channels in observable/measurable ways. In turn, these changes in the physical characteristics of streams as they respond to sediment, water, wood, and energy may have negative impacts on the biological communities they support.

Numerous design measures have been incorporated into each of the action alternatives to avoid or reduce possible effects on the fishery and watershed resources. Specific examples include:

- To protect the highly valued fishery in the Virginia Lake drainage, the project completely avoids disturbance in the Porterfield Creek drainage and the proposed OGR modification would provide protection for nearly all of the Glacier Creek and Virginia Lake drainages.
- Significant changes have been made to proposed road locations to avoid areas with numerous instability features or areas requiring large numbers of Class III, v-notch stream crossings. Additionally, no Class I stream crossings are proposed under any of the action alternatives and two of the four alternatives require one or no crossings on Class II streams.
- Substantial use of helicopter logging techniques to reduce ground disturbance and significantly reduce the number of required road miles and stream crossings in all alternatives. Development of two alternatives dominated by helicopter logging.

Hydrologic Effects

In general, effects to hydrologic processes in forested environments are directly related to the percentage of the watershed area that has been harvested or roaded. The strength of this cause-and-effect relationship diminishes though when clearcut harvest prescriptions are replaced with patch or small group cuts due to increased utilization of available moisture by surrounding vegetation (Beschta et al. 1995). Research on the hydrologic effects of road construction and timber harvest has presented several thresholds or "rules-of-thumb" for predicting a level of disturbance that may result in changes to the hydrologic system. Spencer et al. (1996) presented two such thresholds in their summary of studies of the hydrologic effects of forest management. They reported altered stream hydrology when roads constituted 4 percent or greater of the watershed area. The other threshold was derived from a review of over 90 watershed studies that reported increased water yield generally occurring after 20 percent to 30 percent of a watershed area has been harvested. Separate research conducted by Bartos (1989) suggested that increases in base stream flow were observed after approximately 35 percent of a watershed had been logged.

When compared to the threshold values presented above the anticipated hydrologic effects associated with timber harvest and road construction within the Madan Project Area would be minimal under all of the action alternatives. Increased use of high retention (>50 percent) harvest prescriptions and limited use of traditional clearcut logging techniques have resulted in relatively low percentages of disturbance to any one watershed under all of the action alternatives. Alternative 2 proposes the largest amount of harvest with just over 3 percent of the total review watershed area affected by timber harvest. As a percentage of total watershed area, the Jenkins Creek drainage experiences the highest level of harvest under all of the action alternatives (Table 3-32). The Madan Bay watershed receives the highest percentage (16 percent) of area impacted under Alternative 2, but because the watershed is comprised of two separate drainages, the impact to any one of the two drainages would be smaller than that proposed for the Jenkins Creek watershed. Even though Alternatives 2 and 4 propose a similar level of timber harvest, Alternative 2 requires construction of significantly more road miles and affects most of the major watersheds in the Madan Project Area (Tables 3-32 and 3-33). Likewise, Alternative 5 proposes the harvest on 443 acres fewer than Alternative 4, but

Table 3-32.
Number of Acres and Percent of Total Watershed Area Proposed for Harvest Under Each of the Action Alternatives

Alternative 2		Number of Acres Harvested by Minimum Retention Level					Percent of Total Watershed Area Harvested by Retention Level				
Watershed	Acres	10%	50%	60%	70%	Total	10%	50%	60%	70%	Total
Glacier Creek	9,022	35.0	0.0	0.0	95.1	130.1	0.4	0.0	0.0	0.3	0.7
Virginia Lake	2,718	29.5	0.0	0.0	215.4	244.9	1.1	0.0	0.0	2.4	3.5
Gypsy Creek	2,812	241.6	0.0	0.0	145.5	387.1	8.6	0.0	0.0	1.6	10.1
Moose Creek	5,050	236.0	0.0	264.4	6.6	507.0	4.7	0.0	2.1	0.0	6.8
Jenkins Creek	905	8.2	0.0	0.0	316.5	324.6	0.9	0.0	0.0	10.5	11.4
Porterfield Creek	13,959	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Madan Bay	1,050	119.4	0.0	0.0	175.8	295.2	11.4	0.0	0.0	5.0	16.4
Total	35,516	669.6	0.0	264.4	954.8	1888.8	1.9	0.0	0.3	0.8	3.0

Alternative 3		Number of Acres Harvested by Minimum Retention Level					Percent of Total Watershed Area Harvested by Minimum Retention Level				
Watershed	Acres	10%	50%	60%	70%	Total	10%	50%	60%	70%	Total
Glacier Creek	9,022	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Virginia Lake	2,718	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gypsy Creek	2,812	44.2	0.0	0.0	37.5	81.6	1.6	0.0	0.0	0.4	2.0
Moose Creek	5,050	156.7	0.0	264.4	6.6	427.6	3.1	0.0	2.1	0.0	5.2
Jenkins Creek	905	4.0	0.0	0.0	407.2	411.1	0.4	0.0	0.0	13.5	13.9
Porterfield Creek	13,959	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Madan Bay	1,050	46.1	0.0	0.0	275.5	321.6	4.4	0.0	0.0	7.9	12.3
Total	35,516	250.9	0.0	264.4	726.7	1242.0	0.7	0.0	0.3	0.6	1.6

Alternative 4		Number of Acres Harvested by Minimum Retention Level					Percent of Total Watershed Area Harvested by Minimum Retention Level				
Watershed	Acres	10%	50%	60%	70%	Total	10%	50%	60%	70%	Total
Glacier Creek	9,022	35.0	0.0	0.0	0.0	35.0	0.4	0.0	0.0	0.0	0.4
Virginia Lake	2,718	29.5	0.0	0.0	0.0	29.5	1.1	0.0	0.0	0.0	1.1
Gypsy Creek	2,812	241.6	0.0	0.0	37.5	279.1	8.6	0.0	0.0	0.4	9.0
Moose Creek	5,050	240.2	0.0	264.4	0.0	504.6	4.8	0.0	2.1	0.0	6.9
Jenkins Creek	905	4.2	4.0	0.0	422.0	430.1	0.5	0.4	0.0	14.0	14.9
Porterfield Creek	13,959	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Madan Bay	1,050	0.0	46.1	0.0	275.5	321.6	0.0	4.4	0.0	7.9	12.3
Total	35,516	550.5	50.1	264.4	734.9	1599.9	1.6	0.1	0.3	0.6	2.5

Alternative 5		Number of Acres Harvested by Minimum Retention Level					Percent of Total Watershed Area Harvested by Minimum Retention Level				
Watershed	Acres	10%	50%	60%	70%	Total	10%	50%	60%	70%	Total
Glacier Creek	9,022	35.0	0.0	0.0	95.1	130.1	0.4	0.0	0.0	0.3	0.7
Virginia Lake	2,718	29.5	0.0	0.0	215.4	244.9	1.1	0.0	0.0	2.4	3.5
Gypsy Creek	2,812	241.6	0.0	0.0	0.5	242.1	8.6	0.0	0.0	0.0	8.6
Moose Creek	5,050	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jenkins Creek	905	8.2	0.0	0.0	309.6	317.8	0.9	0.0	0.0	10.3	11.2
Porterfield Creek	13,959	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Madan Bay	1,050	46.1	0.0	0.0	175.8	221.9	4.4	0.0	0.0	5.0	9.4
Total	35,516	360.4	0.0	0.0	796.4	1156.8	1.0	0.0	0.0	0.7	1.7

Table 3-33.
Miles of Proposed Road and Percent Roaded Area for each of the Action Alternatives

		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
Watershed	Total Acres	Road Miles	% Roaded Area[1/]	Road Miles	% Roaded Area	Road Miles	% Roaded Area	Road Miles	% Roaded Area
Glacier Creek	9022	<0.1	0.0	0.0	0.0	0.0	0.0	<0.1	0.0
Moose Creek	5050	5.7	0.7	2.4	0.3	5.5	0.7	0.0	0.0
Jenkins Creek	904.6	1.7	1.1	0.6	0.4	0.0	0.0	1.7	1.1
Madan Bay	1050	1.5	0.9	1.5	0.9	0.0	0.0	1.5	0.9
Porterfield Creek	13959	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gypsy Creek	2812	5.2	1.1	0.5	0.1	0.0	0.0	5.2	1.1
Virginia Lake	2718	1.1	0.2	<0.1	0.0	0.0	0.0	1.1	0.2
Other Areas	5068	5.9	0.6	3.8	0.5	1.1	0.1	5.1	0.6
Total	40584	21.3	0.3	9.0	0.1	6.7	0.1	14.7	0.2

[1/]Percent roaded area calculated by assuming an average 50 feet wide disturbance area multiplied by the miles of proposed road and then divided by the total watershed acres.

Table 3-34.
Number of Miles of Class III Streams Within or Adjacent to Proposed Harvest Units for the Action Alternatives by Review Watershed

Watershed Name	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Watershed Total Class III Stream Miles
Porterfield Creek	0.0	0.0	0.0	0.0	21.6
Glacier Creek	0.0	0.0	0.0	0.0	13.6
Virginia Lake	0.9	0.0	0.0	0.9	10.5
Gypsy Creek	1.4	0.5	0.1	0.9	4.5
Jenkins Creek	0.0	0.8	0.8	0.0	1.2
Moose Creek	2.3	2.3	2.3	0.0	7.0
Madan Bay	1.1	1.7	1.7	1.1	3.5
Total	5.7	5.3	4.9	2.9	61.9

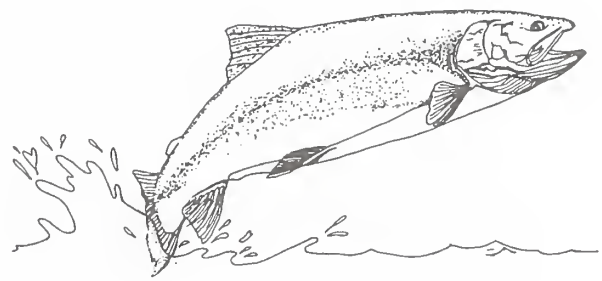


Table 3-35.
Number of Stream Crossings by Stream Class for each of the Action Alternatives

	Alternative 2 Stream Class			Alternative 3 Stream Class			Alternative 4 Stream Class			Alternative 5 Stream Class		
Watershed	II	III	Total	II	III	Total	II	III	Total	II	III	Total
Virginia Lake		1	1			0			0		1	1
Gypsy Creek	4	3	7		1	1			0	4	3	7
Moose Creek		1	1		1	1		3	3			0
Jenkins Creek	1		1	1		1			0	1		1
Madan Bay			0			0			0			0
Glacier Creek			0			0			0			0
Porterfield Creek			0			0			0			0
Other areas		1	1		1	1			0		1	1
Total	5	6	11	1	3	4	0	3	3	5	5	10

Note- There are no Class I stream crossings proposed for the Madan project.

requires the construction of approximately 8 miles of additional road. No timber harvest or road construction activities are proposed under any of the proposed alternatives for the Porterfield Creek watershed. Furthermore, less than 1 percent of the Glacier Creek watershed is proposed for timber harvest requiring less than 0.1 mile of road construction. Although both of these watersheds remain relatively undisturbed under this proposed action, future management actions are planned for both areas.

Sediment Effects

Management-related sediment enters streams primarily through surface erosion from roads and disturbed areas, and mass wasting. The likelihood that sediment will reach the stream system decreases with increasing distance between harvest activities and stream channels. Furthermore, reducing the number of stream crossings reduces the likelihood that management produced sediment will reach stream systems. Since all Class I and II streams will receive a minimum of a 100-foot no-cut riparian buffer, only the miles of Class III streams within or adjacent to harvest units (defined as within 100 feet of a harvest unit) will be used for comparison among the four action alternatives. Following guidelines described in the Forest Plan (1997), all Class III stream channels identified during field surveys received no-programmed harvest buffers extending from the streambank to the top of the first topographic break along the streambank sideslope. Although Alternative 2 has the greatest number of miles of Class III stream miles within or adjacent to harvest units, all four of the action alternatives have relatively limited number of Class III stream miles within or adjacent to harvest units (Table 3-34). The combination of low stream density (Table 3-31) and the limited miles of proposed road under all of the action alternatives have resulted in a limited number of road crossings. Alternatives 2 and 5 contain the largest number of proposed stream crossings with 11and 10, respectively (Table 3-35). Alternative 4 contains the fewest proposed road miles and subsequently, the fewest proposed stream crossings.

Effects on Water Temperature

Mandatory no-cut buffers established on all Class I – III streams will significantly reduce the likelihood of temperature related effects to streams within the Madan Project Area. Proposed timber harvest units located adjacent to Class I and II streams provide a minimum of a 100-foot no-cut buffer between the unit and the stream. Although Class III streams generally receive a narrower no-cut buffer, the relatively narrow channel width associated with these streams require a corresponding smaller buffer area to provide streamside shade. There are currently no mandatory buffers provided on Class IV streams. Although Alternative 2 proposes the largest amount of timber harvest, and would therefore pose the greatest risk of increased stream temperature, there would be no anticipated significant effect on water temperature within study area streams under any of the action alternatives.

Effects on Large Woody Debris

As was the case for predicted water temperature impacts, the mandatory no-cut buffers established along all Class I – III streams will significantly reduce the likelihood of reduction in the short- or long-term recruitment of LWD to streams within the Madan Project Area. Although Alternative 2 proposes the largest amount of timber harvest, and would therefore pose the greatest risk of reducing LWD recruitment, there would be no anticipated significant impact to LWD recruitment within study area streams under any of the action alternatives.

Physical Migration Barriers

Currently there are no management-related barriers to fish migration within the Madan Project Area. Management activities proposed under the action alternatives have the potential to affect habitat access for resident salmonids through the construction of culvert stream crossings. However, no stream crossings are proposed for stream sections containing anadromous salmonids. Alternatives 2 and 5 contain the most stream crossings located on fish-bearing streams with five proposed for each alternative (Table 3-35). Road and stream crossing construction under Alternative 4 would have the lowest risk of creating obstacles to fish migration as no stream crossings are proposed for fish bearing waters. All Class II stream crossings will be designed for fish passage.

Effects on Essential Fish Habitat

Section 305 (b)(1)(A and B) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act, 16 U.S.C. 1801 et seq.), mandates the establishment of new requirements for Essential Fish Habitat (EFH) description and to require federal agencies to consult with National Marine Fisheries Service on activities that may adversely affect EFH. As defined in section 3(10) of the Magnuson-Stevens Act, "EFH is those waters and substrate necessary to salmon for spawning, breeding, feeding, or growth to maturity." For the purpose of the document "waters" are considered all Class I streams, marine waters, and intertidal zones of the Madan study area.

The application of Forest-wide standards, guidelines, and best management practices developed to meet water quality standards and for the protection and enhancement of watershed processes and fish habitat are believed to be sufficient to protect EFH. In addition, no road crossings of Class I streams are proposed and harvest activities have been limited within stream drainages that support salmon populations. Through

evaluation of the action alternatives, it was determined that possible impacts to stream channel and fish habitat were unlikely to adversely affect EFH.

Effects on Floodplains and Riparian Areas

The identification and protection of floodplain and riparian areas is critical to maintaining properly functioning stream systems. Floodplains and riparian areas help to moderate peak flows, recharge streams during low flow periods, allow for natural channel migration, intercepts sediment, and provide shade, large woody debris recruitment, organic nutrients, and channel stability. Tongass National Forest streams have been classified and mapped according to stream process group, which serve as the basis for delineating riparian management areas and defining appropriate streamside buffers. The process groups reflect physical differences in stream channels and stream processes (USDA, 1992). Table 3-36 shows the distribution of stream process groups in each of the major watersheds. Although each channel process group serves a critical role in the development and maintenance of fish habitat, the floodplain (FP), estuarine (ES), alluvial fan (AF), and palustrine (PA) stream process groups represent the most critical and sensitive riparian areas in the Project Area (see Fisheries Resource Report, Gagner, 1999; Paustian et al. 1992 for further discussion of channel process groups).

Table 3-36.
Stream Miles by Channel Process Group for Each of the Review Watersheds

Watershed Name	Stream Process Group (Miles)								
	FP	GO	AF	LC	MM	MC	HC	PA	ES
Porterfield Creek	4.8	0.6	0.4	1.7	0.7	1.1	23.2	0.7	0.0
Glacier Creek	5.5	2.5	1.6	2.0	0.6	0.8	9.9	1.1	0.0
Virginia Lake	0.0	0.0	0.2	0.6	0.0	0.0	10.9	0.0	0.0
Gypsy Creek	0.3	0.0	0.6	0.0	1.2	1.2	5.9	0.0	0.0
Jenkins Creek	0.0	0.0	0.0	0.0	0.6	0.0	1.9	0.0	0.0
Madan Bay	0.5	0.0	0.2	0.0	0.0	0.0	2.7	0.0	0.0
Moose Creek	0.4	0.0	0.5	0.0	1.0	1.4	7.0	0.0	<0.1
Totals	11.5	3.1	3.5	4.3	4.1	4.5	61.5	1.8	<0.1

FP	Flood Plain Process Group
GO	Glacial Outwash Process Group
AF	Alluvial Fan Process Group
LC	Large Contained Process Group
MM	Moderate Gradient Mixed Control Process Group
MC	Moderate Gradient Contained Process Group
HC	High Gradient Contained Process Group
PA	Palustrine Process Group
ES	Estuarine Process Group

Direct effects on floodplains and riparian areas may result from vegetation and ground disturbance in these areas. Each of the action alternatives provides a high level of riparian and floodplain protection through both mandatory mitigation measures and project-specific design considerations. Riparian management areas associated with Class I, II, and III streams in the vicinity of proposed roads and units were verified by field crews and in many cases, unit boundaries and road locations were changed to protect riparian areas (see Gagner, 1999). For example, a road system proposed for the eastside of Moose Creek (A14A) was considered early in the project, but was dropped because the only feasible location for the road was through an area with numerous instability features (old slides and slumps) and which would have required a large number of Class III, v-

notch stream crossings. Even as a temporary road with all drainage structures removed, there was a concern that mitigation measures to maintain floodplain function, channel stability, and fish habitat would have a high risk of failure, resulting in chronic long-term impact to these resources. Therefore, the Moose Creek road system was moved to the opposite side of the stream to an area with significantly fewer instability features, requiring fewer Class III stream crossings, and crossings over Moose Creek were totally avoided.

None of the alternatives propose modifications to the riparian standards and guidelines described in the Forest Plan. The width of the riparian management areas (no-harvest buffers) vary by stream class and channel sideslope characteristics. Special care was taken to ensure that no proposed harvest units were located within or adjacent to areas classified as floodplain channel types. Other protection/mitigation measures included placing complete sideslope buffers along all large v-notch streams (Class III, HC streams) and directional felling and partial suspension of all Class IV stream channels.

Cumulative Effects

Disturbances within a watershed due to management activities can be individually quite small, but may collectively result in larger basin-wide disturbances or cumulative effects. As these disturbances accumulate, they can interact with each other in various combinations over a long period. Cumulative effects may lead to increased erosion, streamflow, and subsequent channel degradation. The degree of the effect is dependent upon the frequency and magnitude of individual impacts plus the rate of recovery by the watershed. Some of the specific factors that could influence cumulative effects to watershed and fisheries resources are the size of harvest and its physical relationship to streams; the length of road, its characteristics, traffic level, and the number of streams crossed; the effectiveness of best management practices implemented; and basin hydrology and channel morphology.

The Madan Project Area has experienced very little past management activity, resulting in little negative change to watershed processes or fish habitat conditions. The only Madan project watersheds with reasonably foreseeable plans for future management are Gypsy Creek and adjacent watersheds, near the mouth of Mill Creek, where future logging on State lands could occur. However, no logging on state lands is currently proposed as part of this action or separately and the amount of suitable timber on State lands within these watersheds that is likely to be logged is very small, because of the low acreage involved and the recreation and visual constraints on harvest. Therefore, there are no anticipated cumulative effects (past management effects combined with present and reasonably foreseeable future effects) on current watershed or fish resources. However, the number of proposed harvest acres and road miles have been presented for each of the action alternatives for use in future evaluations of cumulative effects.

Marine Resources

Estuaries and nearshore marine environments are among the most productive natural systems and are important nursery areas that provide food, refuge from predation, and valuable habitat for many species. The biota of coastal, Southeast Alaska ecosystems includes a wide variety of plants, birds, fish, mammals, and invertebrate species. The ecological health of each coastal ecosystem is controlled by oceanic and terrestrial factors that influence the conditions of its waters (Clark. 1977).

The deepwater habitat comprising most of the Eastern Passage and Blake Channel supports a wide array of marine species. Target species for subsistence, commercial and marine sport fishing include Dungeness and tanner crab; pink, spot, sidestripe, and coonstripe shrimp; halibut; and chinook, coho, and sockeye salmon. Seals, orcas, humpback whales, and Pacific white-sided dolphins have also been observed in this area. Commercial fishing, charter, and recreation boats are known to use the sheltered coves and bays adjacent to the Project Area for anchorages and staging areas for land-based activities.

Due to the steep topography of the Madan Project Area shoreline, there has been very little development of estuarine habitat at the saltwater interface of Project Area streams. Most of the approximately 27 miles of convoluted shoreline is comprised of boulder- and bedrock-dominated intertidal and deepwater marine habitats. Underwater SCUBA surveys for LTF siting were conducted at six separate locations along Project Area shorelines. These surveys described the overall plant and animal species diversity to be low. Only one of the LTF sites studied (located on the eastside of Moose Creek along the north shore of Blake Channel) was found to have insufficient water depth to be acceptable as a LTF site. Another location (on the inside of Jenkins Cove) was found to have a lower degree of circulation than was desirable. Neither of these sites was selected and, at all other survey locations, water depth, bark and sediment flushing potential, and low plant and animal species diversity made the sites suitable locations for construction and operation of an LTF (USFWS, 1997).

Environmental Effects

The processing, transport, and storage of logs along aquatic systems generates two distinct modes of disturbance: physical and chemical. Both modes create direct as well as indirect effects on nearshore aquatic habitat (Meehan 1991). Potential physical disturbances resulting from log-handling operations (sorting and log watering) at proposed LTF and log landing sites include substrate disturbance in shallow water areas; deposition and dispersion of bark and wood debris; disruption of the water column; and reduction in wave action and light penetration. The magnitude and spatial extent of these disturbances differ among types and volumes of log handling activity, water depth, site morphology and substrate, species and age of logs handled, seasons, and prevailing currents and circulation patterns (Meehan 1991).

The lack of estuarine habitats (Table 3-36) and restriction of timber harvest within 1,000 feet of the beach fringe (intertidal area) significantly reduces the potential for impacts to nearshore and estuarine areas. Other potential marine impacts are minimized through the location and design of the LTFs, the use of log landing sites, establishing operating guidelines to control pollution and debris (Hansen et al. 1971), and avoiding the likelihood of conflicts with other marine users.

From observations made during underwater surveys of each of the proposed LTF sites, it was concluded that construction and operation of the proposed LTF sites would not have a significant negative impact on existing marine and estuarine plant and animal resources (see Madan Watershed and Fisheries Resource Report [Gagner, 1999], for further discussion). Of the four action alternatives, Alternative 5 is expected to have the least impact on marine resources due to the fact that only one LTF site is proposed under this alternative. Although Alternative 4 contains the fewest proposed road miles, the lack of proposed roads for log transportation requires the use of two barge sites and the construction of two LTF sites. It should be noted that impacts to marine resources from

the operation of barge sites are generally considered to be much less than those associated with LTF sites (Meehan, 1991). Both Alternatives 2 and 3 propose the construction and operation of two LTF sites. No barge sites are proposed for Alternatives 2, 3, or 5 (Table 3-37).

Table 3-37.
Number of Log Transfer Facilities and Barge Sites Proposed for Each Action Alternative

Action Alternative	LTFs	Barge Sites
2	Two	None
3	Two	None
4	Two	Two
5	One	None

Wetlands

Wetlands are an active interface between terrestrial and aquatic components of a landscape and are defined by the Army Corps of Engineers (Corp) as "those areas that are inundated or saturated with surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (40 CFR 230.41 (a) (1)). This definition includes forested swamps, marshes, bogs, and other similar areas.

For federal regulatory purposes, wetlands are considered a subclass of Special Aquatic Sites (40 CFR Section 230.3) and have been deemed Waters of The United States (33 CFR 328.3). All Waters of the United States are subject to regulation through the Clean Water Act by the COE and the EPA. Sections 404 and 401 of the Clean Water Act were created specifically with the intent "to restore and maintain the chemical, physical and biological integrity of our Nation's waters". Additionally, Executive Order 11990 requires Federal agencies "to avoid....adverse impacts associated with the destruction or modification of wetlands...wherever there is a practicable alternative". To fulfill this requirement, under Section 404 of the Clean water Act, the COE has developed methodology to identify and delineate wetland sites. The procedure evaluates potential wetlands using a multi-parameter approach.

Management and Related Issues

Exemptions to wetland regulations (Sections 404 and 401 of the Clean Water Act) are granted under Section 404(f)(1) and permit normal agricultural, ranching, and silivicultural activities, as well as maintenance of existing drains, farm ponds, and roads. The construction or maintenance of forest roads for silvicultural purposes is exempt from regulation when such roads are constructed and maintained in accordance with BMPs. The BMPs "assure that flow and circulation patterns and chemical and biological characteristics of water of the United States are not impaired, that the reach of the waters of the United States is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized."

Under the Forest Plan, wetlands are protected by their incorporation into non-development LUD. The Plan's Forest-wide standards and guidelines for beach and estuary fringe and riparian areas provide additional protection to wetlands. The Forest Plan also includes Forest-wide standards and guidelines specifically for wetlands, which

establish a requirement to "avoid alteration of, or new construction on, wetlands, wherever there is a practicable, environmentally-preferred alternative, considering the functions and values of wetlands as well as other non-wetlands ecosystems in the Project Area" (Forest Plan, chapter 4, "Wetlands"). Because the scientific information related to the effects of timber harvesting and reforestation on forested wetlands on four specific soil types (i.e., Kaikli, Kargeen, Kitkun, and Maybeso soil series) is incomplete, harvesting on these four forested wetland soils is to be avoided. Because it is not always possible to identify small inclusions of these soils within a larger area of another soil type, instances where two acres or less of these soils are harvested unintentionally is allowed (TLMP ROD, 1997).

Wetland Types Within The Project Area

Wetlands were identified in the Project Area using USFWS National Wetland Inventory (NWI) maps and field reconnaissance using Corps of Engineers three-parameter system described in the U.S. Army Corps of Engineers Wetlands Delineation Manual (COE 1997). Following the field reconnaissance, the NWI GIS database was revised in order to generate wetland maps. These maps were used to quantify the acreage of wetlands in harvest units and along the proposed road segments.

The major types of wetlands in the Project Area are made up of both forested sites on poorly drained organic and mineral soils and nonforested, herbaceous plant-dominated sites on organic soils (muskegs or peatlands) (Table 3-38). Forested wetlands (palustrine forested) or wetland complexes dominated by trees make up approximately 10 percent of the Project Area. Muskegs (palustrine emergent) or muskeg-dominated complexes cover approximately 6 percent and shrub wetlands (palustrine scrub-shrub) make up less than 1 percent of the Project Area. Small estuaries including muddy subtidal areas and riverine-associated wetlands each make up less than 1 percent of the Project Area. Deepwater habitats, including non-wetland areas (lakes and ponds), cover almost 2 percent of the Project Area (consisting mostly of Virginia Lake).

Table 3-38.
Wetland Areas within the Project Area

Wetland Type	Wetland Acres	Percent of Project Area in Wetlands
Estuarine Emergent	17	0.0%
Estuarine Unconsolidated Bottom	43	0.1%
Lacustrine Unconsolidated Bottom	710	1.6%
Palustrine Emergent	2580	5.8%
Palustrine Forested	4240	9.6%
Palustrine Scrub-shrub	219	0.5%
Palustrine Unconsolidated Bottom	52	0.1%
Palustrine Unconsolidated Shore	1	0.0%
Riverine Unconsolidated Bottom	63	0.1%
Total	**7,925**	**18.0%**

The biological significance of a wetland is related to the value of its functions, and at least in part to the relative scarcity of the wetland type in the landscape. This is especially true in terms of biological diversity on the landscape scale. The relatively scarce fens,

estuarine salt marshes and lakes are assumed to have a greater biological significance than the more common bogs and forested wetlands, which are widespread throughout the landscape.

Watersheds affected by project activities that contain the highest overall percentage of wetland habitats are generally found within the western portion of the Project Area and include Gypsy Creek (63 percent), Jenkins Cove (54 percent), the small coastal (000Z) watersheds (28 percent combined), and Virginia Lake (16 percent). Muskeg and sedge wetlands that provide valuable wildlife habitat were found associated with Porterfield Creek east of Virginia Lake, and within the Moose Creek watershed. Muskeg habitats are found interspersed with forested wetland and forested upland habitats throughout the Project Area.

Salt or Marine Estuary Wetlands (Estuary*):* These unique ecosystems are located at the interface of freshwater, terrestrial, and marine environments. They typically have poorly drained mineral soils that have higher pH values and nutrient contents than other wetland types. Vegetation in these areas is generally dominated by salt-tolerant sedge communities (*Carex sp.*). Estuaries support marine invertebrates such as clams and crabs, saltwater fish and anadromous fish. These species, in turn, support a wide variety of wildlife, including waterfowl, wading birds, bald eagles, small mammals, and bears.

Forested Wetland (Palustrine Forested*):* Wetlands dominated by trees and understories consisting of scrub shrubs, mosses, and sedges. Dominant tree species include yellow cedar (*Chamaecyparis nootkatensis*), mountain hemlock (*Tsuga mertensiana), western hemlock (Tsuga heterophylla*), and shore pine (*Pinus contorta*). Dominant understory shrubs and herbaceous species include huckleberries (*Vaccinium* sp.) and skunk cabbage (*Lysichiton americanum*). Soils are typically very poorly drained organic soils or poorly and very poorly drained mineral soils. Forested wetlands are typically interspersed with open moss muskegs or other types of wetlands as described below and can perform a variety of functions.

Muskeg Wetlands (Palustrine Emergent)*:* Wetlands found from low to high elevation which produce and deposit organic matter at a greater rate than it is decomposed, leading to the formation of peat. Site factors that influence the hydrology of peatlands include shallow groundwater, poorly drained organic soils, topography, and vegetation (Brooks, 1992). These factors lead to a low level of microbial activity in the soil. Muskegs function as areas for recharge of groundwater and streams, and for deposition and storage of sediment and nutrients. Tree cover is less than 15 percent, consisting mainly of shore pine (*Pinus contorta*), mountain hemlock, and yellow cedar. Common shrubs include Labrador tea (*Ledum groenlandicum*), crowberry (*Empetrum nigrum*), and huckleberry. Common non-woody vegetation includes sphagnum mosses (*Sphagnum sp.*) or sedges (*Carex sp.)*

Sedge Fen (Palustrine Emergent): These wetland types are very similar to muskegs, but usually receive some drainage from surrounding mineral soil. These types of wetlands are generally slightly minerotrophic sites where peat is formed mainly from sedges or other plants. Fens can also function as recharge of groundwater and streams and because discharge at these sites remains relatively consistent throughout the summer; they can be particularly important for maintaining streams during dry periods.

Alpine and Subalpine Wetlands (Palustrine/Riverine Emergent and Scrub-shrub): Subalpine wetlands are bogs that occupy the sloping to steep summit of mountains. Dwarf shrubs, low sedges and various forbs typically dominate them. Trees are generally scattered and stunted and include mountain hemlock, yellow cedar with lessor amounts of

shore pine. Soils are typically poorly and very poorly drained shallow organic soils over bedrock. Runoff from these sites can function as recharge for streams located within lower elevations of the landscape.

Lacustrine (Ponds and Lakes) and Riverine (River and Streams) Associated wetlands: These wetland types include deepwater habitats (lakes and ponds) and wetlands associated with the floodplains of river and stream systems. These areas may be partially non-vegetated (unconsolidated bottom), or may contain emergent, scrub-shrub or forested vegetation. Common emergent vegetation includes sedges and rushes. Scrub-shrub and forested vegetation is commonly made up of alder (*Alnus rubra* and *Alnus sitchensis*).

General Impact Mechanisms

Timber harvest and associated activities such as road construction and use can affect wetland sites in a variety of ways. These can include altering disturbance regimes, altering successional rates and pathways, altering hydrologic regimes, and altering nutrient/chemical cycles.

Effects on wetlands resulting from the action alternatives can be divided into two categories: permanent loss (long-term) and disturbance (short-term). Road construction results in the filling of wetlands creating a permanent loss of wetland habitat. Timber harvest in wetlands would result in short-term vegetarian changes.

For the purpose of wetland impact analysis within this section, harvest prescriptions were combined into two groups that include the area to be clearcut with reserves (10 percent minimum retention) and the area being selectively cut or patchcut (50-70 percent minimum retention). Descriptions of the individual harvest scenarios can be found in Chapter 2.

Alternatives Comparison

Alternative 1 is a no-action alternative and, therefore, would have no direct or indirect effect on wetland resources. Of the remaining alternatives, the greatest wetland area within harvest units occurs under Alternative 3 (424 acres) followed by Alternative 4 (419 acres), Alternative 2 (360 acres), and Alternative 5 (281 acres) (Table 3-39). Even though the greatest number of wetland acres would be affected under Alternatives 3 and 4, the amount affected totals five percent of the wetland acres in the Project Area (Table 3-39). Additionally, less than 0.5 acre of wetlands would be directly impacted by road construction under any of the alternatives (Table 3-40).

It is important to note that harvest activities would mainly directly impact forested wetland sites. Due to the lack of commercial timber within muskegs or other non-forested/scrub-shrub wetland habitats, these areas would not be harvested. Revegetation of forested wetlands sites is expected to occur in the same time frame as other forested sites, usually within 3 to 5 years. Consequently, long-term effects on forested wetlands are expected to be minor. Timber site productivity on wetland soils, however, is typically lower than on better-drained sites. Growth rates on wetland sites are expected to be slower than non-wetland sites, and merchantable timber may not be available in a 100-year rotation.

Wetlands associated with riparian habitats, and muskegs, were avoided to the greatest extent possible when flagging road routes in the field. However, in some instances,

Table 3-39.
Acres of Harvest on Wetlands under the Alternatives

	Alternative 2			Alternative 3			Alternative 4			Alternative 5		
Wetland Type[1/]	Total Acres	Clearcut	Selection harvest	Total Acres	Clearcut	Selection harvest	Total Acres	Clearcut	Selection harvest	Total Acres	Clearcut	Selection harvest
PFO (4240 acres)	327 (8%)	113 (3%)	214 (5%)	398 (9%)	49 (1%)	349 (8%)	394 (9%)	0 (0%)	394 (9%)	268 (6%)	113 (3%)	155 (4%)
PSS (219 acres)	5 (2%)	0 (0%)	5 (2%)	4 (2%)	0 (0%)	4 (2%)	4 (2%)	0 (0%)	4 (2%)	3 (1%)	0 (0%)	3 (1%)
PEM (2580 acres)	28 (1%)	7 (<0..5%)	21 (1%)	22 (1%)	3 (<0.5%)	19 (<1%)	21 (1%)	1 (<0.5%)	20 (1%)	10 (<1%)	4 (<0.5%)	6 (<0.5%)
Total (7925 acres[2/])	*360 (5%)*	*120 (2%)*	*240 (3%)*	*424 (5%)*	*52 (<1%)*	*372 (4%)*	*419 (5%)*	*1 (<0.5%)*	*418 (5%)*	*281 (<4%)*	*117 (1%)*	*164 (2%)*

1/ PFO-Palustrine Forested, PSS= Palustrine Scrub-Shrub, PEM= Palustrine Emergent.
2/ Includes total acreage of wetlands within Project Area.

Table 3-40.
Length and Area of Wetland Impact From Roads Under the Alternatives

Roads in Wetlands Wetland Type[1/]	Alt. 1	Alt. 2	Alt 3	Alt 4	Alt 5
PFO	0	5.9	2.0	0.1	5.5
PSS	0	0.2	0	0	0.2
PEM	0	0.4	0.2	0	0.3
Total Length	0	6.5	2.2	0.1	6.0
Total Acres[2/]	0	39.4	13.3	0.6	36

1/ PFO-Palustrine Forested, PSS= Palustrine Scrub-Shrub, PEM= Palustrine Emergent.
2/ Assumes a 50 foot ROW

wetland areas could not be avoided due to topographic/engineering constraints encountered during road layout. The filling of wetlands by associated road systems poses the greatest direct effect of wetlands from project implementation. The construction of roads permanently removes the roaded portions of wetlands from production. Additionally, sedimentation from road construction and use has been found to indirectly impact wetland ecosystems (Stoeckeler, 1967; Boelter and Close, 1974). Table 3-40 shows the miles and acres of road construction on wetlands, by wetland type, under the alternatives. A maximum area permanently covered by road fill was calculated using a width of 50 feet, although it is recognized that the width of road fill may be substantially less in some areas depending on site conditions. Overall, the largest impact on wetlands from roads would occur under Alternative 2 followed by Alternative 5.

Forest-wide Standards and Guidelines require that beaches and estuaries be buffered by 1,000-foot no-harvest zone. Road construction should avoid this buffer but can occur within it when there is no suitable alternative. Two LTF sites are located along the beach and estuarine zone in the Project Area (Jenkins Cove and Moose Creek). These areas do not occur within estuarine habitats, but do occur within beach fringe. Small areas of beach fringe would be directly impacted by LTF construction. Adjacent beach fringe and estuarine habitats may be slightly impacted by increased organic matter (wood debris)

that may be transported to these habitats from the LTF sites by ocean currents. Additionally, sediment from associated road construction and mass-wasting relating to upslope timber harvest that enters streams will eventually be delivered to the estuarine zone. Estuaries are natural deposition zones for fine-grained sediments and all aquatic organisms are adapted to this process. Therefore, except for the direct effects on the beach fringe zone area at the two LTF sites, all alternatives would have minimal biologic effects and should not adversely affect biotic populations in beach fringe and estuarine areas.

Cumulative Effects

Future harvest entries, road building, and road use by the Forest Service and the State of Alaska on State lands within the Project Area would likely continue a low to moderate disturbance level on wetlands in several of the watersheds. Cumulative effects on wetlands would be proportional to the level of harvest and road building that occurred. Table 3-41 shows the maximum percent of wetlands currently included in harvest units within Project Area watersheds. It should be noted that most harvest units have prescriptions that remove 50 percent or less of the timber volume. Thus, wetland effects are not as high as are indicated in the table and so the table represents a worst case scenario. The highest cumulative effects to wetland systems from harvest and roading on National Forest lands would occur in Jenkins Creek (AA6A) and the small coastal (000Z) watersheds (primarily 0Z04). Overall, due to the relatively low intensity of harvest and low acreage of wetlands affected by the alternatives, significant cumulative effects on wetland resources are not anticipated from proposed project activities. Additionally, revegetation of forested wetland sites generally occurs in the same time frame as other forested sites, usually within 3 to 5 years. Consequently, long-term effects on forested wetlands are expected to be minor.

Table 3-41.
Maximum Acres of Wetlands Affected by Harvest Under the Action Alternatives (Alternative 2) Relative to Existing Wetland Acres

Watershed	Watershed Acres	Existing Wetland Acres[1/]	Wetland Acres Affected by Harvest[2/]	Percent of Wetlands Affected[3/]
A13A	1050	221	1	0.3%
AA7A and A09A	1050	173	5	5.4%
Glacier Creek	8,924	1,219	1	0.1%
Moose Creek	5,004	286	4	1.4%
Virginia Lake	2,662	426	10	2.3%
000Z [4/]	3,102	757	96	12.6%
Gypsy Creek	2,812	1,775	117	6.6%
Jenkins Creek	905	489	132	26.7%
00Z4	878	474	71	15%
00Z5	1,112	277	21	7.5%

1/ Acres of wetlands within watershed.

2/ Wetland acres within harvest units under the alternative with maximum harvest acreage. Note that most harvest units have prescriptions that remove 50% or less of the timber volume.

3/ Percent of wetlands affected by harvest under the proposed alternative.

4/ 000Z watersheds combined.

The State lands that are west of Virginia Lake may be harvested and roaded in the future although there are no harvest plans within the next 10 years. Depending on the degree of harvest and road building, these actions may impact wetlands that occur within watersheds associated with these areas (0Z04, 0Z03, Virginia Lake (A07D), 0Z02, A06A, and 0Z01). The most significant effect would occur from roading within wetland areas since this would permanently adversely impact wetland sites. The percent loss due to road construction within watersheds is presented in Table 3-42. Cumulative effects on wetlands from road construction would be minimal due to the low acreage loss within the watersheds. Also note that these figures represent maximum acres because Alternative 2 develops the maximum road mileage and the average wetland filling width associated with road construction would be less than 50 feet.

Table 3-42.
Maximum Acres of Wetlands Affected by Road Construction Under the Action Alternatives (Alternative 2) Relative to Existing Wetland Acres

Watershed Name	Watershed Acres	Current Wetland Acres	Miles in Wetlands	Acres of Wetland Loss[1/]	Percent of Wetland Acres Affected[2/]
000Z[3/]	382	153	2.6	15	9.0%
Virginia Lake	2,662	426	0.08	0.4	0.2%
Gypsy Creek	2,812	1775	2.45	14	0.8%
A14A	5,004	286	0.04	0.2	0.8 %
Jenkins Creek	905	498	1.11	6.4	1.2%
AA7A	202	29	0.21	1.2	4.0%

1/ Assumes a 50-foot right-of-way. Note that the actual width to be filled is expected to be less than 50 feet.
2/ Percent of wetlands within watershed affected by road construction.
3/ 000Z watersheds combined.

Lands

General

The majority (approximately 42,800 acres) of land in the Project Area is National Forest System land. There is also state land (approximately 1,300 acres) in the Project Area, located on either side of Mill Creek between saltwater and the southwestern part of Virginia Lake. The Forest Service has an easement with the state for the Mill Creek Trail. State lands also extend north of the Project Area to include the area around the mouth of Crittenden Creek. There is one parcel (approximately 50 acres) of private land in the Project Area associated with a mine in the upper Porterfield Creek drainage.

The National Forest System land in the Project Area has been assigned six LUDs in the Forest Plan (Table 3-43). All of the LUDs except Old Growth Habitat permit some timber harvest in varying amounts. Timber production is one of the primary emphasis areas for two of the LUDs, Timber Production and Modified Landscape. Figure 3-4 depicts the locations of the LUDs in the Project Area.

In recent years, the state identified several potential timber sales in the vicinity of the Madan sale. These potential sale areas were identified as; the Virgin Point sale (located at the very southern portion of the state land adjacent to the Madan project); and the Mill Creek sale (located north of Mill Creek and adjacent to the Madan sale area); and the Crittenden Creek sale (located north of the Mill Creek sale area).

Table 3-43.
Land Ownership and Land Use Designations (LUDs) Within the Project Area

Ownership	Land Use Designation (National Forest System lands)		Acres
National Forest System			
	Old Growth Reserve		3,193
	Semi-Remote Recreation		43
	Recreation River		3,201
	Scenic Viewshed		16,107
	Modified Landscape		16,654
	Timber Production		3,605
		Sub total	**42,803**
State and Private			1,376
		Total	**44,179**

The Alaska Department of Natural Resources is in the process of planning for future land use on state lands in southeast Alaska. Until all the lands are classified, they will not be scheduled for timber harvest. Of the potential sale areas in the vicinity of the Madan project, the Crittenden Creek sale is considered the most likely to occur and it would probably not occur for at least 10 years (personal communication, J. Elasier, Juneau Area Forester, Alaska Department of Natural Resources, 1999).

All alternatives associated with the Madan Timber sale would be consistent with the Forest Plan. All standards and guidelines for each LUD included in the Forest Plan would be followed.

Wild and Scenic Rivers

The Recreation River LUD that encompasses the Virginia Lake and Creek system begins at the edge of state lands, continues up Mill Creek to Virginia Lake, and extends beyond Virginia Lake up Porterfield Creek. The entire proposed corridor is approximately nine miles in length and encompasses 3,240 acres of National Forest System land. The river was recommended for Recreation River designation in part, to allow for potential future road development. Recreation River designation would permit timber harvest adjacent to and within the corridor as long as VQOs are met, and as long as the adjacent LUD permits timber harvest.

None of the alternatives would place any harvest units within the 0.25-mile corridor of the Virginia Lake and Porterfield Creek system. Alternatives 2 and 5 would place harvest units approximately 0.25 mile from the south shore of Virginia Lake. However, the units would have a harvest prescription that would not be noticeable from the lake.

Roadless Areas

The Madan Roadless Area (Roadless Area 204) contains 69,757 acres. All of the Project Area is contained within this Roadless Area.

The Forest Plan assigned various LUDs to the area that includes the Madan Roadless Area that would allow varying amounts of road development. The LUDs are Old Growth Habitat, Remote Recreation, Scenic Viewshed, Semi-Remote Recreation, Timber Production, and Wild, Scenic and Recreation River.

All of the alternatives, except Alternative 1, would introduce roads into the Madan Roadless Area and would be consistent with the Forest Plan. Alternative 2 would change the greatest amount of unroaded area and Alternative 3 the least.

From a cumulative perspective, the introduction of roads into the Project Area would not have a great effect on unroaded areas in the Tongass National Forest. Although the Forest Plan did not recommend any Roadless Areas for Wilderness designation, 90 percent of all currently unroaded areas will still be unroaded at the time of the next Forest Plan revision, assuming that all roadless areas become roaded in the same proportion as in the past. Therefore, the alternatives examined for the Madan Timber Sale will add little cumulatively, to the loss of unroaded areas in the Tongass National Forest.

Heritage Resources

Heritage resources generally represent past human activities. While the Project Area is close to the mouth of the Stikine River and adjacent to a site identified as an early Stikine Tlingit village, relatively few heritage resources were identified during heritage resource surveys for the project. The archaeological team recorded three heritage resource sites in the Project Area, including a shell midden of cultural origin (Site 49-PET-461), an intertidal, wood stake fish weir complex (Site 49-PET-462) with a nearby Culturally Modified Tree (CMT), and a short-term campsite with petroglyphs (Site 49-PET-463). Forest Service staff from the Petersburg and Wrangell Ranger Districts and paleontologists from the University of South Dakota recorded a karst feature (friatic tube) (49-PET-482) within the Project Area containing a stone artifact, a bone tool, and a shell bead. Within the larger study area, there are previously recorded petroglyphs and a Tlingit village overlain by an historic mill (Site 49-PET-023) on State land.

After application of the eligibility criteria for the National Register of Historic Places, the Forest Service recommended to the Alaska State Historic Preservation Office (SHPO) that the three sites recorded during the inventory of the sale area and the karst feature (49-PET-482) are eligible (C. Jorgensen to J. Bittner, letter, 8 June 1999, Madan Timber Sale Planning Record). Based on the known presence of petroglyphs and historic material, plus the reported presence of the ancestral Tlingit village, the Forest Service and SHPO have concurred on the eligibility of Site 49-PET-023 (Waterfall Town) for the National Register. The SHPO concurred with the Forest Service determination that there will be no effect to Sites 49-PET-023, 49-PET-461, 49-PET-463 and the karst feature as a result of implementing any of the action alternatives. The Forest Service deferred making a determination of effect on the fish weir complex (Site 49-PET-462) until there is a more detailed design of a possible log transfer facility at Moose Creek. The Forest Service intends to make a determination of effect for Site 49-PET-462, in consultation with the SHPO and affected Indian Tribes, when a design is complete.

(Side bar for above paragraph: Five Sites Eligible to the National Register of Historic Places)

A discussion of previous heritage resource surveys can be found in the Madan Timber Sale EIS Cultural Resources Specialist Report (Greiser 1999), copies of which are at Forest Service offices, the Alaska SHPO, and the Wrangell Cooperative Association (the

Federally recognized Indian Tribe with traditional ties to the Project Area). Generally, copies of these reports are not available to the public due to the sensitive nature of heritage resources and the need to protect them. The earlier heritage resource work provided a starting point for the planning and implementation of the current heritage resource inventory. The heritage resources study for the Madan Project Area was designed to satisfy federal and state resource management legislation as summarized in regulations prepared by the President's Advisory Council on Historic Preservation (Advisory Council), entitled, "The Protection of Historic and Cultural Properties" (36 CFR, Part 800). These regulations encompass the requirements of Section 106 of the National Historic Preservation Act of 1966 (as amended), the National Environmental Policy Act of 1969, and FSM 2300, among other laws and regulations. The heritage resource inventory plan, consistent with Forest Service and Alaska Heritage Resource Survey (AHRS) guidelines, included pedestrian examination of the ground surface, along with subsurface investigation where necessary, to recover adequate data to assess the potential for significant resources in the Project Area.

Heritage resource standards and guidelines developed and refined over the past several years by archaeologists on the Tongass National Forest and incorporated into a Programmatic Agreement with the Advisory Council and the Alaska SHPO define high and low sensitivity zones based upon the probability that they may contain heritage resources. The heritage resource study was conducted following the definition of high sensitivity zones that includes "All land between lower low water and 100 feet of elevation, with no consideration of slope." High sensitivity areas include: passes; portages; Class 1 streams and lakes, including areas of barrier falls; fossil beaches or terraces; areas of caves or rockshelters; myth or legend sites; raw material source areas; lode or placer mining areas; and areas identified by historical, ethnographic, or oral history research. "The low sensitivity zone on the Tongass National Forest and immediately adjacent lands includes all land not relegated to the high sensitivity zone (Programmatic Agreement 1995)."

In July of 1998 archaeologists conducted an inventory for heritage resources on approximately 700 acres within the Project Area. The inventory initially focused on several proposed harvest units (all located in the low sensitivity zone) and along proposed roads in high sensitivity zones. No new heritage resources and only one CMT were located during intensive inventory of about 200 acres in or adjacent to harvest units or road. However, one site located along the shore is near the proposed log transfer facility at the lower end of the proposed Moose Creek road (49-PET-462). As inventory of the proposed harvest units and roads neared completion, approximately 500 additional acres were surveyed in a continuous strip along the shoreline from north of Berg Bay to the boundary with State of Alaska lands at the north end of the Project Area. Inventory in these high sensitivity areas resulted in the location and evaluation of two other previously unrecorded sites (49-PET-461 and 49-PET-463).

Environmental Effects

Forest Service and State of Alaska, Office of History and Archaeology general objectives for undertakings such as the Madan Timber Sale are to document heritage resources and to preserve and protect National Register eligible resources. Where avoidance and *in situ* preservation are not viable management options, measures are implemented to recover data as a way of mitigating adverse effects to significant heritage resource properties.

Direct effects on heritage resources may result from activities such as road building, logging, or construction of log transfer facilities. While natural processes, such as erosion and redeposition, can also adversely affect heritage resources either by covering the resources with sediment or uncovering and washing away resources when a channel changes, such processes can be accelerated by logging-related activities. Indirect effects on heritage resources, such as changes in stream flow or sediment loads, vandalism, or disturbance to the resources resulting from increased access to an area, may result from logging and road building.

Alternative 1 would result in no effect on known heritage resources in the Project Area. Construction of both the proposed Moose Creek road and the proposed log transfer facility west of the mouth of Moose Creek under Alternatives 2, 3, and 4 could indirectly impact Site 49-PET-462 and the nearby CMT (depending on the LTF final design. The remains of the fish weir site, used by early Native peoples, could sustain indirect impacts such as changes in channels or unauthorized collection of cultural material. Under Alternative 5, neither construction of the Moose Creek road nor the log transfer facility west of the mouth of Moose Creek would occur. Therefore, this alternative would result in no effect on known heritage resources in the Project Area.

(Side bar for above paragraph: Potential Effects to Eligible Site from Construction of Moose Creek Road and LTF.)

The preferred management approach for heritage resource sites by the Forest Service and other agencies is avoidance. Thus the preference for final design of the proposed Moose Creek Road and LTF, is to redesign to avoid Site 49-PET-462. For all action alternatives, logging operators and road crews would be urged to avoid moving logs or equipment near shore areas to minimize impacts to shoreline sites and to stay within cleared rights-of-way and log transfer facilities. Specific mitigation measures, such as controlled testing and data recovery, would be developed and incorporated into the project design if avoidance of impacts to the fish weir site is not feasible.

Avoidance and preservation concerns should be addressed through final design of the Moose Creek road and LTF to avoid Site 49-PET-462, and monitoring during road building and logging activities by heritage resources personnel. If avoidance is not feasible or practicable during project implementation, mitigation of impacts to the sites through data recovery would need to be undertaken. Data recovery plans would be based on the qualities that make the sites eligible for the National Register. Data recovery can include archival research, interviews of local people regarding use of the area, detailed recording of surface features, or excavation of subsurface portions of a site. If disturbance occurs or is imminent, heritage resource personnel will develop a plan to protect properties or mitigate the effects of any impacts.

In cases where development is planned in areas of high heritage resources sensitivity or in the vicinity of known heritage resources, the Forest Service should develop and implement a plan for monitoring known, significant resources and monitoring for and recording previously unknown sites, if they are located. If the monitoring program documents effects to sites, then measures should be developed to mitigate those effects.

This Draft EIS summarizes existing knowledge of heritage resources within the Project Area. It is possible that the public is aware of heritage resources the team has not considered in the analysis. Our intent with this Draft EIS is to solicit the views of Alaska Natives and other interested persons who may have information about heritage resources in the Project Area. On April 8, 1999 the Wrangell District Ranger, planning staff officer, and archaeologist met with the Wrangell Cooperative Association IRA Council. The

Forest Service shared general information about the timber sale analysis and specific information about the heritage resource study. The Council did not express concern about effects to heritage resources as a result of the proposed timber sale.

Cumulative Effects

Impacts from natural decay, landscape changes, private developments, and timber management activities potentially result in the loss of nonrenewable heritage resources in Southeast Alaska. Development activities of all kinds pose particular threats to heritage resources because such activities tend to be located in the same places that heritage resources are found, such as sheltered coastal settings.

It is impossible to determine the exact nature of resources that may have been previously disturbed in Project Area. Intensive heritage resource investigations and mitigation measures have been implemented only since the 1980s. The implementation of updated research and survey designs based upon the results of previous work and current methods and techniques, combined with various mitigation measures, will preserve significant properties and provide data that will guide future research and management activities. In addition, current Forest Service management approaches for Beach Fringe/Estuary and Stream/Lake Protection will benefit heritage resources through decreased activity in high probability zones and reduced indirect effects, such as erosion or deposition of sediments, on heritage resources located in or near drainages or beach fringe areas.

There are currently no other timber sales under way or planned in or near the Project Area; thus, cumulative effects to heritage resources should be insignificant..

Socioeconomics

The Madan Project Area is located approximately 15 miles southeast of Wrangell, Alaska. Although Wrangell is the closest community to the timber sale area, Petersburg (about 67 miles to the northwest of the Project Area) also could experience some socioeconomic effects from the proposed sale. This discussion is drawn primarily from the Community Profiles and Socioeconomic Resource Report (Downs and Galginaitis 1999) and the TLMP "Economic and Social Environment" section, and Appendix H (USDA Forest Service, 1997b). The interested reader is referred to these documents for a more detailed treatment of the timber sector and its community (and regional) context.

Both Petersburg and Wrangell have diverse private sector economies, but Petersburg, displays a much more robust economy. In terms of those economic sectors most reliant on the use of local natural resources potentially affected by the proposed action (fishing and fish processing and recreation and tourism as well as timber), there are some differences between the communities. Petersburg's economy is more dependent on fishing, especially fish processing, and recreation and tourism, while Wrangell's economy has a greater timber dependence. Thus, while Petersburg shows a greater economic diversity than Wrangell, the latter has a broader timber business base. Small-scale timber operators are important in both communities, but produce more value-added product in Wrangell than in Petersburg. The economic dependence of specific communities upon timber supply is addressed in the revised TLMP regional and subregional discussions (USDA Forest Service, 1997b). The sensitivity of smaller communities to changes in the timber sector, especially mill closures, is a major point. This information is a component

of the Forest Service estimate of future demand for timber from the Tongass National Forest (Appendix A).

Petersburg

Petersburg has a moderate population by Alaskan standards (3,398 in 1998), but is relatively large in terms of geographical size. Petersburg has no road connections to other communities, but Mitkof Island has a developed road network due to past and ongoing timber harvest activities.

Petersburg's economy has been historically been based on commercial fishing and timber harvests. Government sector employment and recreation/tourism activities have become increasingly important as the fishing and timber sectors have experienced some difficulties.

The most recent systematic survey of community subsistence harvest and consumption dates from 1987. In terms of edible harvest, fish constituted 45 percent of the 1987 total harvest, deer 22 percent, invertebrates 17 percent, mammals other than deer 9 percent, plants 4 percent, and birds 3 percent (Betts et al. 1992). Salmon made up about 50 percent of the 1987 community fish harvest. The principal method of subsistence harvest of fish for Petersburg residents is rod and reel, and takes place close to the community. Petersburg residents also trap relatively close to their community, primarily on Mitkof Island but also using other nearby lands. They do not trap the Madan Project Area. More recent data indicate there currently is no documented subsistence harvest of deer or other subsistence species by Petersburg residents from the Madan Project Area. The interested reader is referred to the Subsistence Resource Report (Galginaitis and Downs 1999a).

Wrangell

The community of Wrangell is located on the northern tip of Wrangell Island, about 155 miles south of Juneau, 40 miles south of Petersburg and 89 miles northwest of Ketchikan. Wrangell is a geographically dispersed community, although historical Wrangell is relatively concentrated and development outside of this area is comparatively recent. Wrangell is still important as a trading or "service" center, but the fishing and timber industries brought a measure of diversity and stability to the community. By 1916, fishing and forest products had become primary industries.

Cohen (1989) stated that the Wrangell of 1989 contained much the same mix of industry and services as the newly incorporated Wrangell of 1903. However, with the 1994 closure of the largest mill in town (which has recently reopened on a smaller scale), the mainstay of the local timber economy vanished overnight. After many years of continuity, Wrangell as a community is now in a position of trying to redefine its economic center. While Wrangell offers a deep-water port, both large and small cruise ship dockings were expected to total only 27 during 1998. Other tourism related enterprises, such as flightseeing and boat-based tours and charter sports fishing, are present in Wrangell. These businesses vary in the strength of their dependence on cruise ship passengers for their customer base. Government-related employment is a relatively large and important component of the local economy. City positions include employment by the City of Wrangell (50 jobs), Wrangell School District (80 jobs), and Wrangell General Hospital (45 jobs); local employment by state agencies (25 jobs) include positions through Health and Social Services, Fish and Game, Transportation, and Public Safety; and local federal employment (50 jobs), includes positions with the Forest Service, Postal Service, and Customs (City of Wrangell 1998).

Available total population figures for the City of Wrangell are tabulated in Downs and Galginaitis (1999). The 1997 Department of Community and Regional Affairs estimate was 2,543 residents of the community. According to the US Bureau of the Census (1990), Wrangell's population was 17 percent Native American in 1990.

Wrangell is important as a regional service center for trade and transportation. The available statistics do not demonstrate the seasonality of Wrangell's economy, but most significant economic activities peak in the summer. While fishing is important to Wrangell's economy, Wrangell residents do not earn as much from fishing as do residents of some other communities in the region. Thus, wage jobs are especially important in Wrangell. The last comprehensive description of Wrangell's economy is Cohen (1989), but the same general pattern persists through the present. The major changes are the decline of the timber sector and the increase in the tourism sector (Galginaitis and Downs 1999; Rushmore 1998, 1999). Cohen (1989) indicates that in 1987, the largest single employer in Wrangell was Wrangell Forest Products (174 to 197 employees). In 1987, four fish processors operated in Wrangell and employed 185 people during the peak season (with very few employees retained during off-season periods). Wrangell also has a developed secondary economy, which serves to multiply the economic importance of the base industries. In terms of relative contribution to Wrangell's economy, the most important sectors are indicated to be government (26.5 percent), timber (20.8 percent), fishing (20.2 percent), and transportation (10.3 percent) (Gove 1988 cited by Cohen 1989:29). Timber has substantially declined in terms of percentage since then.

The most recent systematic survey of community subsistence harvest and consumption dates from 1987. In terms of edible harvest, fish constituted 45 percent of the 1987 total harvest, deer 12 percent, invertebrates 25 percent, mammals other than deer 10 percent, and other resources 8 percent. Of the total Wrangell 1987 subsistence fish harvest, 70 percent was taken by rod and reel, while 16 percent was taken by commercial gear, and 14 percent by non-commercial gear. Non-salmon fish made up 59 percent of the community's fish harvest. More recent data, indicate that little community subsistence activity takes place in the Madan Project Area. The only documented harvest is the trapping of furbearers, which is not likely to be affected by the proposed action. Interviews determined that the Project Area is used for the harvest of a very low number of deer, but this pattern of use will also not likely be affected by the proposed action. The interested reader is referred to the Subsistence Resource Report (Galginaitis and Downs 1999a).

Overview of Local Commercial Timber Economy

With the close of the Alaska Pulp Company (APC) mill in Sitka in 1993, and the subsequent close of the Ketchikan Pulp Company (KPC) mill in Ketchikan, the largest users of Tongass National Forest wood were removed from the market. This has created some dislocations in the regional timber economy. The APC sawmill in Wrangell continued operations for a time, but eventually closed. Regional effects have no doubt had some influence in both Wrangell and Petersburg, especially when combined with the relatively poor performance of the fishing economy during this time. This is probably most obvious in terms of the number of smaller-scale operators (especially from Wrangell and Prince of Wales Island) that are expressing interest in timber sales offered in the Stikine Area that are relatively far from their base of operations, and this is especially true in the Petersburg Ranger District. Downs and Galginaitis (1999) list timber sales offered on the Stikine Area for 1993-1997 by volume and by the community of the highest bidder for each sale. Data presented in that same report indicates that while sales on the Wrangell Ranger District

predominated during this time period in terms of absolute number of sales (25 of 37 sales, or 68 percent of the total), more timber volume was offered on the Petersburg Ranger District (62 percent of the total volume). Thus, the average offering on the PRD was over four times that on the WRD. This pattern can be expected to continue, based upon the projected distribution of ASQ among the ranger districts of the Tongass National Forest (Appendix A).

Sale awards were differentially distributed by community by the size of the sale. Sales less than 1,000 MBF were considered "small" and tended to be won by local bidders. Sales of 1,000 MBF or more were considered "large" and tended to be won by non-local bidders. Of the 37 sales offered, 26 were small sales, averaging 187 MBF, with a median of 132.5 MBF. The 11 large sales offered an average of 14,970 MBF, with a median offering of 11,439 MBF. No large sale offered less than 1,588 MBF. Wrangell bidders were awarded 16 of the 37 sales (43 percent), with 15 of these being in the small category. Ketchikan bidders were awarded seven of the 37 sales (19 percent), five in the large category and two in the small category. Petersburg bidders were awarded four of the 37 sales (11 percent), all of which were small sales. Other communities with sale awards were Craig (two large sales), Juneau (one large sale), Kake (one small sale), Sitka (one large and one small sale), Thorne Bay (two small sales), and Unknown (one large and one small sale).

Additional information presented in Downs and Galginaitis (1999) further differentiate between sales offered on the Petersburg and Wrangell Ranger Districts. Of the 25 sales offered on the Wrangell Ranger District (WRD), 19 (76 percent) were small sales. Of the 19 small sales, 13 (68 percent) were awarded to Wrangell bidders. Of the six large sales offered on the WRD, only one was awarded to a Wrangell operator. Of the 12 sales offered on the Petersburg Ranger District (PRD), seven (58 percent) were small sales. Of the seven small sales, four (57 percent) were awarded to Petersburg bidders and two (29 percent) to Wrangell bidders. All of the five large sales offered on the PRD were awarded to non-local operators.

Current Petersburg Timber Operations

The small-sales program on the Petersburg Ranger District, and more generally on the Stikine, has been relatively stable, and may have increased in response to the demise of the long-term APC contract. There are three active commercial sawmills currently in Petersburg. They have historically concentrated efforts on timber available on Mitkof Island. The Forest Service is not the only source of timber sought by local operators, and none of them use the same strategy in trying to locate timber or in the total design of their business enterprise. Petersburg timber operations are limited both in the size of offering on which they can bid and the distance from their mills they can go for timber. For the most part, they confine their efforts to relatively small offerings on the Petersburg Ranger District.

Current Wrangell Timber Operations

Timber operators in Wrangell consist of two relatively large operations (capable of milling over 500 MBF a month) and a collection of smaller operators. No operations comparable to these larger enterprises exist in Petersburg. Of the two larger operators, one is a reasonably long-term Wrangell enterprise. The other is new to Wrangell, but has had a longtime regional presence and operates in the old APC mill facilities. They share some characteristics, but differ greatly in others.

The two larger Wrangell timber operations not only mill timber but also chip wood to sell to outside markets. They also export other wood with minimal or no processing. Both operate regionally to some extent, primarily to better regulate their timber supplies. One relies more on state timber sales than on federal sales, but both have bid on relatively large federal offerings (25 MMBF). One has much more excess capability than the other, but this operation has no explicit plans to in use this excess production. The need of both operations for larger timber sales is consistent with the analysis of Stikine timber sale offerings in 1993-1997, discussed above, even though one of these operations is too new to be reflected in that information. This is also consistent with the analyses of the revised TLMP (1997b) and Appendix A.

The timber sector in Wrangell cannot be considered stable at the present time. The cancellation of the 50-year contract with APC and the closure of their mill in Wrangell severely reduced the size of the local timber economic sector and greatly affected the local economy, despite the fact that the closed mill subsequently reopened as a smaller-scale operation. The influx of federal relief funds, in compensation for cancellation of the long-term timber contracts, has assisted the overall community economy. Systematic information is lacking in this regard (C. Rushmore, City of Wrangell, personal communication, 1998 and 1999), but interviews with key people (timber operators, city officials, Wrangell residents) consistently elicited either that general statement of change or more specific examples which supported it (Galginaitis 1998a, Downs 1998). The long-term impact of these funds with respect to helping to diversify the community economy, as opposed to getting the community through a more immediate crisis, is still unclear.

Socioeconomic Effects

Given the discussion above regarding the local timber industry, a reasonable assumption is that it is unlikely that current timber operators in Petersburg will be significantly affected by the Madan sale. Petersburg timber operators have so far confined their activities to the general Petersburg region. As noted in the community profile, the overall role of timber in the economy of Wrangell has changed in recent years, with a drop in the volume of locally available timber, and a reduction in the number of timber-related and timber support service-related businesses. Even among the apparently most viable timber operations, as sketched above, the Wrangell timber economy is hardly static, and the competitive balance of the two larger local operators is far from clear. The Madan Timber Sale, by itself, will most likely affect the area through its effects on local timber operators. All local timber operators indicated that a reliable and predictable timber supply is most important to them in terms of economic viability. The Madan Timber Sale would contribute to the predictable timber supply (Appendix A) to the extent that local operators can bid on the offerings from the sale. The No Action alternative, by not offering additional timber, would have the greatest potential negative socioeconomic effects, by contributing to the continuation of negative trends in the local timber economy. To the degree the local timber economy is integrated with the larger economy of the community, negative socioeconomic impacts would be felt on the community level. All action alternatives have approximately the same potential for positive socioeconomic effects.

The differences in total volume offered in the various alternatives, considered in isolation, is not key in terms of producing measurable differences in potential socioeconomic effects. In contrast, the manner in which the total volume is offered (which is not specified in the alternatives, and would be a management function of the Wrangell Ranger

District) could make a significant difference in terms of potential socioeconomic effects. Timber operators differ in their capabilities. The large operators could bid on the total volume for any of the action alternatives, but would also be likely to bid on all offerings of the Madan timber sale, no matter how the total volume is divided up. Smaller operators may not be able to competitively bid on a large, single offering. Dividing the total sale into smaller offerings may enable smaller Wrangell operators to compete for some of the timber, providing that the offerings can be made economically viable in relation to the amount of road building needed for the volume offered. The amount of cable harvest vs. helicopter yarding and the distance of helicopter yarding to a landing are also factors affecting the economic viability of smaller offerings from the project. Historically, larger regional operators are most likely to bid on relatively large offerings within the Wrangell Ranger District, while smaller offerings are less attractive to them.

Subsistence

Section 810 of ANILCA requires a federal agency, having jurisdiction over public lands in Alaska, to analyze the potential effects of proposed land use activities on subsistence uses and needs. An ANILCA 810 analysis must include several components. First, the proposed actions must be analyzed to determine if they significantly restrict subsistence uses. This analysis must be concluded with a draft determination either of "no significant effect" or a determination that clearly describes possible effects. For any conclusion other than "no significant effect", formal ANILCA hearings must be conducted. Following these hearings, a final determination based on an analysis of the potential effects of the final proposed action must be published.

Evaluation criteria used to assess the effects of the alternatives are: 1) changes in abundance or distribution of subsistence resources; 2) supply and demand; 3) changes in access to subsistence resources; and 4) 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 alternatives. Wildlife, fish, shellfish, marine mammals, and other resources are evaluated. A complete Subsistence Resource Report (Galginaitis and Downs, 1999) has been completed and is in the planning record.

This discussion is drawn primarily from the Subsistence Resource Report. The interested reader is referred to this document for more detailed information on subsistence activities in the Project Area. The Subsistence Report also provides a discussion of subsistence management in Alaska in the context of the Alaska National Interests Lands Conservation Act (ANILCA) and federal/state conflicts. For federal management, only "rural" Alaskans are qualified subsistence users.

Community Subsistence Harvest

The Madan Project Area falls primarily within the aboriginal use areas identified for the community of Wrangell (Goldschmidt and Haas 1946: Wrangell Territory map). Residents of Wrangell, the community closest to the Project Area, are the primary contemporary subsistence users of the area. Petersburg residents do harvest subsistence fish resources in the Project Area, but there is no reported harvest of terrestrial resources in the area. There is no known subsistence use of the Project Area by residents of other communities.

Tongass Resource Use Cooperative Survey (TRUCS) maps indicate that Wrangell residents hunt the Project Area, and both Wrangell and Petersburg residents take subsistence salmon from waters near the Madan Project Area. Analysis of 11 years of ADF&G harvest information indicates that the Project Area is not heavily used for subsistence harvest activities (ADF&G 1998). Limited interviews were conducted to verify this low level of use (Galginaitis and Downs 1999). Organizations contacted to obtain potential respondents included the Wrangell IRA, the Wrangell Resource Council, the Southeast Alaska Federal Subsistence Advisory Committee, potentially affected city governments (Wrangell, Petersburg), ADF&G (Wrangell, Petersburg, Juneau) and the Forest Service (Wrangell, Petersburg). Specific subsistence interviewees were chosen primarily because of a high level of subsistence activity in general and potential specific knowledge related to the Madan Project Area.

Wrangell residents harvest a variety of subsistence resources, documented in most detail through the TRUCS of 1987 (Kruse and Frazier 1988, Kruse and Muth 1990, Kruse et al. 1988). In terms of edible harvest, fish constituted 45 percent of the 1987 total harvest, deer 12 percent, invertebrates 25 percent, mammals other than deer 10 percent, and other resources 8 percent (Betts et al. 1992, 1993). Of the total Wrangell 1987 subsistence fish harvest, 70 percent was taken by rod and reel, 16 percent was taken by commercial gear, and 14 percent was taken by non-commercial gear. Non-salmon fish made up 59 percent of the community's fish harvest. Salmon and other fish, thus, are an important subsistence resource. Petersburg displays a similar pattern but has no documented terrestrial harvest within the Madan Project Area or the WAAs of which it is a part.

Overall documented subsistence terrestrial harvest from the Project Area is quite low (Table 3-44). Deer and marten appear to be the most sought after terrestrial mammals.

Table 3-44.
Summary Total Harvest Statistics by VCU in the Madan Project Area for Regulatory Years 1987-1996 (10 years)[1/]

VCU	ADF&G GMU	ADF&G WAA	Wolf	Wolverine	Marten	Black Bear	Deer [2/]
502	1B	1810	3	0	36[3/]	0	12[4/5/]
504	1B	1811	0	2	8[6/]	3	7[7/]

[1/]The reported harvest for beaver, otter, and moose has been zero (0).

[2/]All deer from WAAs 1810 and 1811 were harvested by Wrangell residents.

[3/]23 of 36 marten taken from VCU 502 were taken between 1995 and 1997.

[4/]All deer harvested from WAA 1810 were taken in regulatory year 1988/89.

[5/]An additional 6 deer were harvested from WAA 1810 in regulatory year 1997/98.

[6/]All marten taken from VCU 504 were taken in the regulatory year 1995/96.

[7/]All deer harvested from WAA 1811 were taken in regulatory year 1993/94.

Source: Tom Paul, ADF&G Division of Wildlife Conservation, 1997.

Deer Harvest Within the Madan Project Area

The Project Area comprises relatively small parts of WAAs 1810 and 1811. WAA 1810 includes only VCU 502 portion of the Project Area and extends northward. WAA 1811 includes only VCU 504 portion of the Project Area and extends south and to the east. Only Wrangell residents reported harvesting deer from these WAAs. Wrangell's total community deer harvest over the 1987-1996 period was 4,027 deer, of which only 19 deer (0.5 percent of the total) were taken from these WAAs. Data for 1997 indicates that six

deer were harvested from WAA 1810, but none from WAA 1811. No subsistence harvest effects are likely as a result of the action alternatives.

It is important to recognize, however, that not all subsistence impacts are directly related to harvest levels. During field interviews, a limited number of hunters indicated that they hunted the Madan area on a reasonably regular basis. They judged that the deer population in this area is relatively small, but they still hunt there at times because it is a relatively accessible area where they see few, if any, other hunters. They know the probability of a successful harvest is low, but the "hunting experience" and the "quality" of the hunt is deemed high. If the timber sale was to decrease local deer habitat or radically increase or encourage more access, these hunters would experience negative effects. In their view, however, these consequences were not likely to occur, and potential access effects have been minimized as much as possible through access management restrictions for all action alternatives.

None of the action alternatives would significantly affect subsistence deer use in the Madan Project Area in terms of habitat effects. Further, none of the action alternatives can be differentiated in terms of such effects from the others. Deer habitat capability in the Project Area would decrease by 4 to 5 percent immediately after timber harvest, and by 4 to 6 percent by 25 years after timber harvest. Calculated "deer per square mile" would decrease from 13.5 before timber harvest to 12.8 to 13.0 immediately after timber harvest (see Issue 3, Wildlife). Deer habitat capability would range from 12.6 to 13.0 deer per square mile 25 years after harvest. The small decrease would have no effect on the already low level of subsistence use of the Project Area. The uncertainties associated with these estimates make the apparent differences between alternatives insignificant. The potential regional cumulative effects may be significant (discussed below), but cannot be differentiated by alternative and none of the alternatives would appreciably contribute to overall long-term regional cumulative effects.

The only available measures of deer numbers or habitat capability for community-wide subsistence use areas are those from the Forest Plan FEIS (1997). The FEIS notes that while 1995 estimates of deer habitat capabilities were 15 deer per square mile for WAA 1810 and 18 deer per square mile for WAA 1811, documented harvest was only one deer per year for WAA 1810, and less than that for WAA 1811.

Under Road Management Option A, Alternative 2 would have the greatest amount (approximately 15 miles) of roads open to motorized travel and the least amount (approximately 4 miles) occurs under Alternative 4. Road Management Option B would close all roads to motorized travel. Open roads could potentially increase hunting activity and competition in the area. However, subsistence use in the area is considered minimal, therefore, the effects of both road management options are expected to be insignificant.

Mountain Goat Harvest Near the Madan Project Area

No mountain goats are harvested within the Madan Project Area, but some are taken from the mountainous areas to the north and east. It is possible that the action alternatives could reduce habitat that these goats use in the Project Area. However, no significant effects are expected (see Issue 3 – Wildlife Habitats and Species of Concern).

Bear Harvest Within the Madan Project Area

Documented harvest of black bear from the Project Area is quite low, which is consistent with the limited interviews conducted in Wrangell and Petersburg. Most, if not all, bears

harvested from the Madan area are taken opportunistically while hunters are pursuing other game. None of the alternatives or the proposed action will affect the subsistence harvest of bears from the Project Area.

Furbearer Harvest Within the Madan Project Area

The take of marten in the last two years may indicate an increase in trapping effort. The few trappers who use the Madan area are residents of Wrangell. Their families have trapped the area for a considerable length of time and have essentially established usufruct rights through their community-recognized trap lines. Traplines are run using a boat, as all trapping in the area is on the beach or, in the case of marten, a short distance inland from the beach. Marten trapping could be affected, as marten travel routes could be more easily disrupted by timber harvest than those of other furbearers. However, even this potential effect is limited by the 1,000-foot beach fringe buffers required by the Forest Plan. Very few wolves or wolverines are harvested in or near the Madan Project Area. Thus, no significant subsistence effects are anticipated.

The construction and operation of log transfer facilities and equipment ramps at Jenkins Cove and near Moose Creek should not significantly affect the overall operation or success of current traplines. However, if these facilities function to increase access to the Madan area, trapping activities could be disrupted by other area users. Under Road Management Option A, most roads would be open to motorized use, thus potentially increasing access to the area. Under this option, Alternative 2 would have the most open roads (15 miles) and Alternative 4 would have the least (4 miles). Road Management Option B would close roads to motorized vehicles although mountain bikes and hikers would be allowed. Open roads could potentially increase trapping pressure in newly accessible areas. However, neither road management option is expected to have significant effects due to the minimal subsistence use in the area. Current informal community understandings regarding established use by specific individuals also limits the level of trapping effort in the area. Therefore, changes in access resulting from the action alternatives are unlikely to affect furbearer trapping in terms of increased competition.

Marine Mammal Harvest Within the Madan Project Area

There are no apparent effects from the action alternatives on either marine mammal populations or marine mammal hunting activities, so potential subsistence effects would be insignificant.

Fish Harvest Within the Madan Project Area

Fish are a significant resource for area communities, both commercially and for subsistence/personal use/home consumption. Fish generally comprise over 50 percent of total subsistence harvest by weight for any given community.

Currently, the State of Alaska manages the fisheries in and around the Madan Project Area. These fisheries consist primarily of gill net and purse seine commercial salmon fisheries in Earl West Cove and the Mill Creek area. State subsistence/personal use salmon fisheries in or near the Project Area also take place in Earl West Cove and the Mill Creek areas. State management of personal use/subsistence fishing had been evolving even before the recent break between federal and state subsistence resource

management orientations, primarily in the direction of fewer subsistence fisheries and more personal use fisheries (Bosworth 1991).

In the recent year with highest reported use, 1990, eight percent of Wrangell residents with subsistence/personal use fishing permits used Earl West Cove. Mill Creek is a higher use subsistence/personal use fishing area, especially for red salmon, but also for chum salmon. In 1995, fully 37 percent of all Wrangell area permit holders used Mill Creek. Most of this use dates from 1992 to the present, with use becoming heaviest after 1994 (Table 3-45). Despite the relative importance of these resources, no significant effects are expected from any of the action alternatives. The Earl West Cove fishery is a terminal salmon fishery on hatchery stock, which limits the potential environmental consequences of project-related activities. Under the action alternatives, the Mill Creek fishery would be adequately protected by Forest Plan standards and guidelines and by the limited harvest that would occur in the watersheds that feed Mill Creek (see Watershed and Fish Resources).

Table 3-45.
Summary of Personal Use/Subsistence Permits and Catch for 1988-1997, Wrangell Area (Earl West Cove and Mill Creek)

Year	Total	Earl West Cove						Mill Creek					
	Permits	Permits	Kings	Reds	Cohos	Pinks	Chums	Permits	Kings	Reds	Cohos	Pinks	Chums
1988	75	0	0	0	0	0	0	0	0	0	0	0	0
1989	92	1	Confidential					0	0	0	0	0	0
1990	112	9	24	0	121	0	20	0	0	0	0	0	0
1991	101	6	52	3	2	0	13	3	1	18	0	16	0
1992	118	0	0	0	0	0	0	16	3	169	0	4	21
1993	123	3	5	0	7	0	0	15	2	189	0	0	4
1994	122	3	3	0	0	0	7	40	5	442	1	4	42
1995	140	7	22	0	41	4	14	52	15	657	1	4	110
1996	126	5	7	1	15	0	10	41	19	441	1	6	341
1997	97	2	Confidential					29	5	251	2	21	85

Source: Gordie Woods, Alaska Department of Fish and Game, Wrangell (1998)

Cumulative Effects

Due to the low level of subsistence activity in the Project Area, the action alternatives would not have any significant effects on these activities. Potential long-term, interactive, or cumulative effects of all the alternatives are essentially equivalent because there are only minor differences (if any) in their potential consequences. All potential long-term, interactive, or cumulative effects are a result of natural conditions and regional dynamics to which the proposed actions have little, if any, contribution.

The Forest Plan FEIS (1997) concludes that, for Wrangell and Petersburg residents, the selected alternative would provide adequate deer to satisfy all demand for deer through the year 2005, within those areas that the communities normally use for most deer harvest. Sufficient deer to satisfy the demand from all rural hunters could be satisfied through the year 2095 for those same areas. The demand for deer for all hunters through the year 2095 will not be met for those areas most important to Wrangell and Petersburg hunters, but subsistence needs will continue to be met.

Future detrimental subsistence effects for Wrangell and Petersburg community subsistence use areas appear to be inevitable. They are not the result of the action alternatives for the Madan Timber Sale, and the action alternatives would contribute only

a very small and almost certainly unmeasurable amount to the potential cumulative effects. Rather, such cumulative effects will result from increased demand due to increased human population and the potential regional decrease in deer population resulting from harsher winter conditions. Even these cumulative regional effects should not affect or change the subsistence use patterns of the Madan Project Area.

For the main use area of Wrangell hunters (from which 75 percent of that community's deer are harvested), the Forest Plan FEIS (1997) concludes that its selected alternative will continue to provide sufficient deer habitat capability to satisfy the total demand for deer through 2005. It will also provide sufficient deer habitat capability to satisfy the demand for deer for all rural hunters through 2095 (Forest Plan FEIS, 1997). The same is concluded to be the case for the main use area of Petersburg hunters (Forest Plan FEIS, 1997). Non-rural hunters demand for deer in these areas is projected not to be met, in small part due to the long-term decline in deer habitat capability, but primarily due to the increased demand for deer through time due to increased human population throughout the region. Thus, in the absence of unforeseeable factors, effects on subsistence uses of the Madan Project Area are expected to be small or nonexistent.

ANILCA 810 Findings

These findings are based on the evaluations in the Subsistence Resource Report (Galginaitis and Downs, 1999) on abundance, distribution, supply and demand, access, and competition for harvested resources in the study area. The area is not an extensively used subsistence harvest area. There would be some decreases in habitat capability for wildlife under the action alternatives. However, the habitat would be capable of maintaining populations greater than projected harvest demand under all alternatives through the rotation. The effects on fish and shellfish populations are expected to be minimal and should not affect the supply available for subsistence harvest.

Although there may be slight long-term changes in access, the level of increased access is not expected to reduce subsistence harvests below historic levels, and the habitat capability should be sufficient to meet some, if not all, of the increased demand for deer. Alternative 2 would result in the construction of the most roads, followed by Alternatives 5, 3, and 4. No roads would be constructed under Alternative 1, which would therefore affect access the least. Under Road Management Option A most roads would be open to high-clearance vehicles. Option B would close roads to motorized vehicles although mountain bikes and hikers would be allowed. Closure of roads under Option B would further mitigate the effect of improved access. A substantial increase in competition for subsistence wildlife resources from non-rural community residents is not projected to result from the action alternatives.

Therefore, a finding that there would not be a significant restriction on subsistence uses is in order for wildlife, fish, shellfish, marine mammals, and other resources.

Irreversible and Irretrievable Commitments of Resources

Irreversible and irretrievable commitments of resources involves resources that would be affected, but that would not be returned or that could only return over long periods of time.

Use of petroleum fuels and rock sources for road and sort yard construction commits non-renewable resources. Alternative 1, the No Action alternative, has no effect on mineral resource use at this time.

Constructing roads in the Project Area would irreversibly reduce the amount of roadless area and opportunities related to the roadless character. Under Road Management Option B, these effects would be reduced because of the closure of roads to motorized use after harvesting is completed. Alternative 1 would not have these consequences.

Under all of the action alternatives, there would be an irretrievable loss of old- growth forest unless reharvesting is avoided for a period as long as 250 to 300 years. Due to increased fragmentation, other old growth areas adjacent to harvest units would have their habitat values reduced for those species that prefer interior habitat.

Energy Requirements and Conservation Potential of the Alternatives

The implementation of the proposed alternatives will require the expenditure of energy (consumption of fuel). The amount of energy used varies by alternative, based on the timber volume harvested, the type of harvest system used, the amount of road construction, and sale preparation and administration.

Fuel Consumption

Fuel Consumption requirements were estimated as follows:

Timber Sale Preparation and Administration	1.56 gallons per MBF
Cable Logging	2 gallons per MBF
Helicopter Logging	8 gallons per MBF
Load, Haul, Dump, and Tow	8 gallons per MBF
Road Construction	4,000 gallons per mile
Road Maintenance	20 gallons per mile

The estimated fuel consumption required for each alternative is displayed in Table 3-46.

Table 3-46.
Estimated Fuel Consumption (Thousands of Gallons)

Activity	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Cable Logging	0	36.6	16.2	14.5	22.0
Helicopter Logging	0	111.1	87.7	97.8	77.0
Load, Haul, Dump, Tow	0	257.4	152.4	155.9	165.2
Road Construction	0	85.2	36.0	26.8	58.8
Road Maintenance	0	0.5	0.2	0.1	0.3
Timber Sale Preparation/Administration	0	50.2	29.7	30.4	32.2
Total Consumption	0	541.0	322.2	325.5	355.5
Average Gallons per MBF	0	16.8	16.9	16.7	17.2

Unavoidable Environmental Effects

Although we designed harvest units and roads to avoid adverse consequences, and have included mitigation measures, some environmental impacts cannot be completely mitigated and would be expected to occur.

Air quality would diminish on a recurring, temporary basis due to the construction of roads, timber harvest, and hauling. Limbs and logging slash would be burned at sort yards intermittently throughout the logging periods, which would deposit minor amounts of particulate matter and smoke into the air.

Although BMPs are designed to protect soil and water, some potential for surface erosion, sediment production, channel erosion, and mass movement does exist. Road development poses a risk of sediment production. However, the degree of risk posed by the proposed roads is not unusually high. Road locations are largely in stable terrain. Helicopter yarding in all alternatives, but especially in Alternatives 3 and 4, reduces the risks associated with road building. Sediment production could displace fish or result in a loss of habitat near stream crossings and temporarily affect the function of the freshwater system.

Increased human activity both during and after logging, and loss of habitat, would result in impacts to fish and wildlife species, particularly those populations that have low numbers or are more sensitive to the presence of people. The habitat for old growth associated species would be reduced. Travel corridors between old growth blocks in adjacent watersheds would also be reduced in size, which may affect the ability for individuals to disperse and genetic material to exchange among local populations of species.

Short-term Uses and Long-term Productivity

The use of natural resources for long-term sustained yield is at the basis of National Forest management and direction. The proposed timber harvesting under the BMPs, Forest Plan standards and guidelines, Forest Plan LUDs, and Regional Guide direction will result in no long-term loss in productivity.

Effects on Prime Farm Land, Range Land, and Forest Land

No prime farm land or range land would be adversely impacted by the action alternatives. Forest land would maintain its productivity, except for those lands permanently occupied by roads built for long-term access for forest management.

Effects on Civil Rights, Women, and Minorities

There would be no adverse impacts on civil rights, women, and/or minorities as a result of any of the alternatives.

A Civil Rights Impact Analysis (CRIA) is used to identify any possible impacts associated with a proposed project based on an individual's civil rights (religion, race, national origin, age, gender, disability, martial status, and political beliefs). We have no indication, nor have any comments been received, that would lead us to believe that any of the alternatives considered for the proposed project would impact any individual's civil rights. This conclusion tiers to the Economics and Social Environmental Analysis included in Chapter 3 of the Forest Plan.

Executive Order 11988

Executive Order 11988 directs Federal agencies to take action to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of floodplains. The many streams in the Madan Project Area make it impossible to avoid all floodplains during road construction. The design of the proposed developments and the application of Best Management Practices combine to minimize adverse impacts on the floodplains. During the planning process for the Moose Creek watershed, the LTF was moved and roads were rerouted so that no floodplain crossings are required in any of the action alternatives. The only crossings in the Project Area are of Jenkins and Gypsy Creeks, where the floodplains are narrow.

Executive Order 11990

Executive Order 11990 requires Federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the destruction or modification of wetlands. Soil moisture regimes and vegetation on some wetlands may be altered in some harvest units; however, the affected wetlands will meet wetland classification and will still function as wetlands in the ecosystem.

Road construction results in the filling of wetlands and creates a permanent loss of wetland habitat. Because wetlands are so extensive in the Project Area, it is not feasible to avoid all wetland areas. However, wetlands are avoided whenever practicable. Effects will be minimized by not using wetlands as sites for overburden disposal and avoiding road construction through wetlands whenever practicable. Implementation of BMPs, minimizing ditching, and providing adequate cross drainage will also help minimize the area affected.

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. Implementation of the action alternatives will not cause adverse health or environmental effects that disproportionately impact minority and low income populations. Public scoping and the analysis in the subsistence section of the EIS contribute to meeting this Executive Order.

Executive Order 12962

Executive Order 12962 directs Federal agencies to conserve, restore and enhance aquatic systems to provide for increased recreational fishing opportunities nationwide. Section 1 of the Executive Order is most pertinent to the proposed activity. Section 1 directs Federal agencies to evaluate effects on aquatic ecosystems and recreational fisheries, develop and encourage partnerships, promote restoration, provide access, and promote awareness of opportunities for recreational fishery resources.

The effects of this project have been evaluated throughout the EIS, including effects to freshwater and marine resources. Partnerships are continuing to be used to leverage Federal project funds to address water quality concerns in areas of the Tongass National Forest, although none have been proposed for recreational fisheries in conjunction with this project.

Under the action alternatives (Option B), road closures would only provide access for recreational fishing opportunities to those willing to walk or mountain bike into the Project Area. Even under Road Management Option A, the impact of improved access on recreational fishing opportunities is expected to be very minor, due to the expected limited use of the area (see Recreation section of Chapter 3).

Chapter 4

References Cited

CHAPTER 4
REFERENCES CITED

Alaska Department of Fish and Game (ADF&G). 1997. Summary Report: Sockeye Enhancement Monitoring Adult Mark-recapture Escapement Estimate Virginia Lake, ADFG-107-40-10070.

Alaska Department of Fish and Game. 1978. Mainland Fisheries Resource Inventories: Stikine River Mouth to the Entrance of Bradfield Canal. Alaska Department of Fish and Game, Petersburg, Alaska.

Alaska Department of Fish and Game, Division of Subsistence, 1998, ADF&G SE Alaska Deer Hunter Survey Summaries (1987-1997).

Alaska Department of Community and Regional Affairs ([AADCRA). 1998. Alaska Community Profiles Online Web Site (Petersburg and Wrangell), located at http://www.comregaf.state.ak.us/CF_ComDB.htm

See also http://www.comregaf.state.ak.us/WRANGELL.htm

See also http://www.wrangell.com/profile.htm

See also http:// www.petersburg.org/

Betts, Martha; Anne Marie Victor; Robert F. Schroeder; and Thomas F. Thornton. 1992.Subsistence Resource Use Patterns in Southeast Alaska: Summaries of 15 Communities. Alaska Department of Fish and Game, Subsistence Division: Juneau.

Betts, Martha; Anne Marie Victor; Robert F. Schroeder; and Thomas F. Thornton. 1993. Subsistence Resource Use Patterns in Southeast Alaska: Summaries of 30 Communities. Alaska Department of Fish and Game, Subsistence Division: Juneau.

Boelter, D.H. and Close, G.E. 1974. Pipelines in Forested Wetlands. J. For., 72, 561.

Bosworth, Robert G. 1991. An Overview of the History and Current Status of Subsistence Fisheries in Southeast Alaska. A report to the Alaska Board of Fisheries, January 1991. Alaska Department of Fish and Game, Division of Subsistence: Douglas.

Brooks, K.N., 1992. Surface Hydrology, in The Patterned Peadlands of Minnesota, University of Minnesota Press, Minneapolis MN, Chap. 10.

4 References Cited

Brooks, David J. and Haynes, Richard W. 1997. Timber Products Output and Timber Harvests in Alaska: Projections for 1997-2010. U.S. Department of Agriculture, Forest Service General Technical Report. PNW-GTR-409.

Buskirk, S.W., and S.C. Forrest, M.G. Raphael, and H.J. Harlow. 1989. Winter resting site ecology of marten in the Central Rocky Mountains. Journal of Wildlife Management 53:191-202.

Chadwhich, D.H. 1973. Mountain Goat Ecology - Logging Relationships in the Bunker Creek Drainage of Western Montana. M.S. Thesis. University of Montana, Missoula, Montana. 260 pp.

Clark, J. 1977. Coastal Ecoystems: Ecological considerations for management of the coastal zone. The Conservation Foundation. Washington , D.C.

Cohen, Kathryn K. 1989. A Comprehensive Study of Wild Resource Use by Wrangell Residents. Division of Subsistence, ADF&G, Technical Paper Number 165: Juneau.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31. Washington, D.C.; U.S. Fish and Wildlife Service, Biological Services Program.

Crocker-Bedford, D.C. 1990. Status of the Queen Charlotte Goshawk. U.S. Department of Agriculture, Forest Service, Tongass National Forest, Ketchikan, Alaska. 16 pp.

DeGange, A. 1996. A conservation assessment for the marbled murrelet in Southeast Alaska. U.S. Department of Agriculture, Forest Service General Technical Report PNW-GTR-388.

DellaSala, D.A., K. Engel, D.P. Volsen, R.L. Fairbanks, W.B. McComb, J. Hagar, and K. Radeke. 1993. Final Report 1993: Evaluation of Young Growth Treatments for Wildlife. USDA Forest Service Region 10, Juneau, Alaska.

Downs, Michael A. 1998 Contact Records for Wrangell field work.

Downs, Michael A. and Michael Galginaitis 1998. Personal communication, Ms. Rushmore - head of the Economic Development Department for the City of Wrangell.

Downs, Michael A. and Michael Galginaitis. 1999. Community Profiles and Socioeconomic Resource Report for the Madan Timber Sale. Prepared by KEA Environmental Inc. and Applied Sociocultural Research under subcontract to Impact Assessment Inc. for Foster Wheeler Environmental Corporation. Submitted to the Wrangell Ranger District, Tongass National Forest.

Gagner. 1999. Watershed and Fisheries Resource Report for the Madan Timber Sale. Prepared by R2 Resource Consultants, Inc. for Foster Wheeler Environmental Corporation. Submitted to the Wrangell Ranger District, Tongass National Forest.

Galginaitis, Michael. 1998a. Contact Reports for Wrangell and Petersburg field work.

Galginaitis, Michael and Michael A. Downs. 1999a. Madan Timber Sale Subsistence Resource Report. Prepared by Applied Sociocultural Research and KEA Environmental Inc. under subcontract to Impact Assessment Inc. for Foster Wheeler Environmental Corporation. Submitted to the Wrangell Ranger District, Tongass National Forest, USDA Forest Service.

Goldschmidt, Walter R. and Theodore H. Haas. 1975. Possessory Rights of the Natives of Southeastern Alaska: A Detailed Analysis of the Early and Present Territory Used and Occupied by the Natives of Southeastern Alaska, Except the Natives of the Village of Kake (partially treated), Hydaburg, and Klawock. A report to the Commissioner of Indian Affairs. [Copy typed from the original mimeographed copy, 1975.] Recently reprinted as Haa Aani Our Land: Tlingit and Haida Land Use Rights and Use. Walter R, Goldschmidt and Theodore H. Haas, edited by Thomas F. Thornton. University of Washington Press: Seattle, 1998.

Griffin, K.A. 1999. Wildlife Resource Report for the Madan Timber Sale. Tongass National Forest, Wrangell Ranger District.

Greenig. Mark. 1999. Recreation, Scenery, and Lands Resource Report for the Madan Timber Sale. Tongass National Forest, Wrangell Ranger District.

Greiser. Weber. 1999. Cultural Resource Survey Resource Report for the Madan Timber Sale. Prepared by Historical Research Associates, Inc. for Foster Wheeler Environmental Corporation. Submitted to the Wrangell Ranger District, Tongass National Forest.

Hanley, T.A. and C.L. Rose. 1987. Influence of overstory on snow depth and density in hemlock-spruce stands: Implications for management of deer habitat in southeastern Alaska. USDA Forest Service, Research Note PNW-RN-459. 11pp.

Hanley, T.A., C.T. Robbins, and D.E. Spalinger. 1989. Forest habitats and the nutritional ecology of Sitka black-tailed deer: a research synthesis with implications for forest management. USDA Forest Service, General Technical Report PNW-GTR-230. 52 pp.

4 References Cited

Hanson, E. A., G. Carter, W. Towne, and G. O'Neal. 1971. Log storage and rafting in public waters: Pacific Northwest Pollution Control Council, a task force report. U.S. Environmental Protection Agency, Seattle, Washington.

Iozzi. Joe. 1999. Timber/Silviculture Resource Report for the Madan Timber Sale. Tongass National Forest, Wrangell Ranger District.

Iverson, C.G. 1996. Design of Old growth Reserves. USDA Forest Service Memo.

Iverson, C.G., G.D. Hayward, K. Titus, E. DeGayner, R.E. Lowell, D.C. Crocker-Bedford, P.F. Schempf, and J. Lindell. 1996. Conservation Assessment for the Northern Goshawk in Southeast Alaska. Gen. Tech. Rep. PNW-GTR-387, November 1996, Pacific Northwest research Station, Portland, Oregon. USDA, Forest Service. 101 pp.

Kerschke, W., and J. Arnett. 1999. Wetlands and TES Plants Resource Report for the Madan Timber Sale. Tongass National Forest, Wrangell Ranger District. June 1999.

Kessler, W.B. 1982. Wildlife and second-growth forests of southeast Alaska: Problems and Potential for Management. USDA Forest Service, Administrative Document 110. Juneau, AK. 36 pp.

Kirchhoff, M. and T.A. Hanley. 1992. A Quick-Cruise Method for Assessing Deer Winter Range in Southeast Alaska. Habitat Hotline: 92-1, July 1992. USDA Forest Service Alaska Region.

Kirchhoff, M.D. 1991. Status, Biology, and Conservation Concerns for the Wolf (*Canis lupus ligoni*) in Southeast Alaska. Report Prepared for Forest Service, R10 Subcommittee on Viability of Forest Wildlife. 16 pp.

Kirchhoff, M.D. and J.W. Schoen. 1987. Forest cover and snow: Implications for deer habitat in southeast Alaska. Journal of Wildlife Management 51:28-33.

Kruse, Jack and Rosyland Frasier. 1988. Tongass Resource Use Cooperative Survey: Community Report. Institute of Social and Economic Research, University of Alaska, Anchorage, In cooperation with U.S. Forest Service and Division of Subsistence, Alaska Department of Fish and Game. A separate report is available for each rural Southeastern Alaskan community under the title "Report to the Community of XXX: Tongass Resource Use Cooperative Survey."

Kruse, John A. and Robert M. Muth. 1990. Subsistence Use of Renewable Resources by Rural Residents of Southeast Alaska. Institute of Social and Economic Research, University of Alaska: Anchorage.

Kruse, Jack, Rosyland Frazier, and Lissa Fahlman. Tongass Resource Use Cooperative Survey Technical Report Number One: Research Design and Field Phase. Institute of Social and Economic Research, University of Alaska: Anchorage.

Landau. Brian. 1999a. Geology, Minerals, and Karst Resource Report for the Madan Timber Sale. Tongass National Forest, Wrangell Ranger District.

Landau. Brian. 1999b. Soils Resource Report for the Madan Timber Sale. Tongass National Forest, Wrangell Ranger District.

Marcot, B.G., M.J. Widsom, H.W. Li, and G.C. Castillo. 1994. Managing for Featured Threatened, Endangered, and Sensitive Species and Unique Habitats for Ecosystem Sustainability. USDA Forest Service, PNW-GTR-329.

McFetridge, R.J. 1977. Strategy of Resource Use by Mountain Goats in Alberta. M.S. Thesis. University of Alberta, Edmonton. 148 pp.

Meehan, W. R., editor. 1991. Influences of forest and rangeland management on salmonid fishes and their habitat. Special Publication 19. American Fisheries Society, Bethesda, Maryland.

Morrison, M.L., B.G. Marcot, and R.W. Mannan. 1992. Wildlife-Habitat Relationships: Concepts and Application. University of Wisconsin Press. Madison, WI.

Northern Southeast Regional Aquaculture Association (NSRA). 1986. Internal memo and draft limnological data for Virginia Lake.

Nowacki, G. J. and M. G. Kramer. 1998. The effects of wind disturbance on temperate rainforest structure and dynamics of southeast Alaska. Prepared for the U.S. Department of Agriculture, Forest Service. Pacific Northwest Research station. Gen. Tech. Rpt. PNW-GTR-421. April 1998.

Oliver, C.D. and B.C. Larson 1996. Forest Stand Dynamics. New York. John Wiley and Sons, Inc. 520p.

Paton, P., C.J. Ralph, H.R. Carter, and S.K. Nelson. 1990. Surveying marbled murrelets at inland forested sites: A guide. Gen. Tech. Rep. PSW-120. Berkeley, CA: Pacific Southwest Research, Forest Service, U.S. Dept. of Agriculture. 9 pp.

Paul, Tom. 1997. Harvest information for the Madan Project Area, personal communication.

4 References Cited

Paustian, S. J., K. Anderson, D. Blanchet, D. Brady, M. Cropley, J. Edgington, J. Fryxell, G. Johnejack, D. Kelliher, M. Kuehn, S. Maki, R. Olson, J. Seesz and M. Wolanek. 1992. Channel type user guide for the Tongass National Forest, Southeast Alaska. R10-TP-26. 179 p.

Petersburg Ranger District (PRD). 1997. Summary information on timber sale offerings, Stikine Area of the Tongass National Forest.

Pletscher, D.H. 1994. Tongass National Forest Land Management Plan Scientific Review. *In* Kiester, A.R. and C. Eckhardt, eds. Review of Wildlife Management and Conservation Biology on the Tongass national forest: A Synthesis with recommendations, p145-150. USDA Forest Service, Pacific Northwest Research Station, Corvallis OR. Ref. R-93.

Ralph, C.J. and S.L. Miller. 1995. Offshore Population Estimates of Marbled Murrelets in California. *In:* C.J. Ralph, G.L. Hunt, M. Raphael, and J.F. Piatt (tech. eds.) Ecology and Conservation of the Marbled Murrelet. General Technical Report PSW-GTR-152. Albany, California. Pacific Southwest Experiment Station, Forest Service, U.S. Department of Agriculture. 420 pp.

Reed, D. 1999. Personal communication between Dennis Reed, Tongass National Forest, Wrangell, Alaska and Michael Gagner, R2 Resource Consultants, Inc. 26 February 1999.

Rushmore, Carol. 1999. Personal communication, by phone, with Michael Galginaitis. Ms. Rushmore is head of the Economic Development Department for the City of Wrangell.

Schoen, J.W., R.W. Flynn, L.H. Suring, L.R. Beier, and M.L. Orme. 1989. Habitat Capability Model for Brown Bear in Southeast Alaska. ADF&G Federal Aid in Wildlife Restoration Progress Report Project W-23-1, 32 pp.

Smith, C.A, E.L. Young, C.R. Land, and K.P. Bovee. 1986. Effects of predation on black-tailed deer population growth. Fed. Aid in Wildlife Rest., Prog. Rep. W-22-3,4; Job 14.14. Alaska Department of Fish and Game, Juneau, AK. 24 pp.

Stoeckeler, J.H. 1967. Wetland Road Crossings. Drainage Problems and Timber Damange, U.S. Department of Agriculture, Forest Service, Research Note NC-27, 1967, 4pp.

Suring, L.H., W.B. Dinneford, A.T. Doyle, R.W. Flynn, M.L. Orme, J.W. Schoen, L.C. Shea, and E.L. Young. 1988. Habitat Capability Model for Mountain Goats in Southeast Alaska: Winter Habitat. USDA Forest Service, Juneau, Alaska

Suring, L.H., D.C. Crocker-Bedford, R.W. Flynn, G.C. Inverson, M.D. Kirchhoff, T.E. Schenck, L.C. Shea, and K. Titus. 1992a. A Strategy for Maintaining Well-Distributed, Viable Populations of Wildlife Associated with Old-Growth Forests in Southeast Alaska. Recommendations of an Interagency Committee. Juneau, Alaska.

Suring, L.H., E.J. DeGayner, and R.W. Flynn. 1992b. Habitat Capability Model for Marten in Southeast Alaska: Winter Habitat. USDA Forest Service, Juneau, Alaska.

Suring, L. H., E.J. DeGayner, R.W. Flynn, M.D. Kirchhoff, J.W. Schoen, and L.D. Shea. 1992c. Habitat Capability Model for Sitka Black-tailed Deer in Southeast Alaska: winter habitat. USDA Forest Service, Alaska Region.

TLMP (Tongass Land Management Plan). 1997. See USDA Forest Service, 1997a.

TLMP FEIS. 1997. See USDA Forest Service, 1997b.

TLMP ROD. 1999. See USDA Forest Service, 1999.

Urstadt. E, and Barnhart. C. 1999. Logging System and Transportation Analysis Resource Report. Prepared by Stuntzner Engineering and Forestry for Foster Wheeler Environmental Corporation. Submitted to the Wrangell Ranger District, Tongass National Forest.

USDA Forest Service. 1991. Queen Charlotte goshawk (*Accipiter gentilis laingi*) status. Report for R10 Sensitive Species Consideration.

USDA Forest Service. 1991b. Tongass Land Management Plan Revision, Supplement to the Draft Environmental Impact Statement. USDA Forest Service, Tongass National Forest, RIO-MD-I 49 (Supplement to the Draft EIS), R10-MB-146 (Supplement to DEIS, Proposed Revised Forest Plan), RIO-MB-145 (Supplement to DEIS, Appendix Volume 1), and RIO-MB-144 (Supplement to DEIS, Appendix Volume 2). Alaska Region, Juneau, Alaska.

USDA Forest Service. 1997a. Tongass Land and Resource Management Plan. Tongass National Forest. Alaska Region, Juneau, Alaska.

USDA Forest Service. 1997b. Tongass Land Management Plan Revision, Final Environmental Impact Statement. USDA Forest Service, Tongass National Forest, R10-MB-338dd (Record of Decision, Final Environmental Impact Statement—Part 1 and Part 2, Map Packet, Appendix—Volume 1, Volume 2, Volume 3, Volume 4, and Errata). Alaska Region, Juneau, Alaska.

USDA Forest Service. 1998a. Tongass National Forest Land and Resource Management Plan, Implementation Policy Clarification, August 1998. US Forest Service, Ketchikan, AK. August 7, 1998.

4 References Cited

USDA Forest Service. 1998b. Canal Hoya Timber Sale Final Environmental Impact Statement.

USDA Forest Service. 1999. Tongass Land Management Plan Record of Decision. Tongass National Forest. Alaska Region, Juneau, Alaska.

Washington Department of Wildlife. 1987. Black-tailed deer (*Odocolieus hemionus columbianus*) winter habitat evaluation model for western Washington. 36 pp.

Woods, Gordie. 1998. Information on personal use/subsistence fishing permits in the Wrangell area, as documented in Galginaitis 1998a.

Chapter 5

Glossary

CHAPTER 5
GLOSSARY

Access Management
The designation of roads for differing levels of use by the public.

Alaska National Interest Lands Conservation Act (ANILCA)
Passed by Congress in 1980, this legislation designated 14 National Forest wilderness areas in Southeast Alaska. Section 810 requires evaluations of subsistence impacts before changing the use of these lands.

Alaska Native Claims Settlement Act (ANCSA)
Approved December 18, 1971, ANCSA provides for the settlement of certain land claims of Alaska natives and for other purposes.

Allowable Sale Quantity (ASQ)
The maximum quantity of timber that may be sold each decade from suitable lands covered by the Forest Plan.

Anadromous Fish
Anadromous fish spend part of their lives in fresh water and part of their lives in salt water. Anadromous fish include pink, chum, coho, sockeye, king salmon, and steelhead trout. There are also anadromous Dolly Varden Char.

Aquatic Habitat Management Unit (AHMU)
A mapping unit that displays an identified value for aquatic resources. It is a mechanism for carrying out aquatic resource management policy.

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

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

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

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

Non-streams: Rills and other watercourses, generally intermittent and less than 1 foot in bankfull width, little or no incisement into the surrounding hillslope, and with little or no evidence of scour.

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

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

Best Management Practice (BMP)
Practices used for the protection of water quality. BMPs are designed to prevent or reduce the amount of pollution from nonpoint sources or other adverse water quality impacts while meeting other goals and objectives. BMPs are standards to be achieved, not detailed or site-specific prescriptions or solutions. As defined in the USDA Forest Service's Soil and Water Conservation Handbook, BMPs are mandated for use in Region 10 under the Tongass Timber Reform Act.

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

Blowdown
See windthrow.

Board Foot
A unit of wood measuring 12 inches by 12 inches by 1 inch (12"x12"x1"). One acre of commercial timber in Southeast Alaska yields on the average 18,000 to 34,000 board feet per acre (ranging from 8,000 to 90,000 board feet per acre). One million board feet (MMBF) would be the volume of wood covering one acre two feet thick. One MMBF yields approximately enough timber to build 120 houses.

Bog
An undrained or imperfectly drained area with a vegetation complex composed of sedges, shrubs, and sphagnum mosses, typically with peat formation. See also Muskeg.

Braided Streams or Channels
A stream flowing in several dividing and reuniting channels resembling the strands of a braid, the cause of division being the obstruction by sediment deposited by the stream.

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

Canopy
See Overstory.

Carrying Capacity
The maximum number of species that can be supported indefinitely by available resources in a given area.

Class I, II, III, IV, and Non-streams
See Aquatic Habitat Management Units.

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

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

Normal CFL: Timber that can be economically harvested with locally available logging systems. Composed of two categories:

> *Standard:* Timber that can be economically harvested with locally available logging systems, such as highlead or short-span skyline.
>
> *Special:* Timber that is in areas where special consideration is needed to protect other resources but can be harvested with locally available logging systems.

Non-standard CFL: Timber that cannot be harvested with locally available logging systems and would require the use of other logging systems such as helicopter or long-span skyline.

Commercial Thinning
Thinning a stand where the trees to be removed are large enough to sell.

Confluence
The point where two streams meet.

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

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

Cruise
Refers to the general activity of determining timber volume and quality, as opposed to a specific method.

Cultural Resources
See Heritage Resources.

5 Glossary

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 non-Federal) 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.

Debris Torrents
Landslides that occur as a result of debris; avalanche materials which either dam a channel temporarily or accumulate behind temporary obstructions such as logs and forest debris.

Deer Winter Range
Locations that provide food and shelter for Sitka black-tailed deer under moderate to severe winter conditions. Usually associated with high volume old-growth forest at low elevations and south aspects.

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 a timber sale, including logging, sawmills, and pulp mills.

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 or management activities.

Diversity
The distribution and abundance of different plant and animal communities and species within an area.

Draft Environmental Impact Statement (DEIS or Draft EIS)
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).

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

Effects
Effects may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historical, cultural, economic, or social and may be direct, indirect, or cumulative.

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

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

Cumulative Effects: See Cumulative Effects

Endangered Species
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 (ESA). See also Threatened Species, Sensitive Species.

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.

Estuary
For the purpose of this EIS process, estuary refers to the relatively flat intertidal and upland areas generally found at the heads of bays and mouths of streams. They are predominantly mud and grass flats and are unforested except for scattered spruce or cottonwood.

Even-aged Stand Management
Management that results in the creation of stands in which trees of essentially the same age grow together. Clearcut, shelterwood, and other tree-cutting methods produce even-aged stands. See also Uneven-aged Management.

Executive Order
An order issued by the President of the United States that has the force of law.

Falldown
The difference between planned or scheduled harvest and that which is attained after implementation.

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 in response to public and agency comments. The decisionmaker chooses which

alternative to select from the Final EIS, and subsequently issues a Record of Decision (ROD).

Floodplain
The lowland and relatively flat areas joining inland and coastal waters including debris cones and flood-prone areas of offshore islands; generally including that area subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given year.

Forb
Any herbaceous plant that is not a grass or grass-like. Includes plants that are commonly called weeds or wildflowers.

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

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

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.

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

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.

Group Selection
Small groups of trees up to 2 acres in size are harvested.

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
An estimate of the number of healthy individuals of a species that a habitat can sustain.

Habitat Suitability Index (HSI)
A value assigned to a unit of land using a computerized model that relates vegetative and geographic characteristics (e.g. stand volume, proximity to a stream or cliff, slope, aspect, etc.) to the land unit's value for a particular wildlife species. Values range from 0 to 1,

with 1 being the best. Habitat Capability Models (HCM) used to generate HSIs were developed by interagency teams of biologists using the best available information including research results and best professional judgment.

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

Important Subsistence Use Area
Important Subsistence Use Areas include the "most-reliable" and "most often hunted" categories from the 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.

Indirect Employment
The jobs in service industries that are associated with a timber sale, including suppliers of logging and milling equipment. See also Direct Employment.

Infrastructure
The facilities, utilities, and transportation systems needed to meet public and administrative needs.

Inoperable Timber
Timber that cannot be harvested by any proven method because of potential resource damage, extremely adverse economic considerations, or physical limitation.

Interdisciplinary Team (IDT)
A group of people with different backgrounds assembled to research, analyze, and write a project EIS. The team is assembled out of recognition that no one scientific discipline is sufficiently broad enough to adequately analyze a proposed action and its alternatives.

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 minerals and cultural resources.

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

Karst
A type of typography that develops in areas underlain by soluble rocks, primarily limestones. Sinkholes, collapsed channels, vertical shafts, and caves are formed when the subsurface layer dissolves. Areas on which karst has developed are said to display "karst topography."

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Landscape-level Diversity
A function of the spatial distribution of habitat types across a large area such as a Project Area or ecological province.

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

Land Use Designation (LUD)
A defined area of land specific to which management direction is applied by the Forest Plan.

Large Woody Debris (LWD)
Any large piece of relatively stable woody material having a diameter greater than 10 centimeters and a length greater than one meter that intrudes into the stream channel.

Logging Camp
A temporary facility established to house industry and Forest Service personnel while timber harvest occurs in the area.

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 "terminal transfer facility."

MBF
A thousand board feet of net sawlog and utility volume.

MMBF
A million board feet of net sawlog and utility volume.

Management Indicator Species (MIS)
Species that are used to monitor the effects of planned management activities on viable populations of fish and wildlife during a planning process. The population changes of these species are believed to best indicate the effects of land management.

Management Prescriptions
Management practices and intensity selected and scheduled for application on a specific area (e.g., a land use designation) to attain multiple-use and other goals and objectives.

Maritime Climate
Weather conditions controlled by an oceanic environment characterized by small annual temperature ranges and high precipitation.

Market Pond Value
Also known as pond log value. Selling value minus manufacturing costs. Pond log values are the price a timber buyer would pay for a log at the mill site.

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

Mass Movement Index (MMI)
Rating used to group soil map units that have similar properties with respect to the stability of natural slopes. It includes the following: MMI1 = Low potential for mass movement; MMI2 = Moderate potential for mass movement; MMI3 = High potential for mass movement; and MMI4 = Very high potential for mass movement.

Memorandum of Understanding (MOU)
A legal agreement between the Forest Service and other agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project. A MOU is not a fund obligating document.

Mineral Soils
Soils consisting predominantly of, and having its properties determined by, mineral matter.

Minerotrophic Sites

True fens that receive water which passes through mineral soil. These areas generally have a high groundwater level and occupy a low point of relief in a basin.

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 limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during he life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

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

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 matter 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 methods of monitoring.

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

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

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.

National Environmental Policy Act (NEPA)
An act, passed by Congress in 1969, that declared a national policy to encourage productive harmony between humans and their environment to promote efforts that will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of humans to enrich the understanding of the ecological systems and natural resources important to the nation and to establish a Council on Environmental Quality. This act requires the preparation of environmental impact statements for federal actions that are determined to be of major significance.

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.

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).

Non-interchangeable Components (NIC's)
Increments of the suitable land base and their contribution to the allowable sale quantity (ASQ) that are established to meet Forest Plan objectives. NIC's are identified as parcels of land and the type of timber thereon which are differentiated for the purpose of Forest Plan implementation. The total ASQ is derived from the sum of the timber volumes for all NIC's. The NIC's cannot be substituted for each other in the timber sale program.

NIC I. Normal Operability: This is volume scheduled from suitable lands using existing logging systems. Most of these lands are expected to be economic under projected market conditions. On average, sales from these lands have the highest probability of offering a reasonable opportunity for a purchases to gain a profit from his/her investment and labor. This is the best operable ground.

NIC II. Difficult and Isolated Operability: This is volume scheduled from suitable lands that are available for harvest using logging systems not in common use in Southeast Alaska. Most of these lands are presently considered economically and technologically marginal. Difficult operability would include helicopter yarding distances greater than three-quarters of a mile. Isolated operability stands are extremely difficult and costly to harvest, due to terrain or helicopter yarding distances greater than one mile.

Old-growth Forest
Ecosystems distinguished by the later stages of forest stand development that differs significantly from younger forests in structure, ecological function, and species composition. Old-growth forest is characterized by a patchy, multi-layered canopy; trees that represent many age classes; large trees that dominate the overstory, large standing dead (snags) or decadent trees; and higher accumulations of large down woody material. The structure and function of an old-growth ecosystem will be influenced by its stand size and landscape position and context.

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

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.

Partial Cutting
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, shelterwood, or other methods.

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

Planning Record
A detailed, formal system of records that document 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 and ROD.

Plant Communities
Aggregations of living plants having mutual relationships among themselves and to their environment.

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 over time. See viable population.

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.

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

Productive Old Growth (POG)
Old-growth forest capable of producing at least 20 cubic feet of wood fiber per acre per year, or having greater than 8,000 board feet per acre.

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

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)
The system for planning and managing recreation resources that categorizes recreation opportunities into six 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 skill needed to enjoy the area, and the relative density of recreation use. The classes are:

Primitive: An essentially unmodified natural environment of fairly large size. Interaction between users is very low, and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use is generally not permitted.

Semi-Primitive Nonmotorized: A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed to minimize on-site controls and restrictions. Use of local roads for recreational purposes is not allowed.

Semi-Primitive Motorized: A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed to minimize on-site controls and restrictions. Local roads used for other resource management activities may be present.

Roaded Natural: A natural-appearing environment with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Motorized use is allowed.

Roaded Modified: A natural environment that has been substantially modified particularly by vegetation manipulation. There is strong evidence of roads and/or highways. Frequency of contact is low to moderate.

Rural: A natural environment that has been substantially modified by development of structures and vegetative manipulation. Structures are readily apparent and may range from scattered to small dominant clusters. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high.

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.

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 region.

Rehabilitation
Actions taken to protect or enhance site productivity, water quality, or other values for a short period of time.

Reserve Trees
Merchantable or submerchantable trees and snags that are left within the harvest unit to provide biological habitat components over the next management cycle.

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.

Resource Values
The tangible and intangible worth of forest resources.

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

Retention
A visual quality objective which provides for management activities that are not visually evident to the casual observer. The term is also used to describe the trees retained in a stand after harvest.

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

Riparian Ecosystems
A transition between the aquatic ecosystem and the adjacent terrestrial ecosystem; identified by soil characteristics or distinctive vegetation communities that require free or unbound water.

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

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 of 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 purpose of an individual road based on Management Area direction and access management objectives. RMOs contain design criteria, operation criteria, and maintenance criteria. Long-term and short-term roads have RMOs.

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

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

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

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

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

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 is needed, and what level of public participation is appropriate. Scoping focuses on the issues surrounding the proposed action and the range of actions, alternatives, and impacts to be considered in an EA or an EIS.

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

Second-growth Forest
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.

Sediment
Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by streams, mass movement, glaciers, or wind and has come to rest on the earth's surface.

Seedling/Sapling Stage
The stage following timber harvest when most of the colonizing tree and shrub seedlings become established. Usually 1 to 25 years.

Selective Cutting
The annual or periodic removal or trees (particularly mature trees), individually or in small groups from an uneven-aged forest to realize the yield and establish a new crop of irregular constitution.

Sensitive Species
Plant and animal species which 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 System lands to prevent placement on Federal or State lists.

Shade Tolerance
Tree species that have physiological growth processes adapted to shaded environments. Western hemlock is a shade tolerant species. Other tree species tolerance to shade may range from tolerant to intolerant.

Significant
Specific legal term under the National Environmental Policy Act (NEPA) that requires considerations of both context and intensity in evaluating impacts.

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

Silviculture
The art, science and practice of controlling the establishment, composition, structure and growth of trees and other vegetation in forest stands.

Site Index
A measure of the relative productive capacity for tree growth of an area. Measurement of site index is based on height of dominant trees in a stand at a given age.

Site Productivity
Production capability of specific areas of land.

5 Glossary

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

Smolt
A juvenile salmon, trout, or Dolly Varden migrating to the ocean and undergoing physiological changes to adapt its body from a freshwater to a saltwater environment.

Snag
A standing dead tree, usually greater than 5 feet tall and 6 inches in diameter at breast height.

Soil Productivity
Capacity of soil to produce plant growth due to the chemical, physical, and biological properties of the soil.

Spawning Area
The available area in a stream course which is suitable for the deposition and incubation of salmon or trout eggs.

Split Yarding
The process of separating the direction of timber harvest yarding into opposite directions.

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.

Stand-level Diversity
The diversity within specific habitats or limited land areas as measured by number of species present (species richness) or structural complexity of a given habitat type.

State Historic Preservation Officer (SHPO)
State appointed official who administers Federal and State programs for cultural resources.

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

Stream Classes
See Aquatic Habitat Management Unit.

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

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

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 family consumption; and for customary trade.

Subsistence Use Area
Important Subsistence use areas include the "most reliable" and "most often hunted" categories from the Tongass Resource Use Cooperative Survey (TRUCS) and from subsistence survey data from 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 judgment 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.

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

Suitable Forestland
Commercial forestland 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 Forestland
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.

Thinning
The practice of removing some of the trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may also be done to change the characteristics of a stand for wildlife or other purposes. Thinning may be done at two different stages: precommercial and commercial.

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, Sensitive Species.

5 Glossary

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 be management of the timber resource. The following are definitions of timber classification used for this purpose:

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

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

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

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

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

Timber 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 30-40 years); the second entry would be completed when two-thirds (approximately 66 percent) of the available acreage is harvested (usually 60-70 years); the third entry would be completed when all of the available acreage is harvested (at the end of the rotation).

Timber Harvest Unit
An area within which Forest Service specifies for harvest all or part of the timber.

Tongass Land Management Plan (TLMP)
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 signed in 1997. See Forest Plan.

Tongass Resource Use Cooperative Survey (TRUCS)
A compilation of data on subsistence uses for evaluating the effects of the proposed action in this EIS.

Traffic Service Levels
Traffic characteristics and operating conditions that are used in setting road maintenance levels.

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

Uneven-aged Management
The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular size to retain within each area, thereby maintaining a planned distribution of size classes.

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

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

Viewshed
An expansive landscape or panoramic vista seen from a road, marine waterway, or specific viewpoint.

Visual Absorption Capability (VAC)
An estimate of the relative ability of a landscape to absorb alteration yet retain its visual integrity.

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 "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 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 swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds.

Wildlife Analysis Area (WAA)
Alaska Department of Fish and Game (ADF&G) administrative designation of an area that includes one or several Value Comparison Units (VCUs) for wildlife analysis and regulating wildlife populations.

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.

Yarding
Hauling timber from the stump to a collection point.

Chapter 6

Distribution List

Chapter 6

Distribution List

Federal Agencies

Admiralty National Monument, Juneau, AK
Advisory Council on Historic Preservation, Washington, DC
Craig Ranger District, Craig, AK
Department of Interior, Office of Environmental Affairs, Washington, DC
Environmental Protection Agency, Juneau, AK
Environmental Protection Agency, Seattle, WA
Equal Employment Opportunity Commission, Washington, DC
Federal Aviation Administration, Renton, WA
Federal Energy Regulartory Commission, Washington, DC
Federal Highway Administration, Portland, OR
Forestry Sciences Laboratory, Juneau, AK
Hoonah Ranger District, Hoonah, AK
Ketchikan-Misty Ranger District, Ketchikan, AK
Interstate Commerce Commission, Washington, DC
Juneau Ranger District, Juneau, AK
National Marine Fisheries Service, Juneau, AK
NOAA Ecology and Conservation Division, Washington, DC
Petersburg Ranger District, Petersburg, AK
Sitka Ranger District, Sitka, AK
Soil Conservation Service, Washington, DC
Thorne Bay Ranger District, Thorne Bay, AK
US Army Corps of Engineers, Anchorage, AK
US Army Corps of Engineers, Juneau, AK
US Army Corps of Engineers, Portland, OR
US Coast Guard, Environmental Impact Branch, Washington, DC
US Department of Housing and Urban Development
US Department of Transportation, Washington, DC
USDA Forest Service, Petersburg, AK
USDA Forest Service, Ketchikan, AK
USDA Forest Service, Juneau, AK
USDA Forest Service Chief, Washington, DC
USDA National Agricultural Library, Beltsville, MD
USDA Office of Equal Opportunity, Washington, DC
USDA OPA Publications Stockroom, Washington, DC
USDI Fish and Wildlife Service, Anchorage, AK
USDI Fish and Wildlife Service, Juneau, AK
USDOE, Office of Environmental Compliance, Washington, DC
US Naval Observatory, Washington, DC
US Navy, Environmental Protection Division, Washington, DC

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US EPA Office of Federal Activities, Washington, DC
Wrangell Ranger District, Wrangell, AK
Yakutat Ranger District, Yakutat, AK

State And Local Agencies

Alaska Department of Environmental Conservation, Juneau, AK
Alaska Department of Fish and Game, Douglas, AK
Alaska Department of Fish and Game, Ketchikan, AK
Alaska Department of Fish and Game, Petersburg, AK
Alaska Department of Fish and Game, Juneau, AK
Alaska Department of Fish and Game, Sitka, AK
Alaska Department of Natural Resources, Juneau, AK
Alaska Division of Air and Water Quality, Juneau, AK
Alaska Division of Governmental Coordination, Juneau, AK
Alaska Natural History Program, Anchorage, AK
Alaska Public Radio Network, Anchorage, AK
Alaska State Library, Juneau, AK
City of Kake, AK
City of Petersburg, AK
City of Wrangell, AK
Ketchikan Gateway Borough, Ketchikan, AK
Organized Village of Kake, Kake, AK

American Indian Nations, Tribes, and Related Agencies

Kake Tribal Heritage Foundation, Kake, AK
Wrangell Cooperative Association, Wrangell, AK

Organizations

Alaska Rainforest Campaign, Anchorage, AK
Cascadia Wildlands Project, Fairbanks, AK
Earthjustice Legal Defense Fund, Juneau, AK
Forest Dwellers, Point Baker, AK
Forest Guardians and the FCC, Santa Fe, NM
Forest Service Employees for Environmental Ethics, Eugene, OR
Narrows Conservation Coalition, Petersburg, AK
Native Forest Network, Missoula, MT
Natural Resources Defense Council, Olympia, WA
Southeast Alaska Conservation Council, Juneau, AK
Sunnyside School Library, San Francisco, CA
SWCBD, Berkely, CA
Tongass Cave Project, Ketchikan, AK
Tongass Cave Project, Sitka, AK
Tongass Hunting Fishing Coalition, Sitka, AK
Wilderness Society, Anchorage, AK
Wrangell Chamber of Commerce, Wrangell, AK
Wrangell Resource Council, Wrangell, AK

Businesses

Alaska Forest Association, Ketchikan, AK
Alaska Pacific Trading Company, Mukilteo, WA
Alaska Peak and Seas, Wrangell, AK
Chilkoot Lumber Company, Haines, AK
Gateway Forest Products, Wards Cove, AK
Harza Northwest, Bellevue, WA
Kadin Corporation, Wrangell, AK
Kake Tribal Logging and Timber Corporation, Kake, AK
KFSK Radio, Petersburg, AK
Koncor Forest Products Co., Anchorage, AK
Monographs Acquisition Services, Fort Collins, Co
Paden Timber Services, Twain Harte, CA
Reid Brothers Logging and Construction, Petersburg, AK
Robertson, Monangle, and Eastaugh, Juneau, AK
Sealaska Corporation, Juneau, AK
Seley Corporation, Ketchikan, AK
SENSC, Juneau, AK
Silver Bay Logging, Wrangell, AK
South East Alaska Wood Products, Peterburg, AK
Stikeen Wilderness Adventures, Wrangell, AK
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Wesley Rickard, Inc, Gig Harbor, WA
Woodbury Enterprises, Wrangell, AK
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CHAPTER 7
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Chapter 8

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Appendix A

Reasons for Scheduling the Environmental Analysis of the Madan Timber Sale Project

APPENDIX A
REASONS FOR SCHEDULING THE ENVIRONMENTAL ANALYSIS OF THE MADAN TIMBER SALE

This Appendix provides a detailed explanation of the rationale for a specific timber sale project and its importance to the multi-year timber program on the Tongass National Forest. To accomplish this, the following questions are answered:

- **Why is Timber from the Tongass National Forest Being Offered for Sale?**
- **What Steps Must Be Completed to Prepare a Sale for Offer?**
- **How does the Forest Service Develop Expectations about the Market Demand for Timber?**
- **How does the Forest Service Maintain an Orderly and Predictable Timber Sale Program?**
- **How Does the Forest Service Decide Where Timber Sale Projects Should be Located?**
- **How Does This Project Fit into the Tongass Timber Program?**
- **Why Can't This Project Be Located Somewhere Else?**

Coordinated timber sale planning is essential for meeting the goals of the Tongass Land Management Plan and to provide an orderly flow of timber to local industry. To determine the volume of timber to offer each year, the Forest Service can look to current market conditions and the level of industry operations. However, the lengthy planning process—of which this document is a part—requires the Forest Service to rely on projections of future harvest levels to decide how many timber sale projects to begin each year. This document explains how the Forest Service uses information about future markets and past experience with the logistics of timber sale planning to determine the volume of timber that needs to be started through this process each year. Using a detailed timber sale schedule that provides information about each sale as it moves through each stage of the planning process, this Appendix explains the rationale and the necessity for completing this particular timber sale project at this point in time.

Why is Timber from the Tongass National Forest Being Offered for Sale?

National Legislation

On a national level, the legislative record is very clear about the role of the timber program in the multiple-use mandate of the National Forests. The Organic Act of 1897, 16 USC 473-481 (partially repealed in 1976) directed the agency to manage the forests in order to "improve and protect the forest ... [and] for the purpose of securing favorable conditions of water flows, and to *furnish a continuous supply of timber* for the use and necessities of the citizens of the United States" (emphasis added.) The Multiple-Use Sustained Yield Act of 1960, 16 U.S.C. 528-531, directs the Forest Service to administer federal lands for "outdoor recreation, range, timber, watershed, and wildlife and fish purposes."

The National Forest Management Act of 1976 (16 U.S.C. 472a) states that "the Secretary of Agriculture...[may sell , at not less than appraised value, trees, portions of trees, or forest products located on National Forest System Lands." Although the heart of the Act is land management planning, the Act also sets policy direction for timber management and public participation in Forest Service decision making. Under NFMA, the Forest Service was directed to "limit the sale of timber from each national forest to a quantity equal to or less than a quantity which can be removed from such forest annually in perpetuity on a sustained-yield basis" (16 U.S.C. 1611)

The NFMA directed the Forest Service to complete land management plans for all units of the National Forest System. Forest Plans were to be developed by an interdisciplinary team to provide for the coordination of outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness. The 1979 Tongass National Forest Land and Resource Management Plan was the first to be completed. A revised

Forest Plan was issued in 1997. With regard to timber production, the Record of Decision for the 1997 Plan stated:

> The Tongass National Forest will continue to allow timber harvest while maintaining sustained yield and multiple use goals...Although the maximum amount of timber that could be harvested during the first decade of the Revised Plan implementation is an average of 267 MMBF per year, a level of 200 MMBF or less is more likely to be offered over the next few years, given current market conditions and the transition that both the timber industry and the Forest Service is experiencing. Therefore the public can expect the amount of timber to be offered annually to vary between 200 MMBF or less and 267 MMBF.
>
> ...The timber resource will be managed for production of sawtimber and other wood products from timberlands available for sustainable timber harvest, on an even-flow, sustained-yield basis and in an economically efficient manner. We will seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber and the market demand for the planning cycle...

In April 1999, Under Secretary Jim Lyons elected to modify the 1997 Plan and issue a new Record of Decision (ROD). As stated in the 1999 ROD:

> The Tongass National Forest will continue timber harvest consistent with sustained yield and multiple use goals. The forest-wide standards and guidelines for timber include general direction to "[e]nsure that silvicultural systems other than clearcutting are considered through an appropriate project level analysis process. However, uneven-aged management systems will be limited to areas where yarding equipment suited to selective logging can be used"...
>
> Forest-wide, considering all land allocations where timber harvest is permitted, it is estimated that 65 percent of harvesting will involve clearcutting, with the remaining 35 percent utilizing other methods.
>
> ...the ASQ for the next 10 years on the Tongass is reduced from an estimated average annual level of 267 MMBF in the 1997 ROD to 187 MMBF in the 1999 ROD, considering both NIC I and NIC II. Although initially this would seem to be a significant reduction in the ASQ, this ceiling for timber harvests from the Tongass remains sufficient to meet all but the most optimistic projections for timber demand and harvests from the Forest for the next decade. I believe that the additional environmental and multiple use benefits provided by this decision should not result in negative social and economic impacts based upon the most current demand for timber.

In day to day operation of the Tongass timber program, the Forest Service attempts to strike a balance among timber availability as documented in the Forest Plan, the market demand for timber in Southeast Alaska, the needs and desires of other forest users, and funding allocations made by Congress.

Alaska-Specific Legislation

Legislation unique to Alaska also directs the Forest Service to maintain a commercial timber program. The Alaska National Interest Lands Conservation Act (ANILCA; P.L. 96-487, 1980) and the Tongass Timber Reform Act (TTRA; P.L. 101-625, 1990) speak directly to the issue of Tongass timber supply. Section 705(a) of ANILCA directed the Forest Service to maintain a timber supply from the Tongass at a rate of four billion five hundred million board feet per decade. To ensure that the timber target was met,

Congress provided for a $40 million annual earmark to fund pre-roading, cultural treatments and innovated logging systems.

Section 101 of TTRA repealed the timber supply mandate and fixed appropriations of ANILCA and replaced them with the following more general direction:

> Sec. 705. (a), Subject to appropriations, other applicable law, and the requirements of the National Forest Management Act (P.L. 94-588); except as provided in subsection 9d) of this section, the Secretary shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the annual market demand from such forest for each planning cycle.

Timber from the Tongass National Forest is being offered as part of the multiple use mission of the Forest Service as identified in public laws. Alaska-specific legislation and the Forest Plan directs the Forest Service to seek to provide timber to meet market demand subject to appropriations and balancing of forest uses.

What Steps Must Be Completed to Prepare a Sale for Offer?

The timber sale program is complex. A number of projects are underway at any given point in time, each of which may be in a different stage of planning and preparation. A system of checkpoints, or "gates", helps the Forest Service track the significant milestones of each project from inception to contract termination, followed by monitoring, reforestation, and timber stand improvement. Each project passes through all of the following gates, with the complexity of the sale determining the complexity of the final product at each stage.

Gate 1: Completion of Position Statement. The Position Statement is a brief analysis of the project area with the intent of determining the feasibility of the potential timber sale. This is the first step in the timber sale planning process and it is usually completed from seven to ten years before a sale is offered. After the Position Statement is developed, the Forest Service decides whether to continue to the next phase of the project where a significant investment in time and money will be made.

Gate 2: Sale Area Design, Environmental Documentation and Decision. This phase of the project is commonly referred to as the "NEPA" phase and includes inventory, public scoping, analysis, draft disclosure of the effects of the project on the environment, public comment, final analysis and disclosure, decision, potential appeal, and litigation. Gate 2 activities are generally completed two to six years before a sale is offered. The end product of this phase, an environmental decision document, forms the starting point for the next phase.

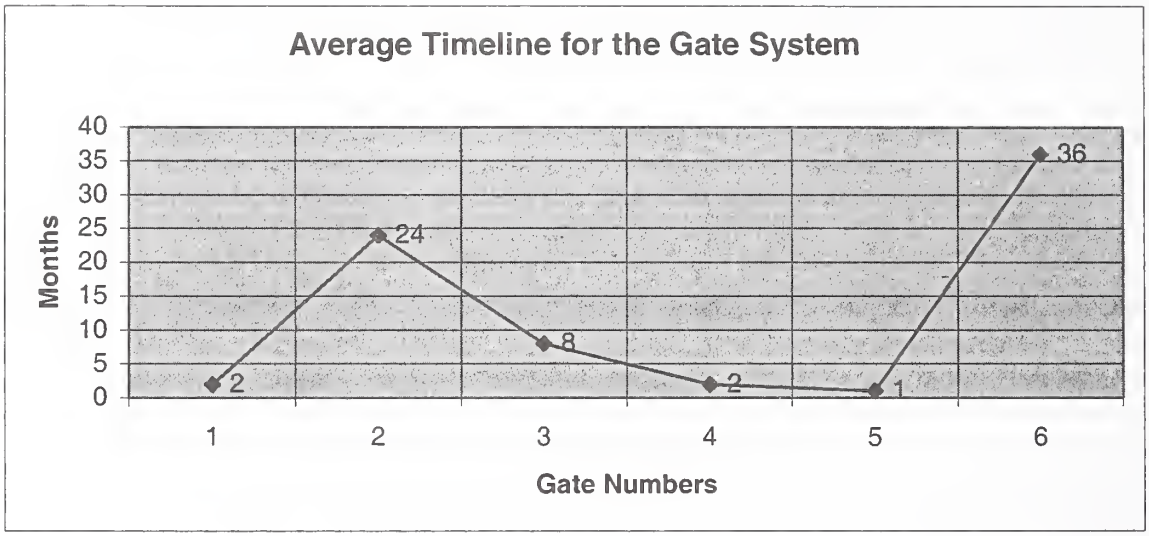
Gate 3: Plan Implementation and Field Layout. Gate 3 activities are typically completed one to three years before a sale is offered. During this phase, the information and direction included in the decision document (Gate 2) is used to designate the actual project on the ground. Additional site-specific information is collected at this time.

Gate 4: Appraisal Offering Package. The costs and value associated with the timber sale designed in Gate 3 are computed and packaged in a timber sale contract. The contract tells the prospective timber sale purchaser how the sale must be harvested to be in conformance to the project decision document. This phase of the Gate system occurs during the final year of the project development and culminates with the advertisement of the project for sale.

Gate 5: Bid Opening. Gate 5 is completed with the opening of bids for the project. If a bid is submitted, contractual provisions govern when the award of the sale takes place and when the sale will be completed and how timber removal is to occur.

Gate 6: Award. Gate 6 is the formal designation of a contract between a bidder and the Forest Service

Figure 1.



How does the Forest Service Develop Expectations about Future Timber Markets?

The Tongass National Forest makes two determinations on volume to be offered. The first is a determination on volume to be offered for the current year (annual market demand). The annual market demand is analogous to assessing industry performance in the short-term. In the short-run a firm will make use of its existing equipment to maximize profits or minimize losses. The general approach is to consider the timber requirements of the region's sawmills at different levels of operation and under different assumptions about market conditions and technical processing capability. These assumptions provide a basis for estimating the volume of timber likely to be processed by the industry as a whole in any given year. Timber inventory requirements are acknowledged and estimated in a related calculation. The volume of timber likely to be purchased is equal to the volume needed to make up any inventory shortfall in addition to the volume likely to be harvested in the coming year. The document titled *Evaluating the Demand for Tongass Timber* (USDA, Forest Service, R-10; Morse; September 28, 1998) forms the basis for how these estimates are developed. The document titled *Tongass Timber Sale Procedures* (USDA, Forest Service, R-10; Morse, Draft August 30, 1999) documents actual estimates for the current year. This estimate is what the Tongass plans to offer for the current year of the Ten Year Timber Sale Schedule pending sufficient funding to do so.

Based on the analysis documented in *Tongass Timber Sale Procedures*, for Fiscal Year 2000, the Tongass National Forest plans to offer approximately 148 MMBF for sale. The sales planned for offer will be a combination of new, previously offered, or previously offered and reconfigured. Both standing timber and salvage will be components of the program. Offerings will consist of those targeted for Small Business qualified firms as well as a portion of the volume being made available for the open market.

Life of the Forest Plan (Market Demand over the Planning Cycle)

Given the long time involved in preparing a timber sale, the proposed timber sales in this document may not be harvested for 3 to 4 years or longer, not including appeals or litigation. The Forest Service needs some idea of what the long run timber demand will be given cycles in the market. On average what should the Forest Service plan for offer, given that timber from this NEPA document may not be harvested for 4 years into the future? The Forest Service needs to take a long-run view for planning purposes. To answer these questions the Forest Service asked the Pacific Northwest Research Station for professional assistance.

As the Tongass Land Management Plan was being revised in 1997, research economists at the Pacific Northwest Research Station (PNW) were asked to update their earlier projections of Alaska timber products output and timber harvest by ownership. The most recent projections of timber harvest over the planning cycle account for several dramatic changes in the region's manufacturing capabilities, increased competition from a number of sources, and the steady erosion of North America's share of Japanese timber markets.

The Tongass documents these projections and the means of implementation through the issuance of a Ten Year Timber Sale Schedule. Each year this plan is updated whereby the current year is dropped at the culmination of the fiscal year and a new year ten is added. The basis for this schedule is long range timber market projections documented in the publication titled *Timber Products Output and Timber Harvest in Alaska: Projections for FY97-10* (Brooks and Haynes; PNW-GTR-409, September, 1997). These projections of Alaska timber products output, the derived demand for raw material, and timber harvest by owner are developed from a trend-based analysis. These projections reflect the consequences of recent changes in the Alaska forest sector and long-term trends in markets for Alaska products. With the closure of the two southeast Alaska pulp mills, demand for Alaska National Forest timber now depends on markets for sawn wood and the ability to export manufacturing residues and lower grade logs. Three alternative projections are used to display a range of possible future demand (Table 1). Areas of uncertainty include the prospect of continuing changes in markets and in conditions faced by competitors and the speed and magnitude in investment in manufacturing in Alaska.

Demand projections are important for program planning. They provide important guidance to the Forest Service for requesting budgets, for making decisions about workforce and facilities, and for indicating the need to begin new NEPA analysis for future program offerings. They also provide a basis for expectations regarding future harvest, and thus provide an important source of information for establishing the schedule of probable future sale offerings. The weight given to the projections will vary depending on a number of factors, such as how recently they were done, and how well they appear to have accounted for recent, site-specific events in the timber

Table 1-Projected National Forest Harvest

For Fiscal Year 2001-2009, the Tongass National Forest plans to schedule approximately 160 MMBF for sale each year over the life of the Forest Plan. This schedule is based on the projections documented in *Timber Products Output and Timber Harvest in Alaska: Projections for FY97-10* (Brooks and Haynes; PNW-GTR-409, September, 1997), and current volumes in the timber sale pipeline process. Prior to the beginning of Fiscal Year 2001 the amount of volume scheduled in outyears will once again be analyzed to determine if projections made now meet the anticipated needs in the future.

Fiscal Year	Projected Harvest (MMBF)		
	Low	Medium	High
2000	95.5	116.6	142.7
2001	104.6	129.0	157.7
2002	113.7	134.9	173.1
2003	122.8	140.8	188.9
2004	131.9	146.5	205.0
2005	131.9	152.2	221.4
2006	131.9	157.8	238.2
2007	132.0	163.4	255.3
2008	132.0	168.9	272.8
2009	132.1	174.3	290.7
Average	122.8	148.4	214.6
Mean	168.7		

How does the Forest Service Maintain an Orderly and Predictable Timber Sale Program?

Pools of Timber (Pipeline Volume)

As discussed earlier, the Forest Service tracks accomplishment of various stages of development of each timber sale with the Gate System process. From a timber sale program standpoint, it is also necessary to track and manage multiple projects through time as projects collectively move through the Gate System. Tracking of the multiple projects can be likened to following various segments of several projects through a pipeline of time. Because of the relatively long timeframes needed to accomplish a given timber sale and the complexities inherent in timber sale project and program development, it is necessary to track various timber sale program volumes from Gate 1 through Gate 6. Gate 1 volume represents a large pool of program volume, but represents a relatively low investment from project to project. This relative investment level offers the timber program manager a higher degree of flexibility and thus, does not greatly influence the flow of volume through the pipeline. In addition, tracking of how much volume near the end of the pipeline that is in appeals or litigation may be necessary to determine potential effects on the flow of potential timber sales.

The goal of the Tongass National Forest is to provide an even flow of timber sale offerings on a sustained yield basis. In past years, this has been difficult to accomplish due to continual reductions in the suitable timber land base, reductions in the timber industry processing capabilities, rapid market fluctuations and Forest Plan modifications and litigation. To achieve an even flow of timber sale offerings, 'pools' of projects in various stages of the Gate System will be maintained so volume offered can be balanced against current year demand and market cycle projections. Today, upward trends in demand are reacted to by moving outyear timber projects forward leaving outyears not capable of meeting the needs of the industry. In other instances, a number of new projects are started based on today's market but not available for a number of years. By the time the added projects are ready for offer, the market and demand for this volume has changed. Three pools are being tracked to achieve an even flow of timber sale offerings:

1. Timber volume under analysis (Gate 2): Timber volume under analysis, contains sales being analyzed and undergoing public comment through the NEPA process. This process can often take from one to five years and reaches a significant milestone when a NEPA decision is made. This pool includes any project with a formal Notice of Intent through those with a decision document issued. Volume in appeals and litigation will be tracked as a subset of this pool as necessary.

2. Timber volume available for sale (Gate 3, Gate 4 and Gate 5): Timber volume available for sales, contains sales for which environmental analysis has been completed, and administrative appeals, and litigation (if any) have been resolved. They have also been fully prepared, and are available to managers to schedule for sale offerings. Managers need to maintain enough volume in this pool to be able to schedule future sale offerings in an orderly manner of the size and configuration that best meets the need of the public. As a matter of policy, and sound business practice, the Forest Service attempts to announce probable future sale offerings at least one year in advance. This allows potential purchasers an opportunity to do their own evaluations of these offerings in order to determine whether to bid, and if so, at what level.

3. Timber volume under contract (Gate 6): Timber volume under contract contains sales which have been sold and a contract awarded to a purchaser, but have not yet been fully harvested. Timber contracts typically, but not always, give the purchaser three years to harvest and remove the timber purchased. Long standing Forest Service practice is to attempt to maintain about two to three years of unharvested timber volume under contract to timber purchasers. This volume of timber is the industry's dependable timber supply which allows immediate flexibility in business decision. This practice is not limited to the Alaska Region, but is particularly pertinent to Alaska because of the nature of the land base. The relative absence of roads, the island geography, the steep terrain, and the consequent isolation of much of the timber land means that timber purchasers need longer-than-average lead times to plan operations, stage equipment, set up camps, and construct roads prior to beginning harvest.

What drives the various timber sale program pipeline pool volume is a combination of actual harvest and projected demand. As purchasers harvest timber, they deplete the volume under contract. Managers track harvest, and offer sales that give the industry as-a-whole the opportunity to replace this volume and build or maintain their working inventory. Although there can be significant variation for practical reasons from year to year, in the long-run, over both the high points and low points of the market cycle, timber harvest will equal timber sales.

The amount of pipeline volume in each of the pools is determined by the Forest Service based on historical patterns. Table 2-Pools Matrix displays what volume levels are expected to be maintained in each pool. Pool 1-Timber Volume Under Analysis is expected to be maintained at approximately 4.5 times the amount of anticipated harvest; Pool 2-Timber Volume Available for Sale is expected to be maintained at approximately 1.3 times the amount of anticipated harvest, and Pool 3-Volume Under Contract is expected to be maintained at approximately 3 times the amount of anticipated harvest. The objective of the pools concept is to maintain sufficient volume in preparation and under contract to be able to respond to yearly fluctuations in a timely manner.

Table 2- Pipeline Pool Matrix

Pipeline Pool Volume	Flows	Start of Year One	During Year One	End of Year One
1. Volume Under Analysis **(Gate 2)**		238	401	230
	NEPA Decision	126	343	171
2. Volume Available for Sale **(Gate 3, Gate 4 and Gate 5)**		79	266	159
	Offered		163	
	Sold		148	
3. Volume Under Contract **(Gate 6)**		325		352
	Volume Harvested*		121	
*Note-The amount of volume estimated to be harvested for the year sets the basis for what will be maintained in Pools 1-3 **(Gates 2 through 6).** Should this estimate be incorrect, adjustments can be made in the following years without significant departures in outyear programs capabilities.				

Matrix crosswalk between Gate Tracking System and Pools of Timber Concept:
Gate 2: Proposed timber volume with a published decision document (Record of Decision) that is viable for sale after completion of appeals and litigation.
Gate 3: NEPA cleared timber volume with field preparation work completed and the timber sale ready to be offered in a timber sale contract package.
Gate 6: Timber volume under contract.

Timber volume in appeals and/or enjoined in litigation *.	55	Million Board Feet

*As of 09/30/99. The volume in appeals and or enjoined in litigation is updated on a quarterly basis.

How Does the Forest Service Decide Where Timber Sale Projects Should be Located?

The Allowable Sale Quantity (ASQ)

The Modified 1997 Forest Plan Record of Decision established an ASQ for timber at 1.87 billion board feet per decade which equates to an annual average of 187 million board feet (MMBF). The ASQ serves as an upper limit on the amount of timber that may be offered for sale as part of the regularly scheduled timber sale program. It consists of two separate Non-Interchangeable Components (NIC's) called NIC I, which is

1.53 billion board feet of timber per decade, and NIC II, which is .34 billion board feet per decade. The purposes of partitioning the ASQ into two components are to maintain the economic sustainability of the timber resource by preventing the over-harvest of the best operable ground, and to identify that portion of the timber supply that is at risk of attainment because of marginal economic conditions. The NIC I component includes lands that can be harvested with normal logging systems. The NIC II component includes land that has high logging costs due to isolation or special equipment requirements. Most of these NIC II lands are presently considered economically and technically marginal.

Immediately following the issuance of the Modified 1997 Forest Plan Record of Decision by the Deputy Under Secretary of Agriculture, James Lyons, the Forest Service began an analysis of the ROD to develop consistent methodologies for its implementation (Implementation of Tongass Land Management Plan, 1920/1950, James A. Bartelme, Forest Supervisor, May 11, 1999). The purpose of the analysis was to develop methodology to ensure the modified Forest Plan changes received a consistent implementation approach across the Tongass, and to determine where the land base existed to begin programming current and future timber sale projects.

The Tongass National Forest has been unified under one Forest Supervisor overseeing the three combined Administrative Areas (Chatham, Stikine and Ketchikan). The allowable sale quantity is disaggregated by Ranger District offices for planning and scheduling purposes. Each District has been allocated a portion of the timber harvest program based on the FORPLAN computer run and availability of suitable and available acres, to implement the Forest Plan, and Section 101 of the Tongass Timber Reform Act (1990). The Forest Plan set the Forest allowable sale quantity (ASQ) upper limit at 187 MMBF per year. The distribution of the planned ASQ harvest among the Districts is listed in Table 3 (All volumes are identified as sawlog plus utility):

Table 3-Distribution of ASQ Among the Tongass National Forest Ranger Districts

Tongass NF Ranger District	Non-Interchangeable Components	
	NIC I	NIC II
Ketchikan	18	4
Thorne Bay	21	5
Craig	18	4
Wrangell	24	4
Petersburg	37	8
Sitka	12	3
Hoonah	6	2
Juneau	12	3
Yakutat	5	1
Admiralty	0	0
NIC Totals	153	34
ASQ Total	187	

Historically, timber harvest activities were generally concentrated in the central and southern portions of the Tongass. Now, under the Modified 1997 Forest Plan, the suitable timber land base is more evenly distributed across the Forest. As a result, it is necessary to lessen harvest on the southern end and begin planning projects in areas further north. In answer to the question presented for this section of the Appendix, the suitable timber base is capable of producing the ASQ documented in the Modified 1997 Forest Plan Record of Decision. However, harvest activities will be more evenly distributed than they were in the past.

Chart 1- 1997 Modified Forest Plan Land Allocations

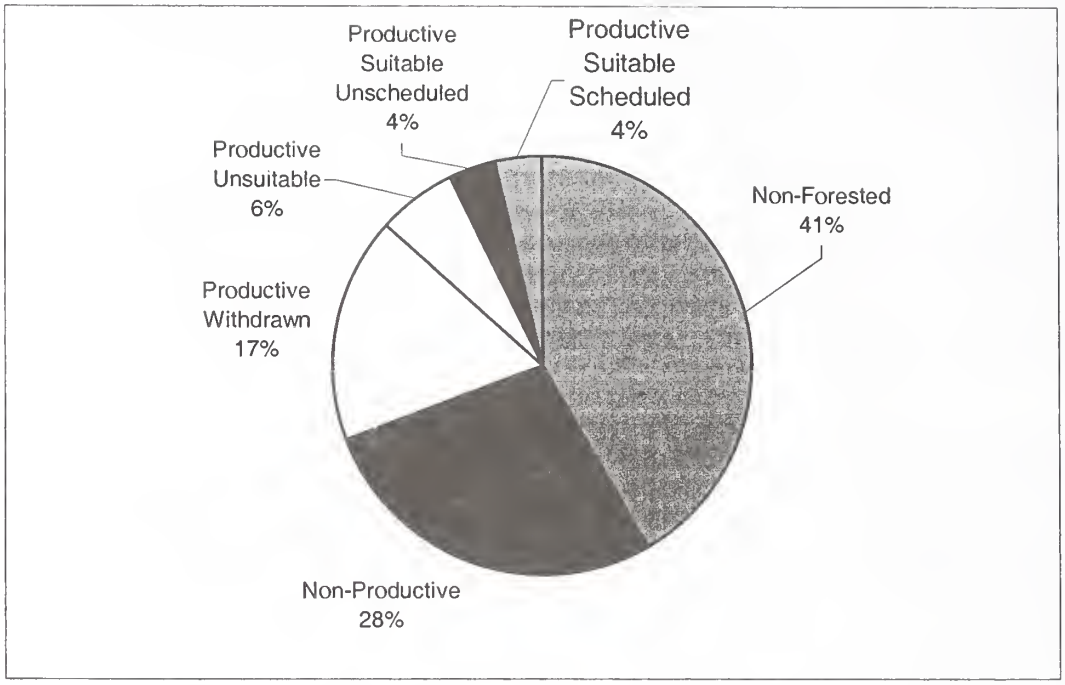


Chart 1- 1997 Modified Forest Plan Land Allocations depicts the productive suitable land base that is scheduled for timber harvest activities. Four percent of the Tongass land base generates the allowable sale quantity of 187 MMBF per year. The remainder of the land, approximately ninety-six percent, does not allow or will not support timber harvest activities.

District-Level Planning

The Forest Supervisor for the Tongass National Forest has discrete responsibilities for the overall management of the Forest's timber sale program. Included within these responsibilities is making the determination on the amount of timber volume to be made available to the industry as described above. Once a determination is made for the current year (annual demand) offer level, the information is presented to Congress via the Regional Forester and Chief of the Forest Service. Whether or not funding is appropriated to attain the program is the responsibility of the Congress and the President of the United States.

While the debate on funding takes place, the Tongass Forest Supervisor directs the District Rangers to formulate timber sale schedules that attain the prescribed offer level for the current year as well as develop outyear timber programs based on projected market demand for the planning cycle. It is the Ranger's role to recommend to the Forest Supervisor timber sale projects that meet forest plan goals and objectives. Districts work on various projects simultaneously resulting in continual movement of projects through the stages of the timber program pipeline. Their schedule allows the necessary time to complete preliminary analysis, resource inventories, environmental documentation, field layout preparations and permit acquisition, appraisal of timber resource values, advertisement of sale characteristics for potential bidders, bid opening, and physical award of the timber sale. Once all of the Rangers' recommendations are made and compiled into a consolidated schedule, the Forest Supervisor is responsible for the review and approval of the final plan.

Pending Congressional appropriations, the sale schedule is implemented. In the event insufficient funds are appropriated to achieve the desired outputs, timber sale projects are selected and implemented on a priority

basis. Generally, the higher priority projects include sales where investments such as, road networks, camps or log transfer facilities have already been established. Those sales that are not implemented or only partially implemented are moved to the outyears. The sale schedule becomes very dynamic in nature due to the number of influences on each of the districts. A formal review of the schedule is done annually by the Forest Supervisor in consultation with the District Rangers, and amendments are made as needed through the course of the year. (The Tongass Timber Sale Plan is located on the Tongass National Forest Website)

The National Forest Management Act requires the Forest Service to develop timber sale schedules that encompass the life of the forest plan. The recent Tongass National Forest planning process culminated upon issuance of the Modified 1997 Forest Plan Record of Decision for the Tongass Land and Resource Management Plan. In response to this Plan, the Tongass has prepared a Ten Year Timber Sale Schedule for Fiscal Years 2000-2009. Fiscal Year 2000 offer level is based on annual market demand estimates. The remaining years, 2001-2009 are based on market demand projections over the planning cycle. Table 4-Tongass Ten Year Timber Sale Schedule-Fiscal Year 2000, denotes the first year of the ten-year plan. Fiscal Year 2000 is listed below to show the reader an example of the information available and display the timber sales scheduled for the current fiscal year.

Table 4-Tongass Ten Year Timber Sale Schedule-Fiscal Year 2000

NEPA	Decision		S+U	Sale	Vol S+U		Gate	FY00 Gate	Gate
Project	Date	RD	(MMBF)	Name	(MMBF)	Class	2	3	5
Sea Level EIS	May-99	KRD		Madder	26	S			26
Sea Level EIS	x	KRD		Buckdance	11	S			11
Sea Level EIS	x	KRD		Orion	13	S			13
Craig Small Sales EA	x	CRD	1.5	Craig Small Sales	1.5	S	1.5	1.5	1.5
TNB Small Sales EA	x	TNB	5	Various	5	S	5	5	5
Luck Lake EIS	Jan-00	TNB	13	Luck Lake	5	S	13	5	5
Luck Lake EIS	x	TNB		Twin Bridge	8	S		8	8
Couverdan CE	Jun-00	JRD	0.8	Couverden Salvage	0.8	S	0.8	0.8	0.8
8-FATHOM EIS	Apr-96	HRD		Midway	6.4	S		6.4	6.4
HRD Small Sales EA	x	HRD	0.2	Small sales	0.2	S	0.2	0.2	0.2
NW BARANOF EIS	Feb-96	SRD		Schultz	8	S		1	8
Small Salvage Sale CE	x	YRD	0.2	Small Salvage Sale-00	0.2	S	0.2	0.2	0.2
Woodpecker EIS	(May-00)	PRD	(5-18)	Woodwork	1	S	18	1	1
Twin Creek EA	Aug-98	PRD		Twin Creek heli (41,66)	1.5	S		1.5	1.5
Twin Creek EA	Aug-98	PRD		Twin Creek 15	0.1	S		0.1	0.1
South Lindenberg EIS	Dec-96	PRD		South Central (U140)	1.5	S		1.5	1.5
South Lindenberg EIS	Dec-96	PRD		S.Lindy SE	10	S		10	10
East Fork EA	Jul-88	PRD		East Fork	2	S		2	2
Bohemia Mountain EIS	Jun-95	PRD		Goose (Unit 538)	1	S		1	1
Doughnut EA	x	WRD	8	Doughnut	4	O	8	4	4
Skipping Cow EIS (X)	x	WRD	20	Skipping Cow	20	S	20	20	20
Kuakan EIS	x	WRD	12	Kuakan	12	S	12	12	12
Total			40		138.2		40	81.2	138.2

NOTE: The difference between projected volume (148 MMBF) and offer volume (138 MMBF) will be made up from re-offer/reconfigured unsold FY 98/99 timber sales.

The Ten Year Schedule provides a significant amount of information and is described as follows:

Title	Description
NEPA Project	Environmental document project name. This name may or may not differ from the timber sale project name depending on how many sales originate from the original NEPA document.
Decision Date	The date of the decision document whether planned or actual. 'x' denotes project has started and completion is within the FY noted under column H.
RD	Ranger district office project is located (PRD=Petersburg Ranger District).
S+U (MMBF)	Anticipated timber volume (sawlog plus utility) expected from the NEPA document. Generally only appears once in the year the decision is made. If no volume shown, decision on document was made in another fiscal year.
Sale Name	Timber sale project name.
Vol S+U (MMBF)	Timber sale project volume (sawlog plus utility).
Class	Timber sale size class determination (S-SBA, O=open sale to all bidders).
FY00 Gate 2 (NEPA)	Only appears in the year the NEPA document will be decided. Number designates potential volume.
FY00 Gate 3 (Layout)	Only appears in fiscal year sale is to be laid out and appraised. May appear in more than one year.
FY00 Gate 5 (Offer)	Only appears in fiscal year sale is to be offered. Number designates potential volume.

The location of timber sale projects are based on the land allocation directed in the Forest Plan decision. Timber sales are located where permitted based on the prescription and objectives of the land use designation. Timber sale projects are located to varying degrees in land use designations identified as timber production, modified landscape, and scenic viewshed.

As stated earlier, the District Ranger is responsible for identifying and recommending the project areas for the Ten Year Timber Sale Schedule. The considerations the Ranger makes on each project includes but are not limited to the following:

1. The project area contains a sufficient number of acres allocated to development land use designations to make timber harvest in the area appropriate under the Forest Plan. There is an adequate amount of suitable and available land for timber harvest opportunities. Available information indicates harvest of the amount of timber volume being considered for this project can occur consistent with the Forest Plan standards and guidelines and other resource protection requirements.

2. The project and proposed timber harvest volume can contribute to achieving the goals and objectives of implementing the Forest Plan.

3. The potential investment in infrastructure (roads, bridges, log transfer facilities, camps, rock pits, etc.) is necessary for sustainable timber harvest offerings. Where infrastructure already exists, this project will enable maintenance and upgrade of the facilities, which is necessary for removal of timber volume.

4. The potential effects on subsistence and other resources.

5. Based on current year and anticipated outyear timber volume demand; volume currently under contract; anticipated Congressional allocations; and the availability of resources to fully prepare and offer this project for sale, this project is consistent and meets Forest Service Policy in the Alaska Region, Regional Guide; Best Management Practices; the Modified 1997 Tongass Land and Resource Management Plan; and all other laws and regulations governing the removal of timber from National Forest System Lands.

How Does This Project Fit into the Tongass Timber Program?

The Madan Timber Sale is scheduled for offer in Fiscal Year 2001 (Tongass National Forest Ten Year Timber Sale Schedule, approved by Thomas Puchlerz, Forest Supervisor, dated 10/20/99). Forest-wide, total offer volume being planned for Fiscal Year 2000 is 148 MMBF. In order to achieve the planned offer date, the Madan Timber Sale has a scheduled Gate 2 completion date of Fiscal Year 2000 with Gate 3 implementation to begin by Fiscal Year 2001.

The Madan Timber Sale is currently in Gate 2, "Volume Under Analysis". The project's action alternatives being addressed in the NEPA analysis range from 19-32 MMBF that could contribute to the Tongass Timber Sale Program. As described earlier, the volume of timber needed to maintain this pool is 343 MMBF. Currently, forest-wide, NEPA decision pool contains from 180 MMBF to 194 MMBF inclusive of this project. Therefore, the Madan Timber Sale is consistent with program planning objectives and necessary to meet the goal of providing an orderly flow of timber from the Tongass on a sustained yield basis. Given the included information, it is reasonable to be conducting the environmental analysis for this project at this time.

Why Can't This Project Occur Somewhere Else?

As previously discussed, the market demand for timber for the next ten years is expected to average 160 MMBF per year. The suitable and available land base on the Tongass is capable of supporting an Allowable Sale Quantity of 187 MMBF annually, 153 MMBF of which is considered economical (i.e. the NIC I component). Based on the projected market demand for the planning cycle, all suitable timberlands will eventually be scheduled for harvest to meet the current and projected demand for raw material in Southeast Alaska. The cumulative impact on other resources from past harvest activities, the location of timber sales under contract, and the eventual use of all suitable lands for timber sale projects makes the relocation of this project in another area inefficient and potentially contrary to the standards and guidelines of the Forest Plan.

- Areas with available timber will be necessary to consider for harvest in order to seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle, pursuant to Section 101 of the Tongass Timber Reform Act (TTRA).

- The potential effects on subsistence resources are projected to differ little based on the sequence these areas are harvested. Harvesting other areas with available timber on the Tongass National Forest is expected to have similar potential effects on resources, including those used for subsistence, because of widespread distribution of subsistence use and other factors. Harvest within other areas is foreseeable, in any case over the forest planning horizon under the Forest Plan.

- Providing substantially less timber volume than required to meet Forest Plan and TTRA Section 101 timber supply and employment objectives in order to avoid harvest in the project area is not necessary or reasonable.

- It is reasonable to schedule harvest in the project area rather than in other areas at the present time based on previous harvest entry and access, level of controversy over subsistence and other effects, the ability to the complete National Environmental Policy Act (NEPA) process and make timber available to meet the needs of dependent industries. Other areas that are reasonable to consider for harvest in the near future are the subject of other project EIS's that are currently ongoing or scheduled to begin soon.

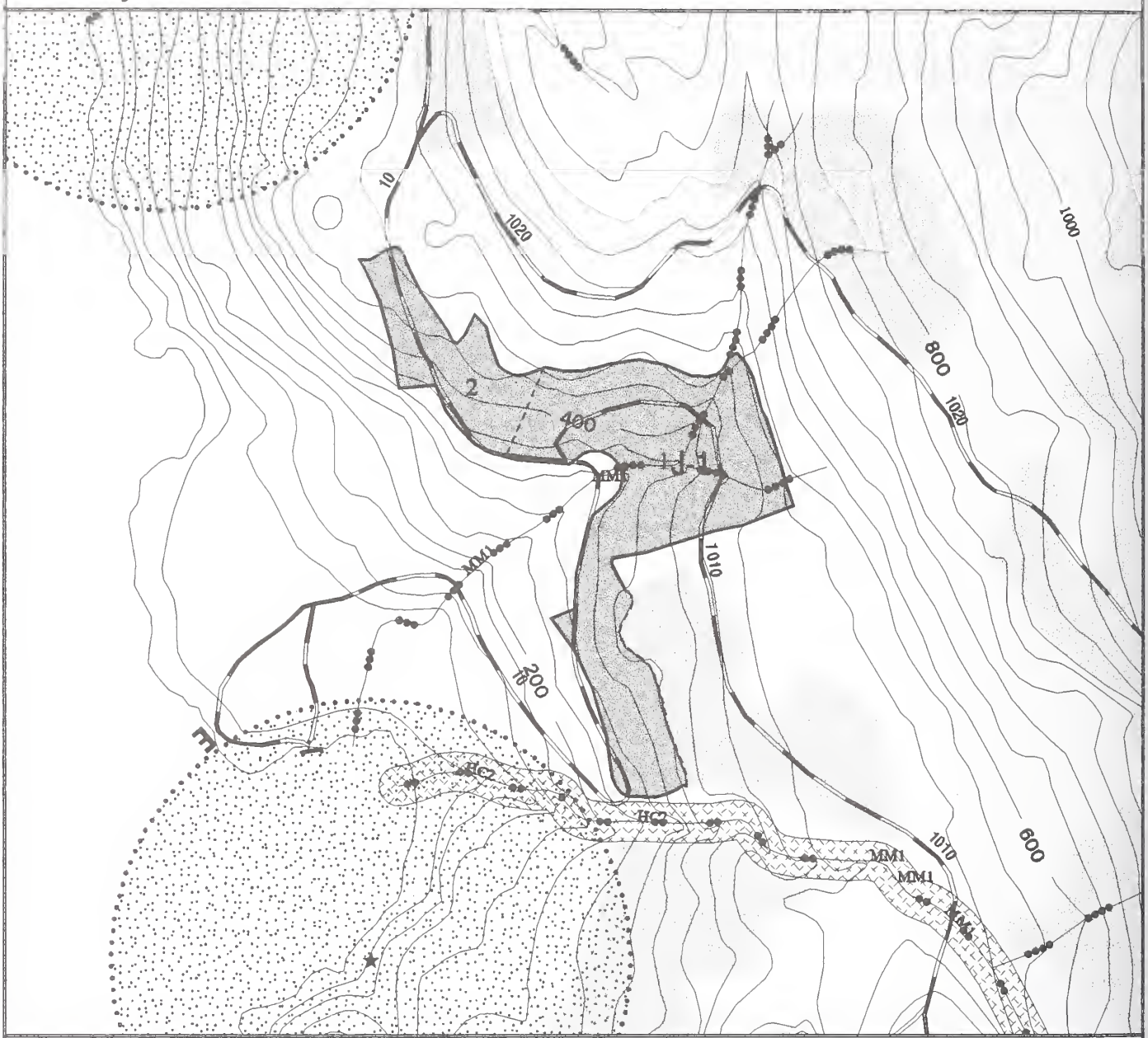
Appendix B

Unit Cards

Appendix B
Unit Cards

UNIT J-1

39 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madan/arcls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-1 In Alternative(s) 2, 3, & 5

Harvest Method: Running Skyline
Total Acres: 39 Total Volume: 694 MFB Volume per Acre 18 MBF

UNIT DEVELOPMENT

Unit designed to meet Visual Quality Objective of partial retention. Southeastern boundary was modified in the field due to unsuitable timber and small area of organic soil. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F11, T1, W1, W7, V1, V7, V8, and V13. These measures are described below within the resource sections that apply. Two mitigation measures, R1 and W9, would only apply under Road Management Option B.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration on both settings using the roads as continuous road-side landings. Portions of the unit can be shovel yarded. Deflection is good. Tailholds are poor and multiple-stump anchors will be necessary. A 1000' beach fringe buffer was placed at the northwest and southwest portions of the unit. Two Class IV streams in center of unit can be split-yarded and require directional felling. The class IV steams combine into a class III below the road outside of the unit.. A class II V-notch stream on the south boundary and has the greater of a 100' or top of bank buffer (BMP 12.6(a), 13.16). The timber is highly defective, old and low value and contains little windthrown timber; no blowdown problems are expected after harvest. The unit has visual concerns from the west; See Visual/Recreation section.

Specified Roads: The unit is accessed by the 10 road and the 1010 road. Consider moving the 10 road uphill 50' in the southern portion of unit.
Temporary Roads: A < 100' long temporary road is needed west of the 10 road in the north section.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve trees (estimated harvest volume = 625 MBF). Leave scattered leave trees and snags and non-merchantable trees within 50-100 feet of the unit/setting boundaries. Leave a higher percentage of reserve trees on visible boundaries and a lower percentage on non-seen edges. Due to visual concerns special methods are needed. See Visual/Recreation section. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allows this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries

Concern: Class IV channel bisects unit, Class II channel forms southern boundary of unit.

Mitigation: Directional felling, splitline or full suspension for channel flagged orange/white, partial suspension for channel flagged green/white (see unit map). No commercial harvest within 100 feet of Class II channel or the top of v-notch whichever is greater. Manage beyond (approx. one site-potential tree height) for reasonable assurance of windfirmness.

Soils/Wetlands/Karst

Concern: Small area of organic soils with poor timber quality along the mid-southeastern boundary.

Mitigation: Removed the wet area from the unit.

Wildlife/TES Plants

Concern: Unit contains high deer HSI values in southern portion of unit. High probability goshawk nesting habitat occurs in the southern portion of unit. Eagle timing restriction may apply near unit on Road 10 (see Road Card).

Mitigation: Leave reserve and non-merchantable trees in southern portion of unit when possible.

Visual/Recreation

Concern: Meet Visual Quality Objective of partial retention in areas of unit seen from saltwater (along the eastern border of the northern and central lobes of the unit). Timber west and downhill of unit will screen most of the unit from saltwater.

Mitigation: Locate logging corridors so that they are not visible from Jenkins Cove. Vary and feather edges of unit (especially visible portions of northern and eastern edges) to give unit a more natural appearance. No straight lines along edges. Leave a higher percentage of reserve trees within 50-100 feet of visible boundaries, than in unseen areas. Unit needs a review by a landscape architect during final layout to make sure that layout will achieve the VQO of partial retention.

Other Resources/Issues

Concern: Unit was inventoried for cultural resources although the unit is outside of high probability areas. Culturally Modified Tree (blaze) was located and recorded near northwestern boundary.

Mitigation: No further cultural resource work recommended.

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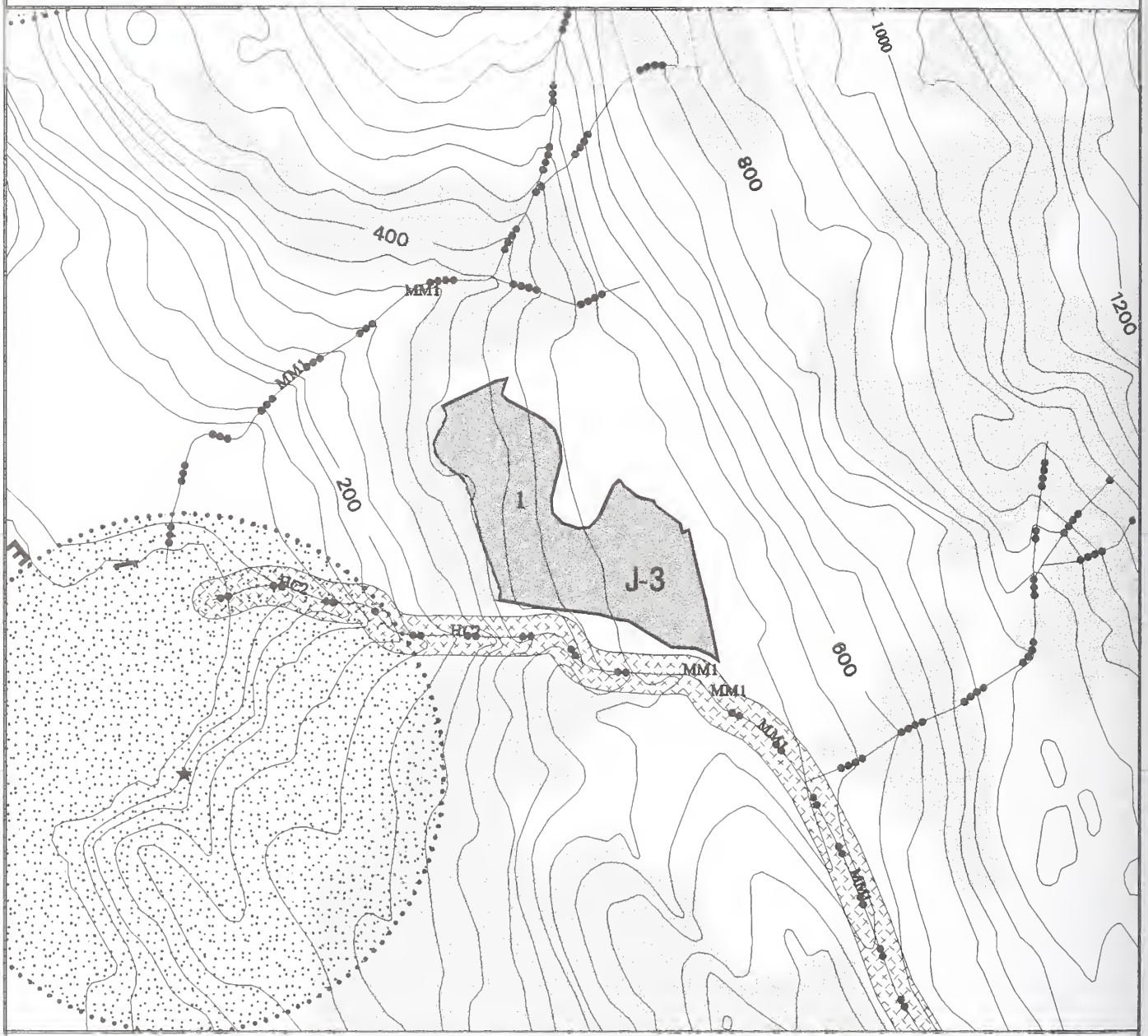
UNIT J-3

21 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madsen/smls/pp-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-3 In Alternative(s) 4

Harvest Method: Helicopter
Total Acres: 21 Total Volume: 372 MBF Volume per Acre 18 MBF

UNIT DEVELOPMENT

Unit has not been field verified. Additional field verification is required. Boundaries correspond with mapped suitability timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F11, T1, W6, W13, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation: This unit design has not been field verified.
The timber can be helicopter yarded to the Jenkins Cove LTF (Alt. 4 yarding distance = 0.5 miles). A Class II stream exists on the south boundary which will need a buffer and directional felling (BMP 12.6(a), 13.16). The remaining boundaries are intended to be at the limit of merchantable timber and/or the logical setting boundary. This unit could likely be yarded using conventional logging systems if roads were planned. This unit has visual concerns from the west; see Visual/Recreation section.

Specified Roads: None since this unit only appears in Alt. 4, for which no roads are planned in the Jenkins Cove area. (If the unit was planned for conventional yarding, it could be yarded directly to the 1020 road).

Temporary Roads: No temp roads needed even if planned for conventional yarding.

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 93 MBF). Harvest individual trees and/or groups up to 2 acres scattered throughout the unit Group cuts should be located horizontally with contours when possible; see Visual/Recreation section. Leave a higher percentage of reserve trees on visible boundaries and a lower percentage on non-seen edges. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: No field inspection of proposed harvest unit. Unmapped Class IV channel may be present in NE corner of the unit draining from muskeg area. Class II channel forms southern boundary of unit.

Mitigation: May require directional felling, splitline, partial, or full suspension for Class IV channels that may be present within the unit. No commercial harvest within 100 feet of Class II channel or the top of v-notch whichever is greater. Expanded buffers are not necessary because of prescription (i.e., minimum 70% retention).

Soils/Wetlands/Karst
Concern: Unit has not been field reviewed. There may be small areas with slope instability concerns that are not shown with GIS mapping.

Mitigation: Geotechnical review during final layout to delineate any areas of instability.

Wildlife/TES Plants
Concern: There is GIS-mapped high probability goshawk nesting habitat along the southwestern boundaries of the unit. A ¼ mile eagle nest timing buffer may be located within the helicopter flight path.

Mitigation: Leave more reserve trees along the southwestern boundaries of the unit. Avoid repeated helicopter flights within ¼ mile of nest from March 1 through May 31. Surveys needed to determine nest activity prior to implementation, if nest is active, continue to avoid repeated helicopter flights through August 31.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention for portion of unit (which is the majority if the unit) seen from saltwater.

Mitigation: Retaining 70% of the timber along with these mitigation measures will allow the unit to meet a Visual Quality Objective of partial retention. Individual selection and/or 2-acre horizontal group cuts that follow the contours where possible. Make sure boundaries of group cuts are uneven in size and shape so that they appear to be natural openings in the forest canopy. Leave non-merchantable trees.

Other Resources/Issues
Concern: None
Mitigation:

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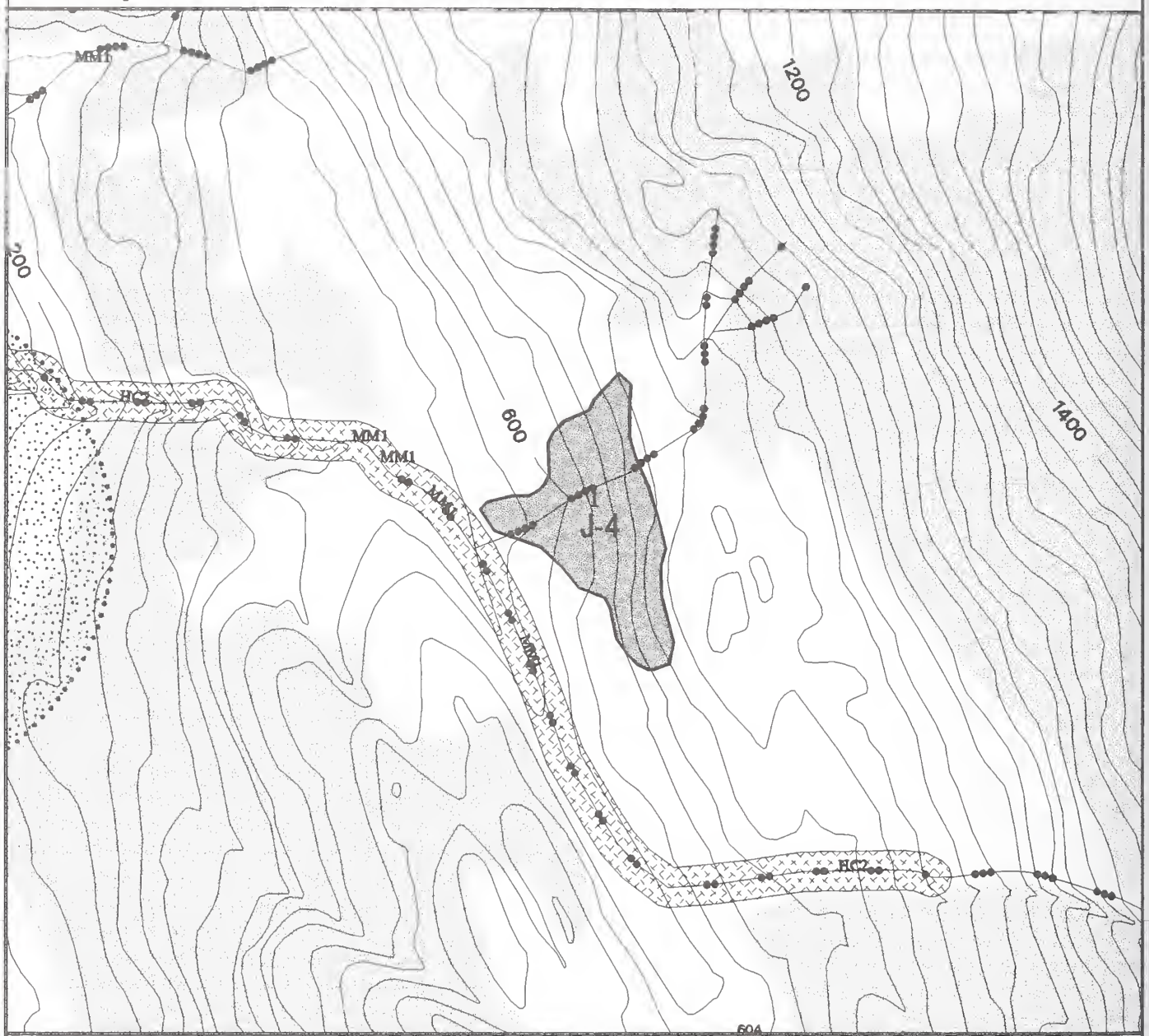
UNIT J-4

15 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- *HC1,MM3,...* — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madas/arnls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-4 In Alternative(s) 3 & 4

Harvest Method: Helicopter
Total Acres: 15 Total Volume: 264 MBF Volume per Acre 18 MBF

UNIT DEVELOPMENT

Unit has not been field verified. Additional field verification is required. Boundaries correspond with mapped suitability timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F11, T1, W6, W13, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation: This unit design has not been field verified.
The timber can be helicopter yarded to the Jenkins Cove LTF (Alt. 4 yarding distance = 1.0 miles), or to the 1010 road in J-5 (Alt. 3 yarding distance = 0.5 miles). A Class II stream exists on the western tip of the unit, which will need a buffer and directional felling (BMP 12.6(a), 13.16). The remaining boundaries are intended to be at the limit of merchantable timber. This unit could likely be yarded using conventional logging systems if roads were planned. This unit has visual concerns from the west; see Visual/Recreation section.

Specified Roads: The timber can be helicopter yarded to the 1010 Alt. 3, or the Jenkins Cove LTF for Alt. 4.

Temporary Roads: This unit would need a temporary road if conventionally logged.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 66 MBF). Harvest individual trees and/or groups up to 2 acres scattered throughout the unit. Leave a higher percentage of reserve trees on visible boundaries and a lower percentage on non-seen edges. This prescription would address visual and other resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: No field inspection of proposed harvest unit. Class IV channel present in northern end of the unit draining from muskeg area. Class II channel forms western boundary of unit.

Mitigation: May require directional felling, splitline, partial, or full suspension for Class IV channels that may be present within the unit. No commercial harvest within 100 feet of Class II channel or the top of v-notch whichever is greater. Expanded buffers are not needed because of prescription (i.e., minimum 70% retention).

Soils/Wetlands/Karst
Concern: Unit has not been field reviewed. There may be small areas with slope instability concerns that are not shown with GIS mapping.

Mitigation: Geotechnical review during final layout to delineate any areas of instability.

Wildlife/TES Plants
Concern: A ¼ mile eagle nest timing buffer may be located within the helicopter flight path.

Mitigation: Avoid repeated helicopter flights within ¼ mile of nest from March 1 through May 31. Surveys needed to determine nest activity prior to implementation, if nest is active, continue to avoid repeated helicopter flights through August 31.

Visual/Recreation
Concern: Meet Visual Quality Objectives of partial retention for portion of the unit (eastern most 1/3) seen from saltwater.

Mitigation: Retaining 70% of the timber along with these mitigation measures will allow the unit to meet a Visual Quality Objective of partial retention. Individual selection and/or 2-acre horizontal group cuts that follow the contours where possible. Make sure boundaries of group cuts are uneven in size and shape so that they appear to be natural openings in the forest canopy. Leave non-merchantable trees.

Other Resources/Issues
Concern: None
Mitigation:

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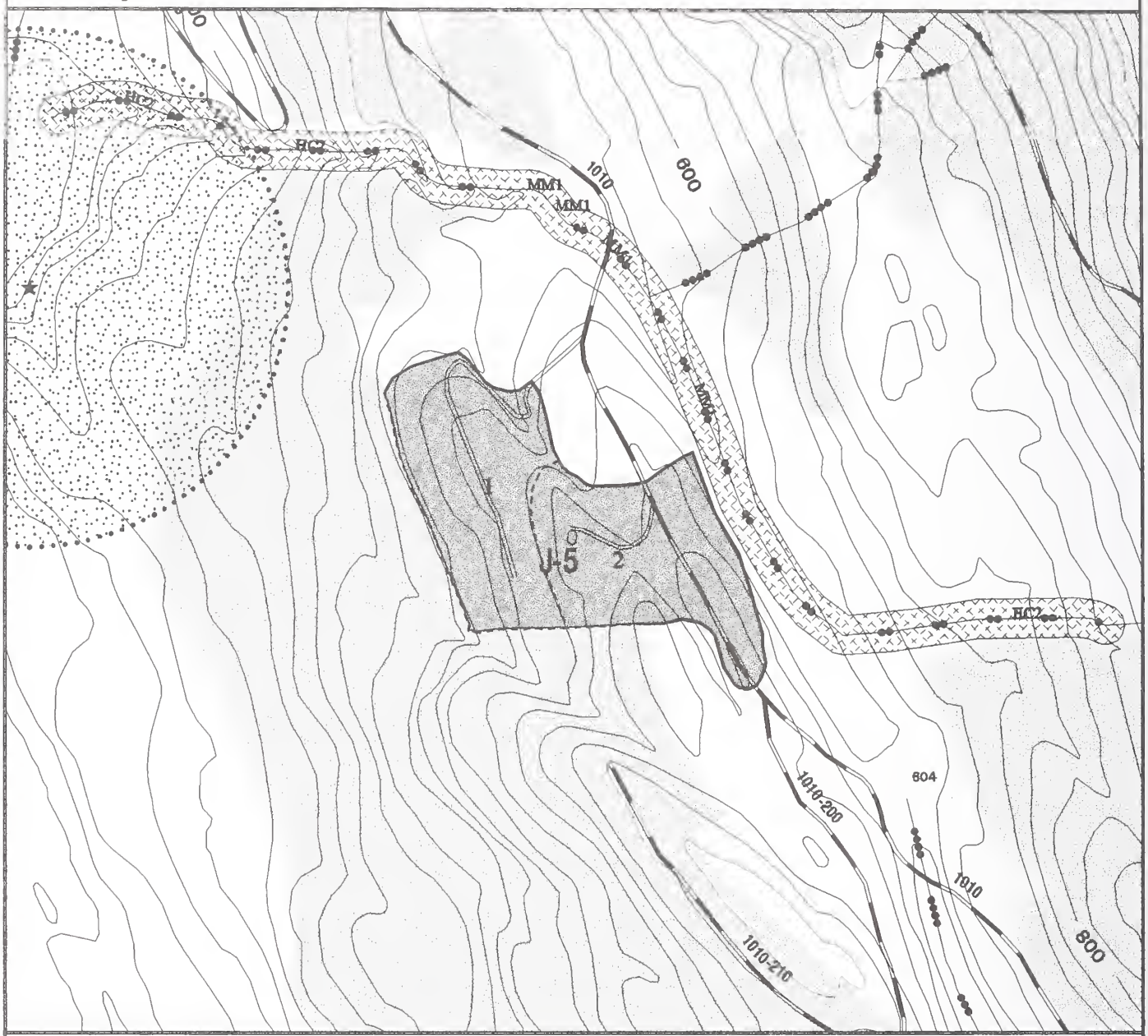
UNIT J-5

37 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/smls/pp-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-5 In Alternative(s) 2, 3, 4, & 5

Harvest Method: Running Skyline (Alt. 2, 3, & 5)/Helicopter (Alt. 4)
Total Acres: 37 Total Volume: 677 MBF Volume per Acre 18 MBF

UNIT DEVELOPMENT

Unit designed to meet Visual Quality Objective of partial retention. Unit boundaries modified in the field due to unsuitable timber. Modified northeastern arm due to unsuitable timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: (Alternatives 2, 3, and 5) F1, F2, T1, W1, W7, W31, V1, V7, and V13; (Alternative 4) F1, F2, T1, W6, W31, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder using a running skyline system on two settings. The roads will be used as continuous road-side landings. A profile in the west setting indicates poor deflection. Deflection and tailholds are poor on that flat central ridgetop, but because the timber is small and defective, no logging problems are anticipated. Tailholds are poor and multiple-stump anchors will be necessary. A class II stream and tributary have 100' buffers making the east boundary (BMP 12.6(a), 13.16). The NE arm of the unit was deleted due to poor timber. The north, south, and SE boundaries were modified to exclude unsuitable timber. The unit contains scattered patches of merchantable timber. No blowdown problems are expected. The unit has visual concerns from the west, and as a result, in this unit 20-30% of the merchantable timber in the seen portion of the unit will remain to reduce the visual effects of harvest and meet Visual Quality Objectives.

Specified Roads: The unit is accessed by the 1010 road.
Temporary Roads: Two temporary roads are is needed. The NW road is approx. 2300' long with potential rock quarry, the SE road is approx. 800' long and ends at a large landing.

Stand Management Objectives:
Alternatives 2, 3, & 5: Future stand will have two or more canopy layers. All of the non-merchantable trees and approximately 20 to 25 % of all the merchantable trees will be retained over most of the unit to meet visual objectives.
Alternative 4: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription:
Alternatives 2, 3, & 5: Clearcut with Reserve Trees (estimated harvest volume = 609 MBF). Leave at least 10-15 %, retention overall, and concentrate reserve trees in the seen areas, so that the seen portion maintains 20-25 % of the merchantable and all non-merchantable trees. Reserve trees should be scattered throughout the seen area; in not seen areas, they can be concentrated within 50-100 feet of the unit/setting boundaries. Leave trees maybe lower quality merchantable trees with high defect, but should be free of mistletoe. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allows this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.
Alternative 4: Individual/Group Selection with a minimum 50% retention (estimated harvest volume = 305 MBF). Harvest individual trees and/or groups up to 2 acres scattered throughout the unit. Leave a higher percentage of reserve trees on visible boundaries and a lower percentage on non-seen edges. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method:
Alternatives 2, 3, & 5: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Alternative 4: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments:
Alternatives 2, 3, & 5: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.
Alternative 4: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries

Concern: Class II stream channel forms eastern boundary of unit, excellent resident trout population.

Mitigation: No commercial harvest within 100 feet of Class II channel or the top of v-notch whichever is greater due to high value fishery. Because blowdown does not appear to be a problem in this area, expanded buffers do not appear to be needed.

Soils/Wetlands/Karst
Concern: None

Mitigation:

Wildlife/TES Plants
Concern: Sensitive plant (*Platanthera Chorisiana*) was found near proposed 1010 road. Plant is located 45 feet east of the road line and at edge of unit boundary.

Mitigation: None needed. The portion of the unit near the sensitive plant has been dropped.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention in areas seen from saltwater (primarily the western third of the unit and along the southern boundary, except for the eastern portion).

Mitigation: By leaving non-merchantable and 20-25% of merchantable trees in the seen portions of the unit, and by implementing mitigation measures, the unit will meet a Visual Quality Objective of partial retention. Vary edges of unit and do not use straight edges to give the unit a more natural shape. Unit needs a review by a landscape architect during final layout to make sure that layout will achieve the VQO of partial retention.

Other Resources/Issues
Concern: None
Mitigation:

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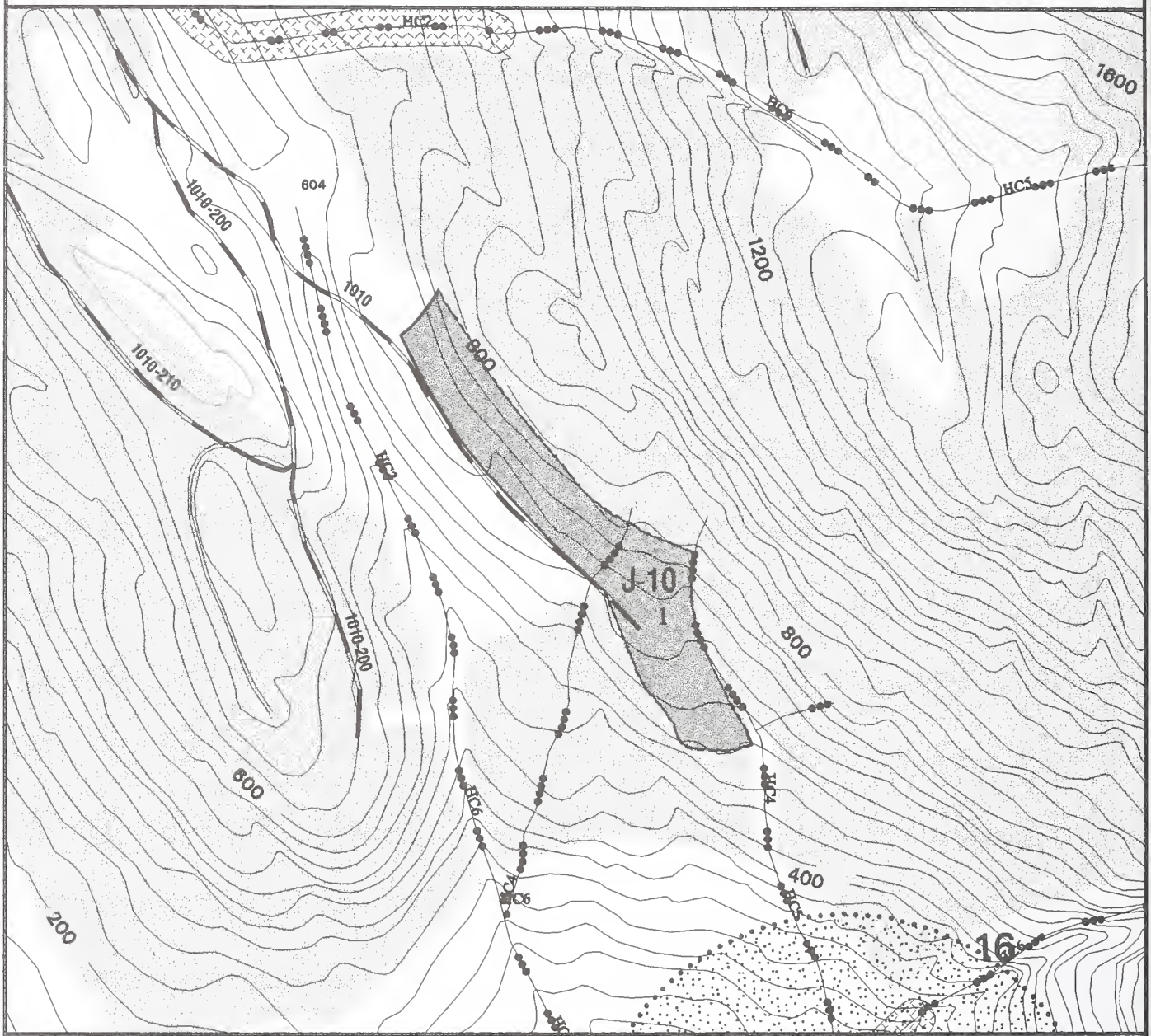
UNIT J-10

21 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

/adams1/madan/arcle/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-10 In Alternative(s) 2, 3, 4, & 5

Harvest Method: Running Skyline (Alt. 2 , 3, 5)/Helicopter (Alt. 4)
Total Acres: 21 Total Volume: 613 MBF Volume per Acre 29 MBF

UNIT DEVELOPMENT

Unit is designed to meet Visual Quality Objective of partial retention. A Class III-IV stream cuts through the southeastern portion and can not be yarded across therefore, the lower portion of the unit has been dropped from this unit and added to adjacent Unit J-42 (helicopter). This Unit may include helicopter landings for Unit J-42. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: (Alternatives 2, 3, and 5) F3, T1, W1, W7, V1, and V7; (Alternative 4) F3, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder using a running skyline system configuration (grapples are recommended). The 1010 road will be used as a continuous road-side landing. The landings may be used to helicopter logs from Unit J-42. Deflection is good. Tailholds are poor in some areas and multiple-stump anchors may be necessary. The southern boundary was modified for logging feasibility. A portion of the SE unit was deleted because of a Class III/IV stream which cannot be yarded across (BMP 12.6(a), 13.16). The timber is average with one patch of marginal timber. The unit has visual concerns from the south and west; see Visual/Recreation section.

Specified Roads: The unit is accessed by the 10 road and the 1010 road.
Temporary Roads: A < 100' long temporary road is needed west of the 10 road in the north section.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription:
Alternatives 2, 3, & 5: Clearcut with Reserve Trees (estimated harvest volume = 551 MBF). Leave scattered leave trees, snags, and non-merchantable trees within 50-100 feet of the unit/setting boundaries. Leave a higher percentage of reserve trees on visible boundaries (particularly the southern ½ of the unit) and a lower percentage in the unseen northern ½ of the unit. Due to visual concerns special methods are needed. See Visual/Recreation section. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allows this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Alternative 4: Individual/Group Selection with a minimum 50% retention (estimated harvest volume = 276 MBF). Harvest individual trees and/or groups up to 2 acres scattered throughout the unit. Leave a higher percentage of reserve trees in the seen southern ½ of unit. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries

Concern: Two Class IV (green/white) streams. Unit boundary was changed to exclude one Class III channel in the southern portion.

Mitigation: Directional felling along Class IV channels. The landing and unit boundary have been moved back to western side of Class III stream – no yarding across Class III channel. No-harvest within v-notch of Class III stream channel. Manage beyond (approx. one site-potential tree height) for reasonable assurance of windfirmness.

Soils/Wetlands/Karst

Concern: None

Mitigation:

Wildlife/TES Plants

Concern: Almost entire unit is high deer HSI values. Less than 1 acre of high probability goshawk nesting habitat occurs along the southern boundary.

Mitigation: Leave reserve and non-merchantable trees.

Visual/Recreation

Concern: Meet visual quality objective of partial retention in areas seen from saltwater (southeastern ½).

Mitigation: Concentrate reserve trees in southern ½ of unit. Vary edges and backline of unit (primarily edges in the southern ½ of unit) to give unit a more natural shape. Feather edges in southern ½ of unit. Do not use any straight edges in the southern ½ of unit.

Other Resources/Issues

Concern: None

Mitigation:

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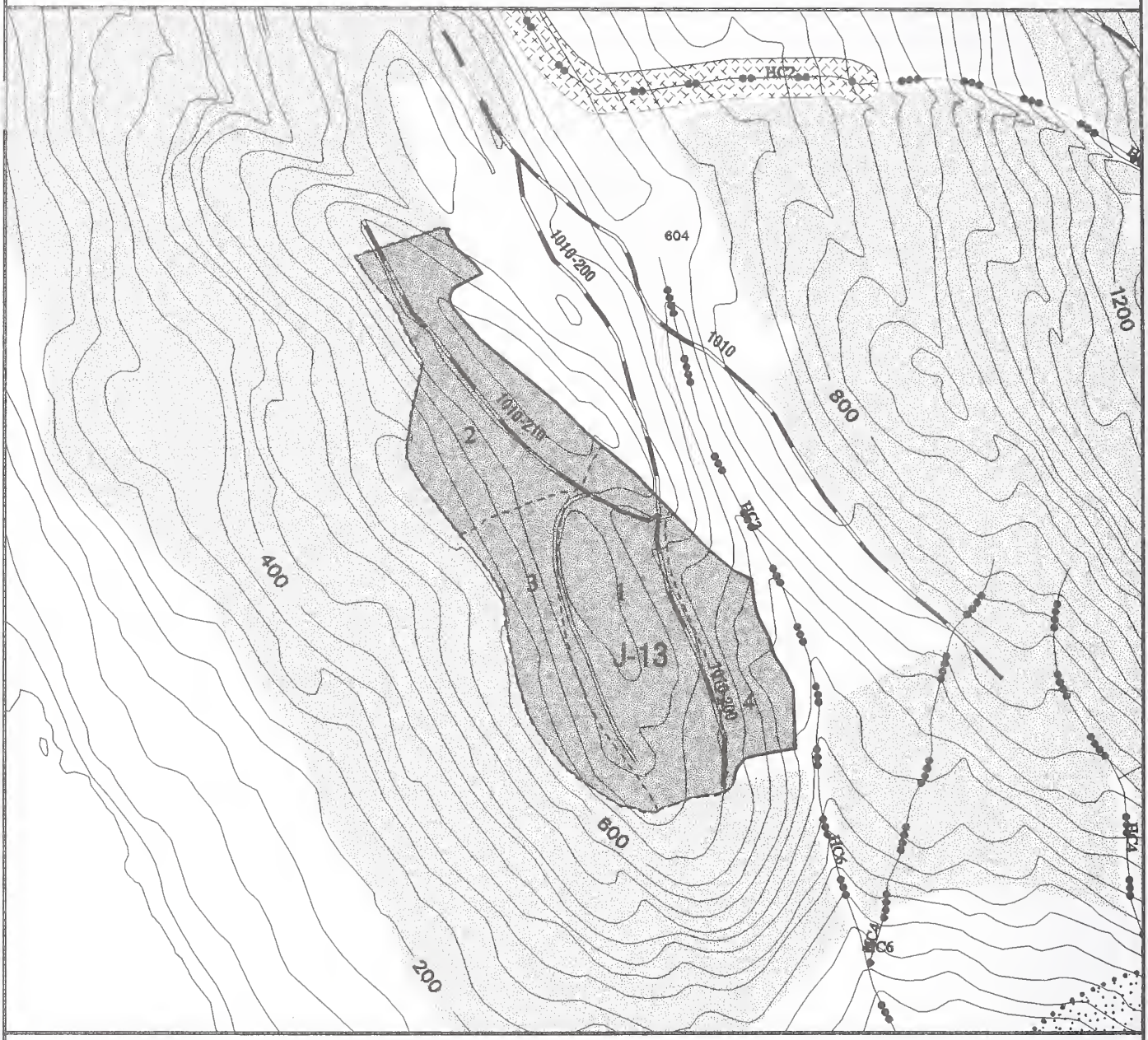
UNIT J-13

63 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/smla/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-13 In Alternative(s) 2, 3, 4, & 5

Harvest Method: Running Skyline, Shovel, Live Skyline (Alt. 2, 3, & 5)/Helicopter (Alt. 4).
Total Acres: 63 Total Volume: 1,762 MBF Volume per Acre 28 MBF

UNIT DEVELOPMENT

Unit designed to meet Visual Quality Objective of partial retention. Western portion (below ridge top) needs to be screened to ensure that there is no "skyline" effect. Unit accessed by specified road 1010-200 and 1010-210 as well as temporary road J-13.1 (1,600'). Planned logging systems include shovel logging on the ridge top and cable logging on the west and east slopes. This Unit may include alternate helicopter landings for Unit J-42. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: (Alternatives 2, 3, and 5) F1, F2, F18, T1, W1, W7, V1, V7, and V8; (Alternative 4) F1, F2, F18, T1, W6, W7, V6, and V8. These measures are described below within the resource sections that apply.

Logging and Transportation:
The unit has four settings. The timber can be yarded using a small mobile yarder in a running skyline configuration on two settings, a shovel on one setting, and a 70' tower in a live skyline configuration on one setting. The temporary spur and the 10210 road will both be used as continuous roadside landings. Landings in this unit may be used as alternatives for helicopter logging J-42. Three profiles indicate that deflection is adequate if hanging across the eastern Class III stream and that rigging tailtrees may be needed for additional lift. The east boundary was placed on the slope break of the Class III stream (BMP 12.6(a), 13.16). On west boundary, tailholds are poor and multiple-stump anchors will be necessary. The unit has visual concerns from the west; leave 20-30% of all trees including reserve trees and non-merchantable residual trees on the west seen area if the unit to screen harvest and roads in unit. Leave more trees downhill side of roads to screen roads..

Specified Roads: The unit is accessed by the 10200 road and the 10210 road.
Temporary Roads: A 1600' long temporary road is needed for the SW settings of the unit.

Stand Management Objectives:
Alternatives 2, 3, and 5 – Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives. The future stand in the western portion of the unit will have two or more canopy layers. All of the non-merchantable trees and approximately 20 to 25 % of all the merchantable trees will be retained over most of the unit to meet visual objectives.
Alternatives 4 – Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription:
Alternatives 2, 3, and 5 - Clearcut with Reserve Trees (estimated harvest volume = 1,586 MBF). Leave at least 10-15 % retention overall, and concentrate reserve trees in the seen areas, so that the seen portion maintains 20-25 % of the merchantable and all non-merchantable trees. Reserve trees should be scattered throughout the seen area; in not seen areas, they can be concentrated within 50-100 feet of the unit/setting boundaries. Also, leave scattered trees along with snags and non-merchantable trees in areas with steep slopes (southern portion) and within 50 - 100 feet of the unit/setting edge boundaries, especially along western side of ridgeline. Due to visual concerns special methods are needed. See Visual/Recreation section. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allows this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Alternatives 4 – Individual/Group Selection with a minimum 50% retention (estimated harvest volume = 794 MBF). Harvest individual trees and/or groups up to 2 acres scattered throughout the unit. Leave a higher percentage of reserve trees on visible boundaries and a lower percentage on non-seen edges. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method:
Alternatives 2, 3, and 5 – Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.
Alternatives 4 – Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments:
Alternatives 2, 3, and 5 – Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.
Alternatives 4 – Future entries similar to this harvest in 30 to 40 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class III stream forms eastern boundary of unit, no unmapped streams observed. Stream location on GIS map should be shifted west to match contour lines.

Mitigation: No programmed harvest within v-notch of Class III stream channel. Manage beyond (approx. one site-potential tree height) for reasonable assurance of wind firmness.

Soils/Wetlands/Karst
Concern: One area of steep slopes (110%) for a short slope length (100 ft) in southeastern portion of the unit. Slope breaks onto wide bench therefore this slope is not a concern and does not need special prescription.

Mitigation: None needed.

Wildlife/TES Plants
Concern: High deer HSI value in lower elevations of the western and middle portions of the unit.

Mitigation: Leave non-merchantable and some merchantable trees in western portion of unit to provide some snow interception.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention in portions of unit visible from saltwater (area of unit west of ridge).

Mitigation: Leave 20-25% of all trees including non-merchantable and some merchantable trees in western portion of the unit that is visible from saltwater. Concentrate trees to be left below roads in seen areas so that roads and harvest are screened from saltwater. Vary edges and backline of unit to make unit to give unit a more natural shape. Unit needs a review by a landscape architect during final layout to make sure that layout will achieve the VQO of partial retention.

Other Resources/Issues
Concern: None
Mitigation:

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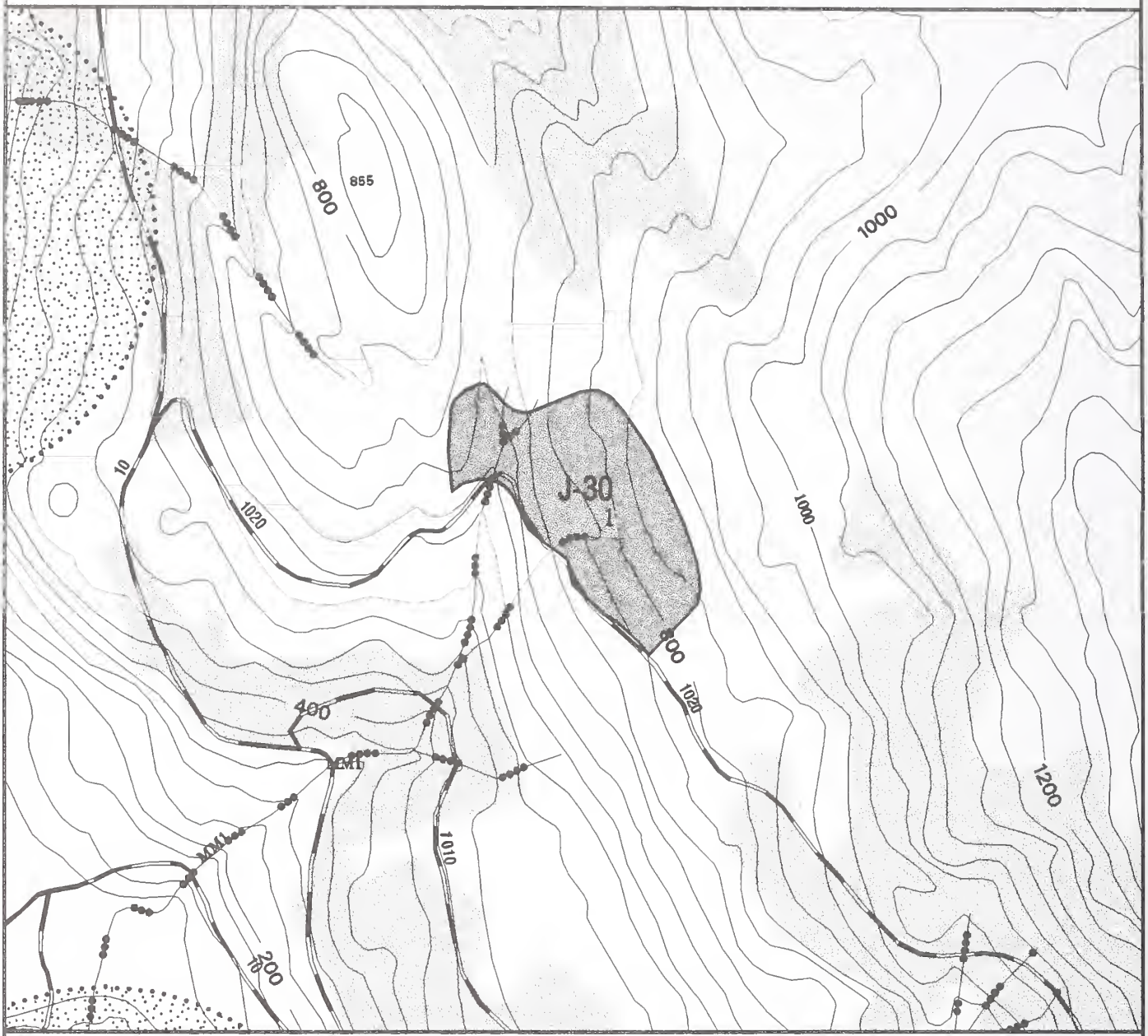
UNIT J-30

21 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/madas/smls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-30 In Alternative(s) 2, 3, 4, & 5

Harvest Method: Running Skyline (Alt. 2 & 5)/helicopter (Alt. 3 & 4)
Total Acres: 21 Total Volume: 265 MBF Volume per Acre 12 MBF

UNIT DEVELOPMENT

Boundaries modified due to unsuitable timber on the south end. Unit boundary brought to the road on the western side. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: (Alternatives 2 and 5) F3, F11, T1, W1, W7, V1, and V7; (Alternatives 3 and 4) F3, F11, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration using the road as continuous road-side landing. Deflection is adequate. 10' tailtrees may help logging in the south portion. Tailholds are adequate. The road is the western boundary. The southern boundary was modified to exclude unsuitable timber. Three Class IV streams in center of unit can be partially suspended or split-yarded and require directional felling (BMP 12.6(a), 13.16). The timber is poor to fair quality. The unit has slight visual concerns from the west; leave reserve trees concentrated in the eastern most (and highest in elevation) portion of the unit.

Specified Roads: The unit is accessed by the 1020 road and a potential rock quarry is in the NW unit.
Temporary Roads: None

Stand Management Objectives:
Alternatives 2 and 5 - Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.
Alternatives 3 and 4 - Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription:
Alternatives 2 and 5 - Clearcut with Reserve Trees (estimated harvest volume = 239 MBF). Leave scattered leave trees, snags, and non-merchantable trees within 50-100 feet of the unit/setting boundaries. Leave a higher percentage of reserve trees on the upper portion (eastern half of unit) to meet the partial retention Visual Quality Objective. Due to visual concerns, special methods are required; see Visual/Recreation section. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allows this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.
Alternatives 3 and 4 - Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 66 MBF). Harvest individual trees and/or groups up to 2 acres scattered throughout the unit. Leave a higher percentage of reserve trees on visible boundaries and a lower percentage on non-seen edges. This prescription would address visual, and other resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method:
Alternatives 2 and 5 - Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.
Alternatives 3 and 4 - Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments:
Alternatives 2 and 5 - Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.
Alternatives 3 and 4 – Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Three Class IV streams drain the middle and northwestern portions of the unit. No fish use occurs in downstream waters.

Mitigation: Use partial suspension, directional felling, and debris cleaning as necessary.

Soils/Wetlands/Karst
Concern: Approximately 0.3 acres of poorly drained soils/muck with very small to small inclusions of Maybeso soils in the northeast portion of unit. Other organic soils also present, however, they contained a mineral component.

Mitigation: Avoid shovel logging within unit.

Wildlife/TES Plants
Concern: None

Mitigation:

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention in areas visible from saltwater (approximately eastern [uphill] 1/3 of unit)

Mitigation: With Alternatives 2 and 5, leave scattered leave trees, snags, and non-merchantable trees within 50-100 feet of the unit/setting boundaries. Leave a higher percentage of reserve trees in the eastern or upper 1/3 of unit to reduce visibility of harvest.

Other Resources/Issues
Concern: None
Mitigation:

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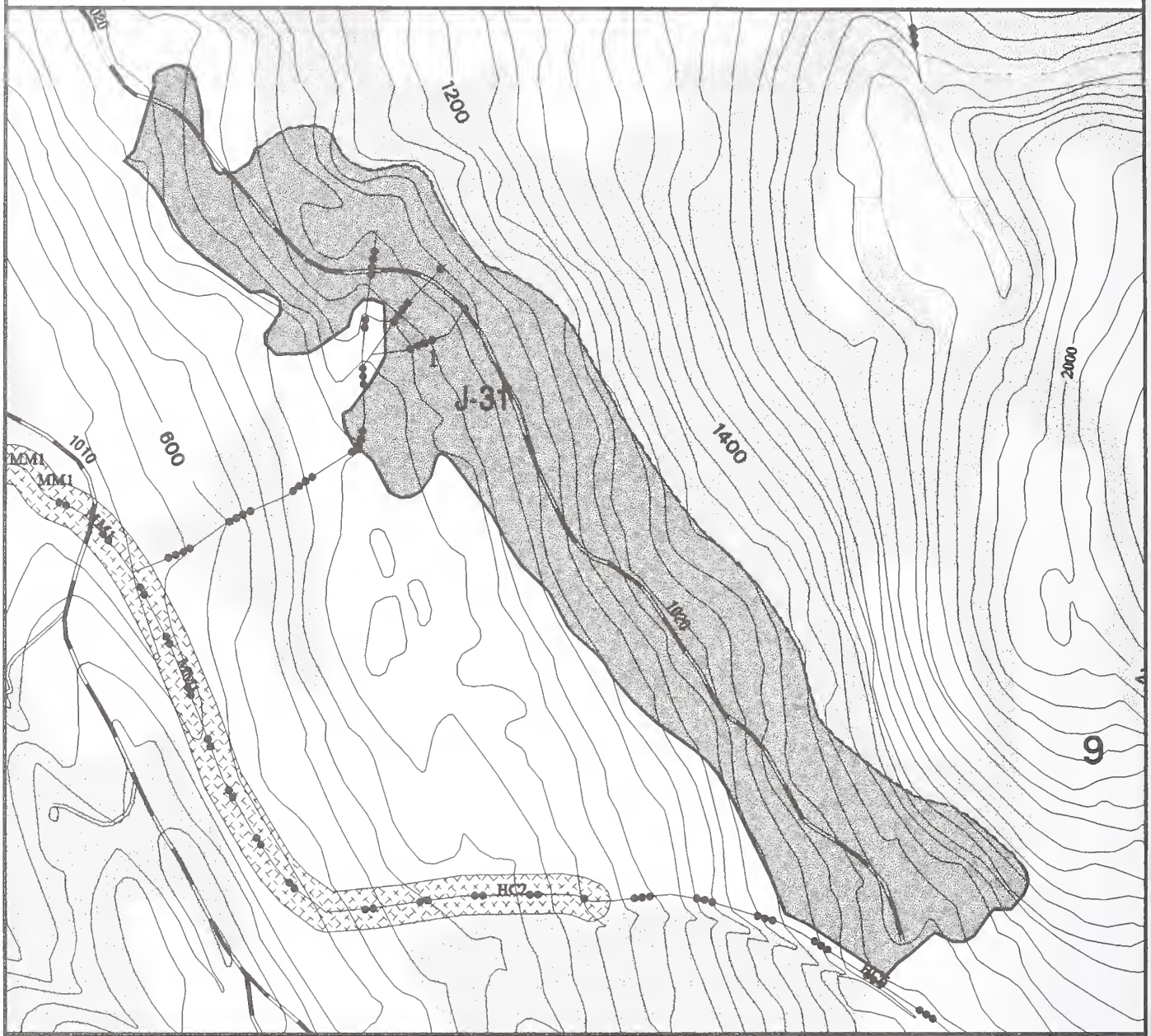
UNIT J-31

111 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/madam/mmle/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-31 In Alternative(s) 2, 3, 4, & 5

Harvest Method: Running Skyline
Total Acres: 111 Total Volume: 941 MBF Volume per Acre 9 MBF

UNIT DEVELOPMENT

Unit designed to meet Visual Quality Objective of partial retention and to minimize impacts to wet area. This unit will include helicopter landings for Unit J-42. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: (Alternatives 2 and 5) F1, F2, F11, F15, T1, W6, W7, V6, and V7; (Alternatives 3 and 4) F1, F2, F11, F15, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration using the road as a continuous road-side landing. Landings may be used for helicopter logging J-32. A Class III stream is located on the SE boundary. Several other Class III/IV streams can be partially suspended of split-yarded and require directional felling (BMP 12.6(a), 13.16). The timber is not consistent in quality. The unit has visual concerns from the west; cut only patches of high quality timber. See Visual/Recreation section.

Specified Roads: The unit is accessed by the 1020 road.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription:
Alternatives 2 and 5 - Group Selection (estimated harvest volume = 235 MBF). Harvest group up to 2-acre horizontal cuts that follow the contours. Remove approximately 25% of the volume in each entry with 40 - 60 years between entries. Retain 10% of the volume as reserve trees throughout the rotation. Leave non-merchantable timber in wetter areas and on steep slopes. Due to visual concerns special methods are needed. See Visual/Recreation section for details on concerns and mitigation. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size). Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Alternatives 3 and 4 - Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 235 MBF). Harvest individual trees and/or groups up to 2 acres scattered throughout the unit. Leave a higher percentage of reserve trees on visible boundaries and a lower percentage on non-seen edges. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Steep slopes and possible sensitive soil types. No Class III streams were identified within the unit, although Class IV streams are present.

Mitigation: Avoid disturbance to areas with steep slopes and sensitive soil types.

Soils/Wetlands/Karst
Concern: There are 3 small areas with steep slopes (greater than 72%). Approximately 15-20 acres of sandy muck soil, small wetlands, and drainages in central portion of unit (see field data map in project files).

Mitigation: Locate harvest patches to avoid steep slopes. Avoid shovel logging within wet area.

Wildlife/TES Plants
Concern: Size of unit could create dispersal problems for some small mammals.

Mitigation: Scatter reserve trees to maintain structure throughout unit to allow dispersal.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention in areas visible from saltwater, which is virtually all of the unit. From saltwater, the group selections will be small and barely noticeable, but should still have natural (uneven) shapes and should appear to be natural openings. Seeing the road in Alternative 2 is more of a concern than the harvest unit.

Mitigation: Group selection will consist of approximately 2-acre horizontal patch cuts that follow the contours. Approximately 10% of volume is to be retained as reserve trees. Make sure the patch cuts are uneven in shape and randomly spaced within Unit J-31 to create a natural pattern of small openings. Leave as many small trees and unmerchantable trees as possible in the patch cuts below the road to screen the road from saltwater.

Other Resources/Issues
Concern: None
Mitigation:

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UNIT J-32 *(page 1 of 2)*

217 ACRES

- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/amla/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-32 In Alternative(s) 2, 3, 4, & 5

Harvest Method: Helicopter (All Alts.)
Total Acres: 217 Total Volume: 7,382 MBF Volume per Acre 34 MBF

UNIT DEVELOPMENT

Unit designed to meet Visual Quality Objective of partial retention. Areas with MMI 4 soil were removed from Unit. A wet area with organic soils occurs along the southern boundary. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: (Alternatives 2 and 5) F1, F2, F11, T1, W6, W7, V6, and V7; (Alternatives 3 and 4) F1, F2, F11, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a helicopter to landings in J-31. Avoid the wet area near the Class III stream on the southeastern boundary (12.6(a), 13.16). Locate harvest patches to avoid MMI 4 soils (BMP 13.5). The unit has visual concerns from the west and south; see visuals.

Specified Roads: The timber will be flown to the 1020 road.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription:
Alternatives 2 and 5 – Group Selection (estimated harvest volume = 1,846 MBF). Harvest groups up to 2-acre horizontal cuts with the contours that run north-south or otherwise utilize topography to reduce visual impacts. Approximately 25% of the stand would be removed in this entry. Leave non-merchantable trees. Locate group cuts to avoid MMI 4 soils, see Soils/Wetlands/Karst section for details. Due to visual concerns special methods are needed. See Visual/Recreation section. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size). Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Alternatives 3 and 4 - Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 1,846 MBF). Harvest individual trees and/or groups up to 2 horizontal acres scattered throughout the unit. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

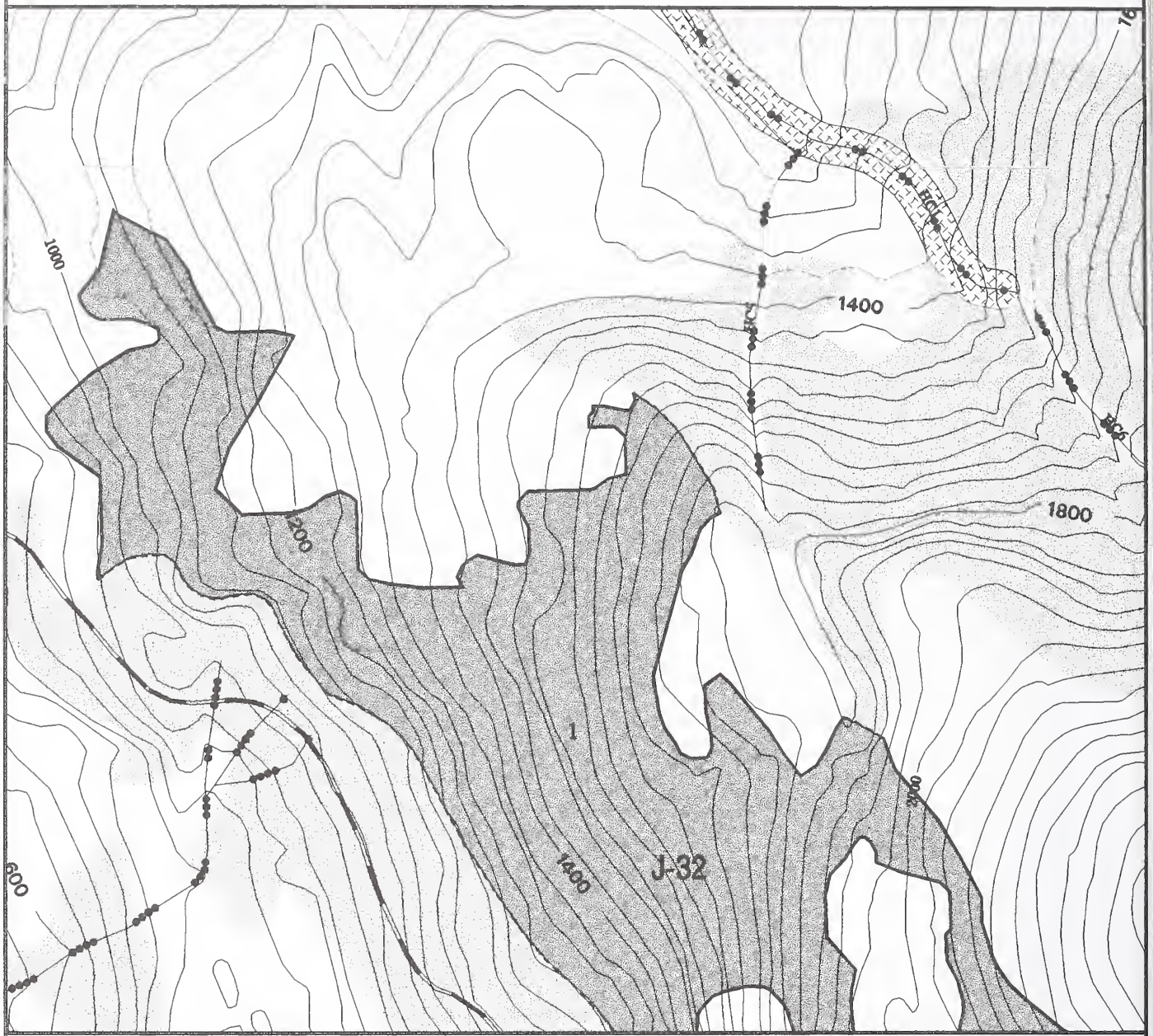
Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: MMI 4 soils present within unit.

Mitigation: Known MMI 4 soils areas have been removed from the unit to reduce possibility of slope failure and excessive sediment input to unmapped stream channels.

UNIT J-32 *(page 2 of 2)* — 217 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- *HC1,MM3,...* — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/maclas/arals/ps-unitcard-2.aml - April 06, 2000

Soils/Wetlands/Karst
Concern: There are two areas of MMI 4 soils (see field data map). These slopes may be susceptible to slope failure if harvested. Approximately 11-15 acres of wet areas (in 2 separate areas) in the south end of unit (unit lobe farthest East). The largest wet area occurs along the creek on the southern boundary of the unit (muskeg associated plants and mucky soils with a mineral component occur within this area).

Mitigation: Locate harvest patches to avoid MMI 4 areas. The 2 known MMI 4 soils areas have been removed from the unit.

Wildlife/TES Plants
Concern: Size of unit could create dispersal problems.

Mitigation: Scatter reserve trees to maintain structure throughout unit to allow dispersal.

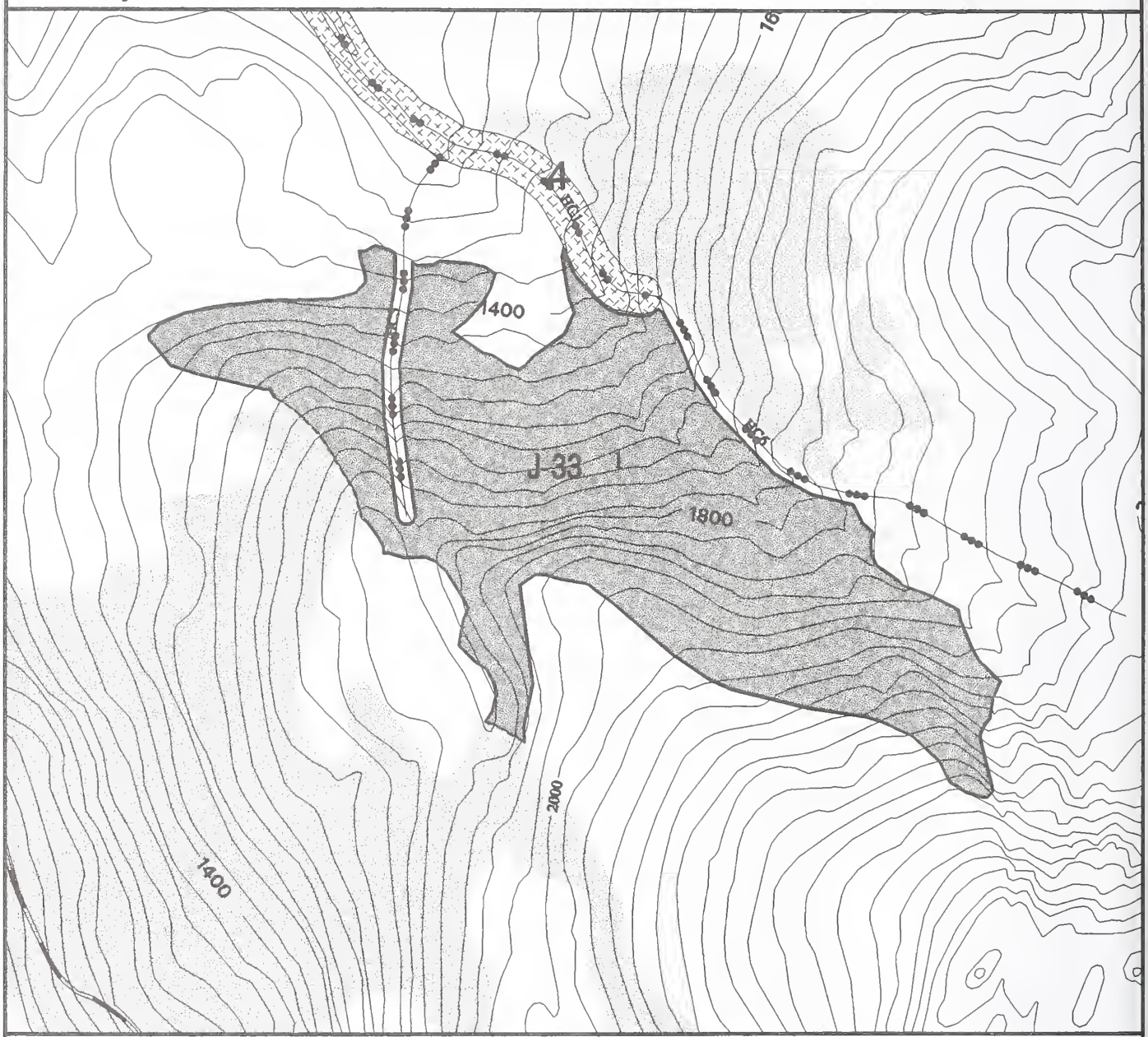
Visual/Recreation
Concern: Meet visual quality objective of partial retention (virtually all of unit is seen from saltwater). From saltwater, the group selections will have natural (uneven) shapes and should appear to be natural openings.

Mitigation: Lay the 2-acre group cuts out horizontally along contours to minimize visual impacts. Make sure the group cuts are uneven in shape and randomly spaced within Unit 32 to create a natural pattern of small openings. Leave non-merchantable trees.

Other Resources/Issues
Concern: None
Mitigation:

UNIT J-33

105 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/madam/emla/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-33 In Alternative(s) 2

Harvest Method: Helicopter
Total Acres: 105 Total Volume: 3,569 MBF Volume per Acre 34 MBF

UNIT DEVELOPMENT

Unit has not been field verified. Additional field verification is required. Boundaries correspond with mapped suitability timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F11, F18, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation: This unit design has not been field verified.
This unit is best suited for helicopter yarding, since an access road would be economically prohibitive. The timber can be helicopter yarded to the 1020 road in J-31 (Alt. 2 yarding distance = 1.0 miles). A small non-fish stream flowing north through the west half of the unit may need protection and directional felling. A Class II stream exists on the north boundary which will need a buffer and directional felling (BMP 12.6(a), 13.16). This stream also forms the boundary between units J-33 and J-36. The remaining boundaries are intended to be at the limit of merchantable timber and/or the logical setting boundary. This is a high elevation unit and timber quality should be verified.

Specified Roads: The timber can be helicopter yarded to the 1020 road in unit J-31.

Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Group Selection with a minimum 70% retention (estimated harvest volume = 892 MBF). Harvest individual trees and/or groups up to 2 acres scattered throughout the unit. All but the northwestern tip of this unit is in an unseen area. For consistency, this unit is being managed like the other units near it. If it is determined in the field that in order to protect visual quality in more visible nearby units that more retention trees than called for are needed, then more trees could be harvested from this unit to make up the difference. This prescription would address visual, and other resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries

Concern: No field inspection of proposed harvest unit. Class IV streams appear to be present in the unit. Class II and III stream channel forms the northeastern boundary of unit. Class III stream channel bisects northwest corner of unit. Class II stream designation is questionable due to elevation numerous impassable stream reaches downstream of unit location. Will require verification of transition from Class II to Class III stream channel.

Mitigation: May require directional felling, splitline, partial, or full suspension for Class IV channels present within the unit. No commercial harvest within 100 feet of Class II channel or the top of v-notch whichever is greater. No programmed harvest within v-notch of Class III channel. Expanded buffers are not needed because of prescription (i.e., minimum 70% retention).

Soils/Wetlands/Karst
Concern: Unit has not been field reviewed. There may be small areas with slope instability concerns that are not shown with GIS mapping.

Mitigation: Geotechnical review during final layout to delineate any areas of instability.

Wildlife/TES Plants
Concern: None known.

Mitigation:

Visual/Recreation
Concern: Meet Visual Quality Objectives of partial retention. Only a very small portion of the northwest corner of this unit is visible from saltwater.

Mitigation: No mitigation is required.

Other Resources/Issues
Concern: None
Mitigation:

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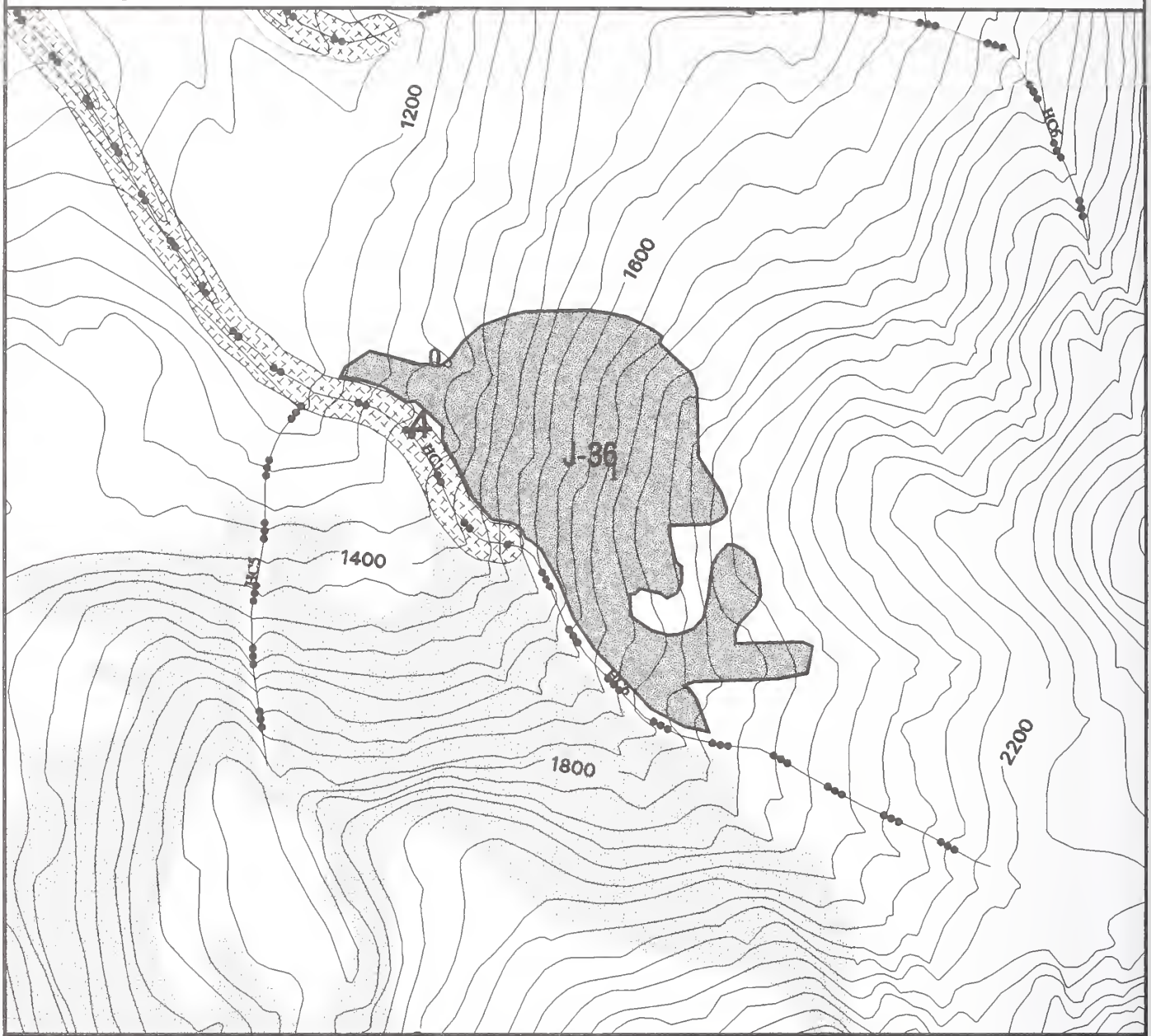
UNIT J-36

47 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/maclas/xmla/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-36 In Alternative(s) 2

Harvest Method: Helicopter
Total Acres: 47 Total Volume: 1,597 MBF Volume per Acre 34 MBF

UNIT DEVELOPMENT

Unit has not been field verified. Additional field verification is required. Boundaries correspond with mapped suitability timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F11, F18, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation: This unit design has not been field verified.
This unit is best suited for helicopter yarding, since an access road would be economically prohibitive. The timber can be helicopter yarded to the 1020 road in J-31 (Alt. 2 yarding distance = 1.0 miles). A Class II stream exists on the west boundary which will need a buffer and directional felling (BMP 12.6(a), 13.16). This stream forms the boundary between units J-33 and J-36. The remaining boundaries are intended to be at the limit of merchantable timber and/or the logical setting boundary. This is a high elevation unit and timber quality should be verified.

Specified Roads: The timber can be helicopter yarded to the 1020 road in unit J-31.

Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Group Selection with a minimum 70% retention (estimated harvest volume = 399 MBF). Harvest individual trees and/or groups up to 2 horizontal acres that follow the contours and are scattered throughout the unit. The eastern (uphill) portion of unit is visible from saltwater. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: No field inspection of proposed harvest unit. Class IV streams appear to be present in the unit. Class II and III stream channel forms the western boundary of unit. Class II stream designation is questionable due to elevation numerous impassable stream reaches downstream of unit location. Will require verification of transition from Class II to Class III stream channel.

Mitigation: May require directional felling, splitline, partial, or full suspension for Class IV channels present within the unit. No commercial harvest within 100 feet of Class II channel or the top of v-notch whichever is greater. No programmed harvest within v-notch of Class III channel. Expanded buffers are not needed because of prescription (i.e., minimum 70% retention).

Soils/Wetlands/Karst
Concern: Unit has not been field reviewed. There may be small areas with slope instability concerns that are not shown with GIS mapping.

Mitigation: Geotechnical review during final layout to delineate any areas of instability.

Wildlife/TES Plants
Concern: None known.

Mitigation:

Visual/Recreation
Concern: Meet Visual Quality Objectives of partial retention for portion of unit (eastern [uphill] ½) seen from saltwater.

Mitigation: Individual selection and/or 2-acre group cuts that follow the contours. Make sure boundaries of group cuts are uneven in size and shape so that they appear to be natural openings in the forest canopy. Leave non-merchantable trees.

Other Resources/Issues
Concern: None
Mitigation:

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UNIT J-37

34 ACRES

- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- *HC1,MM3,...* — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adam1/madm/amla/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-37 In Alternative(s) 3 & 4

Harvest Method: Helicopter
Total Acres: 34 Total Volume: 1,142 MBF Volume per Acre 34 MBF

UNIT DEVELOPMENT

Unit has not been field verified. Additional field work is required. Boundaries correspond with mapped suitability timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation: This unit has not been field verified. This unit is best suited for helicopter yarding, since an access road would be economically prohibitive. The timber can be helicopter yarded to the 1010 road in J-10 (Alt. 3 yarding distance = 1.0 miles), or yarded to a barge in Madan Bay (Alt. 4 yarding distance = 1.5 miles). A non-fish stream on the west boundary (possible "V" notch) will likely need protection such as a buffer or directional felling. The remaining boundaries are intended to be at the limit of merchantable timber. The middle 1/3 of the unit can be seen from saltwater.

Specified Roads: The timber can be helicopter yarded to the 1010 road in unit J-10 for Alt. 3, or a barge in Madan Bay for Alt. 4.

Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 286 MBF). Harvest individual trees and/or groups up to 2 horizontal acres that follow the contours and are scattered throughout the unit. Leave a higher percentage of reserve trees on visible boundaries and a lower percentage on non-seen edges. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Unit has not been field verified. Unmapped Class IV channel may be present within the unit. Class III stream channel forms western boundary of unit.

Mitigation: May require directional felling, splitline, partial, or full suspension for Class IV channels that may be present within the unit. Expanded buffers are not required because of prescription (i.e., minimum 70% retention).

Soils/Wetlands/Karst
Concern: Unit has not been field verified. There may be small areas with slope instability concerns that are not shown with GIS mapping.

Mitigation: Geotechnical review during final layout to delineate any areas of instability.

Wildlife/TES Plants
Concern: None known.

Mitigation:

Visual/Recreation
Concern: Meet Visual Quality Objectives of partial retention for portion of the unit (middle 1/3) seen from saltwater.

Mitigation: Individual selection and/or 2-acre group cuts that follow the contours. Make sure boundaries of group cuts are uneven in size and shape so that they appear to be natural openings in the forest canopy. Leave non-merchantable trees.

Other Resources/Issues
Concern: None
Mitigation:

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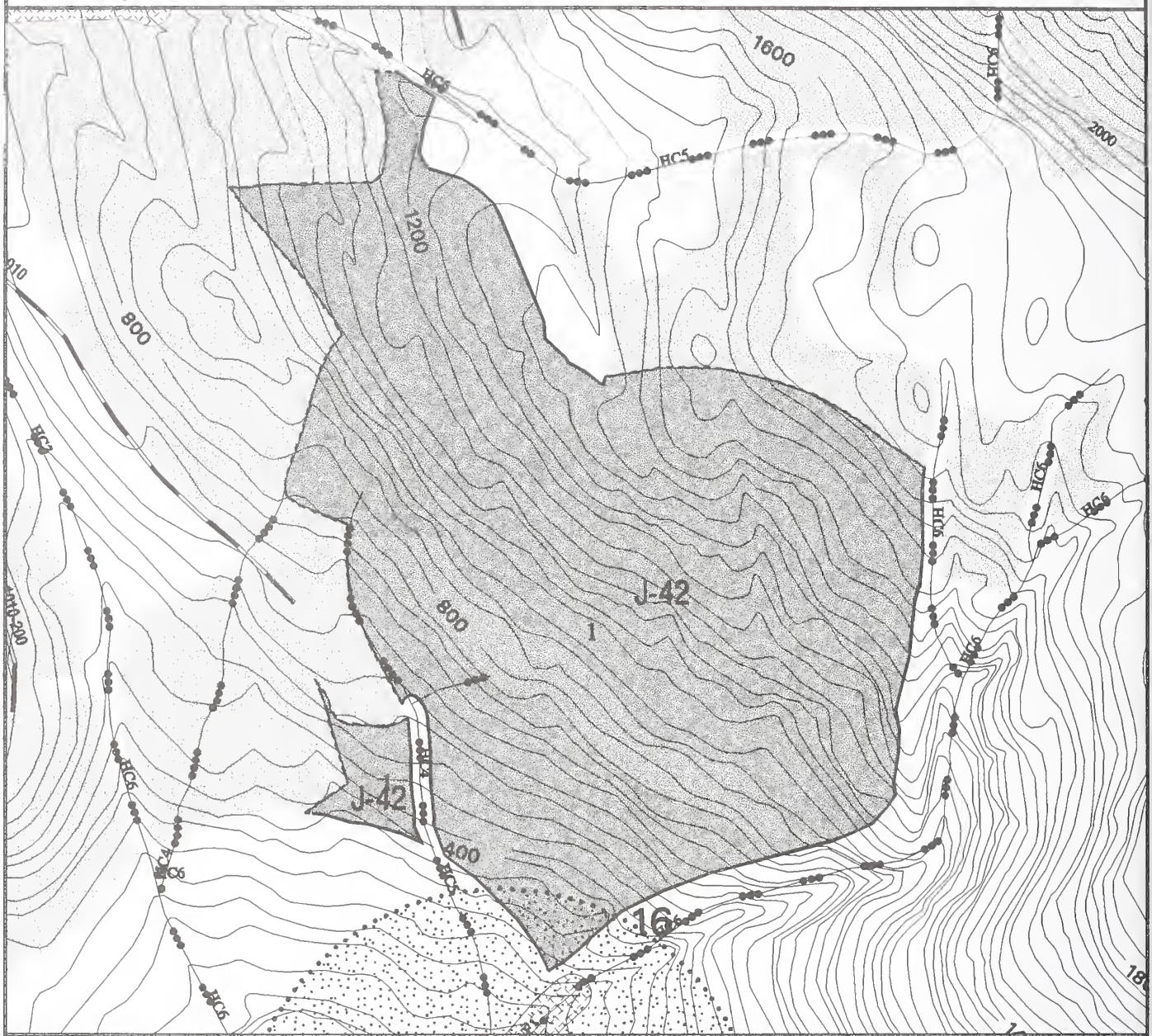
UNIT J-42

187 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/madas/amls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-42 In Alternative(s) 2, 3, 4, & 5

Harvest Method: Helicopter (All Alts.)
Total Acres: 192 Total Volume: 8,686 MBF Volume per Acre 45 MBF

UNIT DEVELOPMENT

Unit designed to meet the Visual Quality Objective of partial retention. The southern portion of Unit J-10 was added to this unit due to logging constraints in J-10. Contour patches will minimize visual concerns. Timber would be carried to landings in either Units J-10 or J-13. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: (Alternatives 2 and 5) F1, F2, F3, F18, T1, W6, W7, W8, V6, and V7; (Alternatives 3 and 4) F1, F2, F3, F18, T1, W6, W8, W13, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a helicopter to landings in J-10 (or J-13). The south west boundary was adjusted to include timber not able to be cable logged in unit J-10. The southeast boundary is a Class III stream which needs a slope break buffer and directional felling. Several Class IV streams require directional felling (BMP 12.6(a), 13.16). The unit has visual concerns from the west and south. See Visual/recreation section.

Specified Roads: The timber will be flown to the 1010 road.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription:
Alternatives 2 and 5 – Group Selection (estimated harvest volume = 2,171 MBF). Harvest groups up to 2-acre horizontal cuts that follow the contours or otherwise utilize topography to reduce visual impacts. Approximately 25% of the stand would be removed in this entry. Leave non-merchantable trees. Due to visual concerns special methods are needed. See Visual/Recreation section. This prescription would address visual, soils, and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size). Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Alternatives 3 and 4 - Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 2,171 MBF). Harvest individual trees and/or groups up to 2 acres scattered throughout the unit. Leave a higher percentage of reserve trees on visible boundaries and a lower percentage on non-seen edges. This prescription would address visual, soils, and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries

Concern: Mapped Class III channel is very sensitive/unstable, large debris flow/torrent has created debris jams and altered channel form and placement, no fish observed (electrofishing) in downstream Class I channel. Large amount of course sediment has been deposited in downstream Class I reach. Deposition has widened channel and filled most pools resulting in poor habitat quality. Note-fish have been observed in Class I channel during previous surveys. No change to channel typing recommended. Unmapped Class IV streams may be present in the unit.

Mitigation: Maintain maximum slope break buffer along Class III stream channels and manage for windfirmness beyond. Directional felling, splitline, or full suspension on all Class IV channels.

Soils/Wetlands/Karst

Concern: Steep slopes (greater than 72%) occur within the unit.

Mitigation: Locate harvest patches on slopes less than 72%, based on assessment during final layout.

Wildlife/TES Plants

Concern: Size of unit could create dispersal problems. A small portion of a ¼ mile eagle nest timing buffer is located in the southern most portion of the unit.

Mitigation: Scatter reserve trees to maintain structure throughout unit to allow dispersal. Avoid repeated helicopter flights within ¼ mile of nest from March 1 through May 31. Surveys needed to determine nest activity prior to implementation, if nest is active, continue to avoid repeated helicopter flights through August 31.

Visual/Recreation

Concern: Meet visual quality objective of partial retention (virtually all of unit is seen from saltwater). From saltwater, the group selections will have natural (uneven) shapes and should appear to be natural openings.

Mitigation: 2-acre group cuts will run horizontally with contour lines to minimize visual impacts. Make sure the group cuts are uneven in shape and randomly spaced to create a natural pattern of small openings. Leave non-merchantable trees.

Other Resources/Issues

Concern: None

Mitigation:

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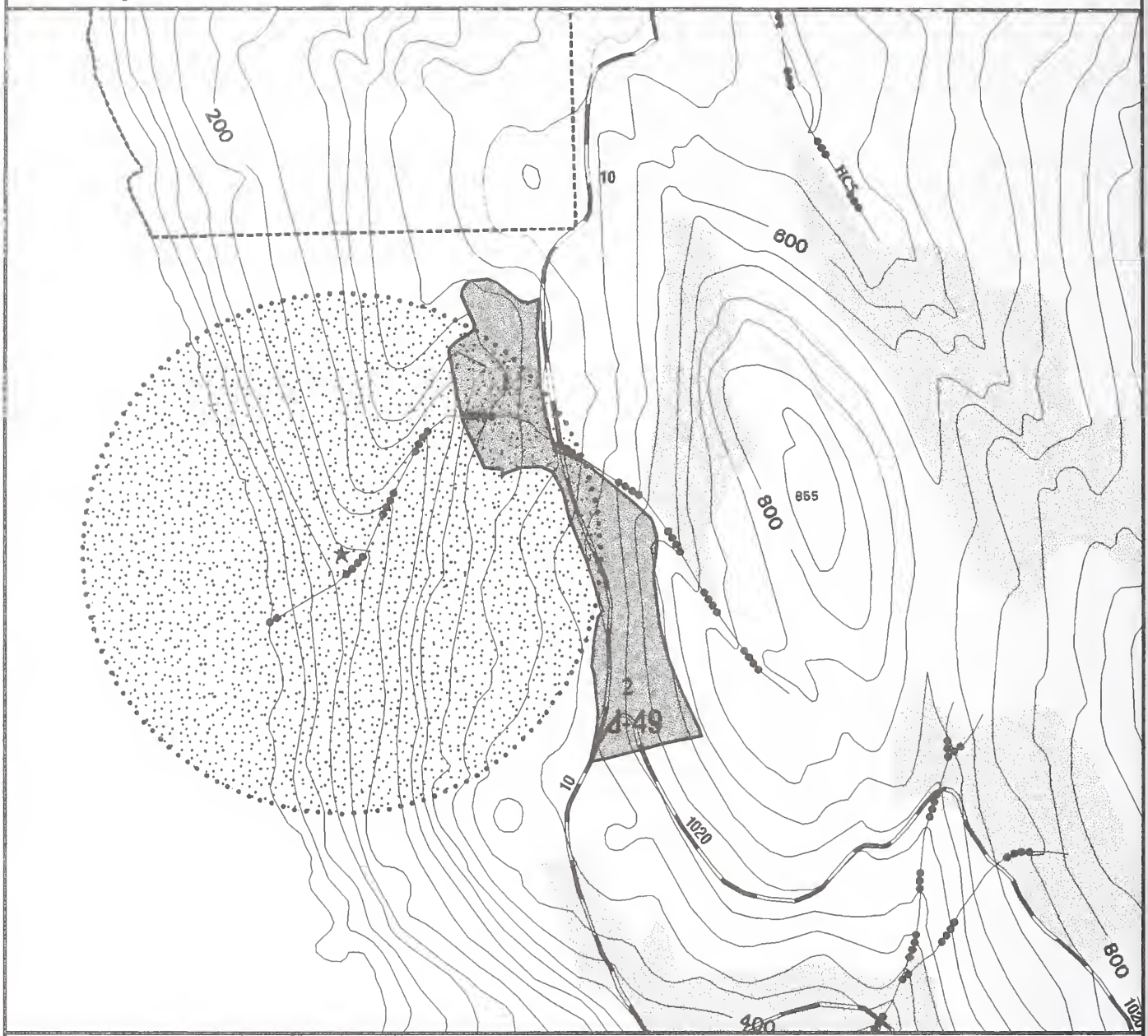
UNIT J-49

21 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/madas/emls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-49 In Alternative(s) 2, 3, & 5

Harvest Method: Running skyline
Total Acres: 21 Total Volume: 398 MBF Volume per Acre 19 MBF

UNIT DEVELOPMENT

Unit designed to meet Visual Quality Objective of partial retention. Northwestern boundary was modified in the field to remove muskeg and unsuitable timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F3, T1, W1, W7, W13, V1, V7, and V13. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration on both settings using the roads as continuous road-side landings. Portions of the unit can be shovel yarded. Deflection is adequate. Tailholds are poor on the NW boundary and multiple-stump anchors will be necessary. The NW boundary was modified to leave out unsuitable timber. The western boundary was measured and exceeds the 1.000 foot beach buffer requirement. A Class IV stream in center of unit can be split-yarded and requires directional felling (BMP 12.6(a), 13.16). The timber in the southern setting is low value muskeg type timber; the northern setting has better quality timber. There is little existing windthrow in the unit and blowdown after harvest is not expected to be a problem. Due to visual concerns from the west special methods are needed; see Visual/Recreation section.

Specified Roads: The unit is accessed by the 10 road.
Temporary Roads: None

Stand Management Objectives: Future stand will have two or more canopy layers. All of the non-merchantable trees and approximately 20 to 25 % of all the merchantable trees will be retained over most of the unit to meet visual objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 357 MBF). Leave at least 10-15 % retention overall, and concentrate reserve trees in the seen areas, so that the seen portion maintains 20-25 % of the merchantable and all non-merchantable trees. Reserve trees should be scattered throughout the seen area; in not seen areas, they can be concentrated within 50-100 feet of the unit/setting boundaries. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allows this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class IV (orange/white) stream bisects unit and crosses road.

Mitigation: Assure that culvert size is adequate to pass flow and debris. Recommend directional felling and partial suspension yarding across orange/white stream channel when possible. Avoid yarding across stream channel in areas that appear unstable.

Soils/Wetlands/Karst
Concern: Northwest portion of unit includes low value muskeg. Southwest portion has small forested muskeg with very open canopy of yellow cedar.

Mitigation: Boundary along northwest portion of unit was modified to remove muskeg and unsuitable timber from unit.

Wildlife/TES Plants
Concern: Unit has a small amount (~ 3 acres) of high deer HSI values in northwestern and mid portions of unit. A small amount (~2 acres) of high probability goshawk nesting habitat occurs in the northern portion of the unit. The area is a forested travel corridor to the beach fringe. The unit also lies within a ¼ mile eagle nest buffer. The flight path for helicopter logging Unit J-50 to landings in this unit potentially lies within a ¼ mile of eagle nest buffer.

Mitigation: Avoid repeated helicopter flights within ¼ mile of nest from March 1 through May 31. Surveys needed prior to harvest to verify eagle nesting activity. If nest is active continue to avoid repeated helicopter flights through August 31.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention from saltwater (the eastern portion of unit is in seen area). From saltwater, unit should appear to be a natural opening.

Mitigation: Vary the edges and backline of the unit to give the unit a more natural shape. Unit needs a review by a landscape architect during final layout to make sure that layout will achieve the VQO of partial retention.

Other Resources/Issues
Concern: None known.
Mitigation:

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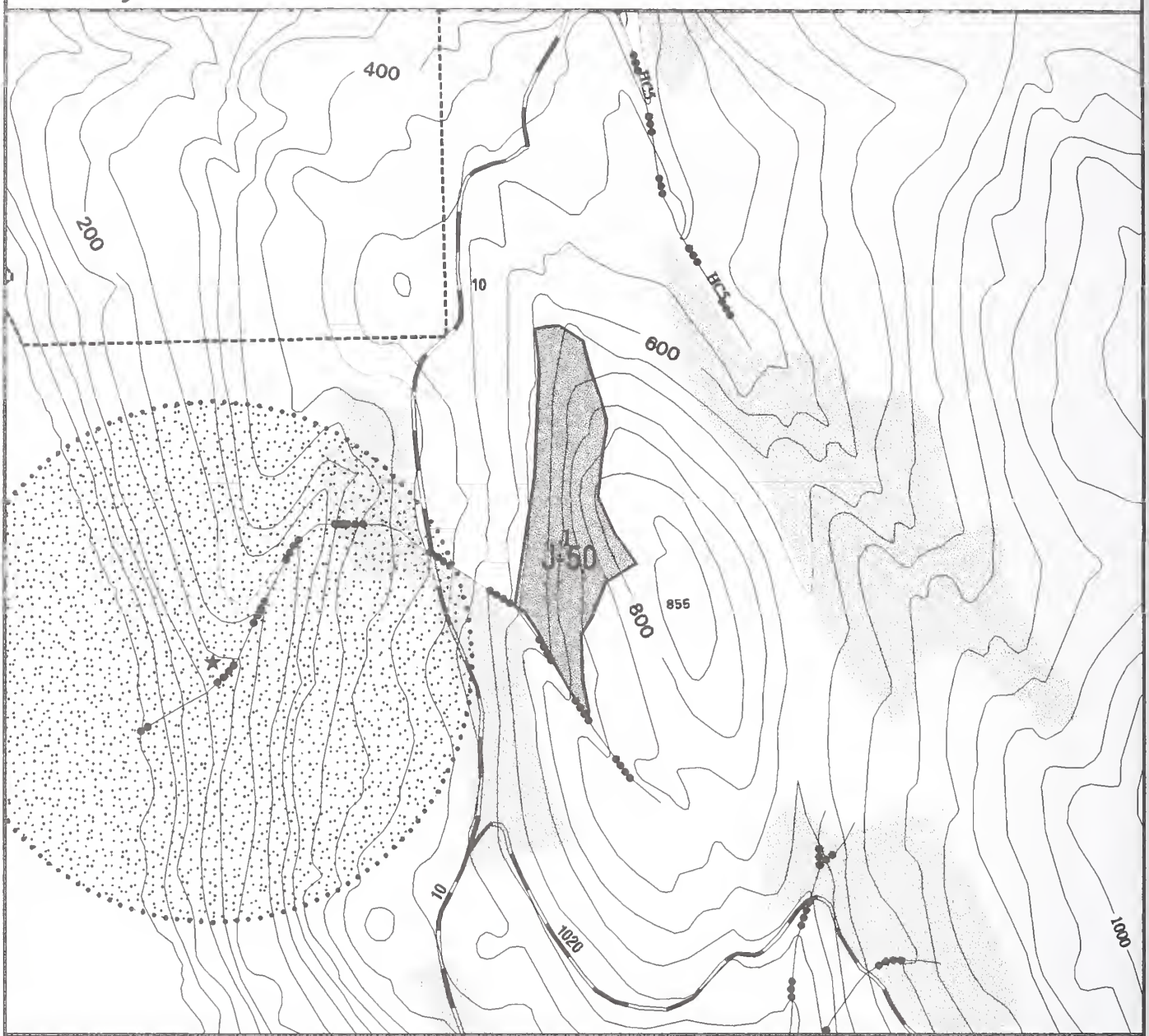
UNIT J-50

14 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/emla/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-50 In Alternative(s) 2, 3, 4, and 5

Harvest Method: Helicopter
Total Acres: 14 Total Volume: 285 MBF Volume per Acre 21 MBF

UNIT DEVELOPMENT

Unit designed to meet Visual Quality Objective of partial retention. The southern 1/3 of unit has been dropped due to unsuitable timber. To minimize the potential to create an "edge" effect for visual resources the northern boundary is located just south of the ridgeline. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: (Alternatives 2 and 5) F3, F18, T1, W6, W7, V6, and V7; (Alternatives 3 and 4) F3, F18, T1, W6, V6. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using helicopter using the landings in J-49. One Class IV stream in center of unit requires directional felling (BMP 12.6(a), 13.16). The south 1/3 of the unit was modified to exclude unsuitable timber. The unit has visual concerns from the west; see visuals.

Specified Roads: The timber will be flown to the 10 road.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription:
Alternatives 2 and 5 – Group Selection (estimated harvest volume = 71 MBF). Harvest groups up to 2-acre horizontal cuts that follow the contours. Remove approximately 25 % of the volume in each entry with 40 - 60 years between entries. Leave non-merchantable timber in wetter areas and on steep slopes particularly in northern portion. Do not harvest over the ridgeline on the northern boundary as this has potential to create an "edge" effect for visuals. Due to visual concerns special methods are needed. See Visual/Recreation section. This prescription would address visual, and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size). Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Alternatives 3 and 4 - Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 71 MBF). Harvest individual trees and/or groups up to 2 acres scattered throughout the unit. Leave a higher percentage of reserve trees in the visible uphill ½ of the unit and a lower percentage on non-seen edges. This prescription would address visual, and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class IV (orange/white) stream at edge of unit. No fisheries concerns.

Mitigation: Directional felling and/or partial suspension, debris cleaning as necessary.

Soils/Wetlands/Karst
Concern: One area of steep slopes greater than 50% occurs in the northern portion of the unit.

Mitigation: Locate harvest patches away from slopes greater than 50%.

Wildlife/TES Plants
Concern: There is a small amount (~3 acres) of high deer HSI value habitat in the western portion of the unit. The flight path for the helicopter logging potentially lies within ¼ mile of eagle nest buffer.

Mitigation: Avoid repeated helicopter flights within ¼ mile of nest from March 1 through May 31. Surveys needed prior to harvest to verify eagle nesting activity. If nest is active continue to avoid repeated helicopter flights through August 31.

Visual/Recreation
Concern: Meet visual quality objective of partial retention in areas seen from saltwater (most of unit). From saltwater, unit should have a natural shape.

Mitigation: Group cuts of 2-acres that run horizontally with contours to minimize visual impacts. Make sure the groups cuts are uneven in shape and randomly spaced within the unit to create a natural pattern of small openings. Leave non-merchantable trees. To minimize the potential of creating a "skyline" condition along the eastern boundary of the unit, the boundary is located just west (downhill) of the ridgeline.

Other Resources/Issues
Concern: None
Mitigation:

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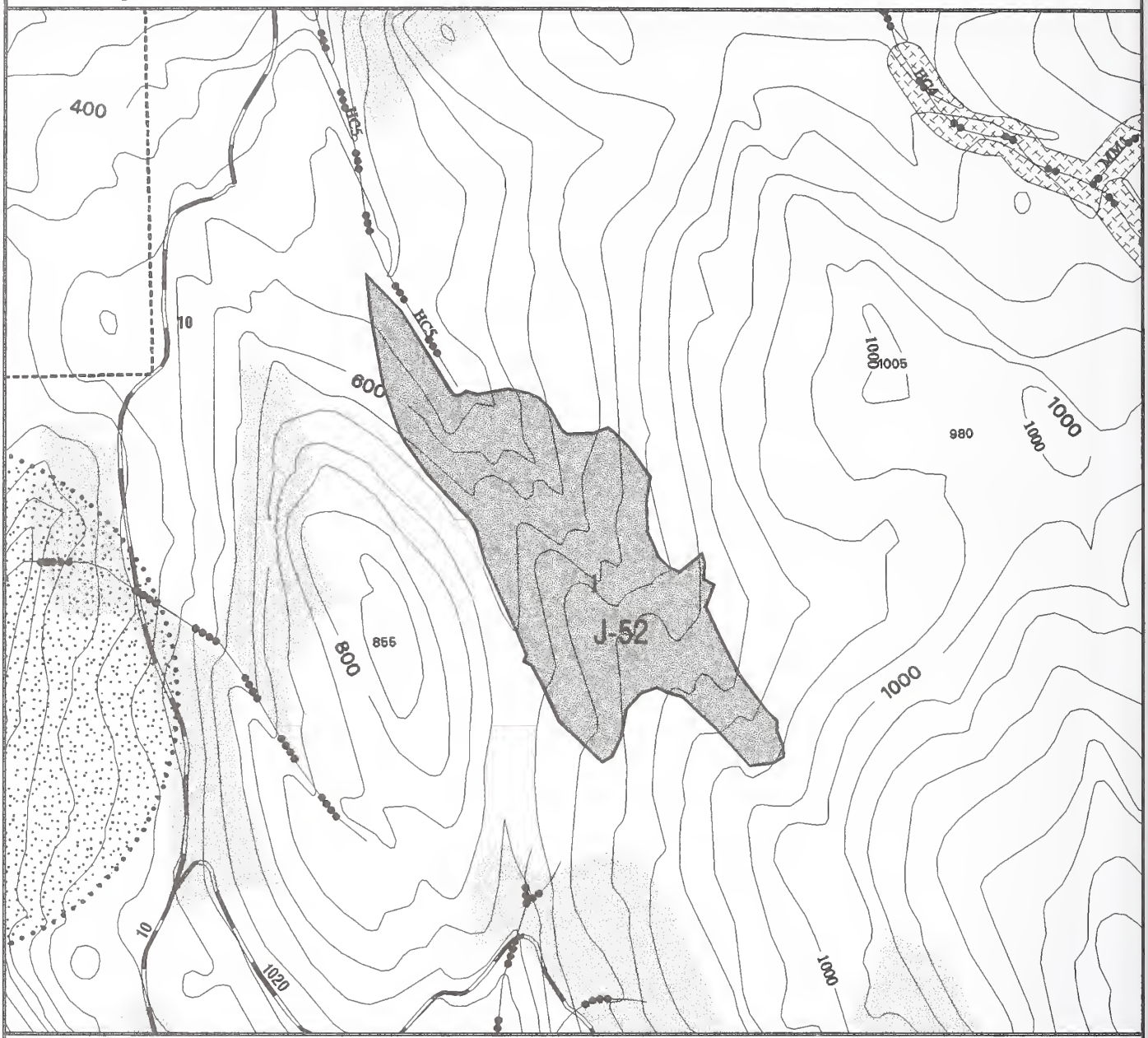
UNIT J-52

42 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- *HC1,MM3,...* — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adems1/madm/amls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-52 (Old V-52)

In Alternative(s) 3 & 4

Harvest Method: Helicopter

Total Acres: 42 Total Volume: 866 MBF Volume per Acre 21 MBF

UNIT DEVELOPMENT

Unit has not been field verified. Additional field verification is required. Boundaries correspond with mapped suitability timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F3, F11, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation: Additional field work is required.
The timber can be helicopter yarded to the 10 road in J-49 (Alt. 3 yarding distance = 0.5 miles), or to the Jenkins Cove LTF (Alt. 4 yarding distance = 1.0 miles). Small streams likely exists in this unit. The boundaries are intended to be at the limit of merchantable timber. This unit is planned for helicopter yarding, however road access might be feasible.

Specified Roads: The timber can be helicopter yarded to the 10 road in unit J-49 for Alt. 3, or the Jenkins Cove LTF for Alt. 4.

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Temporary Roads: None (This unit could possibly be accessed by a temporary road and conventionally logged).

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 217 MBF). Harvest individual trees and/or groups up to 2 acres scattered throughout the unit. This unit is not seen from saltwater or other sensitive viewing areas. This prescription would address wildlife and other resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries

Concern: No field inspection of proposed harvest unit. Unmapped Class IV channels appear to bisect the unit. Will need to verify transition between Class III and IV channel type in northwest corner. Class III stream channel forms northern boundary of unit.

Mitigation: May require directional felling, splitline, partial, or full suspension for Class IV channels present within the unit. No programmed harvest within v-notch of Class III channel. Expanded buffers are not needed because of prescription (i.e., minimum 70% retention).

Soils/Wetlands/Karst

Concern: Unit has not been field reviewed. There may be small areas with slope instability concerns that are not shown with GIS mapping.

Mitigation: Need geotechnical review during final layout to delineate any areas of instability.

Wildlife/TES Plants
Concern: None known.

Mitigation:

Visual/Recreation
Concern: Unit is not seen from saltwater or other sensitive viewing locations.

Mitigation: None needed.

Other Resources/Issues
Concern: None
Mitigation:

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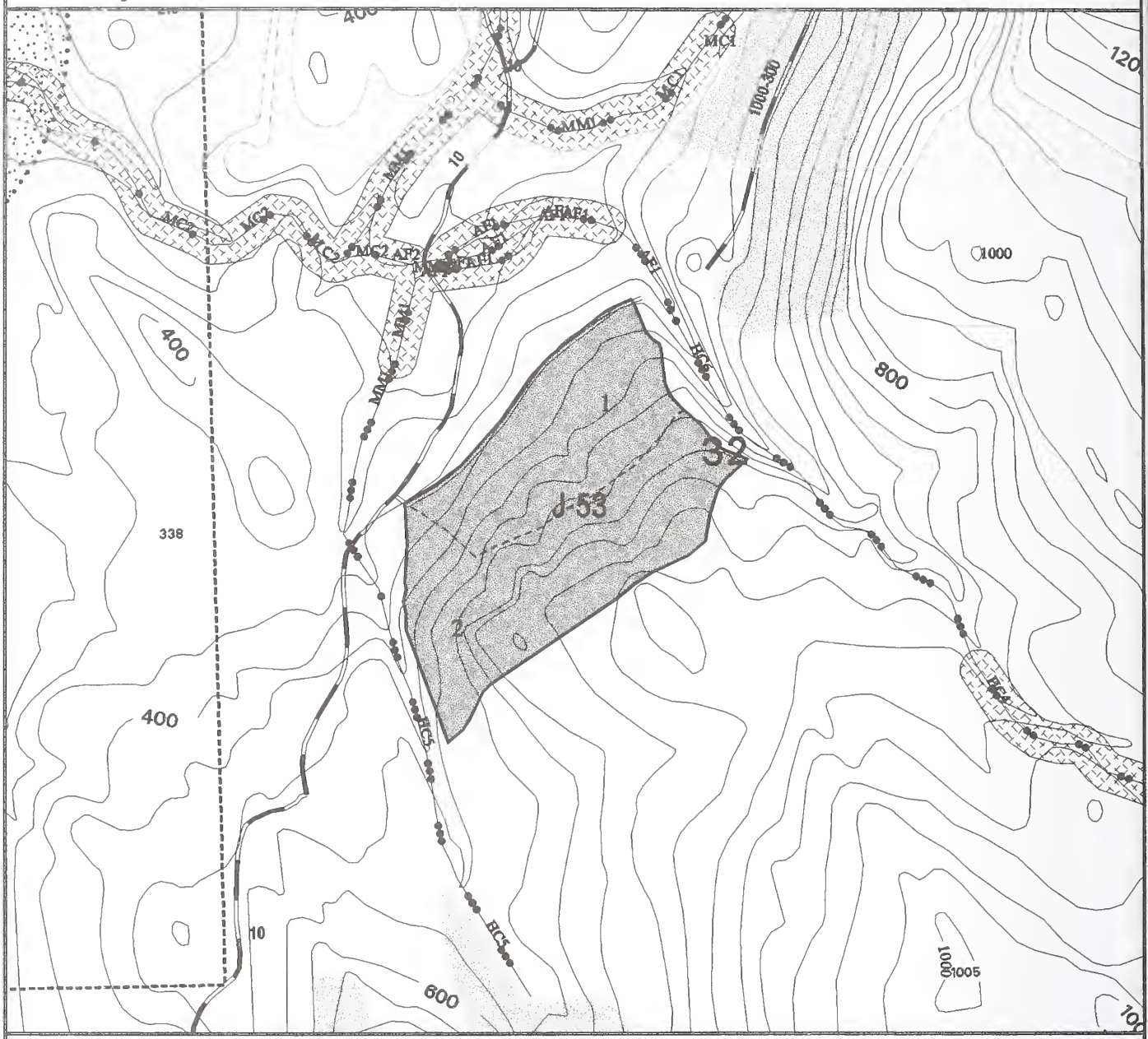
UNIT J-53

44 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adam1/madm/amls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-53 (Old V-53)
In Alternative(s) 2, 3, & 5

Harvest Method: Running Skyline and Helicopter
Total Acres: 44 Total Volume: 1,310 MBF Volume per Acre 30 MBF

UNIT DEVELOPMENT

Unit designed to meet Visual Quality Objective of partial retention. Boundaries were modified in the field due to unsuitable timber and logging breaks along the southern boundary. Blow down problems (wind from southwest) in the past may limit other possible prescriptions. Unit is accessed by 1000-200 road, which will be visible from Eastern Passage. Multiple tailhold anchors may be required for west side of unit. East landing may require multiple stump or log deck guyline anchors. Patch cuts should extend from landings on 1000-200 road down to lower unit boundary so that timber is not isolated. This unit has visual concerns from the west; see Visual/recreation section. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, T1, W1, W7, V1, V7, and V13. These measures are described below within the resource sections that apply.

Logging and Transportation:
This unit design was changed from the field layout due to visuals concerns, potential blowdown problems, road construction economics, and the inability of cable systems to provide the prescribed visual concern mitigation.
The lower setting can be yarded using a small mobile yarder in a running skyline configuration (and grapples) using the road as a continuous road-side landing. The upper elevation setting can be helicopter yarded down to the landings in the lower setting.

The setting boundary should be the elevation of visual concern and the limit of cable yarding feasibility, whichever is lower in elevation. Two Class III streams near the NE and SW boundaries have slope break buffers (BMP 12.6(a), 13.16). The SE boundary is at the edge of suitable timber. The NW boundary is along the road. The upper 2/3 of the unit has visual concerns from the north and west; helicopter logging will facilitate prescription to mitigate visuals; see visuals.

Specified Roads: None (the 10 road is the nearest specified road.) The 1000-200 road is flagged into the upper elevations of the unit, but is not being used. The road has portions of difficult construction, the landings accessed have anchoring problems, would likely be a visual concern, and the length is long when compared to the volume accessed.
Temporary Roads: Approximately 2000' of temporary road is needed. Verify location in field during final layout. There was concern over the location of the 10 road stream crossing near the center-west unit boundary. This may effect the temporary road location and length.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 1,178 MBF) - Leave scattered leave trees, snags, and non-merchantable trees within 50-100 feet of the unit/setting boundaries, especially in the higher 2/3 of unit. Due to visual concerns special methods are needed. See Visual/Recreation section. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allows this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries

Concern: Class III v-notch channels form western and northeastern boundary of unit. Cutthroat trout verified with electroshocker in all Class II waters. Road crossing along western boundary is very unstable.

Mitigation: No harvest in v-notch, unit boundary should follow along top of slope break. Move road crossing on western edge downstream 200-300 ft, if possible. If not possible to move road crossing, then recommend bridge or bottomless arch crossing to reduce possibility of plugging with debris or filling with substrate.

Soils/Wetlands/Karst

Concern: None

Mitigation:

Wildlife/TES Plants

Concern: Unit contains high deer HSI values in western half of unit. High probability goshawk nesting habitat occurs along the northwestern boundary in 1/3 of unit. Connection between large forested blocks in Jenkins Cove and Virginia Lake blocks could be lost if adjacent State lands are harvested.

Mitigation: Reserve trees will enhance snow interception in the future stand.

Visual/Recreation

Concern: Meet Visual Quality Objective of partial retention in area visible from saltwater (the higher elevation portions of the unit – about two-thirds).

Mitigation: Leave enough reserve and unmerchantable trees in the higher portions of unit visible from saltwater. Vary edges and backlines of boundaries to give them a natural shape. Do not use any straight lines for these boundaries. Unit needs a review by a landscape architect during final layout to make sure that layout will achieve the VQO of partial retention.

Other Resources/Issues

Concern: None

Mitigation:

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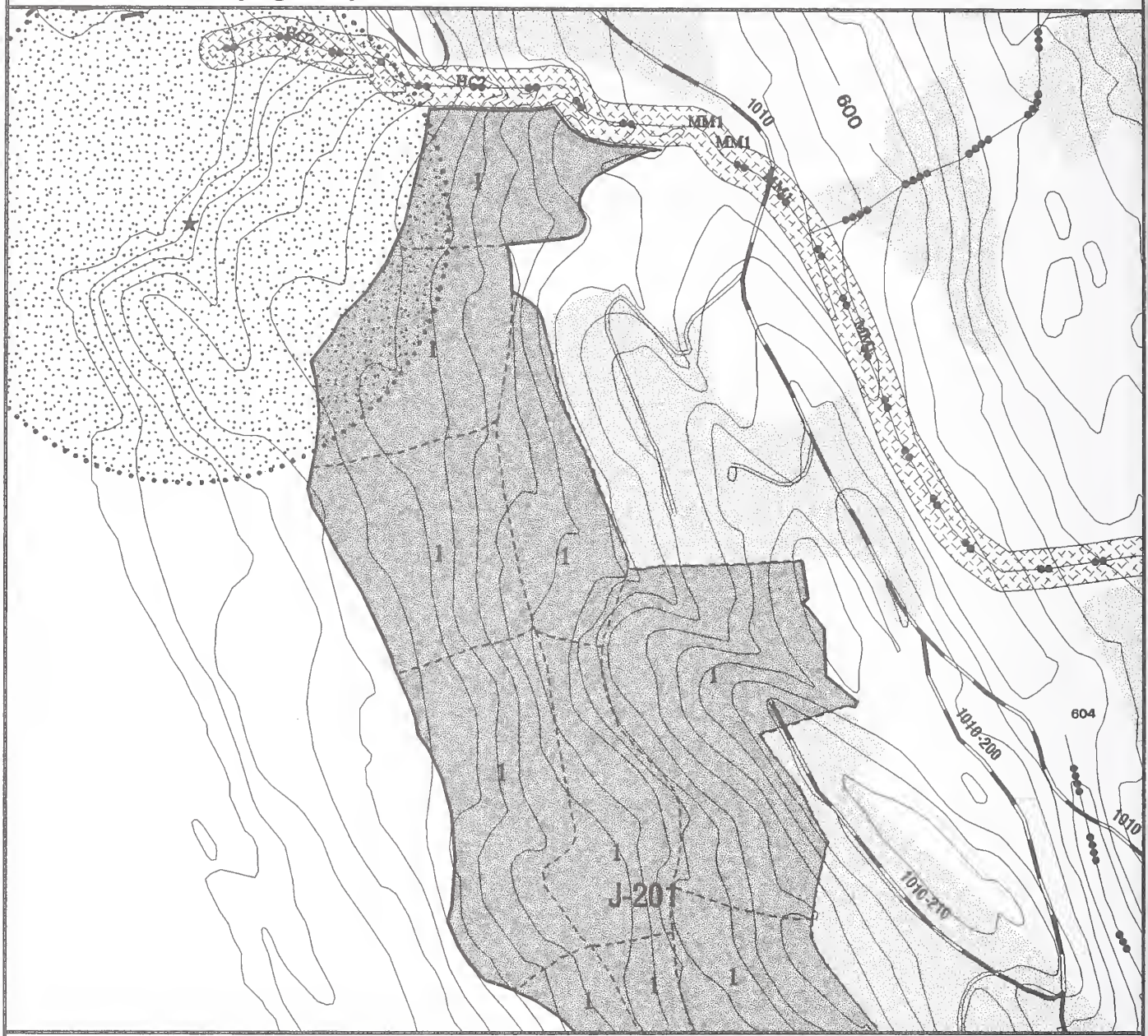
UNIT J-201 *(page 1 of 2)*

243 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- *HC1,MM3,...* — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/edsma1/madam/smls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-201 In Alternative(s) 3 & 4

Harvest Method: Helicopter
Total Acres: 243 Total Volume: 4,414 MBF Volume per Acre 18 MBF

UNIT DEVELOPMENT

Unit has not been field verified. Additional field work is required. Boundaries correspond with mapped suitability timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F11, F18, T1, W6, W8, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation: This unit design has not been field verified.
The timber can be helicopter yarded to the Jenkins Cove LTF or barge in Madan Bay (Alt. 4 yarding distance = 0.5 miles), or yarded to various roads and units to the east (Alt. 3 yarding distance = 0.5 miles). A Class II stream exists on the north tip of the unit, which will need a buffer and directional felling (BMP 12.6(a),13.16). The west and south boundaries are 1000' beach buffers. The east boundaries are intended to be the logical setting boundaries of adjacent units to the east. This unit could likely be yarded using conventional logging systems if roads were planned.

Specified Roads: The timber can be helicopter yarded to the Jenkins Cove LTF or a barge in Madan Bay for Alt. 4, or several roads for Alt.3. This unit would likely need a specified road if conventionally logged

Temporary Roads: This unit would likely need temporary roads if conventionally logged.

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 1,104 MBF). Harvest individual trees and/or groups up to 2 horizontal acres that follow the contours, scattered throughout the unit. The unit has visual concerns from the west and the south. See Visual/Recreation section. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvests 25 to 30 % of the stand every 4- to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70% of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10% reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: No field inspection of proposed harvest unit. Numerous unmapped Class IV channels are expected to be present within the unit. Class II channel forms northern boundary of unit.

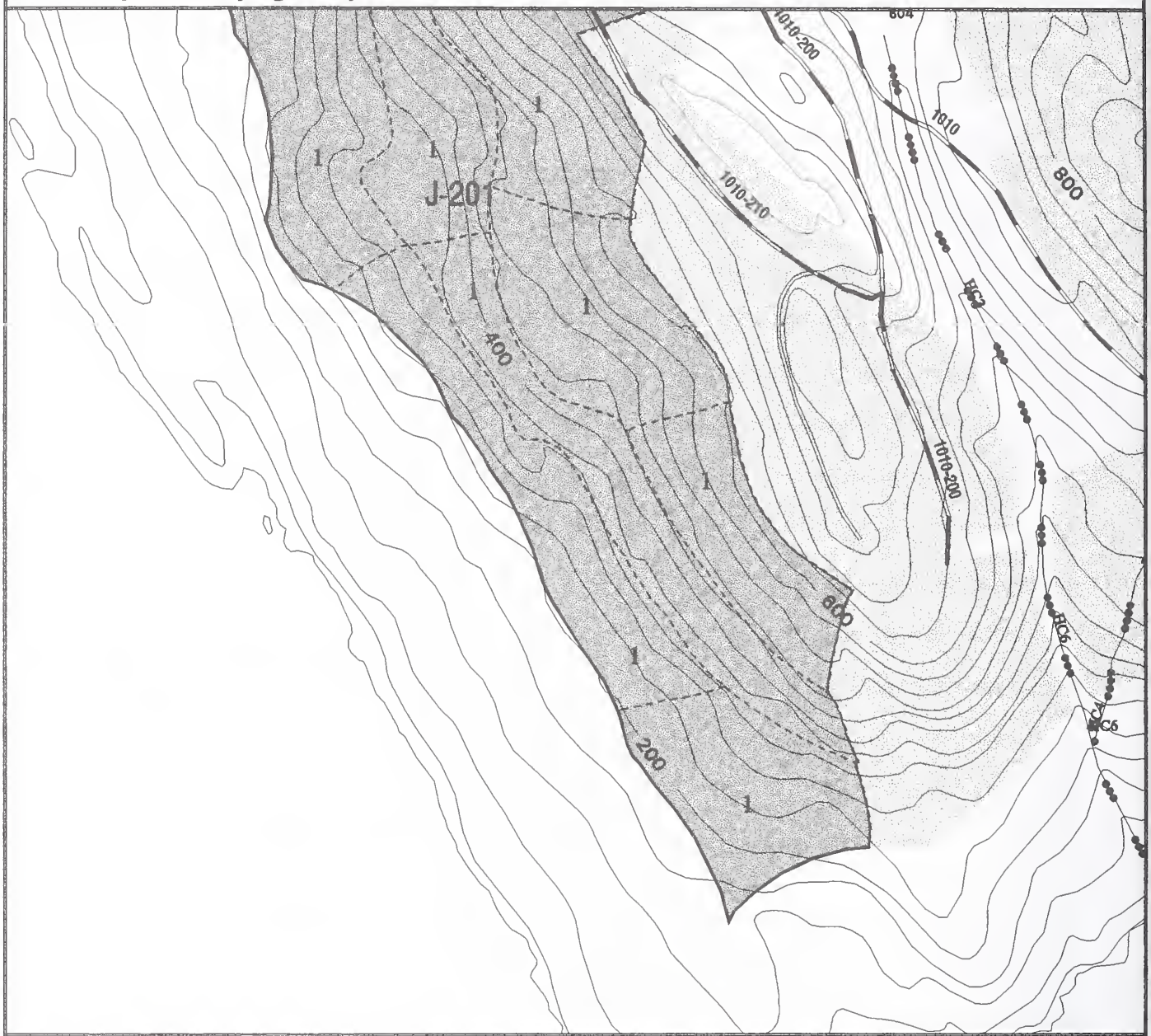
Mitigation: May require directional felling, splitline, partial, or full suspension for Class IV channels present within the unit. No commercial harvest within 100 feet of Class II channel or the top of v-notch whichever is greater. Expanded buffers are not needed because of prescription (i.e., minimum 70% retention).

Soils/Wetlands/Karst
Concern: Unit has not been field reviewed. There may be small areas with slope instability concerns that are not shown with GIS mapping.

Mitigation: Geotechnical review during final layout to delineate any areas of instability.

UNIT J-201 *(page 2 of 2)*

243 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/emals/ps-unitcard-2.aml - April 06, 2000

Wildlife/TES Plants

Concern: Medium to high value deer winter habitat throughout the unit. The highest values occur in the southern tip of the unit. High probability goshawk nesting habitat occurs in the southwestern 2/3 of the unit. A portion of a ¼ mile eagle nest timing buffer is located in the northern most portion of the unit near Jenkins Cove.

Mitigation: Avoid repeated helicopter flights within ¼ mile of nest from March 1 through May 31. Surveys needed to determine nest activity prior to implementation, if nest is active, continue to avoid repeated helicopter flights through August 31. Individual/Group Selection with a minimum 70% retention will help provide structure and snow interception in future stands. Leave more reserve trees and non-merchantable trees in the southern and western portion of the unit.

Visual/Recreation

Concern: Meet Visual Quality Objectives of partial retention. Most of unit is visible from saltwater. From saltwater the units will be small, horizontal and barely visible.

Mitigation: Harvest will consist of individual tree selection or group selection with up to 2 horizontal acres. The group selection will be patch cuts that follow contour lines and are scattered throughout the unit. Make sure the patch cuts are uneven in shape to create a natural pattern of small openings.

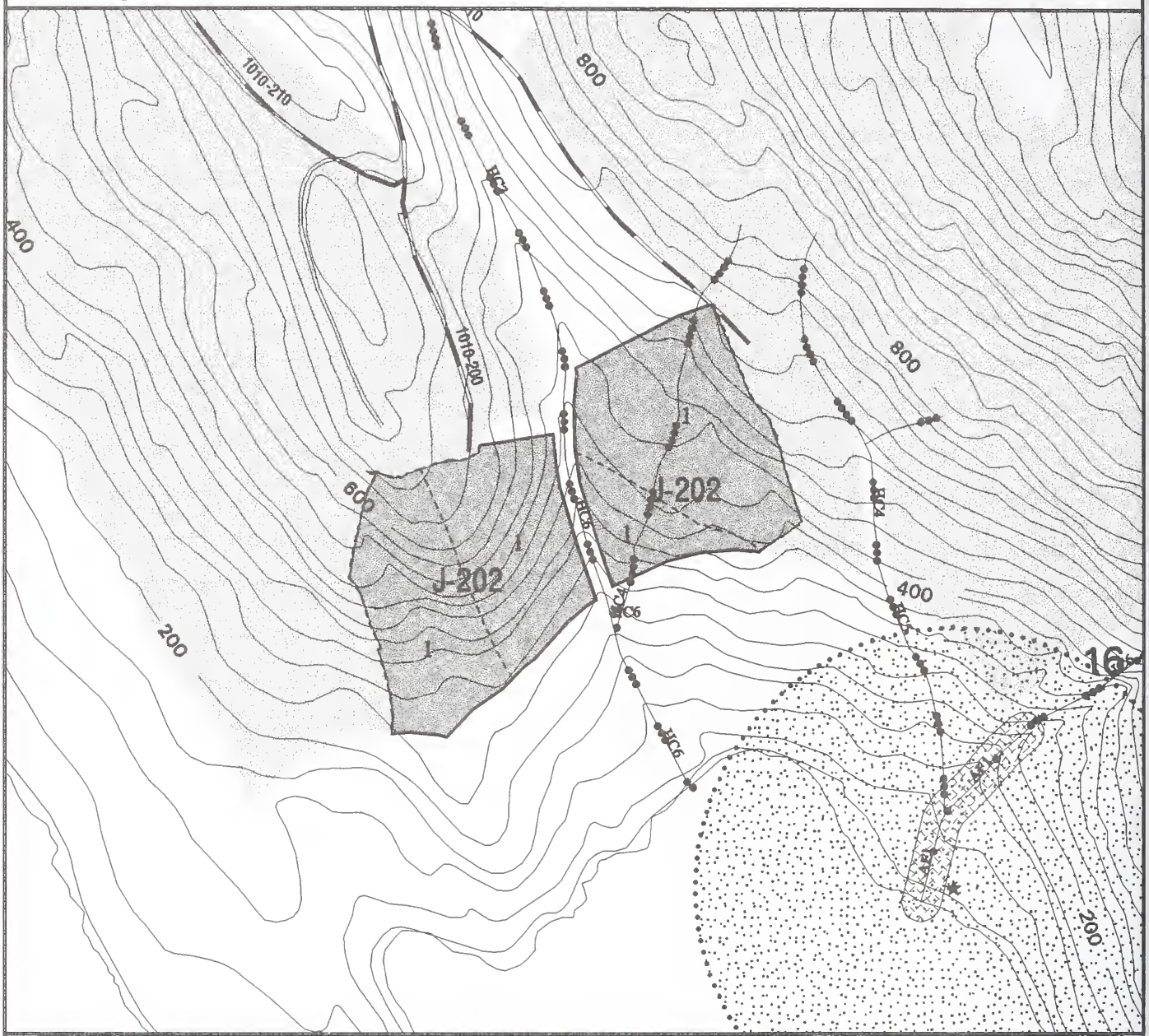
Other Resources/Issues

Concern: None

Mitigation:

UNIT J-202

55 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/smals/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-202 In Alternative(s) 3 & 4

Harvest Method: Helicopter
Total Acres: 55 Total Volume: 993 MBF Volume per Acre 18 MBF

UNIT DEVELOPMENT

Unit has not been field verified. Additional field work is required. Boundaries correspond with mapped suitability timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F11, F18, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation: This unit design has not been field verified.
The timber can be yarded to a barge in Madan Bay (Alt. 4 yarding distance = 0.5 miles), or yarded to the 1010 road in J-10 (Alt. 3 yarding distance = 0.5 miles). A non-fish stream running south through the middle of the unit may need protection. The southeast boundary is a 1000' beach buffer. The remaining boundaries are intended to be logical setting boundaries. This unit could likely be yarded using conventional logging systems if roads were planned.

Specified Roads: The timber can be helicopter yarded to the 1010 road for Alt. 3, or to a barge in Madan Bay for Alt. 4.
Temporary Roads: This unit would likely need temporary roads if conventionally logged.

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 248 MBF). Harvest individual trees and/or groups up to 2 horizontal acres that follow contour lines and are scattered throughout the unit. The unit has visual concerns for the west and south; see Visual/Recreation section. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: No field inspection of proposed harvest unit. Class III and IV stream channels present within or adjacent to the unit. Class III stream channel bisects southeastern corner of unit. The v-notch area of the Class III channel that bisects the unit is not significant. Unmapped Class III and IV channels within this unit may reduce available harvest area.

Mitigation: May require directional felling, splitline, partial, or full suspension for Class IV channels present within the unit No programmed harvest within v-notch of Class III channel. Expanded buffers are not needed because of prescription (i.e., minimum 70% retention).

Soils/Wetlands/Karst
Concern: Unit has not been field reviewed. There may be small areas with slope instability concerns that are not shown with GIS mapping.

Mitigation: Geotechnical review during final layout to delineate any areas of instability.

Wildlife/TES Plants
Concern: Almost the entire unit is high value (HIS) deer winter habitat. High probability goshawk nesting habitat occurs in the southern ½ of the unit and in western half of that portion of the unit east of the creek.

Mitigation: Individual/Group Selection with a minimum 70% retention will help provide structure in future stands. Leave more reserve trees and non-merchantable trees in the southern portion of the unit and along the eastern side of the creek.

Visual/Recreation
Concern: Meet Visual Quality Objectives of partial retention. Most of unit is visible from saltwater. From saltwater the units will be small, horizontal and barely visible.

Mitigation: Harvest will consist of individual tree selection or group selection with up to 2 horizontal acres. The group selection will be patch cuts that follow contour lines and are scattered throughout the unit. Make sure the patch cuts are uneven in shape to create a natural pattern of small openings.

Other Resources/Issues
Concern: None
Mitigation:

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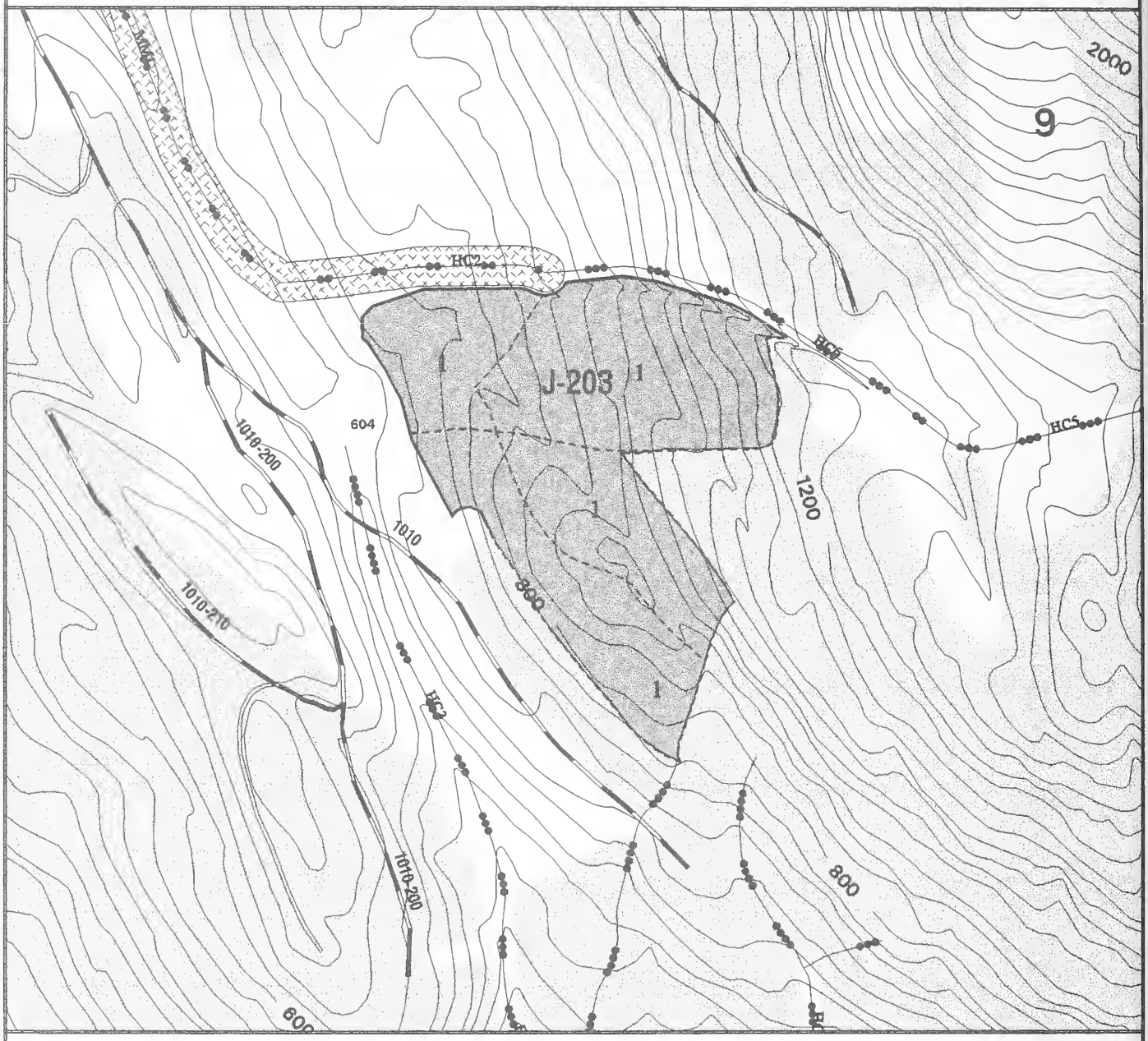
UNIT J-203

65 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/smls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-203 In Alternative(s) 3 & 4

Harvest Method: Helicopter
Total Acres: 65 Total Volume: 2,937 MBF Volume per Acre 45 MBF

UNIT DEVELOPMENT

Unit has not been field verified. Additional field work is required. Boundaries correspond with mapped suitability timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F11, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation: This unit design has not been field verified.
The timber can be yarded to a barge in Madan Bay (Alt. 4 yarding distance = 1.0 miles), or yarded to the 1010 road in J-10 (Alt. 3 yarding distance = 0.5 miles). The Class II stream shown on the north boundary will need a buffer and directional felling; its position may be south of the presently mapped position. The remaining boundaries are intended to be the limit of merchantable timber or logical setting boundaries. Access roads for conventional logging systems are questionable for this unit.

Specified Roads: The timber can be helicopter yarded to the 1010 road in J-10 for Alt.3, or to a barge in Madan Bay for Alt. 4.
Temporary Roads: This unit would likely need temporary roads if conventionally logged.

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 734 MBF). Harvest individual trees and/or groups up to 2 horizontal acres that follow the contour lines and are scattered throughout the unit. The unit has visual concerns from the west and south; see Visual/Recreation section. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: No field inspection of proposed harvest unit. Unmapped Class III/IV channel appears to bisect unit. Class II and III stream channel forms northern boundary of unit. Will require verification of transition from Class II to Class III stream channel.

Mitigation: May require directional felling, splitline, partial, or full suspension for Class IV channels present within the unit. No commercial harvest within 100 feet of Class II channel or the top of v-notch whichever is greater. Manage beyond (approx. one site-potential tree height) for reasonable assurance of windfirmness. No programmed harvest within v-notch of Class III channel. Expanded buffers are not needed because of prescription (i.e., minimum 70% retention).

Soils/Wetlands/Karst
Concern: Unit has not been field reviewed. There may be small areas with slope instability concerns that are not shown with GIS mapping.

Mitigation: Geotechnical review during final layout to delineate any areas of instability.

Wildlife/TES Plants
Concern: Medium to high value deer winter habitat in the southern tip of the unit.

Mitigation: Individual/Group Selection with a minimum 70% retention will help provide structure and snow interception in future stands. Leave more reserve trees and non-merchantable trees in the southern portion of the unit.

Visual/Recreation
Concern: Meet Visual Quality Objectives of partial retention. Most of unit is visible from saltwater. From saltwater the units will be small, horizontal and barely visible.

Mitigation: Harvest will consist of individual tree selection or group selection with up to 2 horizontal acres. The group selection will be patch cuts that follow contour lines and are scattered throughout the unit. Make sure the patch cuts are uneven in shape to create a natural pattern of small openings.

Other Resources/Issues
Concern: None
Mitigation:

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UNIT J-204

42 ACRES

Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/madan/mals/pr-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number J-204 In Alternative(s) 3 & 4

Harvest Method: Helicopter
Total Acres: 42 Total Volume: 1,890 MBF Volume per Acre 45 MBF

UNIT DEVELOPMENT

Unit has not been field verified. Boundaries correspond with mapped suitability timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F11, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation: This unit design has not been field verified.
This unit is best suited for helicopter yarding, since an access road would be economically prohibitive. The timber can be yarded to a barge in Madan Bay (Alt. 4 yarding distance = 1.0 miles), or yarded to the 1010 road in J-10 (Alt. 3 yarding distance = 0.5 miles). Three non-fish streams are within the unit and may need protection, especially the eastern streams. The southwest boundary is a logical setting boundary; the southeast boundary is along the Madan Old Growth Reserve; the north boundary is along a stream; and the remaining boundaries are intended to be the limit of merchantable timber.

Specified Roads: The timber can be helicopter yarded to the 1010 road in J-10 for Alt.3, or to a barge in Madan Bay for Alt. 4.
Temporary Roads: None.

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 473 MBF). Harvest individual trees and/or groups up to 2 horizontal acres that follow contour lines and are scattered throughout the unit. The unit has visual concerns from the south; see Visual/Recreation section. This prescription would address visual and other resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees compared with clearcutting. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: No field inspection of proposed harvest unit. Unmapped Class IV stream channels may be present within the unit. Class III stream channels are located along the northern and southern boundary of the unit. This watershed appears to be sensitive to mass failure and debris torrents.

Mitigation: May require directional felling, splitline, partial, or full suspension for Class IV channels present within the unit. No programmed harvest within v-notch of Class III channel. Expanded buffers are not needed because of prescription (i.e., minimum 70% retention).

Soils/Wetlands/Karst
Concern: Unit has not been field reviewed. There may be small areas with slope instability concerns that are not shown with GIS mapping.

Mitigation: Geotechnical review during final layout to delineate any areas of instability.

Wildlife/TES Plants
Concern: None known.

Mitigation:

Visual/Recreation
Concern: Meet Visual Quality Objectives of partial retention. Most of unit is visible from saltwater. From saltwater the units will be small, horizontal and barely visible.

Mitigation: Harvest will consist of individual tree selection or group selection with up to 2 horizontal acres. The group selection will be patch cuts that follow contour lines and are scattered throughout the unit. Make sure the patch cuts are uneven in shape to create a natural pattern of small openings.

Other Resources/Issues
Concern: None
Mitigation:

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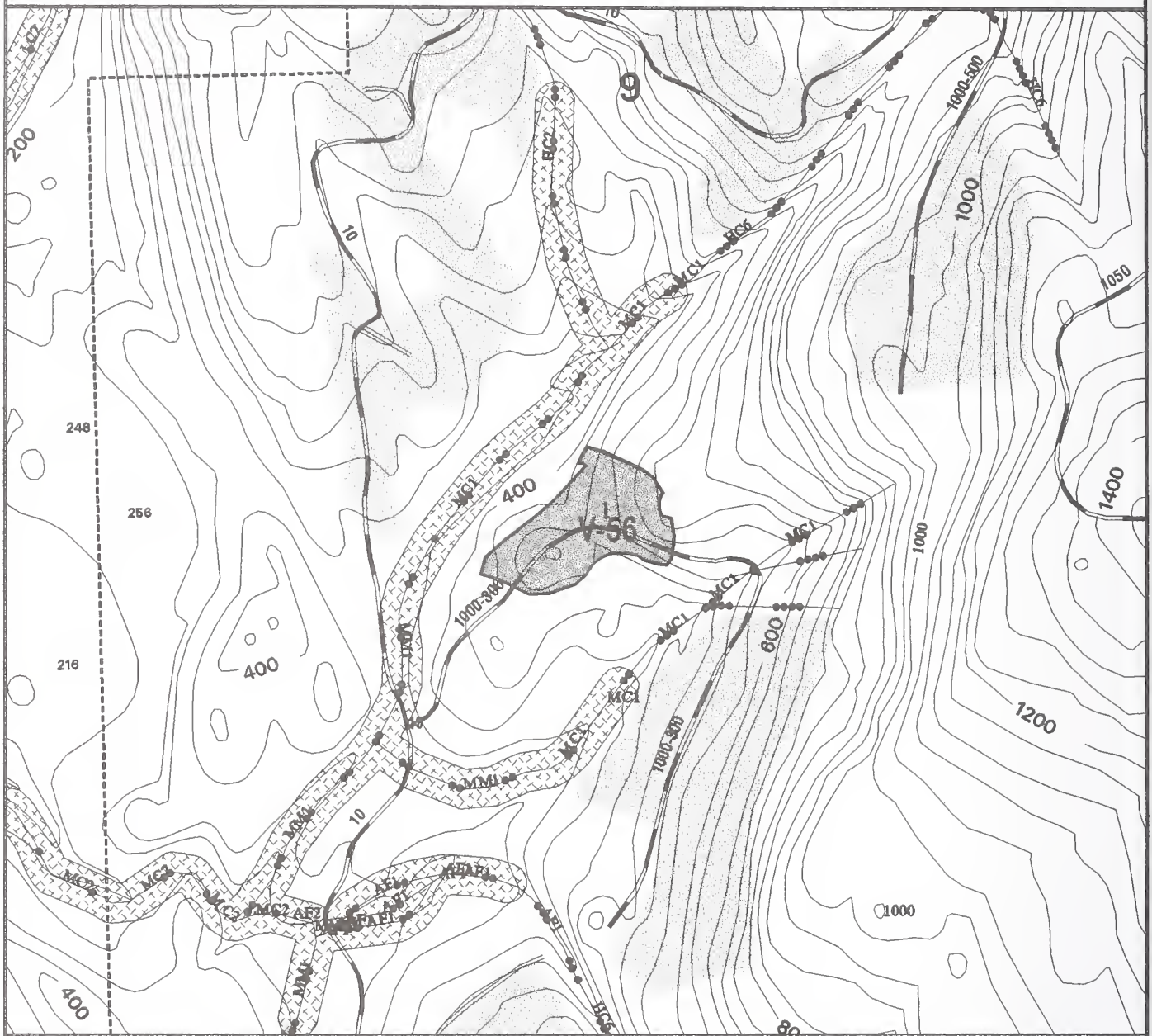
UNIT V-56

9 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/madm/mala/pv-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number V-56 In Alternative(s) 2 & 5

Harvest Method: Running Skyline
Total Acres: 9 Total Volume: 293 MBF Volume per Acre 33 MBF

UNIT DEVELOPMENT

Suitable timber is limited on south and northwest boundaries; multiple tailholds may be required. East boundary located on slope break above road. Unit boundaries are generally located 200-300 ft from Class II and III streams. Potential for some blowdown along northeast boundary should be reduced by feathering this cutting boundary with unmerchantable and merchantable reserve trees. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: T1, W1, W7, V1, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration using the road as a continuous road-side landing. Deflection is adequate. Tail holds are poor along the west side and multiple-stump anchors will be necessary. Portions of the unit can be shovel yarded.

The east boundary is located on a slope break. The class II streams along the SE, south and west sides are 200-300' from the unit. The NE and southern boundaries were modified to exclude unsuitable timber. Blowdown was found near the north boundary and windthrow may be a problem in that area after harvest. The northern portion (upper elevation) of the unit has visual concerns; feathering the northern edge and leaving unmerchantable timber in the northern ½ of the unit should screen the unit from view.

Specified Roads: The unit is accessed by the 1000-300 road.
Temporary Roads: None

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 263 MBF). Leave scattered reserve trees along with snags and non-merchantable trees within 50 - 100 feet of the unit/setting edge boundaries. Leave at least small trees downhill from road (except near landings) to help screen road. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allows this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class II and Class III stream channels adjacent to unit.

Mitigation: No programmed harvest within minimum 100 ft TTRA buffer or the top of v-notch, whichever is greater along class II stream. No programmed harvest within v-notch of class III channel. For both Class II and III channels manage beyond no-harvest zone to provide for a reasonable assurance of wind firmness (approximately one site-potential tree height).

Soils/Wetlands/Karst
Concern: None

Mitigation:

Wildlife/TES Plants
Concern: Unit contains high deer HSI values and high probability goshawk nesting habitat in northern half of unit.

Mitigation: Reserve trees will enhance snow interception in the future stand.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention in area visible from saltwater (approx. northern (upper) 1/2 of unit).

Mitigation: Leave at least small trees downhill from road (except near landings) to help screen the road from saltwater. Leave scattered reserve trees along with snags and non-merchantable trees within 50 to 100 feet of unit boundaries and vary edges and backlines of unit of northwestern boundary to give unit a more natural shape.

Other Resources/Issues
Concern: None
Mitigation:

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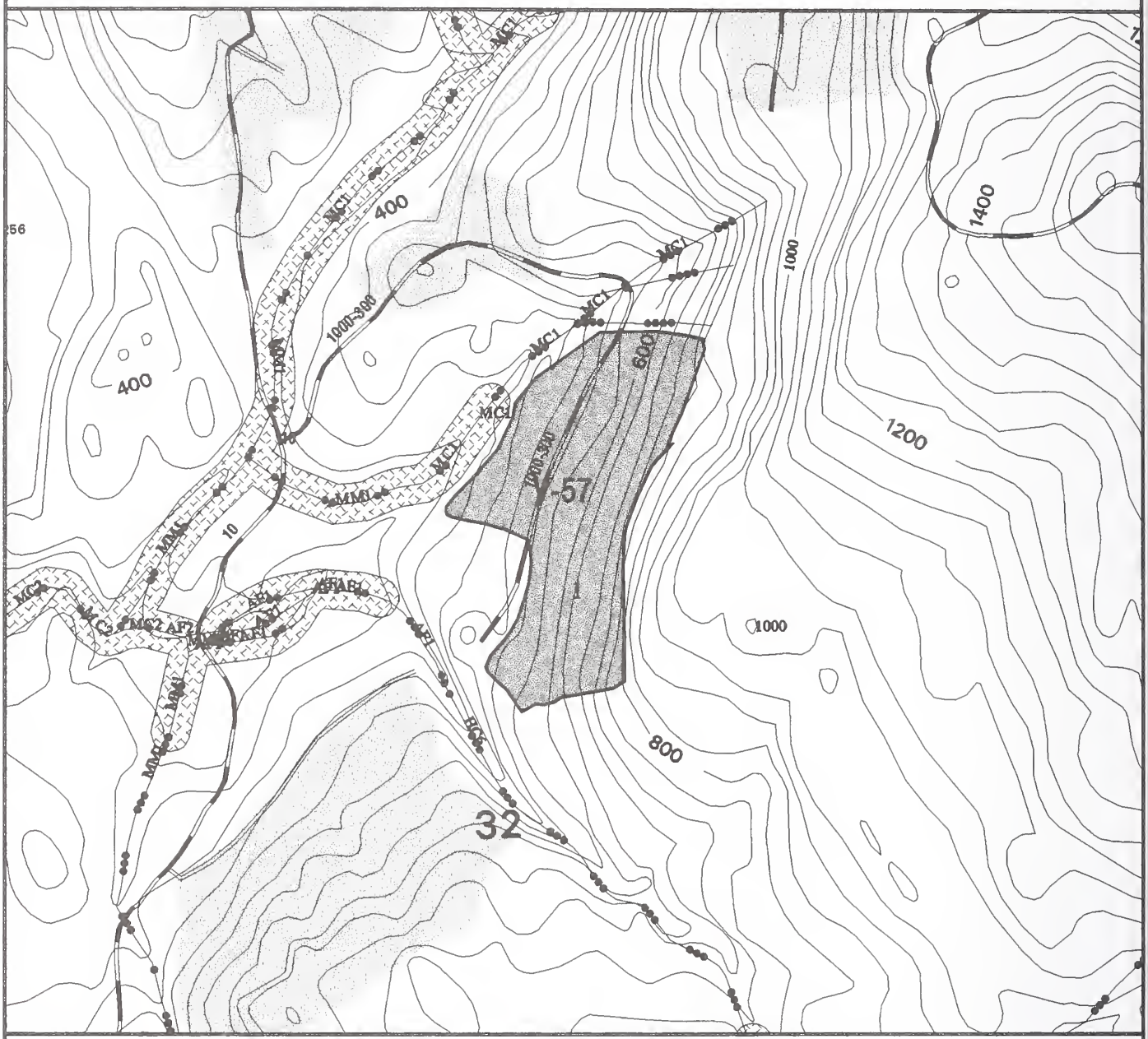
UNIT V-57

30 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/madam/mxds/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number V-57 In Alternative(s) 2 & 5

Harvest Method: Running Skyline
Total Acres: 30 Total Volume: 997 MBF Volume per Acre 34 MBF

UNIT DEVELOPMENT

Unit was designed to meet Visual Quality Objective of partial retention. Visual Quality Objective require prescription other than large clearcut. Boundaries were modified in the field due to unsuitable timber. The eastern portion that was added in the field was later dropped after further field review due to MMI 4 soils. There is a Class II/III along the western boundary. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, T1, W1, W7, V1, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration using the road as a continuous road-side landing. Deflection is adequate to achieve partial suspension for the downhill yarding.

A Class II/III stream on the NW boundaries has the greater of a 100' or slope break buffer on the Class II portion (12.6(a),13.16). Another Class III stream exists near the SW boundary. The eastern boundary has been modified after the field layout to exclude MMI 4 soils (BMP 13.5). The unit contains insignificant windthrown timber; no blowdown problems are expected after harvest. The upper elevations on the east side have visual concerns from the west. See Visuals/Recreation section.

Specified Roads: The unit is accessed by the 1000-300 road.
Temporary Roads: None

Stand Management Objectives: Future stand will have two or more canopy layers.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 898 MBF). Leave scattered leave trees, snags, and non-merchantable trees within 50-100 feet of the unit/setting boundaries. Leave a higher percentage of reserve trees in the seen eastern portion of unit due to visual concerns. See Visual/Recreation section. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allows this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning as well as future entries similar to this patch cut harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class II, III, and IV stream channels adjacent to unit.

Mitigation: No programmed harvest within minimum 100 ft TTRA buffer or the top of v-notch, whichever is greater along class II stream. No programmed harvest within v-notch of class III channel. For both Class II and III channels manage beyond no-harvest zone to provide for a reasonable assurance of windfirmness (approx. one site-potential tree height).

Soils/Wetlands/Karst
Concern: Soil slips and one land slide present near eastern boundary.

Mitigation: Avoid harvest in unstable areas; therefore, eastern portion of unit that was added during initial field review was further modified to remove areas with soil stability concerns.

Wildlife/TES Plants
Concern: Unit contains high deer HSI values in southern 2/3 of unit. High probability goshawk nesting habitat occurs in the northwestern portion of the unit. Corridor between large forested areas in Jenkins Cove and Virginia Lake blocks would be fragmented.

Mitigation: Scatter reserve trees to provide structure in future stand.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention in area visible from saltwater (approx. eastern 1/2 of unit [the upper slopes].

Mitigation: Leave reserve trees downhill from road (except near landings) to help screen the road from saltwater and in patch cut(s) on upper (eastern) slope of unit. Leave scattered reserve trees along with snags and non-merchantable trees within 50 to 100 feet of unit boundaries. Vary edges and backlines of patch cut boundaries to give them natural shapes, and do not use straight lines for boundaries.

Other Resources/Issues
Concern:
Mitigation:

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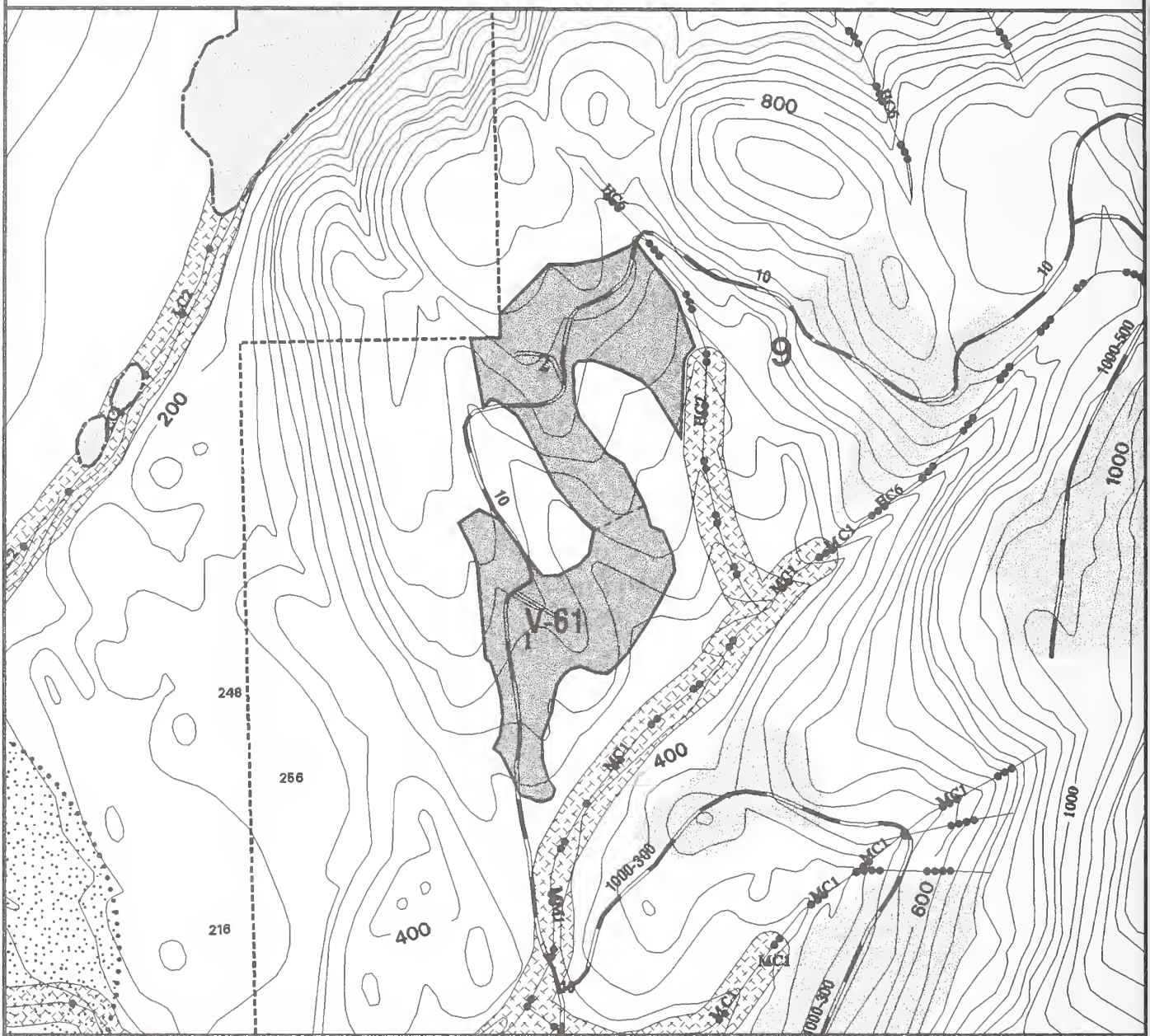
UNIT V-61

36 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1, MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/sdams1/maden/arals/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number V-61 In Alternative(s) 2 & 5

Harvest Method: Running Skyline
Total Acres: 36 Total Volume: 627 MBF Volume per Acre 17 MBF

UNIT DEVELOPMENT

Unit was modified in the field along the northern and western boundaries due to unsuitable timber. A small portion was added along the southeastern boundary. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F11, T1, W1, W7, W31, V1, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration on both settings using the roads as continuous road-side landings. Deflection is adequate. Tailholds and guyline anchors are poor and multiple-stump anchors, deadman, equipment anchors, or other method will be required to anchor the yarder.

A Class II/III stream is located along the NE boundary which has a 100' buffer on the Class II portion and will require directional felling on the Class III portion (BMP 12.6(a), 13.16). The NW boundary may be along the Property line. Portions of the western edges were modified to exclude timber behind a blind lead (and unsuitable timber). The northern tip was modified to exclude unsuitable timber. The timber contains low volume, highly defective hemlock and yellow cedar. No blowdown problems are expected after harvest. The unit does not have visuals concerns.

Specified Roads: The unit is accessed by the 10 road.
Temporary Roads: Two temporary spurs are needed. Both will need to be about 200' long, totaling 400'.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 565 MBF). Leave scattered leave trees, snags, and non-merchantable trees within 50-100 feet of the unit/setting boundaries. Leave a higher percentage of reserve trees in forested muskeg area in the southeastern portion of the unit. Clearcutting with reserve trees is proposed because the unit is not visible from saltwater or other important viewing areas. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class II/III stream outside eastern boundary of unit.

Mitigation: May need controlled directional felling to keep debris out of stream.

Soils/Wetlands/Karst
Concern: Southeast end of unit is forested muskeg (approximately 1 acre); need to move unit boundary to the west to avoid wetland. Much of this unit is characterized by a high water table (<10 inches from surface), poor timber quality/growth, especially in the southern portion of unit.

Mitigation: Avoid shovel logging in southern portion of unit to avoid soil compaction.

Wildlife/TES Plants
Concern: Sensitive plant (Platanthera chorisiana) was located in a muskeg approximately 200 ft up-slope of the road location.

Mitigation: None needed. Area was dropped from unit due to unsuitable timber.

Visual/Recreation
Concern: Unit not seen from saltwater but will be visible when flying into Virginia Lake.

Mitigation: None needed for views from saltwater. Vary edges and backlines of northeastern most unit boundary (no straight edge) to give the corner a more natural shape when viewed from airplanes landing at Virginia Lake.

Other Resources/Issues
Concern: Northwestern boundary boarders State land.
Mitigation:

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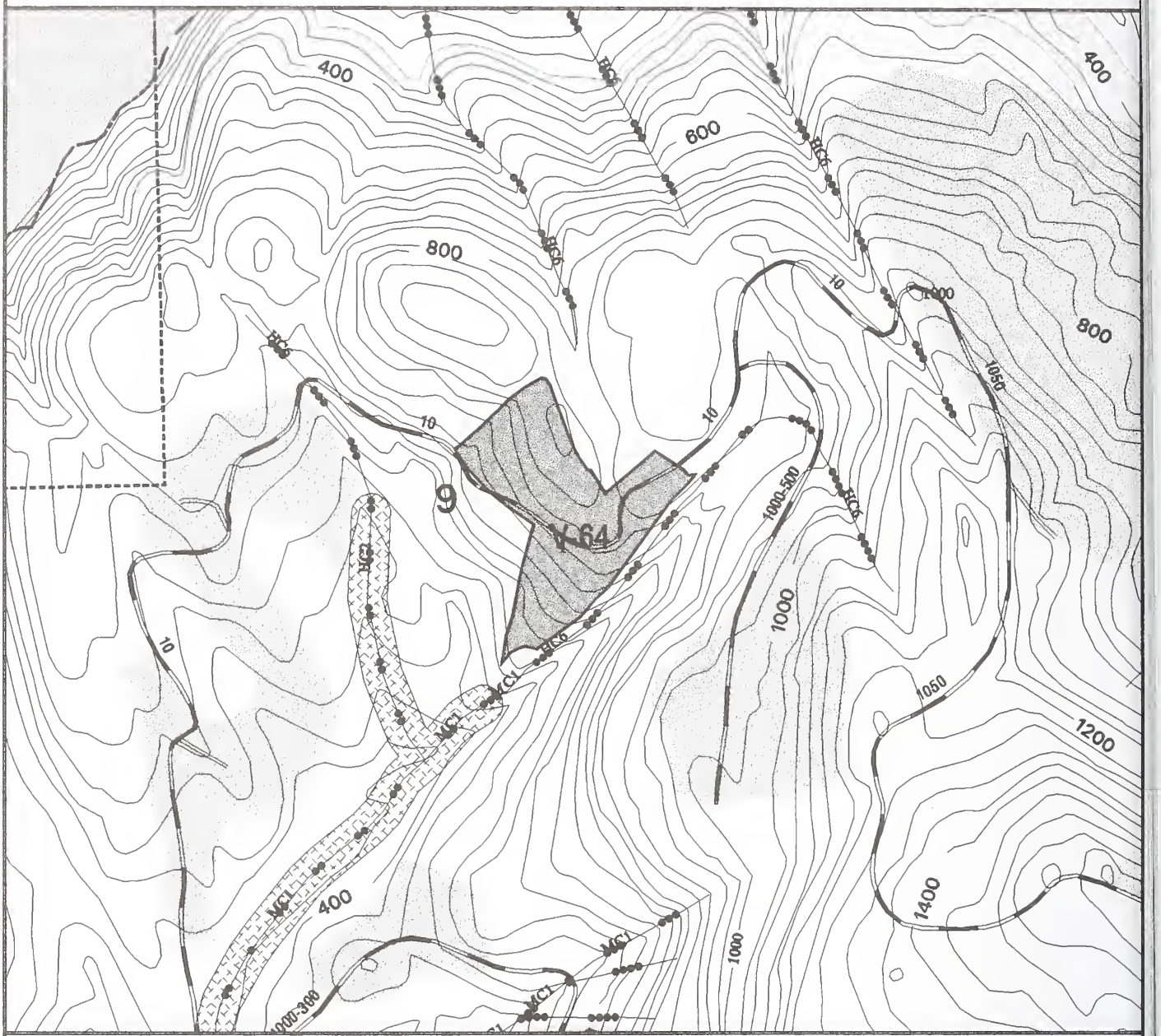
UNIT V-64

16 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/madm/smls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number V-64 In Alternative(s) 2 & 5

Harvest Method: Running Skyline
Total Acres: 16 Total Volume: 480 MBF Volume per Acre 31 MBF

UNIT DEVELOPMENT

Unit designed to meet Visual Quality Objective of partial retention. A small portion of the northeastern lobe has been deferred due to logging feasibility. Unit potentially has a windthrow concern. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, T1, W1, W7, V1, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration using the road as a continuous road-side landing (BMP13.9, 13.10).

A Class III stream on the SE boundary has a slope-break buffer placed on a ridge (12.6(a), 13.16). The timber is mostly good quality, but has lower quality timber in the NE corner above the 10 road. Occasional blowdown was found on the ridgetop in the center-north unit and there is potential for some blowdown in that area. The upper portion of the unit has visual concerns from the west; see Visual/Recreation section.

Specified Roads: The unit is accessed by the 10 road.
Temporary Roads: None

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 432 MBF). Leave scattered leave trees, snags, and non-merchantable trees within 50-100 feet of eastern boundary and southern side of road. No programmed harvest in v-notch. Leave more trees along the eastern ½ (upper slopes) of the unit. Leave at lest small trees downhill from portions of the road visible from saltwater. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allows this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class III steam along southeastern boundary flows into class II stream.

Mitigation: Maintain no harvest slope break buffer along all class III streams (unit does not extend down to class II stream), no programmed harvest within v-notch and manage beyond to maintain windfirm.

Soils/Wetlands/Karst
Concern: None

Mitigation:

Wildlife/TES Plants
Concern: Unit contains high deer HSI values in the southern 2/3 of the unit. The southern boundary boarders high probability goshawk nesting habitat.

Mitigation: Reserve trees will enhance snow interception in the future stand.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention from area visible from saltwater (approx. the eastern 1/2 of unit [the upper slopes]. Leave scattered leave tree, snags, and non-merchantable trees and reserve trees between south side of road where possible to screen road from saltwater to the west. Leave other trees along east side of unit.

Mitigation: Leave at least small trees downhill from portion of road (except near landings) visible from saltwater to help screen the road. Leave scattered reserve trees along with snags and non-merchantable trees within 50 to 100 feet of unit boundaries. Vary edges and backlines of unit boundary to give it a natural shape. Do not use any straight boundary lines for this unit.

Other Resources/Issues
Concern: None
Mitigation:

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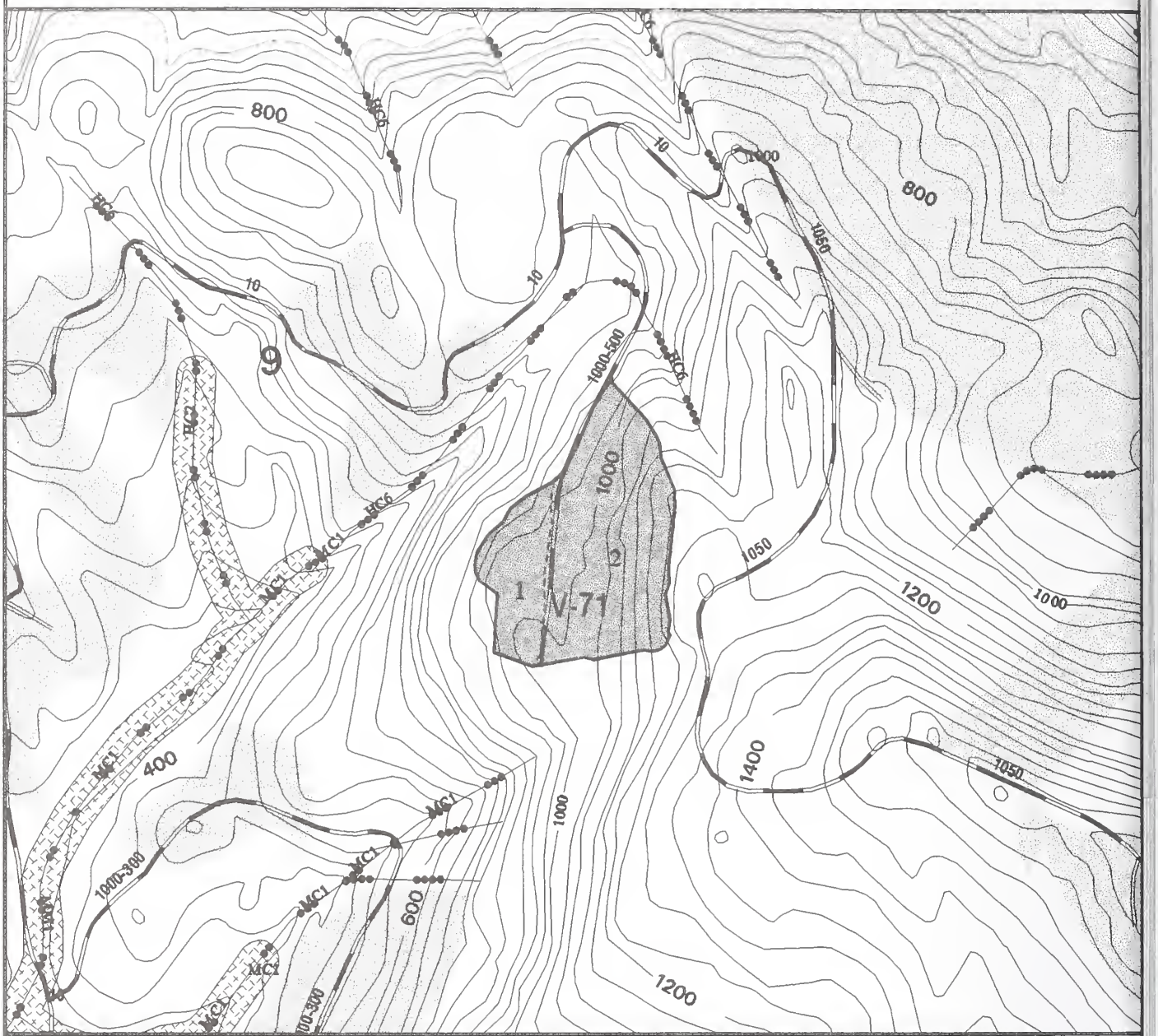
UNIT V-71

22 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/arnis/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number _V-71_ In Alternative(s) 2 & 5

Harvest Method: _Running Skyline_
Total Acres: _22___ Total Volume: _571 MBF_ Volume per Acre 26 MBF

UNIT DEVELOPMENT

Unit designed to meet Visual Quality Objective of partial retention. Unit was expanded along the eastern boundary in the field. The expanded area has not been field reviewed for resource concerns. Southern and western boundaries were modified due to logging constraints. Along the original eastern boundary there is an area with potentially unstable steep slopes. Avoid harvest in these areas, if possible. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F15, F18, T1, W1, W7, V1, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration and a shovel using the roads as continuous road-side landings. Deflection is adequate. The eastern setting which is planned for a running skyline, was expanded easterly after the field layout to include timber on the ridge on the east side; verify unit expansion during final layout .

The west boundary follows a slope-break. Small streams near the south boundary may require partial suspension which can be achieved (BMP 12.6(a), 13.16). The timber is good quality. No blowdown was encountered and no windthrow problems are expected after harvest. The unit may have visual concerns from the west. See Visual/Recreation section.

Specified Roads: The unit is accessed by the 1000-500 road.
Temporary Roads: None.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 514 MBF). Leave scattered leave trees, snags, and non-merchantable trees in areas with steep slopes and within 50-100 feet of the unit/setting boundaries especially along southern and eastern boundaries. Leave trees may have to be left in patches in areas of steep slopes (eastern portion of unit) depending on field review during implementation. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allow this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: No fisheries concerns, shallow slide noted by other resource specialist at north end of unit.

Mitigation: Avoid disturbance of unstable soils.

Soils/Wetlands/Karst
Concern: Unstable steep slopes (approximately 100%) with shallow soils along the original eastern boundary. The expanded portion to the east has not been field verified to determine if steep or unstable slopes exist.

Mitigation: Avoid harvest in the areas with steep slopes. Need geotechnical review of area of expansion to the east.

Wildlife/TES Plants
Concern: None

Mitigation:

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention from area visible from saltwater (approx. eastern 1/3 of unit [upper slope]).

Mitigation: Leave scattered reserve trees along with snags and non-merchantable trees within 50 to 100 feet of unit boundaries and vary edges and backlines of southern and eastern unit boundaries to give unit a more natural shape. Do not use any straight boundary lines for this unit.

Other Resources/Issues
Concern: None
Mitigation:

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UNIT V-78

18 ACRES

Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/madam/smls/ps-unitcard-2.aml - April 05, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number V-78 In Alternative(s) 2 & 5

Harvest Method: Live Skyline
Total Acres: 18 Total Volume: 848 MBF Volume per Acre 47 MBF

UNIT DEVELOPMENT

The unit location was shifted eastward to utilize an available landing on the 1050 road and to make the east and west boundaries perpendicular to the slope. The unit was also extended further north to incorporate areas not seen from Virginia Lake. This unit is also a sensitive visual unit. The 100' slope below the road exceeds 100 % slope therefore need to use corridors through the slide prone area. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F18, T1, W6, V6, and V13. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a large tower in a live skyline configuration. Lateral yarding capabilities will be needed due to partial cut prescription. Deflection is adequate for partial suspension. Anchors are adequate for a large yarder. A large yarder is suggested because the external yarding distance is approximately 1,600'. The unit was modified to include the only good landing and to make the east and west boundaries perpendicular to the contours. A Class IV stream in the NE requires partial suspension (BMP 12.6(a), 3.16).

The timber is good quality. Only occasional blowdown was encountered; however, windthrow may be a problem on the south boundary ridgetop and is a smaller possibility on the east and west sides. MMI 4 soils are located just east and below the road (BMP 13.5). The unit is visible from Virginia Lake. See Visual/Recreation section..

Specified Roads: The unit is accessed by the 1050 road.
Temporary Roads: None.

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Group Selection with a minimum of 70% retention (estimated harvest volume = 212 MBF). Harvest groups up to 2 acres. Allow 10 % harvest in upper 1/3 portion of unit, 30 % in middle 1/3 portion of unit, and 70 % harvest in lower 1/3 due to MMI 4 soils and visual concerns. Need to leave trees behind landing to minimize visual concerns. See Soils/Wetlands/karst and Visual/Recreation sections. This prescription would address visual and other resources concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size). Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Steep side slopes and MMI 4 soils present.

Mitigation: When possible, avoid disturbance to area with excess slope angle and sensitive soil types.

Soils/Wetlands/Karst
Concern: Steep slopes (100%) in southern portion of unit. Shallow soils in some areas and old slide in unit.

Mitigation: Allow 10 % harvest in upper in upper 1/3 portion of unit, 30 % in middle 1/3 portion of unit, and 70 % harvest in lower 1/3 due to MMI 4 soils.

Wildlife/TES Plants
Concern: None

Mitigation:

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention when viewed from Virginia Lake (up slope 2/3 of unit visible from lake).

Mitigation: 10 % harvest in upper 1/3 of unit, 30 % in middle 1/3 of unit, and 70 % harvest in lower 1/3. Vary edges and backlines of boundaries in the unit (especially in the middle and lower portions of unit.) to give it a more natural shape. Do not use any straight boundary lines for this unit. Make sure logging corridors are not inline with, and visible from, the Virginia Lake cabin. Unit needs a review by a landscape architect during final layout to make sure that layout will achieve the VQO of partial retention.

Other Resources/Issues
Concern: None
Mitigation:

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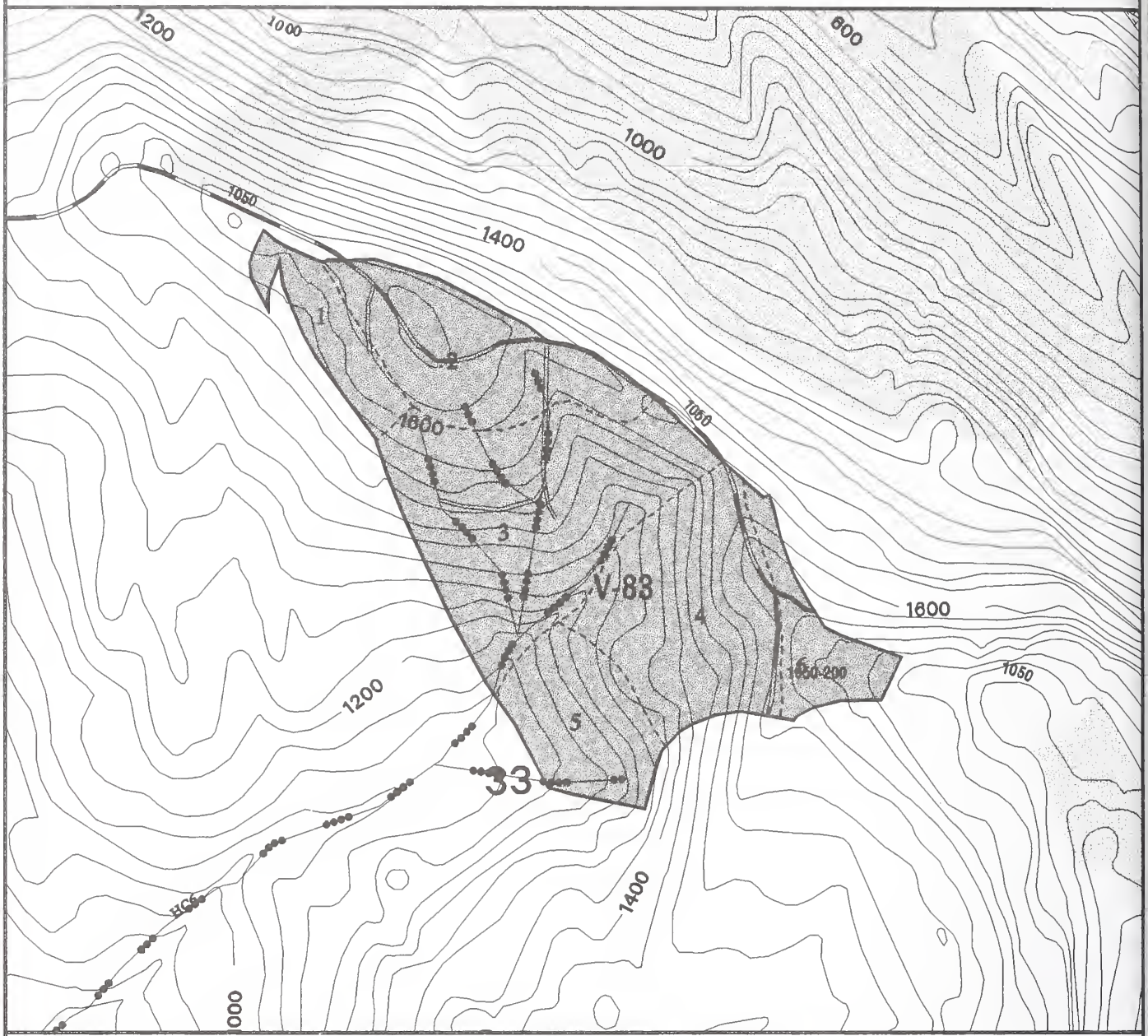
UNIT V-83

94 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adam1/medan/arcls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number V-83 In Alternative(s) 2 & 5

Harvest Method: Running Skyline, Shovel, Live Skyline, Helicopter
Total Acres: 94 Total Volume: 3,609 MBF Volume per Acre 38 MBF

UNIT DEVELOPMENT

Unit boundaries were modified to include good timber along edges and to drop areas of unsuitable timber (western boundary). Some of the southern portion has been dropped due to MMI 4 soils. Helicopter yarding required in southern portion of unit below MMI 4 soils. To compensate for area dropped due to MMI 4 soils, Unit V-84 has been incorporated into this unit. This unit has not been visited by a geotechnician, therefore, need final review of slope stability by geotechnician during final implementation. Southwest boundary placed along edge of suitable timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: T1, W1, W7, V1, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The west, east, and central settings can be yarded with a small mobile yarder in a running skyline configuration. All of these settings can use the roads as continuous road-side landings. The west and central settings require building a short temporary road. Most of the central setting can be yarded to the 1050-190 road used as a continuous road-side landing. The NW setting can be shovel logged to the 1050 road, which can be used as a continuous road-side landing. The central-east setting can be yarded with a large tower in a live skyline configuration. The southernmost setting can be yarded with a helicopter to landings in adjacent settings. Note that this is an uphill flight. Tailholds are poor on portions of the west boundary and multiple-stump anchors may be necessary.

A Class IV(?) stream in the center of the unit can be split-yarded and will require directional felling (BMP 12.6(a), 13.16). The northern and eastern portions of the unit may have visual concerns from the west; see visuals. Since the southern boundary was modified to exclude MMI 4 soils (BMP 13.5), the center north setting (V-84) was added (after field layout) to compensate for the volume loss; verify during final layout. The SW boundary was placed along the edge of suitable timber. The north boundary is along the road. The NE boundary follows a ridge. This unit is not visible from Virginia Lake but it is partially visible from the west. See Visual/Recreation section.

Specified Roads: The unit is accessed by the 1050, 1050-200, and the 1050-190 roads.
Temporary Roads: Two temp roads are needed: one is approximately 600' long, one is approximately 150' long.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 3,247 MBF). Leave scattered reserve trees along with snags and non-merchantable trees within 50 - 100 feet of the unit/setting edge boundaries especially the northern and eastern upper slopes. Potential visual concerns for road; see Visual/Recreation section. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allow this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: At least four Class IV streams present in unit. Steep side slopes and MMI 4 soils present.

Mitigation: Need field verification to determine level of protection needed on Class IV streams. When possible, avoid disturbance to area with excess slope angle and sensitive soil types.

Soils/Wetlands/Karst
Concern: Southern portion of unit has an MMI 4 soils; seeps/springs common near top of very steep slope.

Mitigation: Dropped MMI 4 area from that portion of the unit that has been field verified. Need geotechnical review of area to be added (old Unit 84).

Wildlife/TES Plants
Concern: Size of unit could create dispersal/travel problems.

Mitigation: Scatter reserve trees through out unit to maintain structure throughout to allow dispersal.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention in areas visible from saltwater (northern and eastern most upper slopes).

Mitigation: Leave trees in front of road and landing where possible. Leave most reserve trees in eastern portions of unit.

Other Resources/Issues
Concern: None
Mitigation:

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MADAN TIMBER SALE - UNIT CARD Unit Number V-85 In Alternative(s) Dropped

Harvest Method: _____
Total Acres: _____ Total Volume: _____ Volume per Acre _____

UNIT DEVELOPMENT

Drop entire unit due to MMI 4 soils in upper 2/3 of unit. Not able to use corridors to harvest lower portion therefore lower portion has been added into new unit V-111.

Logging and Transportation: A skyline profile was run in this unit.

Specified Roads:
Temporary Roads:

Stand Management Objectives:

Silvicultural Prescription:

Regeneration Method:

Possible Future Treatments:

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Steep side slopes and MMI 4 soils present.

Mitigation: When possible, avoid disturbance to area with excess slope angle and sensitive soil types.

Soils/Wetlands/Karst
Concern: MMI 4 present in upper 2/3 of unit. These slopes are just above class III stream.

Mitigation: Exclude the MMI 4 from unit (see map).

Wildlife/TES Plants
Concern:

Mitigation:

Visual/Recreation
Concern:

Mitigation:

Other Resources/Issues
Concern:

Mitigation:

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UNIT V-93

21 ACRES

Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

/adams1/madam/xmls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number V-93 In Alternative(s) 2 & 5

Harvest Method: Helicopter
Total Acres: 35 Total Volume: 1,502 MBF Volume per Acre 43 MBF

UNIT DEVELOPMENT

This unit has MMI 4 soils just below the road therefore can not reach lower portion of unit except by helicopter. Cable logging upper unit would require 1/2 mile of specified road with some difficult construction and therefore is not economically feasible. There is a Class IV (orange and white) that requires a slope break buffer, which will also protect karst features. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: T1, W1, W7, V1, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a helicopter to landings in unit V-83. The 1050 road has been flagged into the SW or top of the unit, but due to the removal of area having MMI 4 soils (BMP 13.5), the lower portions were isolated. At this point it was no longer economical to build the road (which has some difficult construction) to access the small amount of timber that could be yarded to the road; and therefore, the entire unit was changed to helicopter .

A Class IV stream in the eastern 1/2 of the unit that flows NE and N then NW needs directional felling (BMP 13.16) and a slope-break buffer (BMP 12.6(a)). Field crews mentioned the possibility of karst and grikes. The eastern part of this unit is visible from Virginia Lake. See Visual/Recreation section.

Specified Roads: None. (The timber will be flown to the 1050 road.)
Temporary Roads: None.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 1,352 MBF). Harvest in the upper portion of unit and the lower portion (below MMI 4 soils) and leave slope break buffer along Class IV disappearing stream to protect stream and karst features. Leave scattered trees and snags and non-merchantable timber especially in northern and eastern portion of the unit; see Visual/Recreation section. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allow this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class IV (orange/white) channel bisects lower portion of unit, possible karst. MMI 4 soils present.

Mitigation: Helicopter lower portion (below MMI 4 soils) and leave slope break no-harvest buffer along Class IV disappearing stream to protect stream and karst features.

Soils/Wetlands/Karst
Concern: Below road 200 ft are slopes greater than 72%, therefore, MMI 4 soils. There is a break in slope below where terrain is more gentle and stable. Marble/limestone found in stream but not extensive features.

Mitigation: Unit has been modified to avoid harvest on MMI 4 soils. Slope break buffer on stream should protect any potential karst features along stream area.

Wildlife/TES Plants
Concern: Potential fragmentation of connected forested blocks between Virginia Lake and Moose Creek which provides a corridor over the lowest elevation pass between the 2 blocks.

Mitigation: The area with MMI 4 soils as well as reserve trees and stream buffers will help minimize fragmentation of the corridor.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention when viewed from Virginia Lake (the northern portion of unit can be seen from Virginia Lake).

Mitigation: Vary edges and backlines of unit boundaries to give unit a more natural shape when viewed from Virginia Lake. Do not use any straight boundary lines for this unit. Leave scattered leave trees, snags, non-merchantable trees and especially reserve trees up and downslope in the central portion of the northern part of this units. This will allow the unit to resemble the natural openings that occur further up the valley.

Other Resources/Issues
Concern: None
Mitigation:

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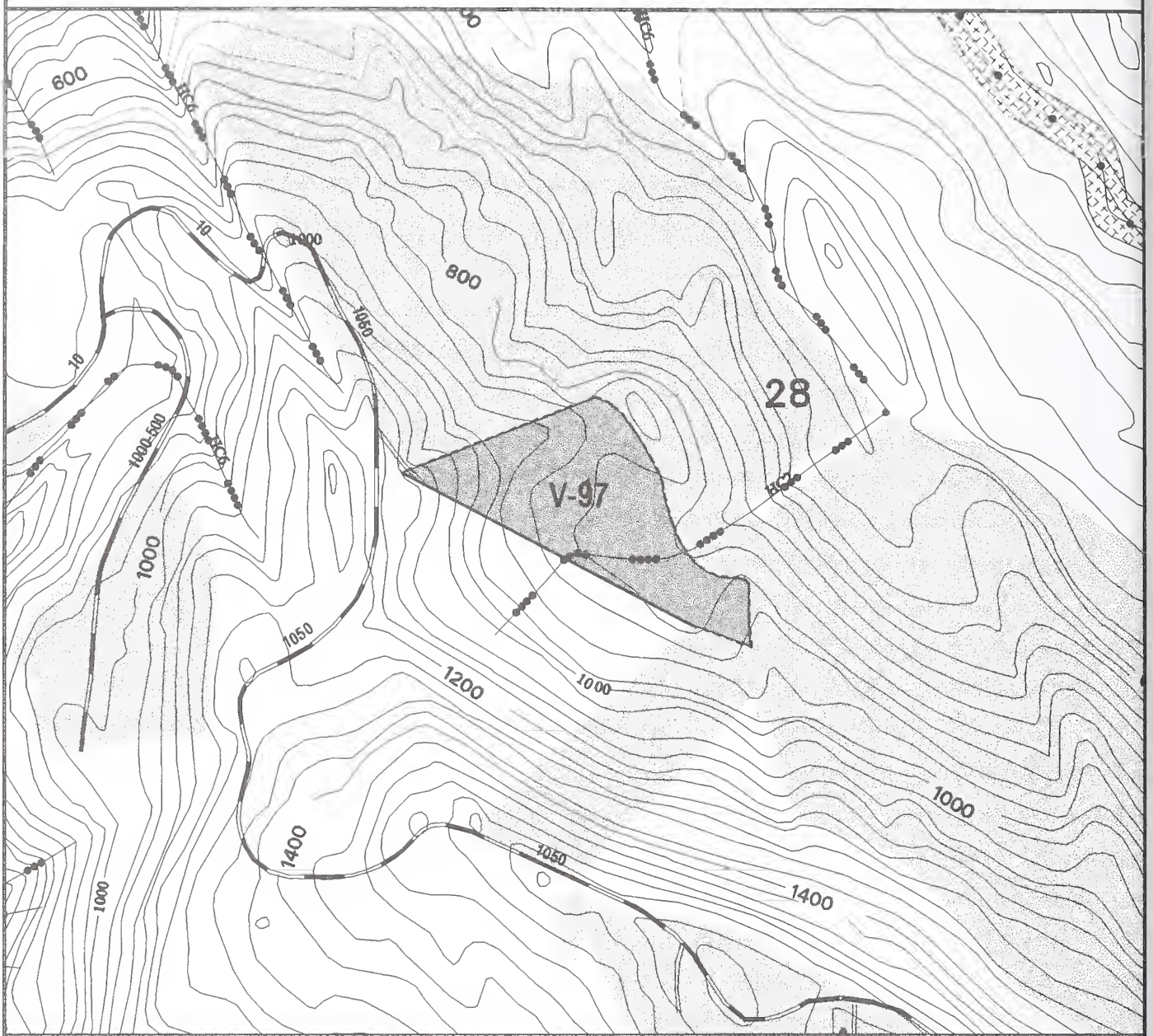
UNIT V-97

20 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

/adam1/madan/amis/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number V-97 In Alternative(s) 2 &5

Harvest Method: Slackline
Total Acres: 20 Total Volume: 647 MBF Volume per Acre 32 MBF

UNIT DEVELOPMENT

Unit designated to meet Visual Quality Objective of partial retention. Cable unit accessed by the 1050 road and a temporary spur (300'). Full suspension required across a class IV orange/white stream along south boundary. Large yarder with 100' tower capable of slackline yarding required. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F3, T1, W1, W7, V1, V7, V8, and V13. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a large (100') tower in a slackline configuration. Deflection is good. Anchors are adequate for this large machine. A large tower is recommended because of the long external yarding distance (1,700'), the large timber in the unit, and full suspension of a Class III stream is required. A slackline configuration is recommended because a haulback will be needed to hold the carriage while hooking turns of logs in the SE corner of the unit. A map profile indicates that full suspension is obtainable in the stream area.

The unit can be expanded south, if desired. The north and east boundaries are located on ridges. A Class III/IV stream located in the SE portion of the unit requires full suspension for portions of its length; the stream can be fully suspended and will need directional felling (BMP 12.6(a), 13.16). The timber is mostly high quality except along the west end of the south boundary. The unit contains scattered blowdown; only the ridge on the north boundary is expected to have potential windthrow problems. The northern ¼ of this unit has visual concerns and is seen from Virginia Lake. See Visual/Recreation section.

Specified Roads: None. (The nearest specified road is the 1050.)
Temporary Roads: A 300' temporary road off of the 1050 is needed to access the landing. The landing is a knob and will need considerable cut and fill to make the landing.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 583 MBF). Leave scattered leave trees, snags, non-merchantable, and reserve trees along streams and in northern ¼ of unit. See Visual/Recreation section. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allow this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class IV (orange/white) channel bisects unit.

Mitigation: Directional felling, splitline, or full suspension logging system required to reduce channel/side slope disturbance.

Soils/Wetlands/Karst
Concern: Wet area with mineral soils in north central portion of unit.

Mitigation: Leave scattered reserve trees and non-merchantable trees in wet area and along stream.

Wildlife/TES Plants
Concern: Size of unit could create dispersal problems.

Mitigation: Scatter reserve trees to maintain structure throughout the unit to allow dispersal.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention when viewed from Virginia Lake. The northern portion (approximately the northern ¼) is visible from Virginia Lake.

Mitigation: By concentrating scattered leave trees, snags, non-merchantable, and reserve tress in the northern ¼ of the unit, the partial retention Visual Quality Objective will be met or exceeded. The edges of the unit should be varied in shape (do not use straight lines) and feathers to give the unit a natural appearance from viewers landing by floatplane at the Virginia Lake Cabin. Unit needs a review by a landscape architect during final layout to make sure that layout will achieve the VQO of partial retention.

Other Resources/Issues
Concern: None
Mitigation:

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MADAN TIMBER SALE - UNIT CARD Unit Number V-98 In Alternative(s) Dropped

Harvest Method: _____
Total Acres: _____ Total Volume: _____ Volume per Acre _____

UNIT DEVELOPMENT

Unit dropped because of the creation of new Unit V-97.

Logging and Transportation:

Specified Roads:
Temporary Roads:

Stand Management Objectives:

Silvicultural Prescription:

Regeneration Method:

Possible Future Treatments:

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern:

Mitigation:

Soils/Wetlands/Karst
Concern:

Mitigation:

Wildlife/TES Plants
Concern:

Mitigation:

Visual/Recreation
Concern:

Mitigation:

Other Resources/Issues
Concern:

Mitigation:

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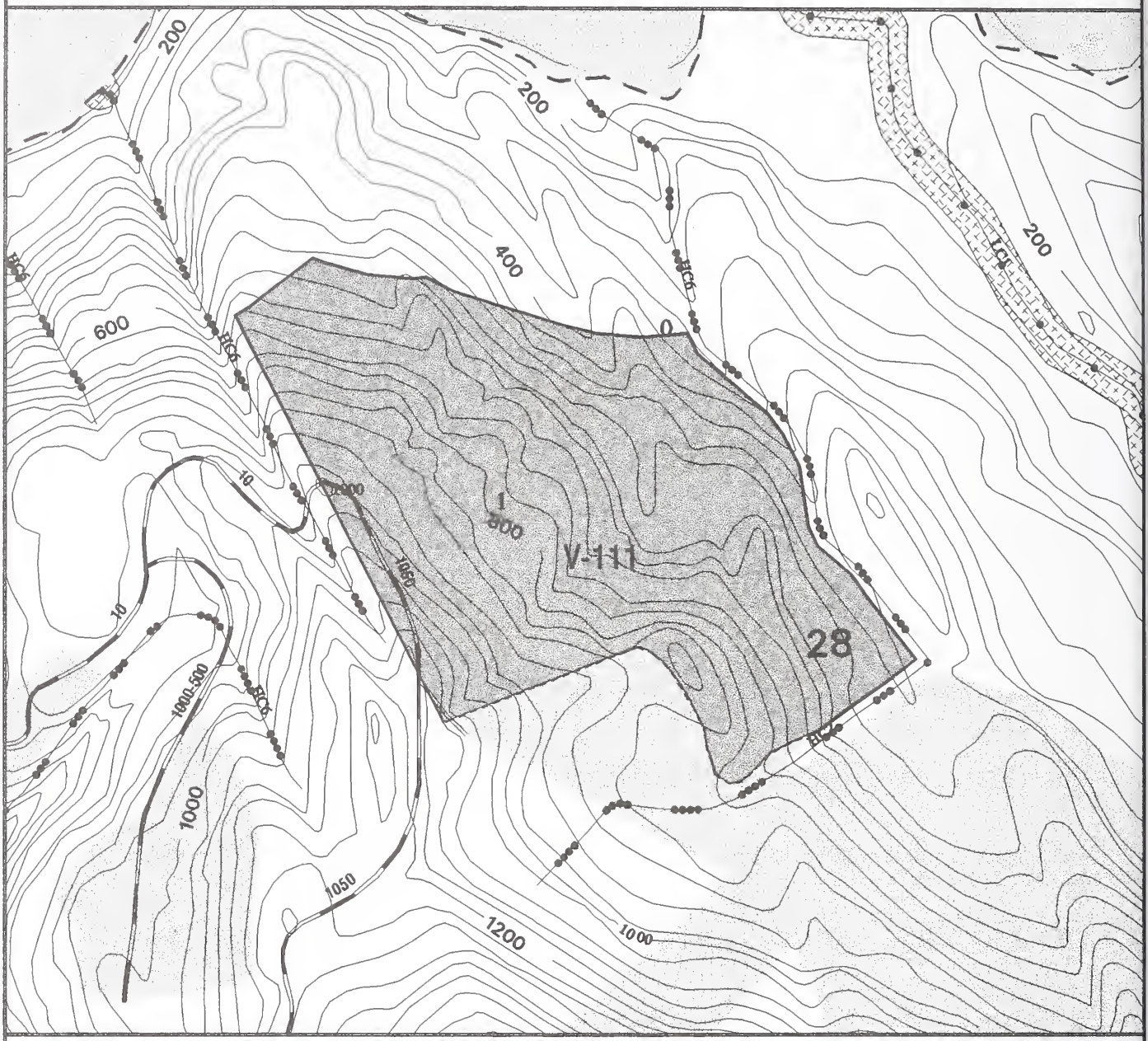
UNIT V-111

114 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adsm1/madas/mals/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number V-111 In Alternative(s) 2 & 5

Harvest Method: Helicopter
Total Acres: 114 Total Volume: 5,801 MBF Volume per Acre 57 MBF

UNIT DEVELOPMENT

This is a new unit designed to meet the Visual Quality Objective of partial retention from Virginia Lake. The new unit encompasses most of Unit V-96 and portions of old Units V-98 and V-85. The boundaries are greatly expanded to the north and southeast. The new southeastern boundary incorporates old Unit V-85. Placement of the patch cuts should avoid the marten den along the southern boundary. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: K3, F1, F2, F15, T1, W6, V6, and V13. These measures are described below within the resource sections that apply.

Logging and Transportation:
A helicopter is planned to yard the timber in this unit. Helicopter yarding was chosen to provide for the harvest prescription and the visual prescription. The timber can be flown to the 1050 road or landings in V-64, V-74, or V-97. The main landing of V-97 is adjacent to the southern tip of the unit, but will be an uphill flight for the timber; and therefore, the timber is planned to be flown to V-64. Verify landings during final layout.

The SW boundary is along a Class III stream. The east and SE boundaries are along Class III streams (BMP 12.6(a), 13.16). The southern boundary is the limit of cable logging for setting V-97. The northern boundary should be the applicable buffer for Virginia Lake visual buffer; verify during final layout. The unit contains the highest quality timber in the area. The unit is visible from Virginia Lake and has visual concerns. See Visual/Recreation section.

Specified Roads: None required. The 1050 road is inside the SW boundary and parallels the SW boundary.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 1,450 MBF). Between 10 and 20 % of the volume will be harvested. Harvest individual trees and/or groups up to 1 horizontal acre scattered randomly throughout the unit. Leave a higher percentage of reserve trees on higher elevation, steep slopes and a lower percentage in the lower elevation unseen areas. In the southwestern portion along the road there are steep slopes. Leave more retention trees in this area below the road (between the road and the cabin). In the southern more visible area only remove 5-10 % and in the northern low elevation portion, there can be up to 30% removal in group cuts. Patch cuts should utilize topography to reduce visual impacts. See Visual/Recreation section. Place group cuts to avoid the marten den near southeastern boundary. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 1 acre in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Several unmapped Class IV (green/white) channel crossings on former road. Class III stream in the western portion of the unit is classified incorrectly. This stream is actually a Class IV (green/white). No significant fisheries concerns.

Mitigation: Partial suspension, debris cleaning as required.

Soils/Wetlands/Karst
Concern: There is a MMI 4 area in the southeast corner of the unit. Karst features include resurgent stream on western boundary of unit, a sinkhole near center of unit, and marble outcrop indicating potential karst vulnerability.

Mitigation: Recommend at least 50 % retention to avoid triggering slides. Class III buffer to slope break is adequate to buffer for karst. In final unit layout, prior to harvest, a karst specialist should evaluate unit for karst vulnerability. Appropriate management activities to protect karst as designated in TLMP Appendix I Karst And Caves will be implemented, if necessary, following karst vulnerability assessment.

Wildlife/TES Plants
Concern: Size of unit could create dispersal problems. Approximately 5 acres of high probability goshawk nesting habitat occurs along the northern boundary. Marten den found in unit. Good habitat overall.

Mitigation: Patch cuts will maintain structure throughout the unit to allow dispersal well as retaining areas with stand structure for wildlife. **No-cut buffer around known marten den (see field data unit map for location).**

Visual/Recreation
Concern: Meet Visual Quality Objective of Partial Retention when viewed from Virginia Lake (much of unit except lower slopes are visible from Virginia Lake).

Mitigation: Helicopter logging of individual trees or patch cuts that range from 1/2-acre to 1-acre in size. These horizontal patch cuts will be long and narrow and will follow the contours of the slope to help hide the units. Leave a higher percentage of leave trees on steeper higher elevation slopes in southwestern part of the unit. To screen view of road from lake, leave more retention trees between the road and the lake. In the more visible southern portion of the unit only remove 5-10 % of the timber and in the lower elevations, less visible part of the unit, remove up to 30% volume. Unit needs a review by a landscape architect during final layout to make sure that layout will achieve the VQO of partial retention.

Other Resources/Issues
Concern: None
Mitigation:

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UNIT V-112

179 ACRES

Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/madas/smla/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number V-112 In Alternative(s) 2 & 5

Harvest Method: Helicopter
Total Acres: 179 Total Volume: 6,639 MBF Volume per Acre 32 MBF (northern portion); 43 MBF (southern portion)

UNIT DEVELOPMENT

This is a new unit designed to meet Visual Quality Objective of partial retention. The unit extends southeast from Unit V-111 to the Unit V-93 boundary. This new unit has not been field reviewed for most resource concerns. Boundaries correspond with mapped suitability timber. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F11, T1, W6, and V6. These measures are described below within the resource sections that apply.

Logging and Transportation:
A helicopter is planned to yard the timber in this large unit. Helicopter yarding was chosen to provide for the harvest prescription and the visual prescription. The timber can be flown to the 1050 road or landings in V-97, V-78, or V-83. The main landing of V-97 has the least climb in elevation for the helicopter and will be used for costing; verify landings during final layout. This unit is visible from Virginia Lake and has visual concerns. See Visual/Recreation section.

The NW boundary is along a Class III stream that separates V-111 and V-112 (BMP 12.6(a), 13.16). The unit is visible from Virginia Lake; see visuals.

Specified Roads: None. The closest road is the 1050 road.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Individual/Group Selection with a minimum 70% retention (estimated harvest volume = 1,660 MBF). Harvest individual trees and/or groups of ½ to 1-horizontal acre that follow contour lines and are randomly scattered throughout the unit. Leave a higher percentage of reserve trees on steeper, upper elevations southwestern slopes and a lower percentage on non-seen lower elevation slopes along northeast boundary. Due to visual concerns special methods are needed. see Visual/Recreation section. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 1 acre in size) and/or individual trees. Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: No watershed/fisheries field inspection of proposed harvest unit. Unmapped Class IV stream channels may be present within the unit. Class III stream channel located along northern boundary of the unit.

Mitigation: May require directional felling, splitline, partial, or full suspension for Class IV channels present within the unit. No programmed harvest within v-notch of Class III channel. Expanded buffers are not needed because of prescription (i.e., minimum 70% retention).

Soils/Wetlands/Karst
Concern: Forested muskeg in the southeastern portion of unit.

Mitigation: Leave more retention trees in the swales and wetter areas especially in southeastern portion of unit.

Wildlife/TES Plants
Concern: Size of unit could create dispersal problems. Extensive heavily grazed area in the southeastern portion of the southern lobe.

Mitigation: Individual/group selection will maintain structure throughout the unit to allow dispersal as well as retaining areas with stand structure for wildlife. Leave more retention trees in the swales and wetter areas especially in southeastern portion of unit.

Visual/Recreation
Concern: Meet Visual Quality Objective of Partial Retention when viewed from Virginia Lake.

Mitigation: Helicopter logging of horizontal patch cuts that follow contour lines and range in size from 1/2-acre to 1-acre in size. Between 20 and 30 percent of volume of the unit will be harvested. Only remove 10% on steeper, higher elevation slopes and leave more retention trees in these areas. Up to 30% can be harvested from the lower elevation, less visible, northeastern part of the unit.

Other Resources/Issues
Concern: None
Mitigation:

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UNIT M-117

13 ACRES

- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/amls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number M-117 In Alternative(s) 2, 3, & 4

Harvest Method: Running Skyline
Total Acres: 13 Total Volume: 335 MBF Volume per Acre 26 MBF

UNIT DEVELOPMENT

Unit designed to avoid MMI 4 soils in the southwest corner of the unit. Boundary moved away from slide in the southeast quarter. Finalize boundary around slide area during field review and implementation. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F3, T1, W1, W7, V1, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration using the 20 road as a continuous road-side landing. To protect the area around and above the slide on the east boundary, split-yarding and directional felling is recommended. Deflection is good. Tailholds are adequate. The east boundary is located on a slope break > 100' from the Class I stream, Moose Creek (BMP 12.6(a), 13.16). The SW corner was deleted due to MMI 4 soils (BMP 13.5). Windthrow is not anticipated be a problem after harvest. This unit has visual concerns from Blake Channel to the south. See Visual/Recreation section.

Specified Roads: The unit is accessed by the 20 road.
Temporary Roads: None

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 302 MBF). Leave scattered reserve trees along with snags and non-merchantable trees within 50 - 100 feet of the unit/setting edge boundaries. Leave more trees along boundaries with steep slopes and in western lobe of the unit for visual reasons. Clearcutting with reserve trees is proposed because unit size, configuration, and use of reserve trees allow this prescription to meet the Visual Quality Objective of partial retention. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Two unmapped Class IV (green/white) channels located within the western portion of the unit. MMI 4 soils located within unit. Shallow failure originates within southeastern corner of unit and extends to Moose Creek.
Mitigation: MMI 4 soils and unstable areas near existing shallow failure have been removed from unit.

Soils/Wetlands/Karst
Concern: Steep slope in southwestern portion of unit could produce slides if disturbed (see map). Small slide on SE corner identified by layout team. Slide needs to be further defined by air photo interpretation and implementation team.

Mitigation: Excluded MMI 4 soils in southwest and slide area in southeast from unit.

Wildlife/TES Plants
Concern: The eastern half of the unit is high probability goshawk nesting habitat.

Mitigation: None needed.

Visual/Recreation
Concern: Meet visual quality objective of partial retention when viewed from Blake Channel (northern and western [up slope] portions of units are visible from saltwater).

Mitigation: Leave reserve trees in western lobe above road for visual concerns. Leave non-merchantable and some merchantable trees within 50-100 feet of unit boundaries. Vary edges and backline of unit (do not make any boundaries straight edges) to give unit a more natural shape.

Other Resources/Issues
Concern: None
Mitigation:

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UNIT M-119

60 ACRES

Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adcm1/madm/amls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number M-119 In Alternative(s) 2, 3, & 4

Harvest Method: Slackline
Total Acres: 60 Total Volume: 1,003 MBF Volume per Acre 17 MBF

UNIT DEVELOPMENT

Unit designed to avoid MMI 4 soils in the northwest and southeast corners of the unit. In the northwest corner the road goes through MMI 4 soils therefore need a geologist field review of the road layout for final approval. Two unmapped Class IV (orange/white) streams need directional felling. Harvest buffer along Moose Creek is more than 100 feet wide at all points. No field review has been done in that portion of the unit east of Moose Creek. (See Logging and Transportation). The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F4, F15, T1, W1, W7, V1, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
A post field-season review of the Moose Creek road system determined that a road on the east side of Moose Creek would not be necessary if the timber on the east side of Moose Creek was yarded west across Moose Creek to the 20 road. As a result, the southern portion (flagged in the field) has been dropped, and acreage has been added east of Moose Creek and is intended to make a logical slackline setting. The timber can be yarded using a large (90') tower with haulback capabilities in a slackline configuration. Field verify anchors, landings, and suspension capability with skyline profiles during final layout. The field engineer states that tailholds will be marginal for the slackline system. Timber is planned to be yarded across the TTRA buffer on Moose Creek (Class II). Small portions of the unit can be shovel yarded. The SE corner (SE of the flagged southern setting) was excluded due too steep slopes and MMI 4 soils (BMP 13.5). The NW portion of the unit was deleted because of MMI 4 soils (BMP 13.5). Two Class IV streams mid-unit require directional felling and split-yarding. Recommend split-yarding and directional felling around southern muskeg & pond. The north boundary may has potential for windthrow after harvest (BMP 12.6(a), 13.16).

Specified Roads: The unit is accessed by the 20 road.
Temporary Roads: One spur about 1000' long . Other short spurs may be necessary.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 903 MBF). Leave scattered reserve trees along with snags and non-merchantable trees along streams and/or muskeg. Possibly leave tree islands downslope of muskeg between muskeg and streams. Clearcutting with reserve trees is proposed because the unit is not visible from saltwater or other important viewing areas. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Two unmapped Class IV (green/white) and one Class IV (green/white) streams present. There has been no field inspection in that portion of the unit east of Moose Creek. Other Class IV stream channels may be present within the unit. Class III stream channel located along southern boundary of the eastern half of unit. Class II stream channel cuts through center of unit. Many areas along the eastern side of Moose Creek have been characterized as unstable. Yarding across Class II stream may result in damage to riparian vegetation. Unmapped off channel/over flow channels have been identified along similar areas of Moose Creek.

Mitigation: Use directional felling and partial suspension yarding along Class IV streams.

May require directional felling, splitline, partial, or full suspension for Class IV channels present within the unit. No commercial harvest within 100 feet of Class II channel or the top of v-notch whichever is greater. Manage beyond (approx. one site-potential tree height) for reasonable assurance of windfirmness. No programmed harvest within v-notch of Class III channel and manage beyond (approx. one site-potential tree height) for reasonable assurance of windfirmness. Ensure adequate deflection to avoid disturbance to riparian vegetation. Survey mainstem Moose Creek to identify unmapped channel features within the floodplain. Strictly enforce retention limits.

Soils/Wetlands/Karst
Concern: MMI 4 soils in northwest and southeast corners of unit. There is a moderate risk of landslides due to timber harvest. There has been no field review on that portion of the unit east of Moose Creek. There may be slope stability concerns that are not shown by GIS mapping.

Mitigation: On the West Side of Moose Creek: northwest and southeast corners of the unit have been dropped due to MMI4 soils. Note, however, that bench below slope would probably prevent significant amounts of sediment from reaching Moose Creek. On the east-side of Moose Creek: need geotechnical review during final layout to delineate any areas of instability or karst features.

Wildlife/TES Plants
Concern: Small portion of southeastern edge of unit is high probability goshawk nesting habitat.

Mitigation: Leave trees in the unit along streams and/or muskeg to provide travel corridors.

Visual/Recreation
Concern: Not seen from saltwater or important viewing areas.

Mitigation: None needed.

Other Resources/Issues
Concern: None
Mitigation:

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UNIT M-123

83 ACRES

- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/arcis/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number M-123 In Alternative(s) 2, 3, & 4

Harvest Method: Slackline
Total Acres: 83 Total Volume: 2,950 MBF Volume per Acre 35 MBF

UNIT DEVELOPMENT

Unit designed to avoid harvest on steep slopes and unstable v-notches of the numerous streams. Upper slope (above road) in southwest and northwest corners dropped during boundary layout due to logging limitations. Unit boundary along southwest portion of Moose Creek needs to be moved up-slope to buffer Class II side channel of Moose Creek. Class III stream at northern boundary needs slope break buffer. No field review has been done on that portion of the unit east of Moose Creek. (See Logging and Transportation). The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F3, F4, F18, T1, W1, and V1. These measures are described below within the resource sections that apply.

Logging and Transportation:
A post field-season review of the Moose Creek road system determined that a road on the east side of Moose Creek would not be necessary if the timber on the east side of Moose Creek was yarded west across Moose Creek to the 20 road. As a result, acreage has been added east of Moose Creek and is intended to make a logical slackline setting. The timber can be yarded using a large (90') tower with haulback capabilities in a slackline configuration. Field verify anchors, landings, and suspension capability with skyline profiles during final layout. The field engineer states that tailholds will be marginal for the slackline system. Timber is planned to be yarded across the TTRA buffer on Moose Creek (Class II). A Class II side channel west of and parallel to Moose Creek will also need a 100' buffer (BMP 12.6(a), 13.16) (final layout). Several Class III & IV streams (V-notches) requiring protection are present in the unit; and the unit settings were selected to avoid logging in the areas with concentrations of streams. Each setting boundary will have streams as north and south boundaries and directional felling will be required. The western boundary was placed at a slope break. Windthrow is not expected to be a problem after harvest. This unit has good quality timber.

Specified Roads: The unit is accessed by the 20 road. Look at moving the road 100-200' west during final layout to avoid "V"-notch crossings which will be difficult to construct. Consider oversize culverts to pass debris.
Temporary Roads: None.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 2,654 MBF). Leave retention blocks of trees in-between streams too close together to allow directional falling. Clearcutting with reserve trees is proposed because the unit is not visible from saltwater or other important viewing areas. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Numerous (12-16) Class IV (green/white) channels on side slope draining directly into Moose Creek. Class II side channel of Moose Creek is located in middle portion of unit. There has been no field inspection of that portion of unit east of moose Creek. Class IV stream channels may be present within eastern half of the unit also. Class III stream channel located along southern boundary of the unit. Class II stream channel cuts through unit and forms northern boundary of unit. Many areas along the eastern side of Moose Creek have been characterized as unstable. Yarding across Class II stream may result in damage to riparian vegetation. Unmapped off channel/over flow channels have been identified along similar areas of Moose Creek.

Mitigation: Move unit boundary away from Class II side channel of Moose Creek to provide at least a 100 foot no-harvest zone and manage beyond (approx. one site-potential tree height) to maintain reasonable assurance of windfirmness. May require directional felling, splitline, partial, or full suspension for Class IV channels present within the unit. No commercial harvest within 100 feet of Class II channel or the top of v-notch whichever is greater. Manage beyond (approx. one site-potential tree height) for reasonable assurance of windfirmness. No programmed harvest within v-notch of Class III channel and manage beyond (approx. one site-potential tree height) for reasonable assurance of windfirmness. Ensure adequate deflection to avoid disturbance to riparian vegetation. Survey mainstem Moose Creek to identify unmapped channel features within the floodplain. Strictly enforce retention limits.

Soils/Wetlands/Karst

Concern: Numerous streams in or adjacent to unit; steep slopes, evidence of debris avalanche in channel, soil slips possible on side slopes. Road crossing are a concern because of potential for delivery of sediments to Moose Creek.

Mitigation: Move road up slope, buffer streams to slope break with windfirm partial cut. Oversize culverts to pass debris.

Wildlife/TES Plants

Concern: Size of unit could create dispersal problems. Potential fragmentation of corridor between Moose Creek and the lowest pass over to Virginia Lake.

Mitigation: Leave trees in the unit along streams and/or muskeg to provide travel corridors.

Visual/Recreation

Concern: Not seen from saltwater or important viewing areas.

Mitigation: None needed.

Other Resources/Issues

Concern: None

Mitigation:

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UNIT M-127

125 ACRES

Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adams1/maden/amls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number M-127 In Alternative(s) 2, 3, & 4

Harvest Method: Helicopter
Total Acres: 125 Total Volume: 3,953 MBF Volume per Acre 32 MBF

UNIT DEVELOPMENT

Upper boundary dropped to 2,000 feet elevation due to dominance of mountain hemlock, mountain goat winter habitat, and economics. There is a potential for windthrow on the eastern half of the unit. There is a potential for slope instability and windthrow. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F18, T1, W5, W8, and V5. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a helicopter and flown to the landings in M-123. Move north boundary down to 2,000' elevation because of wildlife and unsuitable timber. Place a 100' buffer on the SE Class III to prevent windthrow (BMP 12.6(a), 13.16). The unit has visual concerns in the upper elevations. The timber in the unit varies from old and rotten in the west to better quality in the east.

Specified Roads: None. The closest road is the 20 road.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Patch Cuts with Minimum 60% Retention (estimated harvest volume = 1,186 MBF). Small clearcuts up to 5 acres, scattered throughout the unit. Approximately 30% of the volume would be removed in each entry, with 30 to 50 years between entries. 10% of the volume would be retained as permanent reserve trees throughout the rotation. Avoid placement of patch cuts at upper boundaries to maintain timber edge and avoid placement of patches in areas with unstable slopes. Leave more trees in the northeastern 1/3 of unit, which can be seen from saltwater. Vary edges and backline. This prescription would address visual and wildlife resource concerns. Harvest approximately 30% of the stand every 30 to 50 years by harvesting small areas up to 5 acres in size, scattered through the unit. Future entries will maintain a minimum of 60 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest primarily second growth trees. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning as well as future entries similar to this patch cut harvest in 30 to 50 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class III channels along northwestern and southeastern boundaries of unit. There may be unmapped Class IV streams in the unit.

Mitigation: Maintain 100 foot no harvest slope break buffer along Class III and manage beyond (approx. one site-potential tree height) to maintain reasonable assurance of wind firmness.

Soils/Wetlands/Karst
Concern: There are some very steep portions of this unit, with subsurface drainage from avalanche slopes above.

Mitigation: Patch cuts should avoid the steepest portions of this unit.

Wildlife/TES Plants

Concern: Mountain goat winter range. Size of unit could create dispersal problems. Connection between large forested blocks and Moose Creek. Two historical eagle nest sites occur near Moose Creek LTF, therefore, use of helicopter traveling to and from the Moose Creek LTF could disturb nesting eagles.

Mitigation: Select harvest patches away from the higher elevations to maintain adequate forest cover along the non-forested alpine areas. Use designated flight path and avoid repeated helicopter flights within ¼ mile of all nests from March 1 through May 31. Survey needed prior to harvest to verify eagle nest activity. If nests are active, continue to avoid repeated helicopter flights though August 31.

Visual/Recreation

Concern: The Visual Quality Objective is modification and maximum modification. The northeastern 1/3 the main portion of the unit can be seen from saltwater. Do not want a straight, "unnatural" edge for this portion of the unit boundary.

Mitigation: For the eastern edge of the main portion of unit that can be seen from saltwater, vary edges and backline to give this part of unit more natural shape. Do not use straight edges for this part of unit.

Other Resources/Issues

Concern: None

Mitigation:

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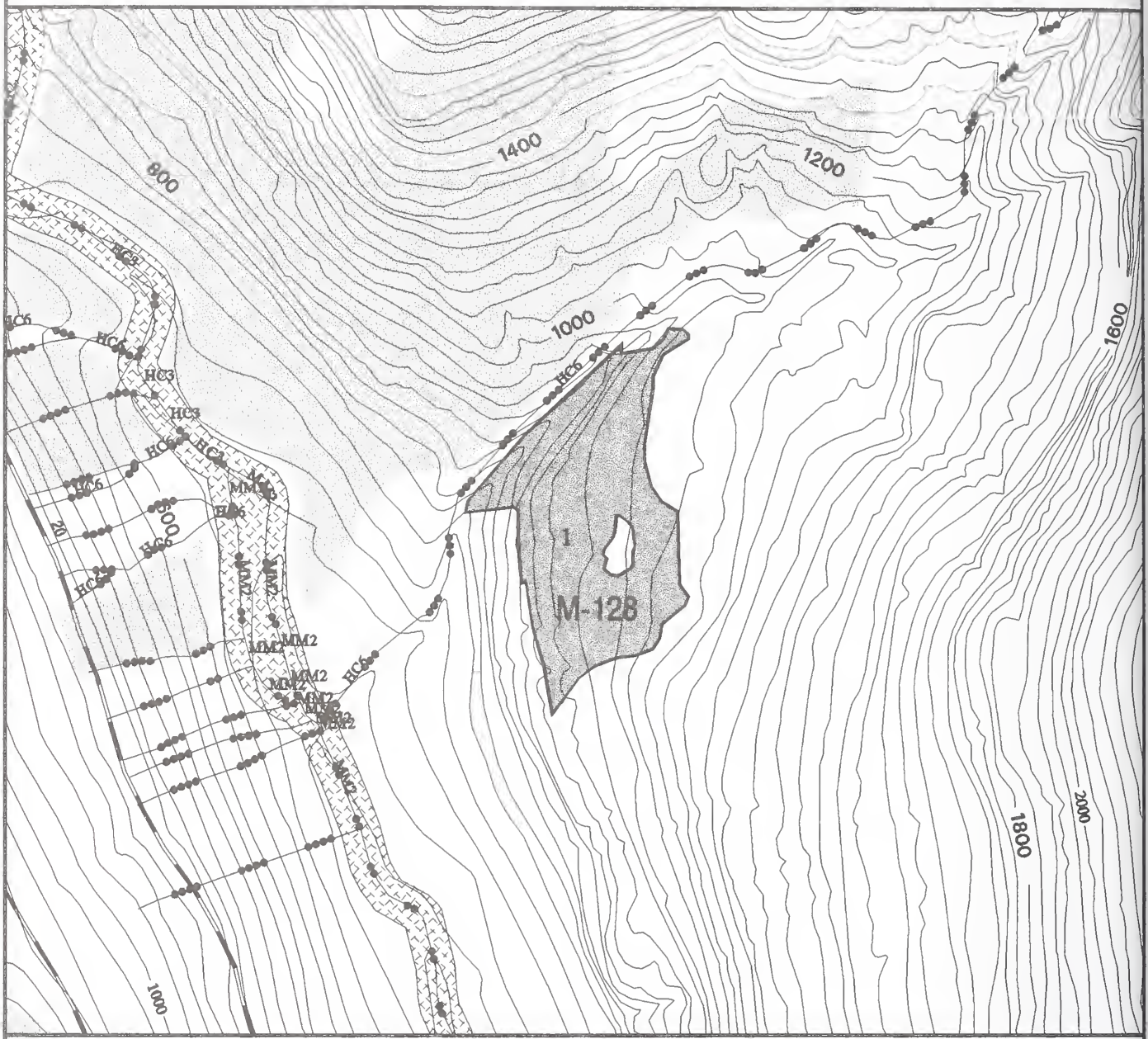
UNIT M-128

24 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/emls/pe-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number M-128 In Alternative(s) 2, 3, & 4

Harvest Method: Helicopter
Total Acres: 24 Total Volume: 718 MBF Volume per Acre 29 MBF

UNIT DEVELOPMENT

Unit boundaries have been altered by dropping the long narrow "finger" to the south due to feasibility and the western edge was modified due to steep unstable slopes. A forested muskeg exists in the mid eastern portion of the unit. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F11, T1, W5, W8, and V5. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using helicopter to the landing in setting 1 of M-123. The northern boundary is along a class III stream with steep banks (BMP 13.16); place the boundary on the slope break. The east boundary shall be the edge of merchantable timber. The western boundary should be the limit of cable system capability. The timber is good to excellent quality. Blowdown was found near the north boundary and windthrow may be a problem in that area after harvest.

Specified Roads: The timber can be flown to the 20 road.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Patch Cuts with Minimum 60% Retention (estimated harvest volume = 215 MBF). Small patches up to 5 acres, scattered throughout the unit. Approximately 30% of the volume would be removed in each entry, with 30 to 40 years between entries. Ten percent of the volume would be retained as permanent reserve trees throughout the rotation. Consider the potential for blow down along the north boundary in the placement of patches. Avoid placement of patch cuts at upper boundaries to maintain timber edge and avoid placement of patches in areas with unstable slopes. Avoid placement of patches in areas of forested muskeg (see map). This prescription would address visual and wildlife resource concerns. Harvest approximately 30% of the stand every 30 to 50 years by harvesting small areas up to 5 acres in size, scattered through the unit. Future entries will maintain a minimum of 60 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest primarily second growth trees. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning as well as future entries similar to this patch cut harvest in 30 to 50 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class III stream forms northwestern boundary of unit. Stream is Class II for approx. 150 m upstream from confluence with Moose Creek.

Mitigation: Maintain slope break buffer along Class III channels with no programmed harvest in notch and maintain windfirm management beyond.

Soils/Wetlands/Karst

Concern: There is an area in the mid-eastern portion of the unit with a forested muskeg with small inclusions of organic soils (no mineral component). Poor quality timber occurs in this area. An area of MMI 4 soils occurs in the western portion of the unit.

Mitigation: Areas of forested muskeg and unstable steep slopes have been dropped from the unit.

Wildlife/TES Plants

Concern: Two historical eagle nest sites occur near Moose Creek LTF, therefore, use of helicopter traveling to and from the Moose Creek LTF could disturb nesting eagles.

Mitigation: Avoid repeated helicopter flights within ¼ mile of all nests from March 1 through May 31. Survey needed prior to harvest to verify eagle nest activity. If nests are active, continue to avoid repeated helicopter flights though August 31

Visual/Recreation

Concern: Not seen from saltwater.

Mitigation: None needed.

Other Resources/Issues

Concern: None

Mitigation:

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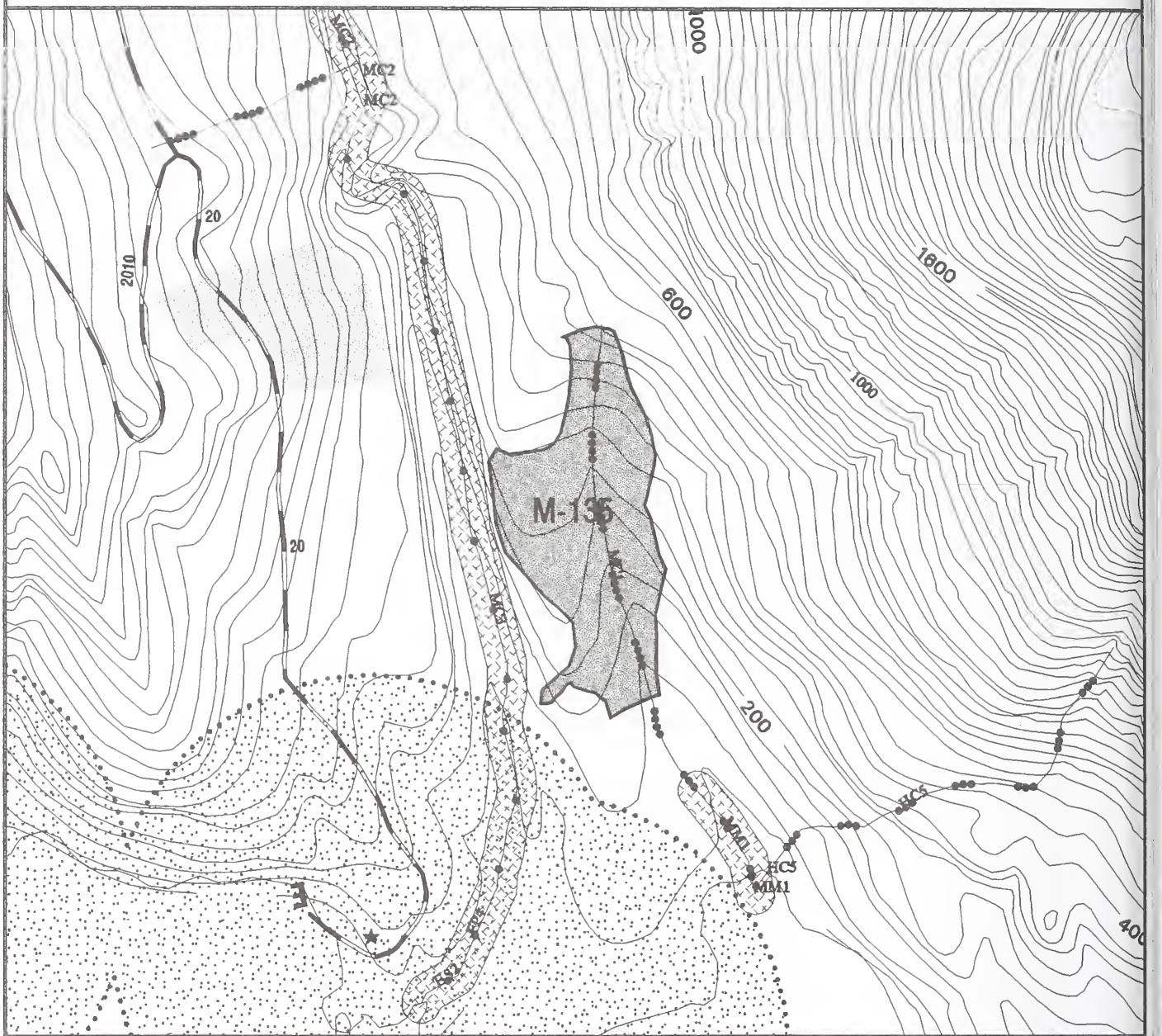
UNIT M-135

23 ACRES



Proposed Spec. Roads
Proposed Temp. Roads
Class 1 Streams
Class 2 Streams
Class 3 Streams
Class 4 Streams
40' Contours
E Proposed LTF Sites
HC1,MM3,... Channel Types

Scale: 1" = 800 ft

Scale in Feet
0 500 1000

★ Eagle Nest Tree
Proposed cut units
Adjacent proposed units
TTRA Buffers
1/4 Mile Eagle Nest Timing Buffers
1 Setting
State/Private Land
Lakes

/adam1/madam/amla/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number M-135 In Alternative(s) 2 & 3

Harvest Method: Helicopter
Total Acres: 24 Total Volume: 615 MBF Volume per Acre 26 MBF

UNIT DEVELOPMENT

Unit designed to avoid steep slopes and slide areas. Those areas need geotechnical review during final layout to refine boundary and either drop additional areas or selective single tree or group selection in these areas. A Class IV stream in the unit becomes a Class II outside the unit so the stream needs a slope break buffer in the unit. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, T1, W6, W7, W8, V6, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded by helicopter directly to the Moose Creek LTF. The boundary is intended to be around a timber type. There are several creeks and one slide with alder regeneration in the unit (BMP 13.5). The unit has visual concerns from Blake Channel to the south. See Visual/Recreation section.

Specified Roads: The timber can be flown directly to the Moose Creek LTF.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Group Selection (estimated harvest volume = 154 MBF). In 2-acre group cuts. Make group cuts along contours to minimize visual impacts; see Visual/Recreation section. Harvest only in areas away from steep slopes; see Soils section. Leave non-merchantable timber in wetter areas and on steep slopes. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size). Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class IV stream bisects unit. Stream channel contains large amount of fine material (mud and silt). Portion of unit is adjacent to Class I stream.

Mitigation: Maintain slope break no harvest buffer on Class IV channel due to active fine sediment recruitment. Maintain no commercial harvest 100 foot buffer on Class I stream.

Soils/Wetlands/Karst
Concern: Unstable soils on steep slopes in the northwest portion of unit. Two slides (1-4 years old) in this area.

Mitigation: Unit boundaries have been designed to avoid steep slopes/unstable soils and slide areas. Avoid placement of group cuts adjacent to these areas.

Wildlife/TES Plants
Concern: Approximately 2/3 of the unit contains high deer HSI values. Northern half of unit is high probability goshawk nesting habitat. Two historical eagle nest sites occur near Moose Creek LTF, therefore, use of helicopter traveling to and from the Moose Creek LTF could disturb nesting eagles.

Mitigation: Group selection will maintain some level of forest stand structure within the unit. Avoid repeated helicopter flights within ¼ mile of all nests from March 1 through May 31. Survey needed prior to harvest to verify eagle nest activity. If nests are active, continue to avoid repeated helicopter flights though August 31.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention in area (north 1/4 [upper slope] part of unit) seen from saltwater. From saltwater, the group selections will be small and barely noticeable, but should still have natural (uneven) shapes and should appear to be natural openings.

Mitigation: Group selection will consist of 2-acre group cuts. Lay the patch cuts out along contours to minimize visual impacts. Approximately 10 % of volume is to be retained as reserve trees. Make sure the patch cuts are uneven in shape and randomly spaced within the unit to create a more natural pattern of small openings.

Other Resources/Issues
Concern: None
Mitigation:

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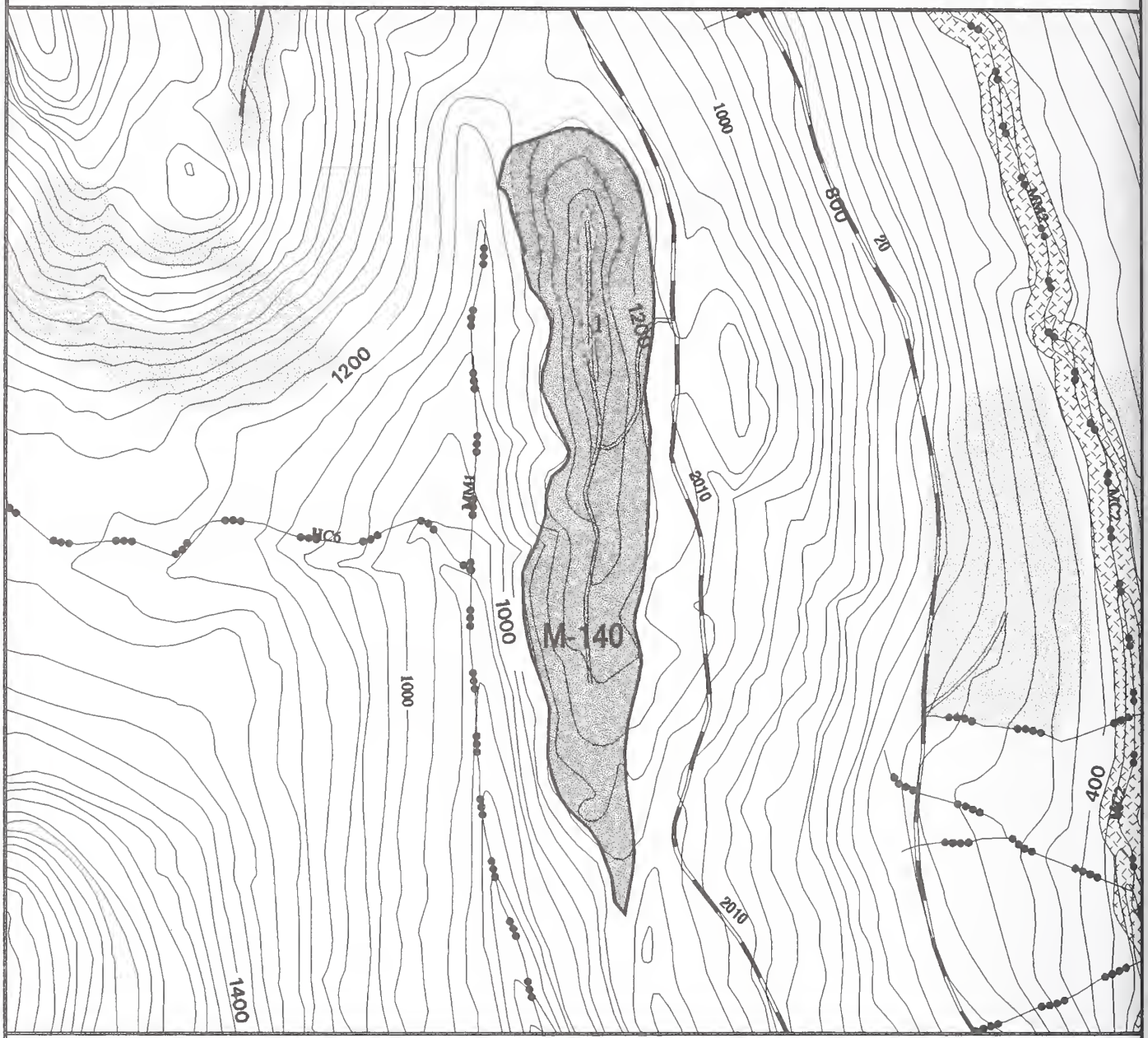
UNIT M-140

43 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/smls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number M-140 In Alternative(s) 2 & 4

Harvest Method: Running Skyline
Total Acres: 43 Total Volume: 1,096 MBF Volume per Acre 25 MBF

UNIT DEVELOPMENT

The western portion of the unit has been dropped due to slope instability. The road into the unit was changed to enter the unit in the mid section and then "t" to reach both ends of the unit. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: K3, T1, W1, W7, V1, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration using the road as a continuous road-side landing. Deflection is adequate for the east side. The west boundary was placed at a slope break above class III stream where hanging across the class III stream would be required due to the convex slopes; the IDT decision is to move the western boundary east up to the topographic limit of a mobile yarder. Portions of the unit can be shovel yarded.

Specified Roads: The unit is accessed by temporary spurs off of the 1020 road.
Temporary Roads: There is 3,800 feet of temporary road in the unit that have segments containing maximum adverse and favorable grades.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 987 MBF). Leave scattered leave trees, snags, and non-merchantable trees within 50-100 feet of the unit/setting boundaries. Clearcutting with reserve trees is proposed because the unit is not visible from saltwater or other important viewing areas. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Steep side slope along Class III stream may result in slope failure.

Mitigation: Move unit boundary upslope to avoid steep side slope. No programmed harvest within v-notch. Maintain windfirmness beyond.

Soils/Wetlands/Karst
Concern: Lower part of west side of unit greater than 90% slope with numerous seeps and possible debris avalanche scars. These are above a class III stream.

Mitigation: This area has been exclude from unit (see map).

Wildlife/TES Plants
Concern: Size of unit could create dispersal problems.

Mitigation: Scatter reserve trees throughout unit to allow dispersal.

Visual/Recreation
Concern: Not seen from saltwater or important viewing locations.

Mitigation: No mitigation needed.

Other Resources/Issues
Concern: None
Mitigation:

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UNIT M-148

83 ACRES

- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/msdm/amla/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number M-148 In Alternative(s) 2 & 4

Harvest Method: Running Skyline
Total Acres: 83 Total Volume: 2,683 MBF Volume per Acre 32 MBF

UNIT DEVELOPMENT

Unit has been expanded on the northern end and reduced in the southern portion due to MMI 4 soils and logging constraints. Expanded area has not had field review for other resource concerns. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F11, F18, T1, W1, W7, V1, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded using a small mobile yarder in a running skyline configuration using the road as a continuous road-side landing. Deflection is adequate. Tailholds are adequate. The western boundary could be expanded west. The SE portion of the unit was deleted due to MMI 4 soils (BMP 13.5). Most of the SE boundary follows a slope break of the MMI 4 soils. The south tip may be partially visible from Blake Channel to the south.

Specified Roads: The unit is accessed by the 2010 road.
Temporary Roads: May need one spur in the center of the unit.

Stand Management Objectives: Future stand will be primarily even-aged but will retain a component of the overstory into the next rotation to meet wildlife objectives.

Silvicultural Prescription: Clearcut with Reserve Trees (estimated harvest volume = 2,415 MBF). Leave scattered leave trees, snags, and non-merchantable trees along streams and within 50-100 feet of the unit/setting boundaries. Clearcutting with reserve trees is proposed because the unit is not visible from saltwater or other important viewing areas. This prescription would optimize the regeneration potential for fiber production, especially for spruce, reduce mistletoe, and would be the most economical harvest method. This prescription is appropriate also to meet wildlife, watershed, and other resource objectives. Regeneration harvest (clearcut with reserve trees) in approximately 100 years. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: MMI 4 soils in lower portion of unit. No significant stream channels observed within unit.

Mitigation: This area of MMI 4 soils has been dropped from unit.

Soils/Wetlands/Karst
Concern: Small patch of MMI 4 in southern 1/5 of unit. Several springs present where till is present.

Mitigation: This area of MMI 4 soils has been dropped from unit.

Wildlife/TES Plants
Concern: Size of unit could create dispersal problems.

Mitigation: Scatter reserve trees throughout unit to allow dispersal.

Visual/Recreation
Concern: Not seen from saltwater or important viewing locations.

Mitigation: None needed.

Other Resources/Issues
Concern: None
Mitigation:

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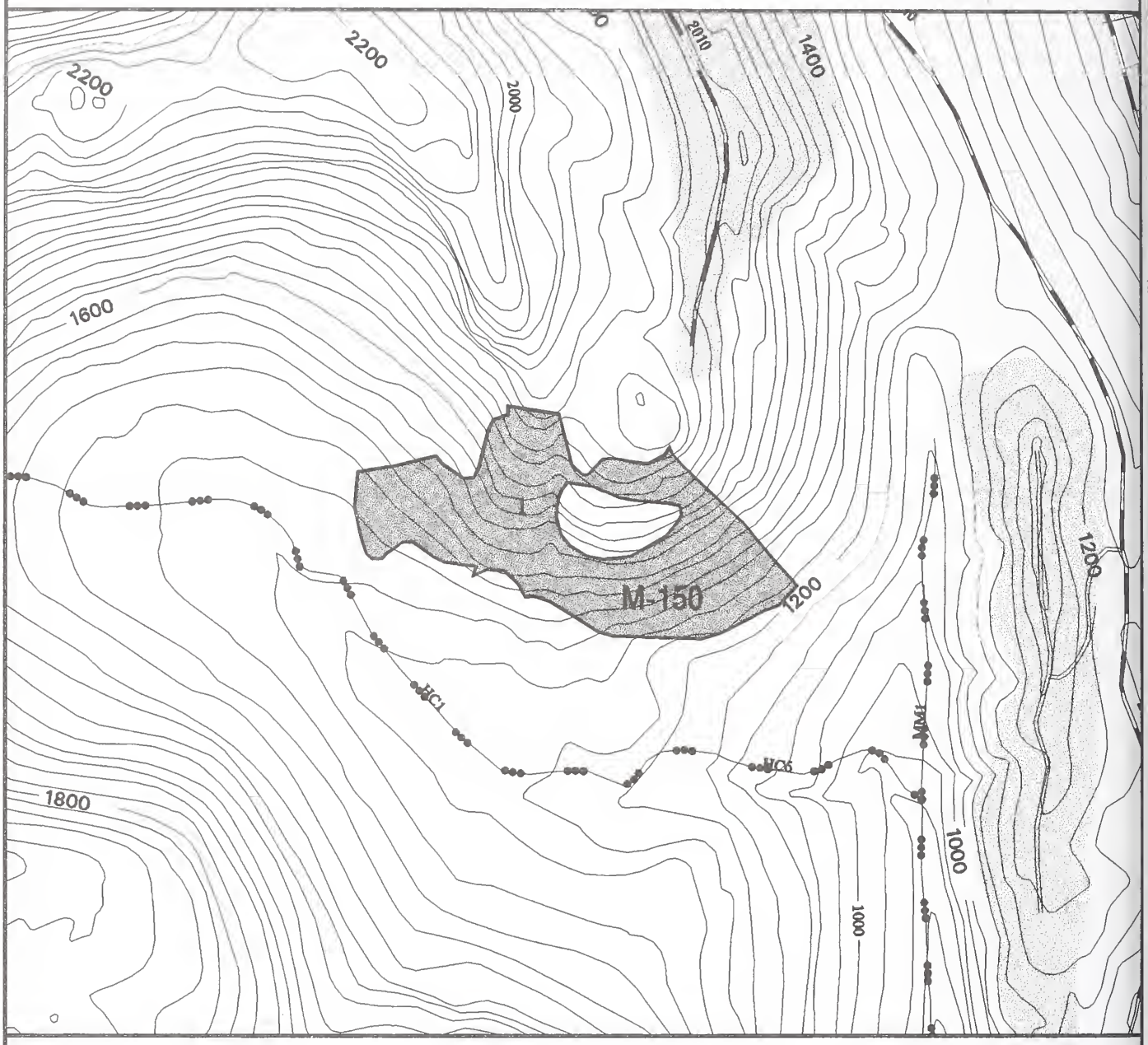
UNIT M-150

30 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale In Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/arals/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number M-150 In Alternative(s) 2 & 4

Harvest Method: Helicopter
Total Acres: 30 Total Volume: 808 MBF Volume per Acre 27 MBF

UNIT DEVELOPMENT

Unit was originally designed for cable harvest and the boundaries were modified (and flagged) in the field due to steep slopes and MMI 4 soils. The logging system was changed to helicopter and therefore, the boundaries should be those originally mapped and not those flagged in the field. The MMI 4 area has been dropped from the unit. Unit is within the scenic viewshed. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F18, T1, W6, W7, V6, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be yarded by helicopter to M-148. Road access and cable logging was dropped due to road construction cost, visuals, inadequate suspension, inadequate guy anchors. The flagged boundary is located at the limit of cable logging; expand boundary to the original unit boundary, but exclude poor soils in the north-central unit (BMP 13.5). Blowdown was found and windthrow may be a problem in the area after harvest. The entire unit has visual concerns.

Specified Roads: The timber can be flown to the 1020 road in M-148.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Group Selection with a minimum 70% retention (estimated harvest volume = 202 MBF). Harvest groups up to 2 acres scattered throughout the unit. Leave scattered leave trees, snags, and non-merchantable trees within 50 – 100 feet of the unit/setting boundaries. Avoid harvest of trees with cavities; see Wildlife concerns. This prescription would address visual and wildlife resource concerns. However, it would not provide conditions suitable for regenerating spruce and would be a less cost-effective method of harvesting trees. Harvest 25 to 30 % of the stand every 40 to 60 years by harvesting groups of trees (up to 2 acres in size). Future entries will maintain a minimum of 70 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest a mix of second growth trees and old growth. Thereafter, primarily second growth trees will be harvested. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be mostly hemlock.

Possible Future Treatments: Future entries similar to this harvest in 40 to 60 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: MMI 4 soils reported found within unit. Unit is located a long distance from significant stream channels. No fisheries concerns.

Mitigation: This area of MMI 4 soils has been dropped from unit.

Soils/Wetlands/Karst
Concern: Small patch of MMI 4 at top of unit. No karst concerns.

Mitigation: Fisheries impacts unlikely, as there is a large muskeg below. However, for regeneration concerns, MMI 4 soils has been dropped.

Wildlife/TES Plants
Concern: There is a high diversity of bird species due to the proximity of the large muskeg/ponded area below the unit. Also unit provides bear denning habitat.

Mitigation: Avoid harvest of trees with cavities, retain 15 ft of the butt log attached to rootwads and retain snags and downed logs.

Visual/Recreation
Concern: Meet Visual Quality Objective of modification in areas visible from saltwater. Northern 2/3 of unit is visible from saltwater (upper slope).

Mitigation: None needed.

Other Resources/Issues
Concern: None
Mitigation:

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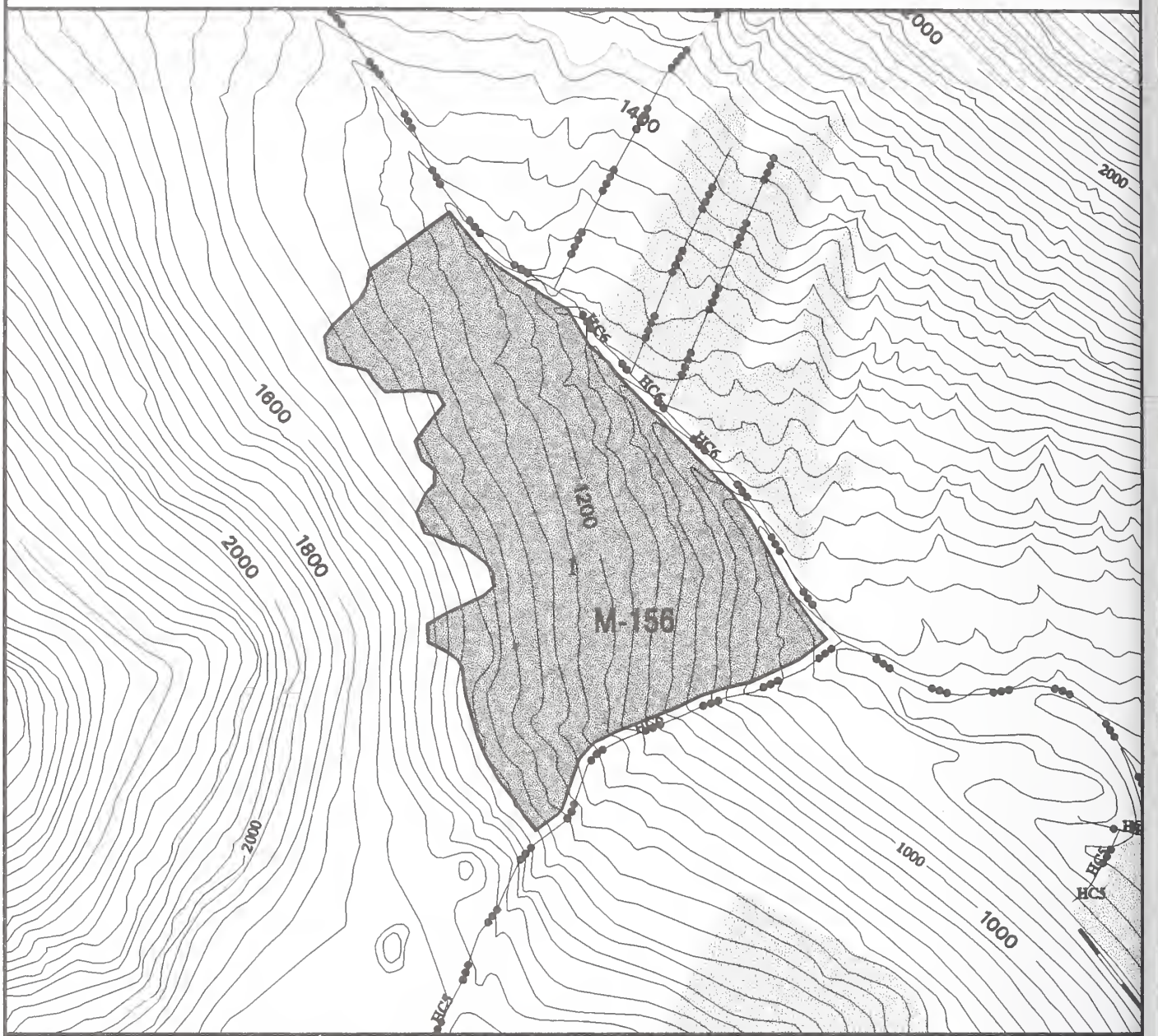
UNIT M-156

81 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/mmls/ps-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number M-156 In Alternative(s) 2, 3, & 4

Harvest Method: Helicopter
Total Acres: 81 Total Volume: 2,702 MBF Volume per Acre 34 MBF

UNIT DEVELOPMENT

Dropped the southwestern 1/3 of unit at approximately the 1,440-foot elevation (setting boundary) due to slope stability concerns. Edges of unit are prone to avalanches, therefore, must maintain avalanche-firm edges by not harvesting directly to the unit boundaries. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, T1, W5, W7, V5, and V7. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be helicopter yarded to M-148. The NE and SE boundaries are along class III streams. The western boundary is the limit of merchantable timber. The NE and southern boundaries were modified to exclude unsuitable timber. Blowdown was found; windthrow may be a problem in that area after harvest.

Specified Roads: The timber can be flown to the 1020 road in M-148.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Patch Cuts with Minimum 60% retention (estimated harvest volume = 811 MBF). Harvest in patches up to 5 -acres, remove approximately 30% of the volume in each entry with 30 - 50 years between entries. Retain 10% of the volume as permanent retention throughout the rotation. Avoid placement of patch cuts at the edges of the unit (to maintain avalanche-firm edges) and on steep slopes. Leave non-merchantable timber at edges. This prescription would address visual, watershed, soils and wildlife resource concerns. Harvest approximately 30% of the stand every 30 to 50 years by harvesting small areas up to 5 acres in size, scattered through the unit. Future entries will maintain a minimum of 60 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest primarily second growth trees. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning as well as future entries similar to this patch cut harvest in 30 to 50 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Edge of unit is prone to avalanches.

Mitigation: Maintain avalanche-firm edges by not harvesting directly to the unit boundaries.

Soils/Wetlands/Karst
Concern: Old avalanche chutes at the upper edges of the unit. Due to low probability of regeneration in these areas need to maintain trees along these edges.

Mitigation: Maintain forested edges along old avalanche areas.

Wildlife/TES Plants

Concern: Size of unit could create dispersal problems and connectivity between Moose Creek and Glacier Creek drainages over the low elevation pass. Two historical eagle nest sites occur near Moose Creek LTF, therefore, use of helicopter traveling to and from the Moose Creek LTF could disturb nesting eagles.

Mitigation: Patch Cuts will help provide connectivity between major drainages as well as retaining areas with stand structure for wildlife. Use designated flight path and avoid repeated helicopter flights within ¼ mile of all nests from March 1 through May 31. Survey needed prior to harvest to verify eagle nest activity. If nests are active, continue to avoid repeated helicopter flights though August 31.

Visual/Recreation
Concern: Not seen from saltwater or important viewing locations.

Mitigation: No mitigation needed.

Other Resources/Issues
Concern: None
Mitigation:

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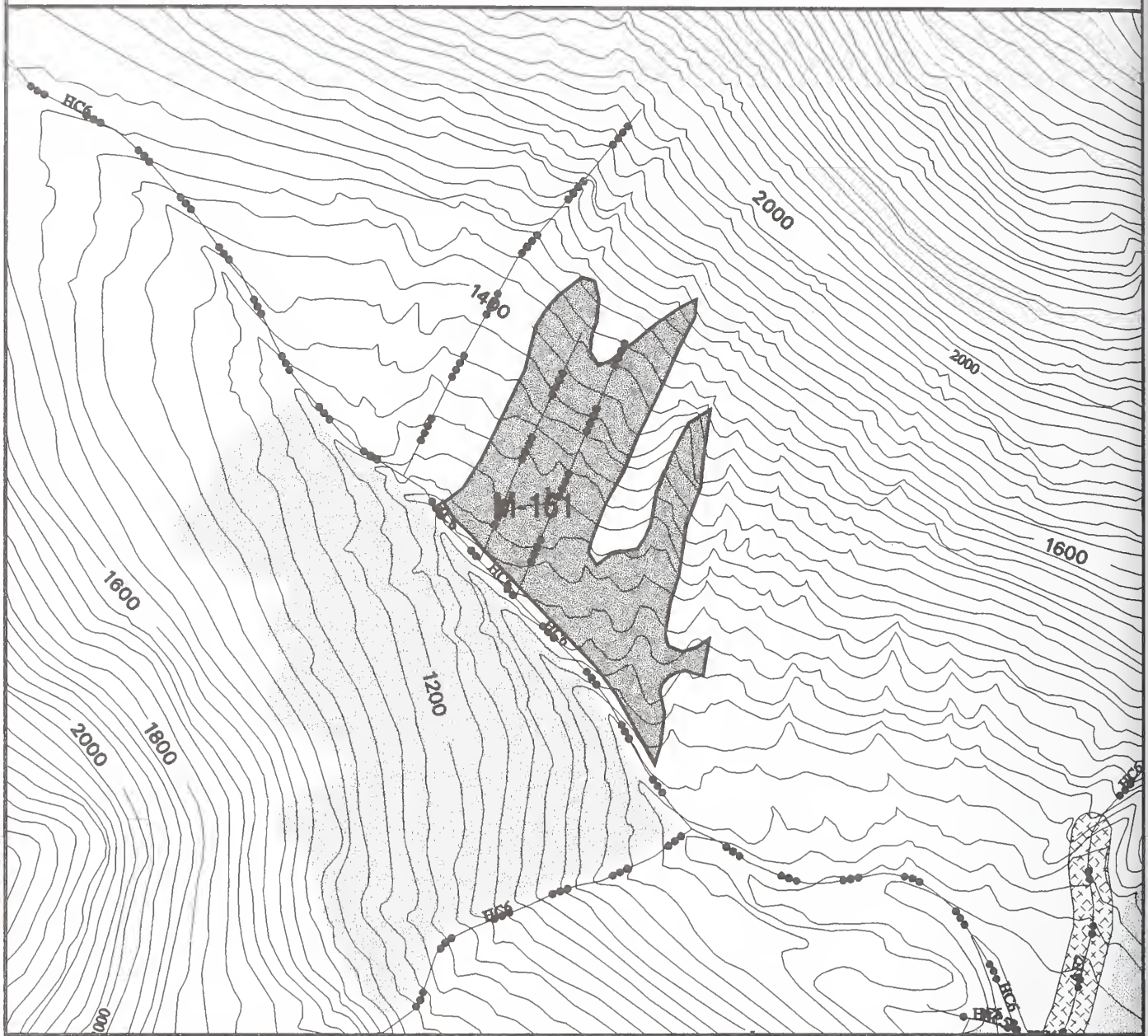
UNIT M-161

34 ACRES



- Proposed Spec. Roads
- Proposed Temp. Roads
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- 40' Contours
- E — Proposed LTF Sites
- HC1,MM3,... — Channel Types

Scale: 1" = 800 ft

Scale in Feet

0 500 1000

- ★ Eagle Nest Tree
- Proposed cut units
- Adjacent proposed units
- TTRA Buffers
- 1/4 Mile Eagle Nest Timing Buffers
- 1 — Setting
- State/Private Land
- Lakes

/adams1/madam/smls/pr-unitcard-2.aml - April 06, 2000

MADAN TIMBER SALE - UNIT CARD Unit Number M-161 In Alternative(s) 2, 3, & 4

Harvest Method: Helicopter
Total Acres: 34 Total Volume: 1,347 MBF Volume per Acre 40 MBF

UNIT DEVELOPMENT

Unit is as designed on unit card. Upper edges of unit are prone to avalanches therefore must maintain avalanche-firm edges by not harvesting directly to the unit boundaries or next to old avalanche chutes. Wet areas along Moose Creek should be avoided when placing harvest patches. The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F1, F2, F11, F18, T1, W5, and V5. These measures are described below within the resource sections that apply.

Logging and Transportation:
The timber can be helicopter yarded to M-123. The SW boundary is along a Class III stream.

Specified Roads: The timber can be flown to the 20 road in M-123.
Temporary Roads: None

Stand Management Objectives: Future stand will be a mosaic of small areas with different cohorts, including remnant old growth, resulting in an uneven-aged stand.

Silvicultural Prescription: Patch Cuts with Minimum 60% retention (estimated harvest volume = 404 MBF). Harvest in patches up to 5 - acres, remove approximately 30% of the volume in each entry with 30 - 50 years between entries. Retain 10% of the volume as permanent retention throughout the rotation. Avoid placement of patch cuts at the edges of the unit (to maintain avalanche-firm edges) and on steep slopes. Avoid placement of patches in wet areas above Moose Creek. This prescription would address visual and wildlife resource concerns. Harvest approximately 30% of the stand every 30 to 50 years by harvesting small areas up to 5 acres in size, scattered through the unit. Future entries will maintain a minimum of 60 % of the stand in mature trees (10% of which will be retention trees). It is expected that the third entry will harvest primarily second growth trees. Leave old growth trees retained in original harvest plus enough large second growth trees to meet the 10 % reserve tree requirement.

Regeneration Method: Natural regeneration. The new stand is likely to be a mixture of species similar to the existing stand.

Possible Future Treatments: Possible planting if natural regeneration does not result in a fully stocked stand or to increase species diversity, release, and pre-commercial thinning as well as future entries similar to this patch cut harvest in 30 to 50 years.

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Two Class IV streams present in unit. Edge of unit is prone to avalanches.

Mitigation: Need field review to determine level of protection needed on Class IV streams. Maintain avalanche-firm edges by not harvesting directly to the unit boundaries.

Soils/Wetlands/Karst
Concern: Wetland soils (organic with a mineral component) along southwestern boundary that boarders Moose Creek. High water table in this area due to subsurface drainage into Moose Creek from hillslope in upper portion of unit. At northern end of unit, timber harvest may effect muskeg due to slope instability.

Mitigation: Avoid placement of harvest patches in the wet areas above Moose Creek. Maintain forested edges along old avalanche areas.

Wildlife/TES Plants
Concern: Mountain goat winter range. Connectivity between Moose Creek and Glacier Creek drainages over the low elevation pass. Two historical eagle nest sites occur near Moose Creek LTF, therefore, use of helicopter traveling to and from the Moose Creek LTF could disturb nesting eagles.

Mitigation: Patch Cuts will maintain the forested areas near alpine habitats and provide connectivity between major drainages as well as retaining areas with stand structure for wildlife. Use designated flight path and avoid repeated helicopter flights within ¼ mile of all nests from March 1 through May 31. Survey needed prior to harvest to verify eagle nest activity. If nests are active, continue to avoid repeated helicopter flights though August 31.

Visual/Recreation
Concern: Not seen from saltwater or important viewing locations.

Mitigation: No mitigation needed.

Other Resources/Issues
Concern: None
Mitigation:

MADAN TIMBER SALE - UNIT CARD Unit Number M-162 In Alternative(s) Dropped

Harvest Method: Helicopter
Total Acres: _____ Total Volume: _____ Volume per Acre _____

UNIT DEVELOPMENT

Unit dropped due to extensive karst features in lower portion and steep slopes in upper portion limit harvest.

Logging and Transportation: No plan to harvest

Specified Roads: None
Temporary Roads: None

Stand Management Objectives:

Silvicultural Prescription:

Regeneration Method:

Possible Future Treatments:

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Extremely low flow, no fish found during electrofishing survey.

Mitigation: Provide slope break buffer along Class III channel with no programmed harvest within v-notch. Manage to maintain windfirmness beyond.

Soils/Wetlands/Karst
Concern: Lower portion of unit has extensive karst terrain development. Karst topography in unit, dry streams.

Mitigation: No harvest in area of or buffers around streams. Drop lower portion of unit.

Wildlife/TES Plants
Concern: Almost the entire unit contains high deer HSI values. The southern 2/3 of the unit is high probability goshawk nesting habitat.

Mitigation: Group selection will retain some areas with stand structure for wildlife.

Visual/Recreation
Concern: Meet visual quality objective of partial retention when seen from saltwater (north [upper slope] of unit is visible). From saltwater, the group selections will be small and barely noticeable, but should still have natural (uneven) shapes and should appear to be natural openings.

Mitigation: Group selection will consist of approximately 2-acre patch cuts. Lay the patch cuts out along contours to minimize visual impacts. Approximately 10 % of volume is to be retained as reserve trees. Make sure the patch cuts are uneven in shape and randomly spaced within the unit to create a more natural pattern of small openings.

Other Resources/Issues
Concern: None
Mitigation:

MADAN TIMBER SALE - UNIT CARD Unit Number M-163 In Alternative(s) Dropped

Harvest Method: Helicopter
Total Acres: _____ Total Volume: _____ Volume per Acre _____

UNIT DEVELOPMENT

Unit dropped due to extensive karst features in lower portion and steep slopes in upper portion limit amount of harvest.

Logging and Transportation: No plan to harvest

Specified Roads: None
Temporary Roads: None

Stand Management Objectives:

Silvicultural Prescription:

Regeneration Method:

Possible Future Treatments:

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Stream flow diminishes quickly, possible karst geology. Class III stream forms southeastern boundary of unit.

Mitigation: Avoid disturbance to karst areas, maintain slope break buffers along Class III stream, no programmed harvest within v-notch, maintain windfirmness beyond.

Soils/Wetlands/Karst
Concern: Lower portion of unit has extensive karst terrain development. Karst topography in unit, dry streams, small cave 3 ft entrance on west edge of unit. Approximately 40-50 ft limestone-marble cliff with solution fractures on surface (cave is at base of cliffs).

Mitigation: No harvest in area of or buffers around streams and cliffs. Drop lower portion of unit.

Wildlife/TES Plants
Concern: Almost the entire unit contains high deer HSI values. Approximately the southern 2/3 of the unit is high probability goshawk nesting habitat.

Mitigation: Group selection will retain some areas with stand structure for wildlife.

Visual/Recreation
Concern: Meet visual quality objective of partial retention in areas seen from saltwater (primarily north part [upper slope] of unit). From saltwater, the group selections will be small and barely noticeable, but should still have natural (uneven) shapes and should appear to be natural openings.

Mitigation: Group selection will consist of approximately 2-acre patch cuts. Lay the patch cuts out along contours to minimize visual impacts. Approximately 10 % of volume is to be retained as reserve trees. Make sure the patch cuts are uneven in shape and randomly spaced within the unit to create a more natural pattern of small openings.

Other Resources/Issues
Concern: None
Mitigation:

MADAN TIMBER SALE - UNIT CARD Unit Number M-164 In Alternative(s) Dropped

Harvest Method: Helicopter
Total Acres: _____ Total Volume: _____ Volume per Acre _____

UNIT DEVELOPMENT

Unit dropped due to karst features in northwest portion limit amount of harvest in this area and economic feasibility.

Logging and Transportation: No plan to harvest

Specified Roads: None
Temporary Roads: None

Stand Management Objectives:

Silvicultural Prescription:

Regeneration Method:

Possible Future Treatments:

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Class III forms northwestern boundary of unit. Possible karst geology.

Mitigation: Avoid disturbance to karst areas, maintain slope break buffer along Class III stream, no programmed harvest within v-notch, maintain windfirm beyond.

Soils/Wetlands/Karst
Concern: Karst in western corner of unit near stream. There is a disappearing stream below the unit.

Mitigation: Avoid harvest in the western corner of the unit (see map). More fieldwork during implementation recommended to better define karst boundaries.

Wildlife/TES Plants
Concern: Southeastern 2/3 of unit contains high deer HSI values. Almost entire unit is high probability goshawk nesting habitat. Unit is partially within the ¼ mile buffers of two historic eagle nests.

Mitigation: Group selection will retain some areas with stand structure for wildlife. Avoid repeated helicopter flights within ¼ mile of nest from March 1 through May 31. Surveys needed prior to harvest to verify eagle nesting activity. If nest is active continue to avoid repeated helicopter flights through August 31.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention in areas seen from saltwater (approximately northern [upper slope] 1/2 of unit). From saltwater, the group selections will be small and barely noticeable, but should still have natural (uneven) shapes and should appear to be natural openings

Mitigation: Group selection will consist of approximately 2-acre patch cuts. Lay the patch cuts out along contours to minimize visual impacts. Approximately 10 % of volume is to be retained as reserve trees. Make sure the patch cuts are uneven in shape and randomly spaced within the unit to create a more natural pattern of small openings.

Other Resources/Issues
Concern: None
Mitigation:

MADAN TIMBER SALE - UNIT CARD Unit Number M-165 In Alternative(s) Dropped

Harvest Method: Helicopter
Total Acres: _____ Total Volume: _____ Volume per Acre _____

UNIT DEVELOPMENT

Unit dropped from lack of economic feasibility due to karst features in adjacent units. Also steep slopes and some rock outcrops/bluffs near top of unit limit amount of harvest in this area.

Logging and Transportation: No plan to harvest

Specified Roads: None
Temporary Roads: None

Stand Management Objectives:

Silvicultural Prescription:

Regeneration Method:

Possible Future Treatments:

RESOURCE CONCERNS & MITIGATION

Watershed/Fisheries
Concern: Steep slopes and some rock outcrops/bluffs near top of unit.

Mitigation: Avoid disturbance of ground cover on steep slopes.

Soils/Wetlands/Karst
Concern: Unit contains areas of steep slopes (greater then or equal to 70 %).

Mitigation: Avoid placement of patch cuts in these areas.

Wildlife/TES Plants
Concern: Mountain goat winter range. Bear denning habitat. Two historic eagle nests occur along the shoreline. Flight path for helicopter harvest potentially is within ¼ mile eagle nest buffer.

Mitigation: Avoid harvest of large trees with cavities, retain 15' of the butt log attached to rootwads and retain snags and downed logs. Silvicultural prescription of group selection minimizes disturbance. Avoid repeated helicopter flights within ¼ mile of nest from March 1 through May 31. Surveys needed to determine nest activity prior to implementation. If nest is active, continue to avoid repeated helicopter flights through August 31.

Visual/Recreation
Concern: Meet Visual Quality Objective of partial retention in areas seen from saltwater (approximately northern 2/3 of unit). From saltwater, the group selections will be small and barely noticeable, but should still have natural (uneven) shapes and should appear to be natural openings.

Mitigation: Group selection will consist of approximately 2-acre patch cuts. Lay the patch cuts out along contours to minimize visual impacts. Approximately 10 % of volume is to be retained as reserve trees. Make sure the patch cuts are uneven in shape and randomly spaced within the unit to create a more natural pattern of small openings.

Other Resources/Issues
Concern: None
Mitigation:

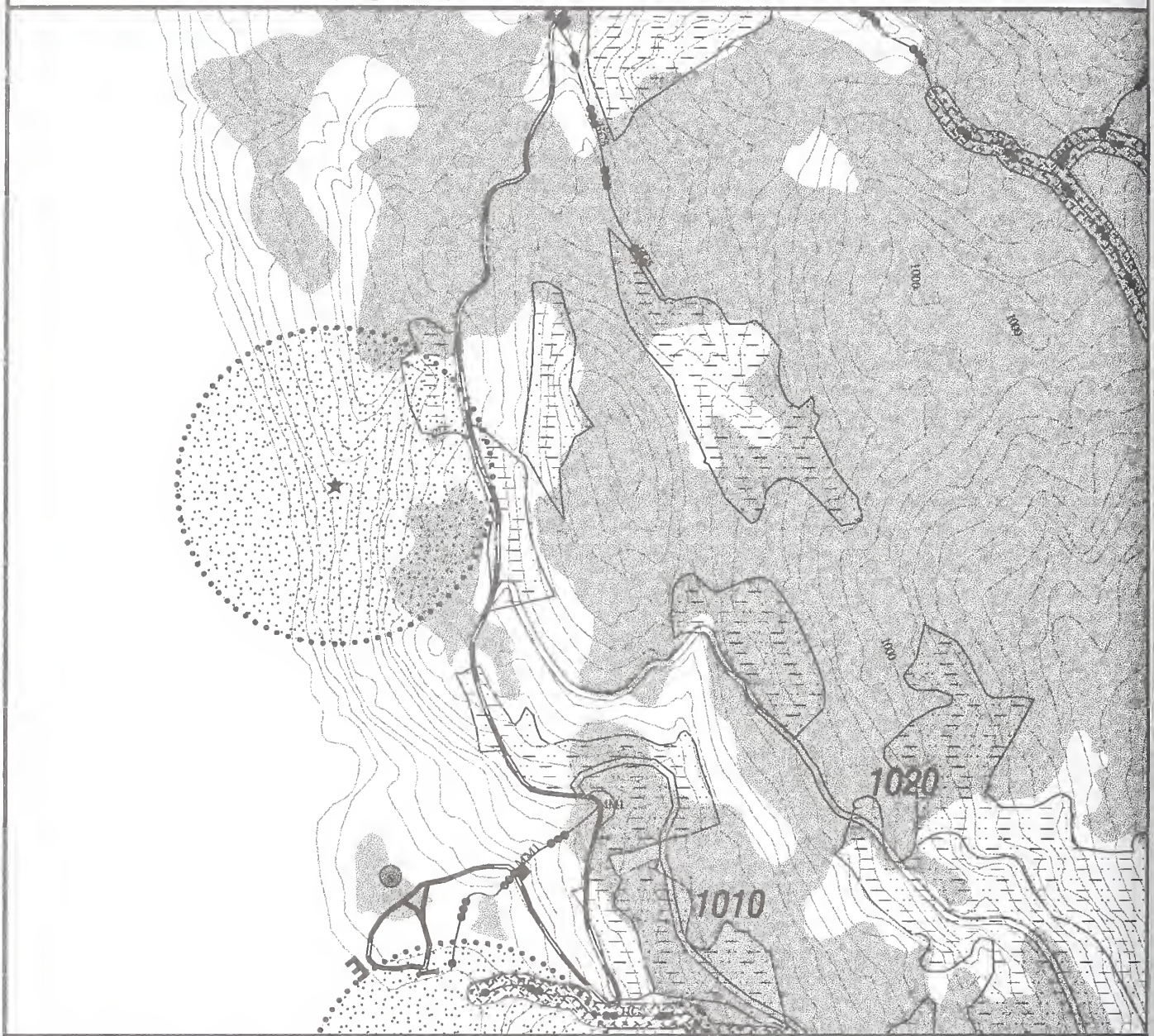
Appendix C

Road Cards

Appendix C
Road Cards

Note: Road cards display the maintenance and operation criteria for Road Management Option A only.

Road Number 10 (page 1 of 2) — *ALTERNATIVE 2*



- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- E — Proposed LTF Sites
- Proposed Major Stream Crossing
- S — Sort Yard
- Eagle Nest Tree
- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 1500 3000

Miles

0 1/2

/adams1/madan/arnls/ps-roadcar1.aml –April 03, 2000

ROAD MANAGEMENT OBJECTIVES
Madan Project - Road 10

Road Description/Location

Project			System	Land Use Designation
Madan			Mainland	TM
Route No	**Route Name**		**Begin Terminus**	**End Terminus**
10	Cove		MP 0.00 at LTF in Jenkins Cove, Eastern Passage	MP 0.00 of Rd 1050 which is a continuation of the road.
Begin MP	**Length**	**Status**	**Map Quarter Quad**	**Photo year, roll, photos**
0.00	5.00	Opportunity	Petersburg (A-1)	

Road 1050 is a continuation of Road 10.

General Design Criteria and Elements

Functional Class	Service Life	Surface	Width	Design Speed	Critical Vehicle	Design Vehicle
Local	LI	Shot rock	14'	20 mph	Low bed truck	Logging Truck

10 mph from junction with Rd. #1000-300 at MP 2.88 to terminus at MP 5.00

Intended Purpose/Future Use

Access for recurring silvicultural activities. Will be used for post-sale silviculture activities and future timber management.

Maintenance Criteria

Bmp	Emp	Operational Maintenance Level (Planned Initial Condition)	Objective Maintenance Level (Desired FutureCondition)	Alaska Forest Practices Act Class
0.00	5.00	2	2	Active

Maintenance Narrative

AFR&P Reg's. "active" status: Keep culverts, catchbasins, ditches and roadblocks functional. Grade as needed to maintain crown and running surface. Control roadside brush to maintain sight distance.

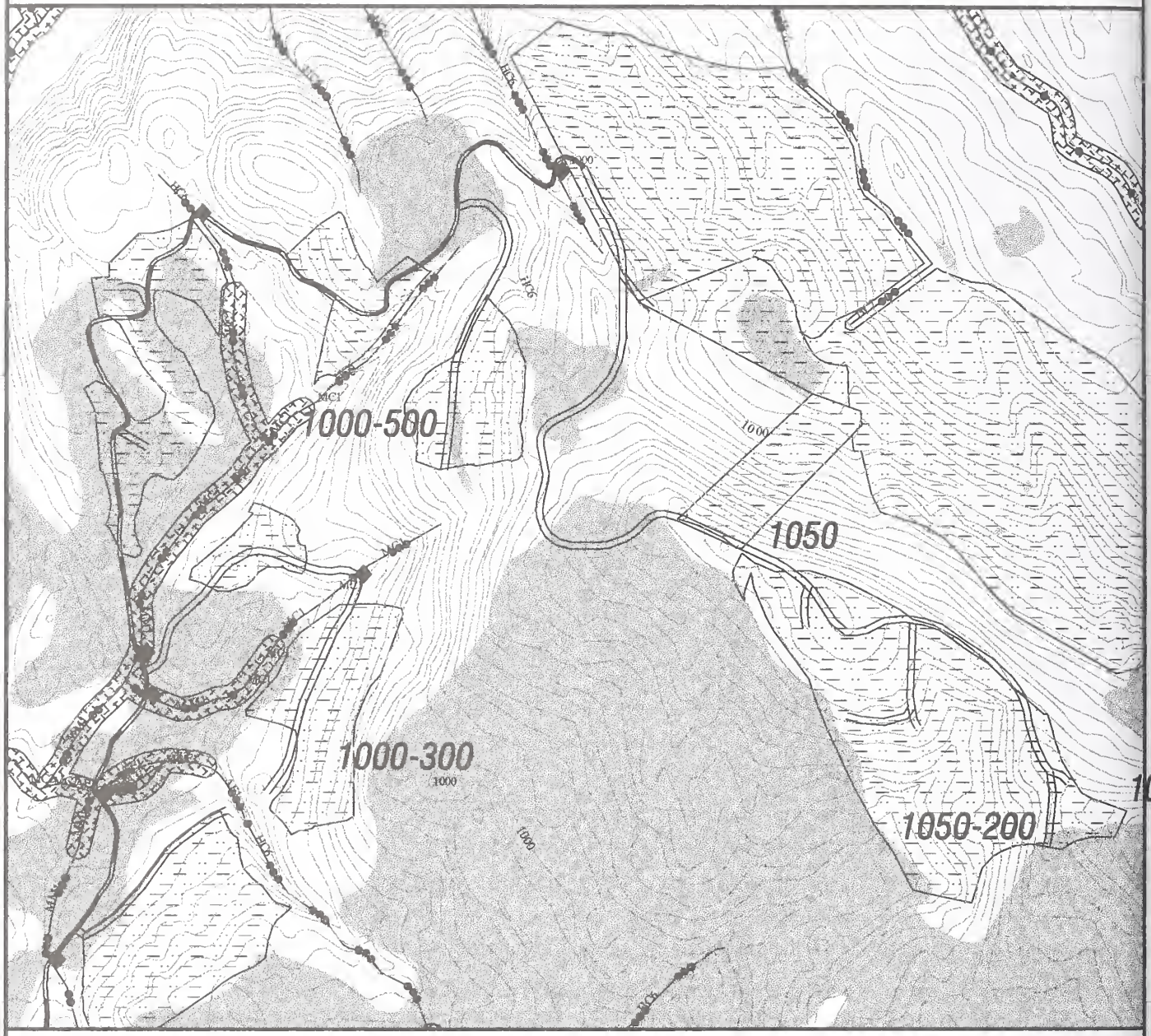
AFR&P Reg's. "inactive" status: Storm Proof MP 0.00 - 5.00 by providing driveable waterbars/rolling dips. Close road to highway vehicle traffic by means of a berm at the beginning of Road #10.

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership

Traffic Management Strategies	**Encourage:**	Hikers and mountain bikes after timber harvest.
	Accept:	High clearance vehicles and non-highway vehicles after timber harvest.
	Discourage:	N/A
	Eliminate:	Public traffic during timber harvest. Passenger highway vehicles.
	Prohibit:	N/A

Road Number 10 (page 2 of 2) — *ALTERNATIVE 2*



- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- E — Proposed LTF Sites
- ◆ — Proposed Major Stream Crossing
- ★ — Eagle Nest Tree
- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 1500 3000

Miles

0 1/2

/adams1/madan/amls/ps-roadcar1.aml –December 22, 1999

Travel Management Narrative

Maintenance Level 2. While the road is at this maintenance level it is open to high clearance highway vehicles and non-highway vehicles. Public travel on this isolated road system is expected to be very low. After timber harvest the log transfer facility will be removed to above mean high water. Given the expense and difficulty in accessing the road by vehicles, the preference for hunters and recreationists is likely to be in other areas. A few people may access the road system with non-highway vehicles, primarily during deer hunting season. Administrative traffic for post sale silviculture purposes and road maintenance is expected to generate most of the traffic on the system.

Approved_____ _____

District Ranger Date

Site Specific Design Criteria

Road Segment Descriptions

Milepost (miles)	Grade (%)	Average Side-slopes (%)	Length (feet)	Comments
0.00 to 0.32	15f-5a	0-30	1700	This section will include upland LTF facilities. Class III stream crossing. Rock pit will be developed near the LTF site. Crosses forested wetlands to stay away from stream.
0.32 to 0.53	10-15f	20-40	1100	MP 0.53 is a 75-ft radius switchback with 10% road grade on a 25% side slope.
0.53 to 0.80	0-15f	25-40	1400	Possible rock pit with granite rock. MP 0.80 is a Class III stream requiring a 36-inch culvert.
0.80 to 1.03	5-12f	30-70	1220	200 feet of full bench rock blasting.
1.03 to 1.46	0-12f	0-25	2300	300 feet of muskeg crossing and several hundred feet of forested wetlands to avoid 1,000 foot beach buffer and steep side slopes.
1.46 to 1.84	0-15f	5-20	2000	Short segment of full bench. Skirts around corner of state lands. Skirts muskeg, forested wetlands.
1.84 to 2.31	5a-12a	15-40	2500	Two short segments of full bench construction. Five Class III streams. MP 2.31 is a large Class III that requires two 60-inch culverts, due to stream convergence. Potential rock pit in segment.
2.31 to 2.72	12a-12f	10-40	2120	Five Class IV stream crossings. MP 2.72 is a Class II stream (Gypsy Creek) requiring a 40 foot bridge. Potential rock pit in this section.
2.72 to 2.95	12a-15f	0-20	1230	Skirts around muskeg through forested wetlands to avoid TTRA buffers. MP 2.95 is a small Class II stream with a history of beaver activity. Requires a 36-inch culvert designed for fish passage.
2.95 to 3.02	12a-10f	0-15	370	Crosses a small ridge to another Class II stream which requires a 48-inch culvert with fish passage.
3.02 to	0-15f	0-20	820	Skirts muskeg through forested wetlands. Road needs to go

3.17				in the muskeg for 100 ft to avoid entering a TTRA buffer.
3.17 to 3.43	0-15f	0-70	1350	200 feet of full bench construction. Segment ends where road crosses knife ridge line at old F.S. grade line(tagged as CP#4 on South Virginia Lake #1 RD)
3.43 to 3.65	8a-8f	20-30	1140	Possible rock pit in segment. MP 3.65 is close to ¼ mile Wild & Scenic buffer to Virginia Lake.
3.65 to 3.91	0-15f	20-40	1400	One short segment of side slopes greater than 40%. Possible small Karst sink hole 50 ft N. Limestone found.
3.91 to 4.11	5a-12f	30-60	1060	Crosses above a confluence of two Class III streams. Crosses a short segment of steep unstable slope out of the 2nd crossing requiring full bench construction.
4.11 to 4.42	5a-15f	40-60	1640	Road follows a narrow bench for most of the segment. MP 4.42 is where the road crosses the narrow ridge. Some short segments of full bench construction.
4.42 to 4.61	10a-15f	20-50	1000	Segment has a 50 ft requiring full bench, rock blasting through head wall.
4.61 to 5.00	5a-15f	20-45	2030	Goes between muskegs and circles around ridgeline. Avoiding wetlands would require moving road onto steep slopes above Virginia Lake. Joins old road grade flag line. Possible rock pit at MP 4.88.

*a = adverse; f = favorable

Notes: MP 2.63 abandoned old FS grade due to difficult stream crossing. Old grade is east of new grade.

Stream Crossings:

MP 0.32 Class III greater than 48-inch culvert, stream gradient is 11%, cobble substrate, low debris jam potential.

MP 2.31 Two Class III streams, each requires a 60-inch culvert, stream gradient is 15%, cobble substrate, high debris jam potential; Consider moving crossing down stream where streams have combined to one channel. Remove culverts or storm proof at closing.

MP 2.72 Class II, Gypsy Creek, 40' bridge, stream gradient is 4%, cobble substrate, large bedload movement, braided channel upstream.

MP 2.95 Class II, 36-inch culvert, silt and gravel substrate, past beaver use below crossing.

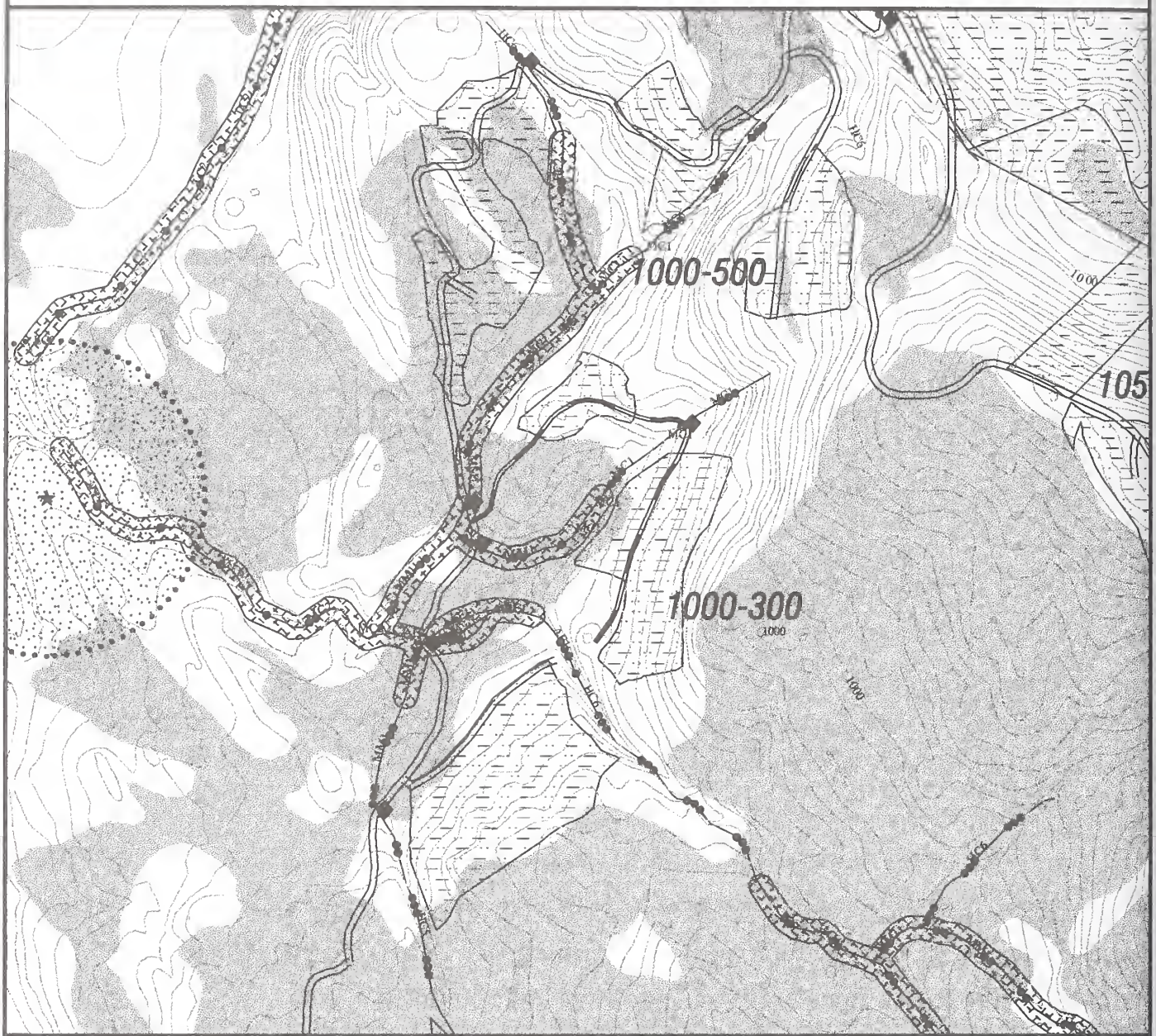
MP 3.02 Class II, 48-inch culvert, high flow is 12-14 ft wide and 5 ft deep, stream gradient is 1%, cobble and gravel substrate, low debris jam potential. Remove culvert or pull back fill at closing to prevent damage from potential beaver dam.

Wetlands: Where practical the road went around wetlands but due to grades, horizontal alignment and increased length of roads, some wetlands were crossed (see Road Segment Description for details). BMP 12.5 applies to road construction on wetlands. Where terrain allows, overlay construction will be used, excavation will be avoided, and extra cross drains will be installed to avoid altering subsurface flow. The following is a list of wetland crossings for this road:

MP 0.10-0.30 Forested wetland-possible sort yard (to be addressed on the LTF/upland facilities card)
MP 1.03-1.96 300 feet of muskeg, several hundred feet of forested muskeg.
MP 2.72-2.95 Forested wetland/edge of muskeg
MP 3.02-3.17 Forested wetland/edge of muskeg
MP 4.61-4.75 Forested wetland/edge of muskeg

Erosion Control: An erosion control plan for road construction and maintenance will be developed according to standard project specifications (BMP 14.5). Specific design measures will address erosion control in the vicinity of streams on the approach to the LTF and stream crossings. All areas of organic or mineral soil exposed during construction shall be grass seeded (with native species if possible) and fertilized (BMP 12.17, 14.8). Noted areas of concern: MP 0.53 75 ft radius switch back; MP1.49 full bench; MP 0.94 200 ft of full bench; MP 2.76 end haul; MP 3.88 small Sink hole/ Bog/ Karst?; MP 3.17-3.43 200 ft of full bench; MP 4.11-4.61 short full bench segments; stream crossings listed below.
Rock Pits: During periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended at quarries near potentially unstable sites where ground vibration may induce mass movement (BMP 14.6). Rock pits will require site specific erosion control plans (BMP 14.18). This road travels through areas of visual concern and therefore attention to visual effects will be necessary when selecting location, size and layout of a rock pit along this road. Sites noted as potential rock pits are listed below: MP 0.70 (granite); MP 2.23; MP 2.55; MP 3.54; MP 4.40; MP 4.88
Wildlife: First approximately 1,000 ft of road is located within ¼ mile of bald eagle nest. Timing restrictions may apply. Avoid ground disturbance within 330 feet and repeated helicopter flights within ¼ mile of all nests from March 1 through May 31. Surveys needed prior to harvest to verify eagle nest activity. If nests are active, continue to avoid ground disturbance and repeated helicopter flight though August 31.
Cultural Resources: Road 10 inventoried for cultural resources from shore of Jenkins Cove to north of Unit J-49 and portion within and adjacent to unit V-61. Lower end of road (at least to the 100 foot elevation) is within high sensitivity zone for cultural resources; monitor road during or after construction in this area, as stated in the Programmatic Agreement among the USDA Forest Service Alaska Region, the Advisory Council on Historic Preservation, and the Alaska SHPO.
Summary of Mitigation: The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F5, F6, F8, F9, F10, F13, W9, W13, R1, and V11. These measures are described within the resource sections that apply.

Road Number 1000-300 — *ALTERNATIVE 2*



- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- E — Proposed LTF Sites
- ◆ — Proposed Major Stream Crossing
- ★ — Eagle Nest Tree
- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 — 1500 — 3000

Miles

0 — 1/2

/adams1/madan/amls/ps-roadcar1.aml –December 22, 1999

ROAD MANAGEMENT OBJECTIVES
Madan Project - Road 1000-300

Road Description/Location

Project			System	Land Use Designation
Madan			Mainland	TM
Route No	**Route Name**		**Begin Terminus**	**End Terminus**
1000-300	Gypsy		MP 2.88 Rd 10	Last landing Unit V-57
Begin MP	**Length**	**Status**	**Map Quarter Quad**	**Photo year, roll, photos**
0.00	0.84	Opportunity	Petersburg (A-1)	

General Design Criteria and Elements

Functional Class	Service Life	Surface	Width	Design Speed	Critical Vehicle	Design Vehicle
Local	LI	Shot rock	14'	10 mph	Logging truck	Logging Truck

Intended Purpose/Future Use

Access for future helicopter units to the NE and may be extended to for future timber management.

Maintenance Criteria

Bmp	Emp	Operational Maintenance Level (Planned Initial Condition)	Objective Maintenance Level (Desired FutureCondition)	Alaska Forest Practices Act Class
0.00	0.84	2		Active
0.00	0.84		1	Closed

Maintenance Narrative

AFR&P Reg's. "active" status: Keep culverts, catchbasins, ditches and road blocks functional. Grade as needed to maintain crown and running surface. Control roadside brush to maintain sight distance (MP 0.00-0.84).

Storage AFR&P Reg's. "closed" status: Place road in storage, MP 0.00 - 0.84, remove or bypass culverts, add waterbars as needed.

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership

Traffic Management Strategies	**Encourage:**	N/A
	Accept:	Hikers after timber harvest
	Discourage:	Non-highway vehicles and mountain bikes after timber harvest.
	Eliminate:	Public traffic during timber harvest. Passenger highway vehicles and high clearance highway vehicles after timber harvest.
	Prohibit:	N/A

Travel Management Narrative

Access for passenger highway vehicles and high clearance highway vehicles will be blocked by removal of drainage structures and cross ditches.

Approved_____ _____

District Ranger Date

Site Specific Design Criteria

Road Segment Descriptions

Milepost (miles)	Grade (%)*	Average Side-slopes (%)	Length (feet)	Comments
0.0 to 0.27	10a-15f	15-30	1440	From jct. Of 10 road to V-56. This location is through muskeg/fringe type timber to avoid TTRA buffers. Small cedar, pine, etc.
0.27 to 0.47	5a-5f	5-15	1040	From south edge of unit V-56 to Class III crossing. This section is mostly through the unit and crosses 2 small seeps and some blow down
0.47 to 0.83	10a-15f	10-30	1930	From Class III stream to end of Project in V-57. This section crosses one Class IV stream and several seeps.

*a = adverse; f = favorable

Note: Entire road is easy construction.

Stream Crossings: No bridges, fish streams or culverts ≥48 inches were noted.

Wetlands: Where practical the road went around wetlands but due to grades, horizontal alignment and increased length of roads, some wetlands were crossed (see Road Segment Description above for details). BMP 12.5 applies to road construction on wetlands. Where terrain allows, overlay construction will be used, excavation will be avoided, and extra cross drains will be installed to avoid altering subsurface flow. The following is a list of wetland crossings for this road:

MP 0.00-0.27 Forested wetlands

Erosion Control: : An erosion control plan for road construction and maintenance will be developed according to standard project specifications (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded (with native species if possible) and fertilized (BMP 12.17, 14.8).

Rock Pits: During periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended at quarries near potentially unstable sites where ground vibration may induce mass movement (BMP 14.6). Rock pits will require site specific erosion control plans (BMP 14.18). This road travels through areas of visual concern and therefore attention to visual effects will be necessary when selecting location, size and layout of a rock pit along this road. Sites noted as potential rock pits are listed below:

None noted along this road. Can use rock pit near MP 2.5 on 10 RD.

Summary of Mitigation: The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F10, F13, W9, and R1. These measures are described within the resource sections that apply.

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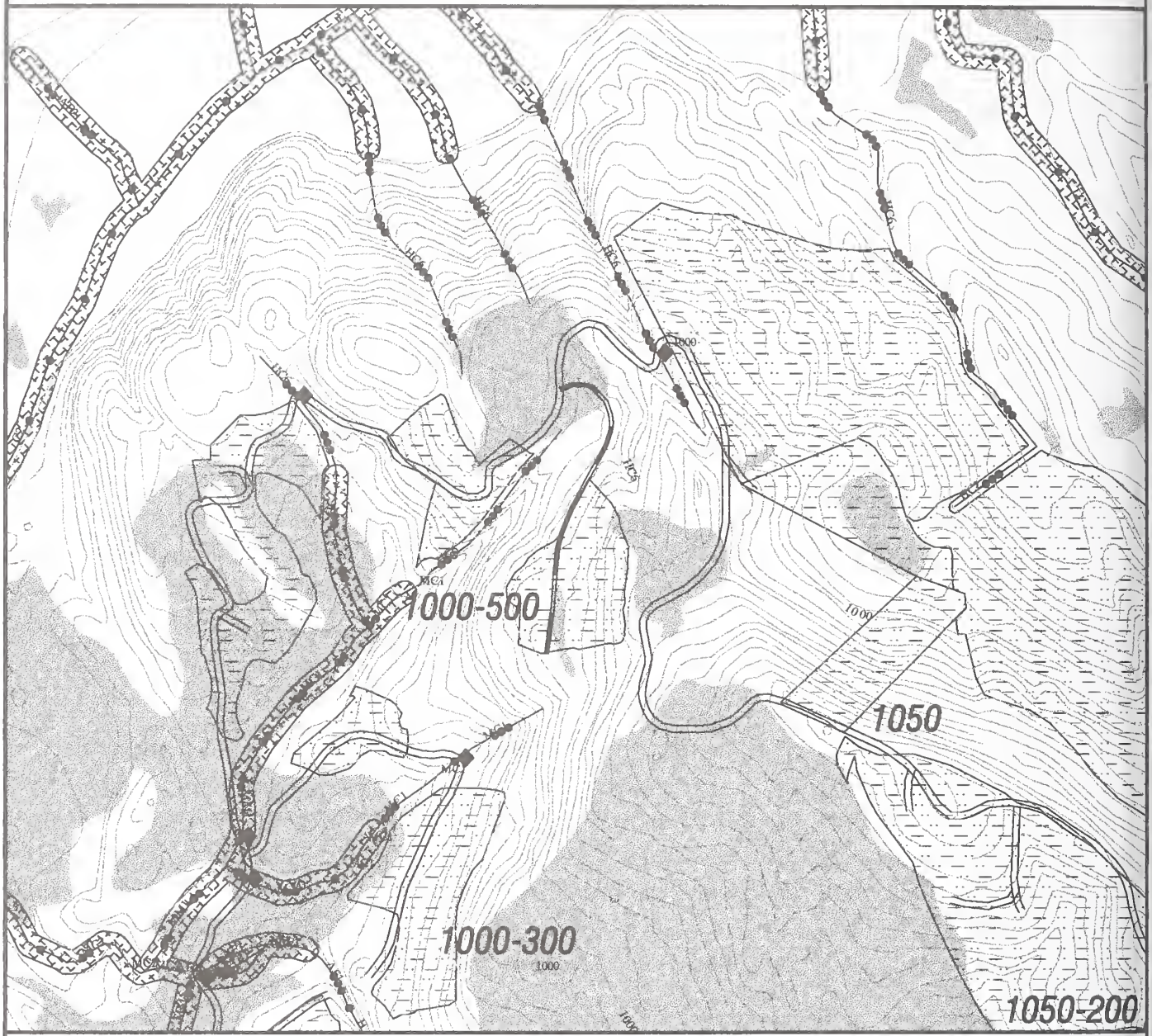
Road Number 1000-500 — ALTERNATIVE 2



- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- E — Proposed LTF Sites
- ◆ — Proposed Major Stream Crossing
- ★ — Eagle Nest Tree
- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 — 1500 — 3000

Miles

0 — 1/2

/adams1/madan/amls/ps-roadcar1.aml –December 22, 1999

ROAD MANAGEMENT OBJECTIVES
Madan Project - Road 1000-500

Road Description/Location

Project			System	Land Use Designation
Madan			Mainland	TM
Route No	**Route Name**		**Begin Terminus**	**End Terminus**
1000-500	Virginia		MP 4.61 Rd 10	Landing in Unit V-71
Begin MP	**Length**	**Status**	**Map Quarter Quad**	**Photo year, roll, photos**
0.00	0.45	Opportunity	Petersburg (A-1)	

General Design Criteria and Elements

Functional Class	Service Life	Surface	Width	Design Speed	Critical Vehicle	Design Vehicle
Local	LI	Shot rock	14'	10 mph	Logging truck	Logging Truck

Intended Purpose/Future Use
Access for future helicopter units to the NE and may be extended to for future timber management.

Maintenance Criteria

Bmp	Emp	Operational Maintenance Level (Planned Initial Condition)	Objective Maintenance Level (Desired FutureCondition)	Alaska Forest Practices Act Class
0.00	0.45	2		Active
0.00	0.45		1	Closed

Maintenance Narrative
AFR&P Reg's. "active" status: Keep culverts, catchbasins, ditches and road blocks functional. Grade as needed to maintain crown and running surface. Control roadside brush to maintain sight distance (MP 0.00-0.45)

Storage AFR&P Reg's. "closed" status: Place road in storage, MP 0.00 - 0.45, remove or bypass culverts, add waterbars as needed.

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership

Traffic Management Strategies

Encourage:	N/A
Accept:	Hikers after timber harvest
Discourage:	Non-highway vehicles and mountain bikes after timber harvest.
Eliminate:	Public traffic during timber harvest. Passenger highway vehicles and high clearance highway vehicles after timber harvest.
Prohibit:	N/A

Travel Management Narrative

Access for passenger highway vehicles and high clearance highway vehicles will be blocked by removal of drainage structures and cross ditches.

Approved_____ _____

District Ranger Date

Site Specific Design Criteria

Road Segment Descriptions

Milepost (miles)	Grade (%)*	Average Side-slopes (%)	Length (feet)	Comments
0.0 to 0.10	12a	10-25	540	Crosses muskeg first 250 feet and Class IV stream, which drains the muskeg. Avoiding muskeg would require greater road length.
0.10 to 0.45	0-16f	0-30	1860	Follows bench to the area indicated as a large bench on the topo. map, this area is hummocky and crisscrossed by small streams. Crosses Class IV streams. Good landing locations along route.

*a = adverse; f = favorable

Note: There will need to be additional short temporary roads constructed to access all of the landings in this area.

Stream Crossings: No bridges, fish streams or culverts ≥48 inches were noted.

Wetlands: Where practical the road went around wetlands but due to grades, horizontal alignment and increased length of roads, some wetlands were crossed (see Road Segment Description above for details). BMP 12.5 applies to road construction on wetlands. Where terrain allows, overlay construction will be used, excavation will be avoided, and extra cross drains will be installed to avoid altering subsurface flow. The following is a list of wetland crossings for this road:
At MP 0.04 Road crosses a muskeg to reduce the road length and improve alignment. During final location of this road investigate moving the intersection north up the 10 Road to avoid the musket crossing, if possible.

Erosion Control: An erosion control plan for road construction and maintenance will be developed according to standard project specifications (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded (with native species if possible) and fertilized (BMP 12.17, 14.8).

Rock Pits: During periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended at quarries near potentially unstable sites where ground vibration may induce mass movement (BMP 14.6). Rock pits will require site specific erosion control plans (BMP 14.18). This road travels through areas of visual concern and therefore attention to visual effects will be necessary when selecting location, size and layout of a rock pit along this road. Sites noted as potential rock pits are listed below:
None noted along this road. Two potential rock pit sites were noted along RD 10 within a short distance.

Summary of Mitigation: The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F10, F13, W9, and R1. These measures are described within the resource sections that apply.

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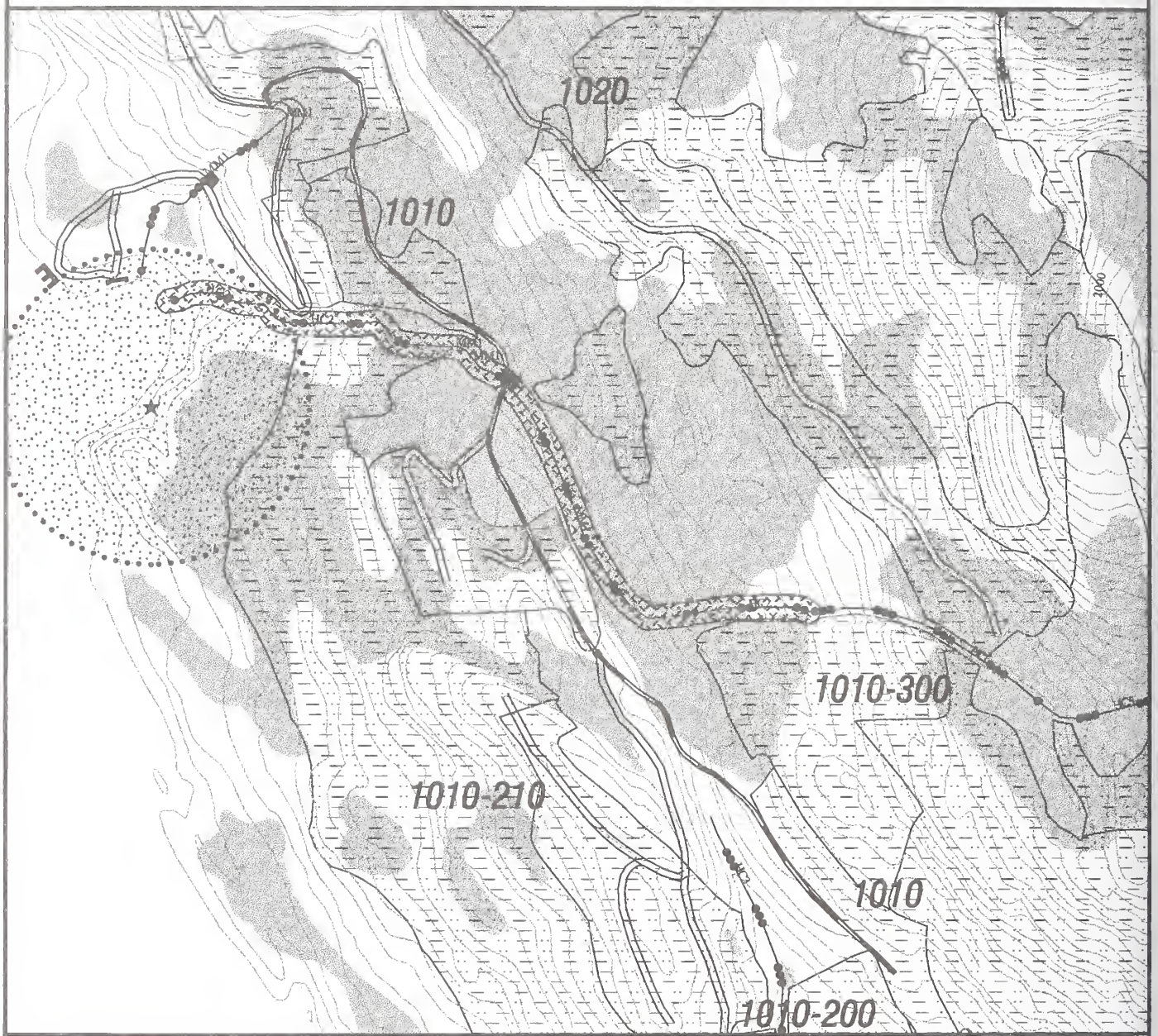
Road Number 1010 — *ALTERNATIVE 2*



- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- E — Proposed LTF Sites
- ◆ — Proposed Major Stream Crossing
- ★ — Eagle Nest Tree
- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 1500 3000

Miles

0 1/2

/adams1/madan/arnls/ps-roadcar1.aml --December 22, 1999

ROAD MANAGEMENT OBJECTIVES
Madan Project - Road 1010

Road Description/Location

Project		System	Land Use Designation
Madan		Mainland	TM
Route No	**Route Name**	**Begin Terminus**	**End Terminus .**
1010	Lower Madan	MP 0.83 Rd 10	Last landing in Unit J-10

Begin MP	Length	Status	Map Quarter Quad	Photo year, roll, photos
0.00	2.14	Opportunity	Petersburg (A-1)	

General Design Criteria and Elements

Functional Class	Service Life	Surface	Width	Design Speed	Critical Vehicle	Design Vehicle
Local	LI	Shot rock	14'	10 mph	Lowbed truck	Logging Truck

Intended Purpose/Future Use
Access for recurring silvicultural activities. Will be used for post-sale silviculture activities and future timber management.

Maintenance Criteria

Bmp	Emp	Operational Maintenance Level (Planned Initial Condition)	Objective Maintenance Level (Desired FutureCondition)	Alaska Forest Practices Act Class
0.00	2.14	2	2	Active

Maintenance Narrative

AFR&P Reg's. "active" status: Keep culverts, catchbasins, ditches and road blocks functional. Grade as needed to maintain crown and running surface. Control roadside brush to maintain sight distance.

AFR&P Reg's. "inactive" status: Storm Proof MP 0.00 - 2.14 by providing driveable waterbars/rolling dips. Close road to highway vehicle traffic by means of a berm at the beginning of Road #10.

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership

Traffic Management Strategies

Encourage:	Hikers and mountain bikes after timber harvest.
Accept:	High clearance vehicles and non-highway vehicles after timber harvest.
Discourage:	N/A
Eliminate:	Public traffic during timber harvest. Passenger highway vehicles after timber harvest.
Prohibit:	N/A

Travel Management Narrative
Maintenance Level 2. While the road is at this maintenance level it is open to high clearance highway vehicles and non-highway vehicles. Public travel on this isolated road system is expected to be very low. After timber harvest the log transfer facility will be removed to above mean high water. Given the expense and difficulty in accessing the road by vehicles, the preference for hunters and recreationists is likely to be in other areas. A few people may access the road system with non-highway vehicles, primarily during deer hunting season. Administrative traffic for post sale silviculture purposes and road maintenance are expected to generate most of the traffic on the system.

Approved_____ _____
District Ranger Date

Site Specific Design Criteria

Road Segment Descriptions

Milepost (miles)	Grade (%)	Average Side-slopes (%)	Length (feet)	Comments
0.00 to 0.27	5f-16f	10-35	1400	Jct. With 1010-200 MP 1.01. Begin with 75' radius curve - through required for switchback. Medium construction difficulty with significant stream crossings (Class IV) at 0.16 & 0.21 miles. Some 50' full bench sections.
0.27 to 1.22	0-12f	15-25	5050	Easy to medium construction in forested wetland. Muskeg crossings were minimized, however several 50' openings were crossed. Class II stream at MP 0.82.(40'-50' Bridge)
1.22 to 1.45	10a-5f	15-35	1225	This accesses J-5. This section runs along a bench. Easy construction with a few wet areas in large timber.
1.45 to 1.74	10a-15f	40-50	1525	This segment contains steeper cross-slopes with road grades approaching the maximum for adverse and favorable (12% & 18%). The muskeg drainage stream is crossed below the muskeg at MP1.59. The road then climbs the ridge to J-10. Some short full bench sections and possible quarry at MP 1.69.
1.74 to 2.14	15a-5f	15-25	2100	Easy construction on mild cross-slopes through Unit J-10 to end of road. No construction difficulties.

*a = adverse; f = favorable

Stream Crossings: MP 0.82 Class II; 40-50 ft bridge; Gravel substrate, Sand; 2% Gradient; stable location; medium debris jam potential.

Wetlands: Where practical the road went around wetlands but due to grades, horizontal alignment and increased length of roads, some wetlands were crossed (see Road Segment Description above for details). BMP 12.5 applies to road construction on wetlands. Where terrain allows, overlay construction will be used, excavation will be avoided, and extra cross drains will be installed to avoid altering subsurface flow. The following is a list of wetland crossings for this road:

MP 0.27-1.22 Forested wetlands/several short muskeg crossings

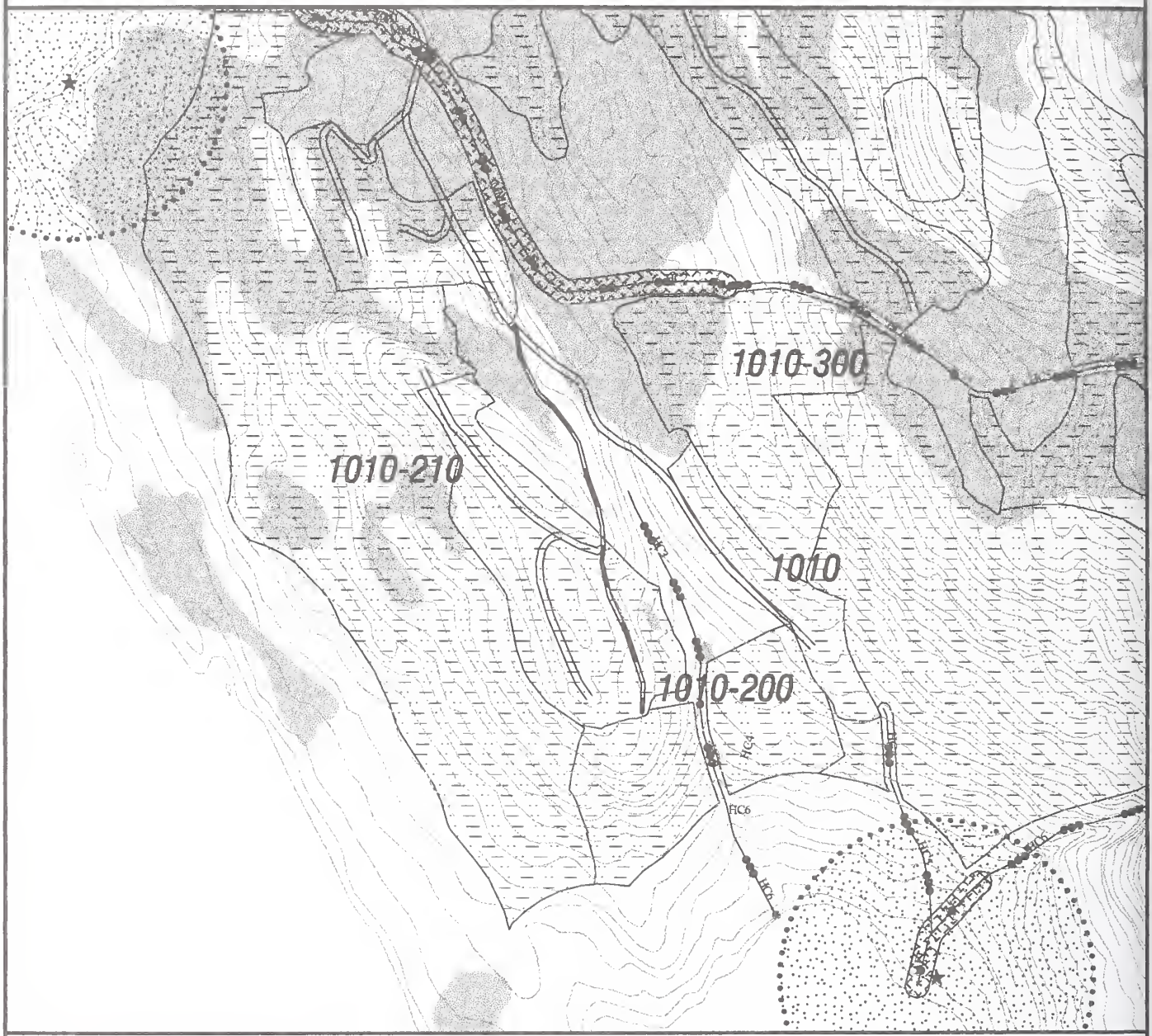
Erosion Control: An erosion control plan for road construction and maintenance will be developed according to standard project specifications (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded (with native species if possible) and fertilized (BMP 12.17, 14.8). Noted areas of concern: Switchback at the beginning of the road will require through cut.

Rock Pits: During periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended at quarries near potentially unstable sites where ground vibration may induce mass movement (BMP 14.6). Rock pits will require site specific erosion control plans (BMP 14.18). This road travels through areas of visual concern and therefore attention to visual effects will be necessary when selecting location, size and layout of a rock pit along this road. Sites noted as potential rock pits are listed below:

None noted along this road. Potential rock pit sites were noted along RD 10 MP 0.70, MP 1.00, MP 1.69.

Summary of Mitigation: The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F5, F6, F8, F10, F13, W9, and R1. These measures are described within the resource sections that apply.

Road Number 1010-200 — *ALTERNATIVE 2*



Proposed Road Segment
Adjacent Proposed Road Segments
Class 1 Streams
Class 2 Streams
Class 3 Streams
E Proposed LTF Sites
◆ Proposed Major Stream Crossing

★ Eagle Nest Tree
Proposed cut units
TTRA Buffers
Wetlands
1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet
0 1500 3000

Miles
0 1/2

/adams1/madan/amls/ps-roadcar1.aml –December 22, 1999

ROAD MANAGEMENT OBJECTIVES
Madan Project - Road 1010-200

Road Description/Location

Project			System	Land Use Designation
Madan			Mainland	TM
Route No	**Route Name**		**Begin Terminus**	**End Terminus**
1010-200	Madan		MP 1.44 Rd 1010	Last landing in Unit J-13
Begin MP	**Length**	**Status**	**Map Quarter Quad**	**Photo year, roll, photos**
0.00	0.66	Opportunity	Petersburg (A-1)	

General Design Criteria and Elements

Functional Class	Service Life	Surface	Width	Design Speed	Critical Vehicle	Design Vehicle
Local	LI	Shot rock	14'	10 mph	Logging truck	Logging Truck

Intended Purpose/Future Use
Access for future helicopter units to the NE and may be extended to for future timber management.

Maintenance Criteria

Bmp	Emp	Operational Maintenance Level (Planned Initial Condition)	Objective Maintenance Level (Desired FutureCondition)	Alaska Forest Practices Act Class
0.00	0.66	2		Active
0.00	0.66		1	Closed

Maintenance Narrative
AFR&P Reg's. "active" status: Keep culverts, catchbasins, ditches and road blocks functional. Grade as needed to maintain crown and running surface. Control roadside brush to maintain sight distance.

Storage AFR&P Reg's. "closed" status: Place road in storage, MP 0.00 - 0.66, remove or bypass culverts, add waterbars as needed.

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership

Traffic Management Strategies

Encourage:	N/A
Accept:	Hikers after timber harvest
Discourage:	Non-highway vehicles and mountain bikes after timber harvest.
Eliminate:	Public traffic during timber harvest. Passenger highway vehicles and high clearance highway vehicles after timber harvest.
Prohibit:	N/A

Travel Management Narrative

Access for passenger highway vehicles and high clearance highway vehicles will be blocked by removal of drainage structures and cross ditches.

Approved_____ _____

District Ranger Date

Site Specific Design Criteria

Road Segment Descriptions

Milepost (miles)	Grade (%)	Average Side-slopes (%)	Length (feet)	Comments
0.00 to 0.27	5f-16f	25-60	1400	First 1000' is easy construction. Next 400' is full bench construction. Slopes appear stable.
0.27 to 0.66	12a-10f	20-50	2100	0.27 is jct. With 1010-210. Cross slopes are generally less than 55%. This segment accesses a large bench. No major concerns; this segment has easy to medium construction.

*a = adverse; f = favorable

Stream Crossings: No bridges, fish streams or culverts ≥48 inches were noted.

Wetlands: None noted.

Erosion Control: An erosion control plan for road construction and maintenance will be developed according to standard project specifications (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded (with native species if possible) and fertilized (BMP 12.17, 14.8).

Noted areas of concern: MP 0.19 to MP 0.27 requires full bench construction.

Rock Pits: During periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended at quarries near potentially unstable sites where ground vibration may induce mass movement (BMP 14.6). Rock pits will require site specific erosion control plans (BMP 14.18). This road travels through areas of visual concern and therefore attention to visual effects will be necessary when selecting location, size and layout of a rock pit along this road. Sites noted as potential rock pits are listed below:
None noted along this road. Can use rock pit at MP 1.69 on 1010 RD.

Summary of Mitigation: The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F13, W9, and R1. These measures are described within the resource sections that apply.

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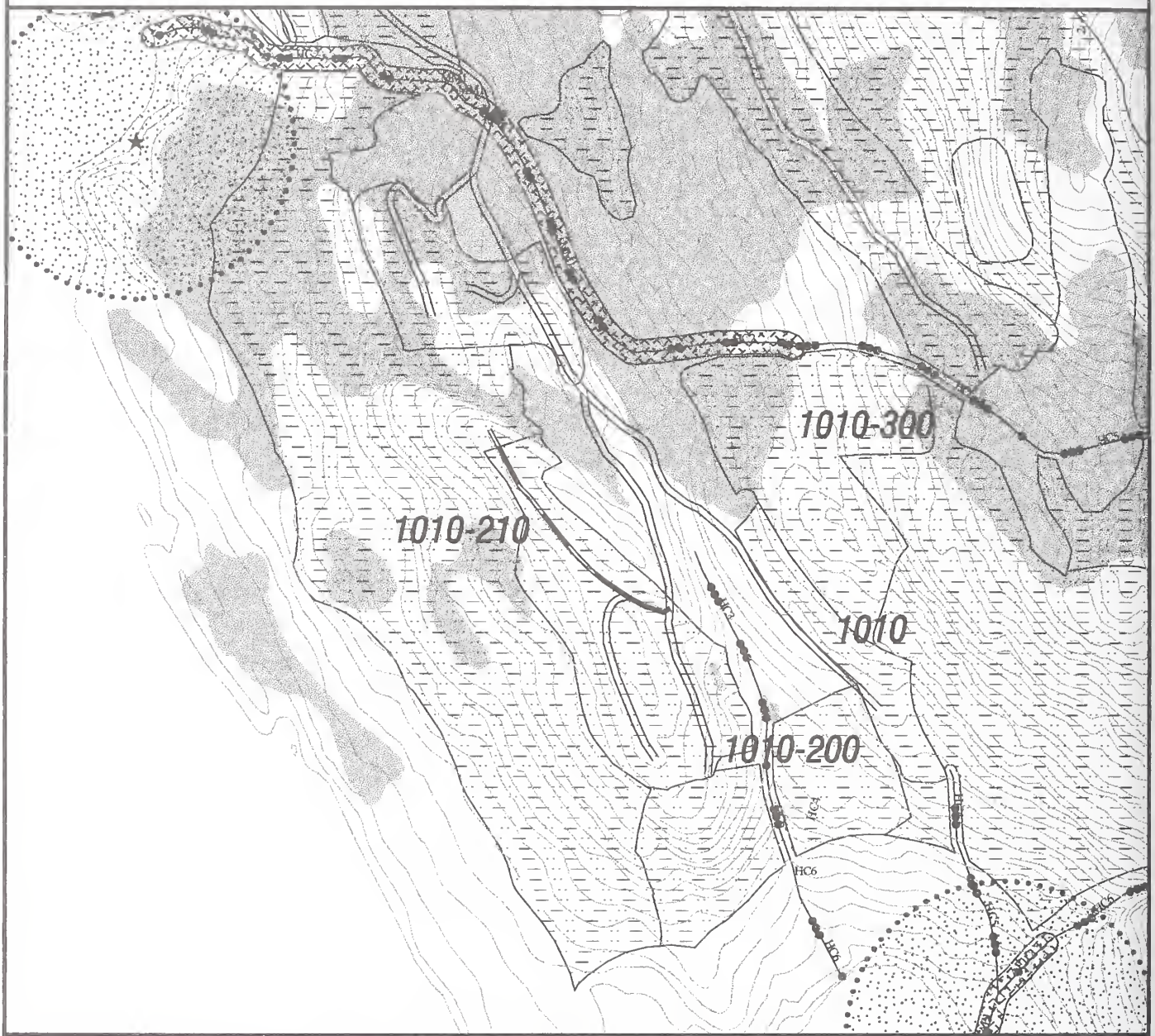
Road Number 1010-210 — *ALTERNATIVE 2*



- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- E — Proposed LTF Sites
- ◆ — Proposed Major Stream Crossing
- ★ — Eagle Nest Tree
- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 — 1500 — 3000

Miles

0 — 1/2

/adams1/madan/amls/ps-roadcar1.aml –December 22, 1999

ROAD MANAGEMENT OBJECTIVES
Madan Project - Road 1010-210

Road Description/Location

Project			System	Land Use Designation
Madan			Mainland	TM
Route No	**Route Name**		**Begin Terminus**	**End Terminus**
1010-210	Ridge		MP 0.27 Rd 1010-200	Last landing in Unit J-13
Begin MP	**Length**	**Status**	**Map Quarter Quad**	**Photo year, roll, photos**
0.00	0.43	Opportunity	Petersburg (A-1)	

General Design Criteria and Elements

Functional Class	Service Life	Surface	Width	Design Speed	Critical Vehicle	Design Vehicle
Local	LI	Shot rock	14'	10 mph	Logging truck	Logging Truck

Intended Purpose/Future Use
Access for future helicopter units to the NE and may be extended to for future timber management.

Maintenance Criteria

Bmp	Emp	Operational Maintenance Level (Planned Initial Condition)	Objective Maintenance Level (Desired FutureCondition)	Alaska Forest Practices Act Class
0.00	0.43	2		Active
0.00	0.43		1	Closed

Maintenance Narrative
AFR&P Reg's. "active" status: Keep culverts, catchbasins, ditches and road blocks functional. Grade as needed to maintain crown and running surface. Control roadside brush to maintain sight distance.

Storage AFR&P Reg's. "closed" status: Place road in storage, MP 0.00 - 0.43, remove or bypass culverts, add waterbars as needed.

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership

Traffic Management Strategies

Encourage:	N/A
Accept:	Hikers after timber harvest
Discourage:	Non-highway vehicles and mountain bikes after timber harvest.
Eliminate:	Public traffic during timber harvest. Passenger highway vehicles and high clearance highway vehicles after timber harvest.
Prohibit:	N/A

Travel Management Narrative

Access for passenger highway vehicles and high clearance highway vehicles will be blocked by removal of drainage structures and cross ditches.

Approved_____ _____

District Ranger Date

Site Specific Design Criteria

Road Segment Descriptions

Milepost (miles)	Grade (%)	Average Side-slopes (%)	Length (feet)	Comments
0.00 to 0.43	5a-5f	25-35	2275	The entire road is medium construction on moderate side-slopes. No major concerns.

*a = adverse; f = favorable

Stream Crossings: No bridges, fish streams or culverts ≥48 inches were noted.

Wetlands: BMP 12.5 applies to road construction on wetlands. The following is a list of potential wetland crossings for this road. Although no wetlands are crossed, at MP 0.02 the road is in the timber along the south edge of a small muskeg.

Erosion Control: An erosion control plan for road construction and maintenance will be developed according to standard project specifications (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded (with native species if possible) and fertilized (BMP 12.17, 14.8).

Rock Pits: During periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended at quarries near potentially unstable sites where ground vibration may induce mass movement (BMP 14.6). Rock pits will require site specific erosion control plans (BMP 14.18). This road travels through areas of visual concern and therefore attention to visual effects will be necessary when selecting location, size and layout of a rock pit along this road. Sites noted as potential rock pits are listed below:
None noted. Can use rock pit at MP 1.69 on 1010 RD.

Summary of Mitigation: The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F10, F13, W9, and R1. These measures are described within the resource sections that apply.

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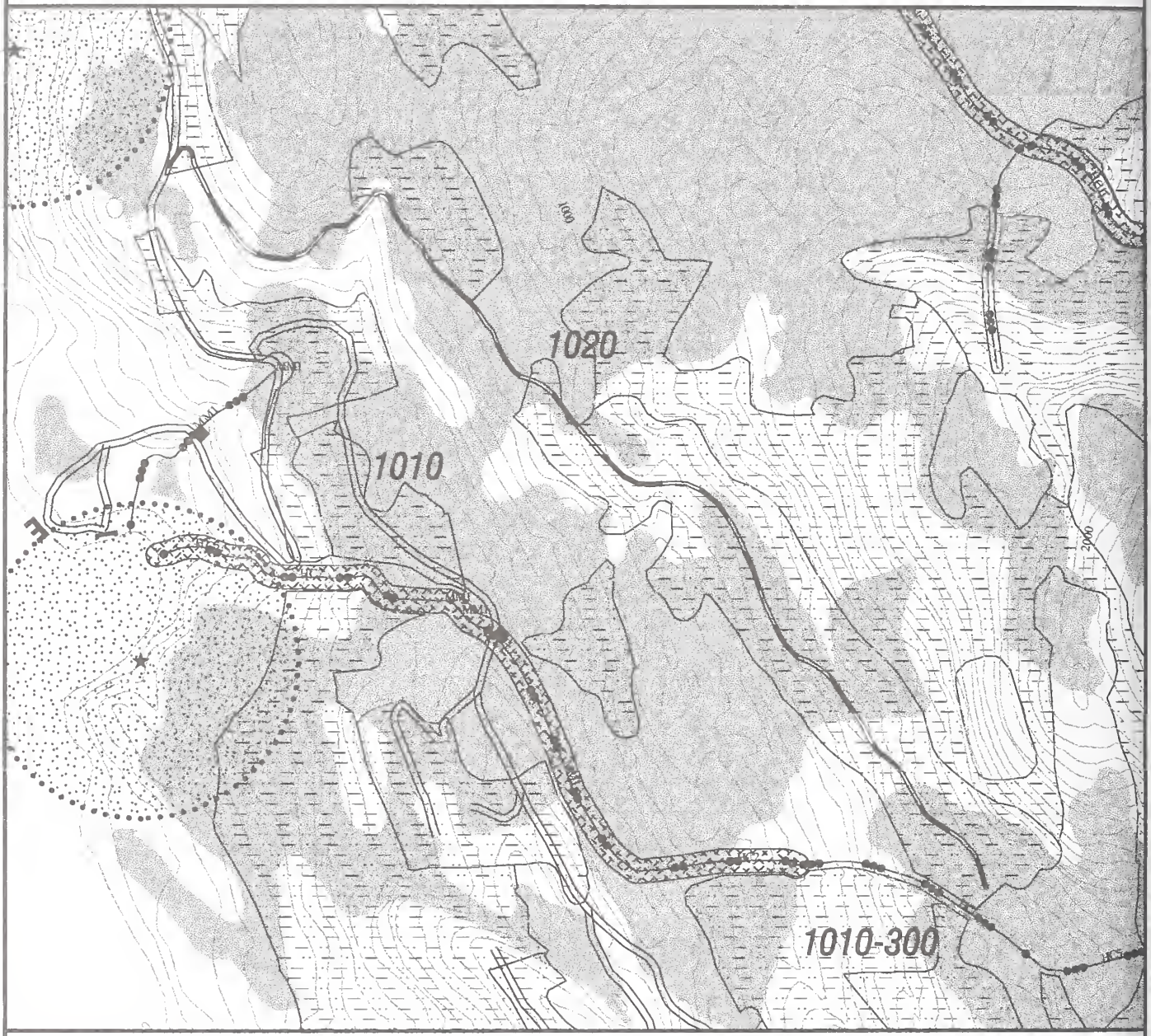
Road Number 1020 — *ALTERNATIVE 2*



- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- E — Proposed LTF Sites
- ◆ — Proposed Major Stream Crossing
- ★ — Eagle Nest Tree
- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 — 1500 — 3000

Miles

0 — 1/2

/adams1/madan/amls/ps-roadcar1.aml –December 22, 1999

ROAD MANAGEMENT OBJECTIVES
Madan Project - Road 1020

Road Description/Location

Project			System	Land Use Designation
Madan			Mainland	TM
Route No	**Route Name**		**Begin Terminus**	**End Terminus .**
1020	Upper Madan		Jct with Rd 10 at MP 1.39	Landing in Unit J-31
Begin MP	**Length**	**Status**	**Map Quarter Quad**	**Photo year, roll, photos**
0.00	2.03	Opportunity	Petersburg (A-1)	

General Design Criteria and Elements

Functional Class	Service Life	Surface	Width	Design Speed	Critical Vehicle	Design Vehicle
Local	LI	Shot rock	14'	10 mph	Logging Truck	Logging Truck

Intended Purpose/Future Use
Access for recurring silvicultural activities. Will be used for post-sale silviculture activities and future timber management.

Maintenance Criteria

Bmp	Emp	Operational Maintenance Level (Planned Initial Condition)	Objective Maintenance Level (Desired FutureCondition)	Alaska Forest Practices Act Class
0.00	2.03	2		Active
0.00	1.75		2	Active
1.75	2.03		1	Closed

Maintenance Narrative
AFR&P Reg's. "active" status: Keep culverts, catchbasins, ditches and road blocks functional. Grade as needed to maintain crown and running surface. Control roadside brush to maintain sight distance.

Storage AFR&P Reg's. "closed" status: Place road in storage, MP 1.75 - 2.03, remove or bypass culverts, add waterbars as needed.

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership

Traffic Management Strategies	**Encourage:**	Hikers and mountain bikes after timber harvest. (MP 0.00-1.75)
	Accept:	High clearance highway vehicles and non-highway vehicles after timber harvest (MP 0.00-1.75). Hikers after timber harvest (MP 1.75-2.05).
	Discourage:	Non-highway vehicles and mountain bikes after timber harvest (MP 1.75-2.03).
	Eliminate:	Public traffic during timber harvest. Passenger highway vehicles after timber harvest (MP 1.75-2.03).

Travel Management Narrative

Maintenance Level 1: While the road is in at this maintenance level the road will be closed and access for motorized highway vehicles will be blocked by placing a rock berm at the beginning of Road #10. Non-highway vehicles will be discouraged from using the road by signing.

Maintenance Level 2. While the road is at this maintenance level it is open to high clearance highway vehicles and non-highway vehicles. Public travel on this isolated road system is expected to be very low. After timber harvest the log transfer facility and equipment ramp will be removed to above mean high water. Given the expense and difficulty in accessing the road by vehicles, the preference for hunters and recreationists is likely to be in other areas. A few people may access the road system with non-highway vehicles, primarily during deer hunting season. Administrative traffic for post sale silviculture purposes and road maintenance are expected to generate most of the traffic on the system.

Approved_____ _____

District Ranger Date

Site Specific Design Criteria

Road Segment Descriptions

Milepost (miles)	Grade (%)	Average Side-slopes (%)	Length (feet)	Comments
0.00 to 0.66	0-10f	5-40	2460	Easy construction, crosses 1 Class IV and 3 non-streams. Good rock source at end of this section.
	8f-10a	15-30	1060	Short section of 10% adverse (180 ft) to Class IV stream. There are 2 class IV streams in this section
0.66 to 1.18	3-15f	5-30	1070	Easy construction, crosses 1 Class IV stream.
	3f-12a	10-30	305	Road parallels muskeg and crosses at the south end to maintain elevation needed for road grade. The crossing is approx. 15-20 ft long.
	5-10f	10-50	1310	Road crosses 3 Class IV streams
1.18 to 2.03	16f	40	200	
	5f-5a	15-40	2215	Grade rolls following bench, crosses 4 Class IV streams. Crosses 1 Class IV stream.
	5-14f	30	290	Class III stream at south end of segment.

	5a 16f 0-16f 0-10f			

*a = adverse; f = favorable

Stream Crossings: MP 1.74 60-inch culvert.

Wetlands: Where practical the road went around wetlands but due to grades, horizontal alignment and increased length of roads, some wetlands were crossed (see Road Segment Description above for details). BMP 12.5 applies to road construction on wetlands. Where terrain allows, overlay construction will be used, excavation will be avoided, and extra cross drains will be installed to avoid altering subsurface flow. The following is a list of wetland crossings for this road:
MP 0.86-0.92 Road is in forested wetlands along muskeg and includes a very short muskeg crossing.

Erosion Control: An erosion control plan for road construction and maintenance will be developed according to standard project specifications (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded (with native species if possible) and fertilized (BMP 12.17, 14.8).

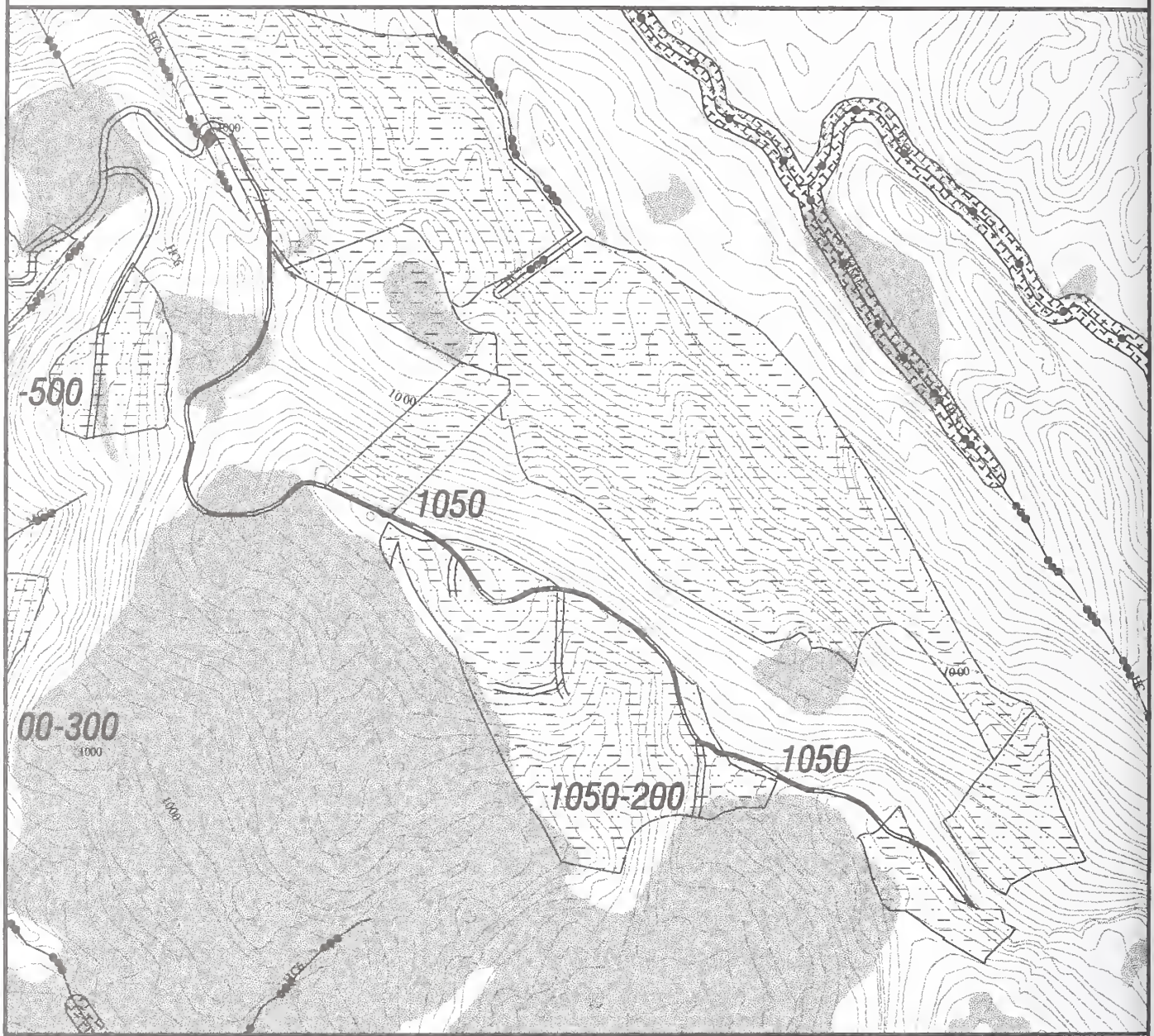
Noted areas of concern: None

Rock Pits: During periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended at quarries near potentially unstable sites where ground vibration may induce mass movement (BMP 14.6). Rock pits will require site specific erosion control plans (BMP 14.18). This road travels through areas of visual concern and therefore attention to visual effects will be necessary when selecting location, size and layout of a rock pit along this road. Sites noted as potential rock pits are listed below:

MP 0.47 Granite Rock Pit

Summary of Mitigation: The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F10, F13, W9, and R1. These measures are described within the resource sections that apply.

Road Number 1050 — *ALTERNATIVE 2*



- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- E — Proposed LTF Sites
- ◆ — Proposed Major Stream Crossing
- ★ — Eagle Nest Tree
- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 — 1500 — 3000

Miles

0 — 1/2

/adams1/madan/amls/ps-roadcar1.aml –December 22, 1999

ROAD MANAGEMENT OBJECTIVES
Madan Project - Road 1050

Road Description/Location

Project			System	Land Use Designation
Madan			Mainland	TM
Route No	**Route Name**		**Begin Terminus**	**End Terminus**
1050	Cove Extension		MP 0.00 at MP 4.88 of Road 10	Landing in unit V-83
Begin MP	**Length**	**Status**	**Map Quarter Quad**	**Photo year, roll, photos**
0.00	1.75	Opportunity	Petersburg (A-1)	

Road 1050 is a continuation of Road 10.

Maintenance Criteria

Bmp	Emp	Operational Maintenance Level (Planned Initial Condition)	Objective Maintenance Level (Desired FutureCondition)	Alaska Forest Practices Act Class
0.00	1.75	2	2	Active

Maintenance Narrative

AFR&P Reg's. "active" status: Keep culverts, catchbasins, ditches and road blocks functional. Grade as needed to maintain crown and running surface. Control roadside brush to maintain sight distance.

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership

Traffic Management Strategies

Encourage:	Hikers and mountain bikes after timber harvest.
Accept:	High clearance highway vehicles and non-highway vehicles after timber harvest.
Discourage:	N/A
Eliminate:	Public traffic during timber harvest. Passenger highway vehicles after timber harvest.
Prohibit:	N/A

Travel Management Narrative

Maintenance Level 2. While the road is at this maintenance level it is open to high clearance highway vehicles and non-highway vehicles. Public travel on this isolated road system is expected to be very low. After timber harvest the log transfer facility will be removed to above mean high water. Given the expense and difficulty in accessing the road by vehicles, the preference for hunters and recreationists is likely to be in other areas. A few people may access the road system with non-highway vehicles, primarily during deer hunting season. Administrative traffic for post sale silviculture purposes and road maintenance are expected to generate most of the traffic on the system.

Approved_____ _____

District Ranger Date

Site Specific Design Criteria

Road Segment Descriptions

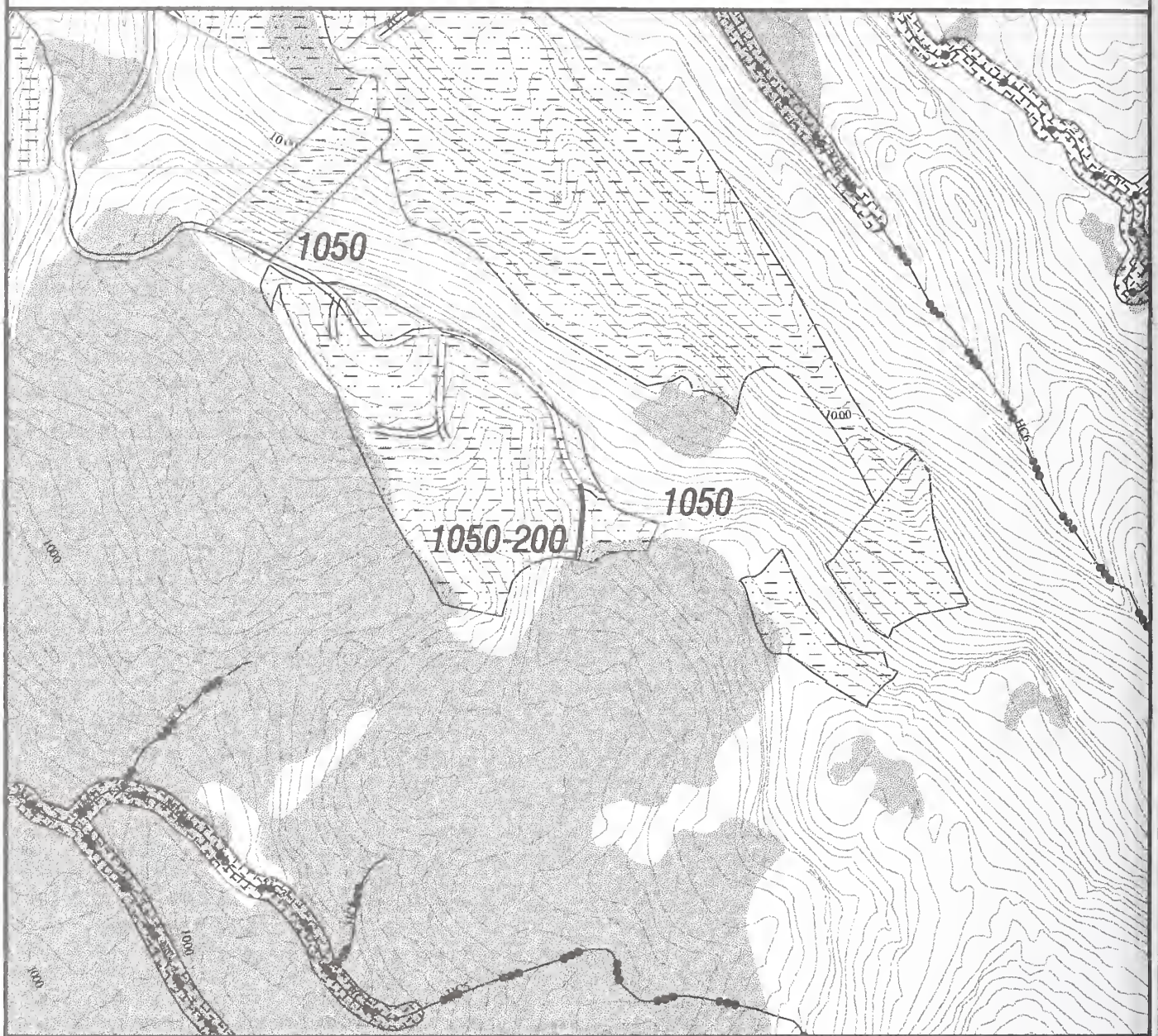
Milepost (miles)	Grade (%)	Average Side-slopes (%)	Length (feet)	Comments
0.00 to 0.41	10-18f	30-70	2150	Some short sections of Full bench/End haul required. No stream crossings. Climbing east side of ridge line. Route on West side of ridge was abandoned due to difficult construction; rock blasting and steep grades
0.41 to 0.50	10-15f	0-30	440	Crossing to ridge top bench along edge of muskeg for short distances.
0.50 to 0.71	10-15f	30-50	1100	Climbing to main ridgeline through good timber.
0.71 to 0.87	15f	20	863	Climbing on south side of main ridge. Crosses forested muskeg and upper end of muskegs. Muskeg could not be avoided and make an acceptable road grade to ridge top east.
0.87 to 1.75			4637	Following ridge top. Several notches and bumps require short segments of grades up to 18% to maintain ridge top location. Excellent logging access. MP 1.75 is the junction with 1050-200 RD
**1.75 to 2.00	12-18f	30-55	1325	Climbing north side of ridge-top at slope break. Some rock blasting required.
**2.00 to 2.09	0-15f	40-50	475	Crosses a notch in ridge top, which has limestone and no streams.
**2.09 to 2.25	0-12f	0-10	858	Follow bench to end. Good logging from bench.

*a = adverse; f = favorable

**This portion of the road was located to Unit V-93 and than abandoned due to poor economics.

Stream Crossings: The road is the near ridge top, and therefore, no major streams or fish streams were crossed.
Wetlands: Where practical the road went around wetlands but due to grades, horizontal alignment and increased length of roads, some wetlands were crossed (see Road Segment Description above for details). BMP 12.5 applies to road construction on wetlands. Where terrain allows, overlay construction will be used, excavation will be avoided, and extra cross drains will be installed to avoid altering subsurface flow. The following is a list of wetland crossings for this road: MP 0.80 to MP 1.03 has forested muskeg.
Erosion Control: An erosion control plan for road construction and maintenance will be developed according to standard project specifications (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded (with native species if possible) and fertilized (BMP 12.17, 14.8). Noted areas of concern: Sections will require rock blasting and full bench construction.
Rock Pits: During periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended at quarries near potentially unstable sites where ground vibration may induce mass movement (BMP 14.6). Rock pits will require site specific erosion control plans (BMP 14.18). This road travels through areas of visual concern and therefore attention to visual effects will be necessary when selecting location, size and layout of a rock pit along this road. Sites noted as potential rock pits are listed below: Field engineer said numerous possible rock pits are available on this road, but no specific locations were noted.
Summary of Mitigation: The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: K1, K3, F10, F13, W9, and R1. These measures are described within the resource sections that apply.

Road Number 1050-200 *ALTERNATIVE 2*



Proposed Road Segment
Adjacent Proposed Road Segments
Class 1 Streams
Class 2 Streams
Class 3 Streams
E Proposed LTF Sites
Proposed Major Stream Crossing

★ Eagle Nest Tree
Proposed cut units
TTRA Buffers
Wetlands
1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet
0 1500 3000

Miles
0 1/2

/adams1/madan/arnls/ps-roadcar1.aml –December 22, 1999

ROAD MANAGEMENT OBJECTIVES
Madan Project - Road 1050-200

Road Description/Location

Project			System	Land Use Designation
Madan			Mainland	TM
Route No	**Route Name**		**Begin Terminus**	**End Terminus**
1050-200	Glacier		MP 1.75 Rd 10	Landing V-83a Unit V-83
Begin MP	**Length**	**Status**	**Map Quarter Quad**	**Photo year, roll, photos**
0.00	0.14	Opportunity	Petersburg (A-1)	

General Design Criteria and Elements

Functional Class	Service Life	Surface	Width	Design Speed	Critical Vehicle	Design Vehicle
Local	LI	Shot rock	14'	10 mph	Logging truck	Logging Truck

Intended Purpose/Future Use
Access for future helicopter units to the NE and may be extended to for future timber management.

Maintenance Criteria

Bmp	Emp	Operational Maintenance Level (Planned Initial Condition)	Objective Maintenance Level (Desired FutureCondition)	Alaska Forest Practices Act Cla
0.00	0.14	2		Active
0.00	0.14		1	Closed

Maintenance Narrative
AFR&P Reg's. "active" status: Keep culverts, catchbasins, ditches and road blocks functional. Grade as needed to maintain crown and running surface. Control roadside brush to maintain sight distance (MP 0.00-0.14).

Storage AFR&P Reg's. "closed" status: Place road in storage, MP 0.00 - 0.14, remove or bypass culverts, add waterbars as needed.

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership

Traffic Management Strategies

Encourage:	N/A
Accept:	Hikers after timber harvest
Discourage:	Non-highway vehicles and mountain bikes after timber harvest.
Eliminate:	Public traffic during timber harvest. Passenger highway vehicles and high clearance highway vehicles after timber harvest.
Prohibit:	N/A

Travel Management Narrative

Maintenance Level 1: While the road is in at this maintenance level the road will be closed and access for motorized highway vehicles will be blocked by removing drainage structures. Non-highway vehicles will be discouraged from using the road by signing.

Approved_____ _____

District Ranger Date

Site Specific Design Criteria

Stream Crossings: Ridge top road: No large streams or fish streams crossed.

Wetlands: Where practical the road avoided wetlands, but due to grades, horizontal alignment and increased lengths of road, some wetlands were crossed. BMP 12.5 applies to road construction on wetlands. The following is a list of wetland crossings for this road: between MP 0.09 and 0.14 the road follows the edge of a muskeg.

Erosion Control: An erosion control plan for road construction and maintenance will be developed according to standard project specifications (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded (with native species if possible) and fertilized (BMP 12.17, 14.8).
Noted areas of concern:

Rock Pits: During periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended at quarries near potentially unstable sites where ground vibration may induce mass movement (BMP 14.6). Rock pits will require site specific erosion control plans (BMP 14.18). This road travels through areas of visual concern and therefore attention to visual effects will be necessary when selecting location, size and layout of a rock pit along this road. Sites noted as potential rock pits are listed below:
None noted; use rock pits on the 1050 road.

Summary of Mitigation: The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F10, W9, and R1.

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Road Number 20 (page 1 of 2) — *ALTERNATIVE 2*

- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- E — Proposed LTF Sites
- Proposed Major Stream Crossing
- ★ Eagle Nest Tree
- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 — 1500 — 3000

Miles

0 — 1/2

/adams1/madan/amls/ps-roadcar1.aml –December 22, 1999

ROAD MANAGEMENT OBJECTIVES
Madan Project - Road 20

Road Description/Location

Project	System	Land Use Designation
Madan	Mainland	TM

Route No	Route Name	Begin Terminus	End Terminus
20	Moose Creek	LTF near Moose Creek in Blake Channel	Landing in Unit M-123

Begin MP	Length	Status	Map Quarter Quad	Photo year, roll, photos
0.00	2.84	Opportunity	Petersburg (A-1)	

General Design Criteria and Elements

Functional Class	Service Life	Surface	Width	Design Speed	Critical Vehicle	Design Vehicle
Local	LI	Shot rock	14'	10 mph	Low bed truck	Logging Truck

Intended Purpose/Future Use
Access for recurring silvicultural activities. Will be used for post-sale silviculture activities and future timber management.

Maintenance Criteria

Bmp	Emp	Operational Maintenance Level (Planned Initial Condition)	Objective Maintenance Level (Desired FutureCondition)	Alaska Forest Practices Act Class
0.00	2.84	2	2	Active

Maintenance Narrative
AFR&P Reg's. "active" status: Keep culverts, catchbasins, ditches and road blocks functional. Grade as needed to maintain crown and running surface. Control roadside brush to maintain sight distance.

Operation Criteria

Highway Safety Act: No **Jurisdiction:** National Forest ownership

Traffic Management Strategies

Encourage:	Hikers and mountain bikes after timber harvest.
Accept:	High clearance highway vehicles and non-highway vehicles after timber harvest.
Discourage:	N/A
Eliminate:	Public traffic during timber harvest. Passenger highway vehicles after timber harvest.
Prohibit:	N/A

Road Number 20 (page 2 of 2) — *ALTERNATIVE 2*

- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- E — Proposed LTF Sites
- ◆ — Proposed Major Stream Crossing
- ★ — Eagle Nest Tree
- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 — 1500 — 3000

Miles

0 — 1/2

/adams1/madan/amls/ps-roadcar1.aml –December 22, 1999

Travel Management Narrative

Maintenance Level 2. While the road is at this maintenance level it is open to high clearance highway vehicles and non-highway vehicles. Public travel on this isolated road system is expected to be very low. Given the expense and difficulty in accessing the road by vehicles, the preference for hunters and recreationists is likely to be in other areas. A few people may access the road system with non-highway vehicles, primarily during deer hunting season. Administrative traffic for post sale silviculture purposes and road maintenance are expected to generate most of the traffic on the system.

Approved_____ _____

District Ranger Date

Site Specific Design Criteria

Road Segment Descriptions

Milepost (miles)	Grade (%)	Average Side-slopes (%)	Length (feet)	Comments
0.00 to 0.71	10-15f	30-60	3760	This stretch has some large cuts and sections of full bench construction. May be able to eliminate some full bench by re-alignment; see notes. Difficult construction.
0.71 to 0.99	10-15f	20-30	1460	This section follows a bench and accesses landings for M-117 ending at a good switchback location for the start of the 2010 RD. Should be potential for rock pits in this area.
0.99 to 1.85	0-10f	50	4505	This section crosses several Class IV streams. The section has gentle grades. May need full bench construction or other measures to mitigate MMI 4 soils near Unit M 119.
1.85 to 1.90	16f	35-50	330	This section is a constant pitch at 16% favorable to tie road from the south to previous grade from the north. Medium construction.
1.90 to 2.28	8f	45	1995	This section is a constant 8% grade that crosses several Class III and IV streams. Medium construction.
2.28 to 2.54	0	35	1390	This section has a rolling 2% grade and crosses several Class III and IV streams. Difficult construction due to streams.
2.54 to 2.84	0-8a	45	1532	This section also crosses several Class III and IV streams. Difficult construction due to streams.

*a = adverse; f = favorable

Note: Original road grade started on the east side of Moose Creek and went up the east side of Moose Creek. The road alignment was changed due to the lack of rock near the East-Side LTF as well as unstable soils, significant V-notches and construction difficulties.

Stream Crossings: No bridges, fish streams or culverts ≥48 inches were noted.

Wetlands: None noted.

Soils: In the northwest corner a short distance of road goes through MMI4 soils and therefore needs a geologist field review of the road layout for final approval.

Erosion Control: An erosion control plan for road construction and maintenance will be developed according to standard project specifications (BMP 14.5). Specific design measures will address erosion control in the vicinity of streams on the approach to the LTF and stream crossings. All areas of organic or mineral soil exposed during construction shall be grass seeded (with native species if possible) and fertilized (BMP 12.17, 14.8).
Noted areas of concern: MP 0.00 LTF; 0.00-0.71 Several full bench sections.

Rock Pits: During periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended at quarries near potentially unstable sites where ground vibration may induce mass movement (BMP 14.6). Rock pits will require site specific erosion control plans (BMP 14.18). This road travels through areas of visual concern and therefore attention to visual effects will be necessary when selecting location, size and layout of a rock pit along this road. Sites noted as potential rock pits are listed below:

MP 0.00 Rock pit near LTF; No other obvious rock sources were noted. It may be difficult to find rock for the north end of this road.

Wildlife: First approximately 1,000 ft of road is located within ¼ mile of bald eagle nest. Timing restrictions may apply. Avoid ground disturbance within 330 feet and repeated helicopter flights within ¼ mile of all nests from March 1 through May 31. Surveys needed prior to harvest to verify eagle nest activity. If nests are active, continue to avoid ground disturbance and repeated helicopter flight though August 31.

Cultural Resources: Limited portions of Road 20 inventoried for cultural resources near the shore of Blake Channel. One cultural resources site and one Culturally Modified Tree were located along the shore and may be within the area of potentially affected by the LTF. Move LTF if possible. Lower end of road (at least to the 100 foot elevation) is within high sensitivity zone for cultural resources; monitor road during or after construction in this area, as stated in the Programmatic Agreement among the USDA Forest Service Alaska Region, the Advisory Council on Historic Preservation, and the Alaska SHPO.

Summary of Mitigation: The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: F9, F13, F16, F17, W9, W13, R1, and V11. These measures are described within the resource sections that apply.

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Road Number 2010 (page 1 of 2) — *ALTERNATIVE 2*

- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- E — Proposed LTF Sites
- Proposed Major Stream Crossing
- S — Sort Yard
- Eagle Nest Tree
- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 — 1500 — 3000

Miles

0 — 1/2

/adams1/madan/amls/ps-roadcar1.aml –April 03, 2000

ROAD MANAGEMENT OBJECTIVES
Madan Project - Road 2010

Road Description/Location

Project			System	Land Use Designation
Madan			Mainland	TM
Route No	**Route Name**		**Begin Terminus**	**End Terminus**
2010	Mountain View		Jct with Rd 20 at MP 0.99	Landing in Unit M-184
Begin MP	**Length**	**Status**	**Map Quarter Quad**	**Photo year, roll, photos**
0.00	3.02	Opportunity	Petersburg (A-1)	

General Design Criteria and Elements

Functional Class	Service Life	Surface	Width	Design Speed	Critical Vehicle	Design Vehicle
Local	LI	Shot rock	14'	10 mph	Logging Truck	Logging Truck

Intended Purpose/Future Use
Access for recurring silvicultural activities. Will be used for post-sale silviculture activities and future timber management.

Maintenance Criteria

Bmp	Emp	Operational Maintenance Level (Planned Initial Condition)	Objective Maintenance Level (Desired FutureCondition)	Alaska Forest Practices Act Class
0.00	1.50	2	2	Active
1.50	3.02		1	Closed

Maintenance Narrative
AFR&P Reg's. "active" status: Keep culverts, catchbasins, ditches and road blocks functional. Grade as needed to maintain crown and running surface. Control roadside brush to maintain sight distance.

Storage AFR&P Reg's. "closed" status: Place road in storage, MP 1.50 - 3.02, remove or bypass culverts, add waterbars as needed.

Road Number 2010 (page 2 of 2) — *ALTERNATIVE 2*

- Proposed Road Segment
- Adjacent Proposed Road Segments
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
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- Proposed cut units
- TTRA Buffers
- Wetlands
- 1/4 mile Eagle Nest Timing Buffer

Scale: 4" = 1 Mile

Scale in Feet

0 — 1500 — 3000

Miles

0 — 1/2

/adams1/madan/aml/ps-roadcar1.aml –December 22, 1999

Operation Criteria		
Highway Safety Act:	No	**Jurisdiction:** National Forest ownership
Traffic Management Strategies	**Encourage:**	Hikers and mountain bikes after timber harvest (MP 0.00-1.52).
	Accept:	High clearance highway vehicles and non-highway vehicles after timber harvest (MP 0.00-1.52). Hikers after timber harvest (MP 1.52-3.02).
	Discourage:	Mountain bikes and non-highway vehicles after timber harvest (MP 1.52-3.02).
	Eliminate:	Public traffic during timber harvest. Passenger highway vehicles after timber harvest (MP 0.00-3.02). High clearance vehicles after timber harvest (MP 1.52-3.02).
	Prohibit:	N/A

Travel Management Narrative

Maintenance Level 1: While the road is in at this maintenance level the road will be closed and access for motorized highway vehicles will be blocked by placing a rock berm at the beginning of Road #20. Non-highway vehicles will be discouraged from using the road by signing.

Maintenance Level 2. While the road is at this maintenance level it is open to high clearance highway vehicles and non-highway vehicles. Public travel on this isolated road system is expected to be very low. After timber harvest the log transfer facility and equipment ramp will be removed to above mean high water. Given the expense and difficulty in accessing the road by vehicles, the preference for hunters and recreationists is likely to be in other areas. A few people may access the road system with non-highway vehicles, primarily during deer hunting season. Administrative traffic for post sale silviculture purposes and road maintenance are expected to generate most of the traffic on the system.

Approved_____ _____

District Ranger Date

Site Specific Design Criteria

Stream Crossings: MP 2.52 Class III or IV, 48-inch culvert. The field engineer says that this appears to split into smaller streams and may have some flow underground, which is why no large culverts are called for downstream.

Wetlands: None noted.

Erosion Control: An erosion control plan for road construction and maintenance will be developed according to standard project specifications (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded (with native species if possible) and fertilized (BMP 12.17, 14.8).

Noted areas of concern: MP 0.00 100 ft radius Switchback.
0.34 90 ft radius Switchback/Rock pit;
0.60-0.69 Full bench/End haul;
0.91 50 feet east, resurgent stream; see Karst section below.
2.11-2.40 1000 ft of Full bench/End haul;
1.44-1.63 Full bench.

Rock Pits: During periods of high rainfall (as defined in current regional specifications) blasting operations will be suspended at quarries near potentially unstable sites where ground vibration may induce mass movement (BMP 14.6). Rock pits will require site specific erosion control plans (BMP 14.18). This road travels through areas of visual concern and therefore attention to visual effects will be necessary when selecting location, size and layout of a rock pit along this road. Sites noted as potential rock pits are listed below:
Potential rock pit at MP 0.34 switchback. There should be opportunities for rock pits at the back of the road at higher elevations.

Karst: A resurgent stream occurs approximately 50 feet east of MP 0.91. The stream runs parallel to road for about 100 feet before resurfacing about 40-60 feet downslope of road. The resurgent stream needs to be marked prior to road construction. The road layout may need to be realigned higher on the slope above the stream to avoid potential damage. However, the steepness of the slope above and below the proposed road may preclude this option. Sediment control structures and BMPs should be used to reduce impacts to the stream during road construction. Surface erosion BMPs should be implemented to divert runoff away from the karstic stream to reduce sedimentation effects.
Note: End of road dropped because of economics due to the reduced cable setting size of M-150 and difficult construction.

Summary of Mitigation: The following mitigation measures were either taken into account during unit design or they will be applied during project implementation: K1, K3, F13, W9, and R1. These measures are described within the resource sections that apply.

Appendix D

Log Transfer Facility Design

Appendix D

Madan LTF Site Selection, Design, and Operating Guidelines

Log Transfer Facilities

A log transfer facility (LTF) is the location where logs are transferred between a ground-based transport system of roads and trucks and a water-based transport system of rafts, barges, and tugboats. Appendix G of the Revised Forest Plan (USDA Forest Service, 1997) contains LTF siting guidelines. The guidelines were developed by the Alaska Timber Task Force Log Transfer Facility Guidelines Technical Subcommittee in 1985. The guidelines identify physical characteristics necessary for safe and efficient log transport as well as minimum requirements for mitigation of water quality and aquatic habitat effects. We consider all of the guidelines and develop LTFs which represent the best mix: allowing activities to proceed while meeting all applicable statutory and regulatory requirements. The LTFs undergo a complex and rigorous permitting process involving multiple federal and state agencies. The information contained in this appendix is intended to facilitate the permitting process and provide an opportunity for the EIS reader to comment on Madan Timber Sale LTF locations, construction, operation, and monitoring.

No roads currently exist in the Madan project area. Three action alternatives for the Madan project propose developing an LTF at Jenkins Cove and at Moose Creek. Alternatives 2 - 5 depend on development of a road transportation system that would originate at new LTFs in Jenkins Cove, Moose Creek, or both sites. Several potential LTF sites have been considered for the Madan Project Area. Field and SCUBA dive investigations were conducted by the US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service in 1984, and by the USFWS in 1997 and 1998 (USFWS, 1984, 1997, 1998). The USFWS found the two selected sites to be suitable for LTF development and unlikely to significantly affect marine and estuarine resources.

The LTF at Jenkin's Cove will be a floating log slide (Figure D-1). Development of the site will also include a rock ramp for equipment and vehicle access. The log slide will be removed upon completion of the sale. The LTF at Moose Creek will be a low angle rock ramp (Figure D-2). The rock ramps at Jenkin's Cove and Moose Creek will be left in place as part of the forest transportation system.

Responses to project scoping indicated concerns about bark deposition at LTFs and impacts on marine productivity. To address these concerns, we have selected sites that meet the approval of the USFWS. Concerns were also raised about interference with commercial fishing activities. Given the contraints of coastal terrain and economics, we have limited opportunity to completely avoid potential conflicts between logging operations and commercial fishing. For example, barges, log rafts, or floating camps could be located in areas which are preferred crab or shrimp pot sites. If these conflicts occur, we anticipate they will be temporary and similar to conflicts which typically occur between competing fishermen (Figure D-3).

Additional site specific information pertaining to the guidelines developed by the Alaska Timber Task Force Log Transfer Facility Guidelines Technical Subcommittee for the proposed LTF follows.

Siting Guidelines

S1. Proximity to Rearing and Spawning Areas: Avoid sites within 300 feet of the mouth of anadromous fish streams, or in areas known to be important for fish spawning or rearing.

There are no anadromous fish streams within 300 feet of the Jenkins Cove LTF site. The nearest anadromous fish stream is Gypsy Creek, about two miles north of the proposed LTF. It is possible that some intertidal pink or chum salmon spawning occurs at the mouth of a stream draining into Jenkins Cove, approximately 900 feet from the LTF

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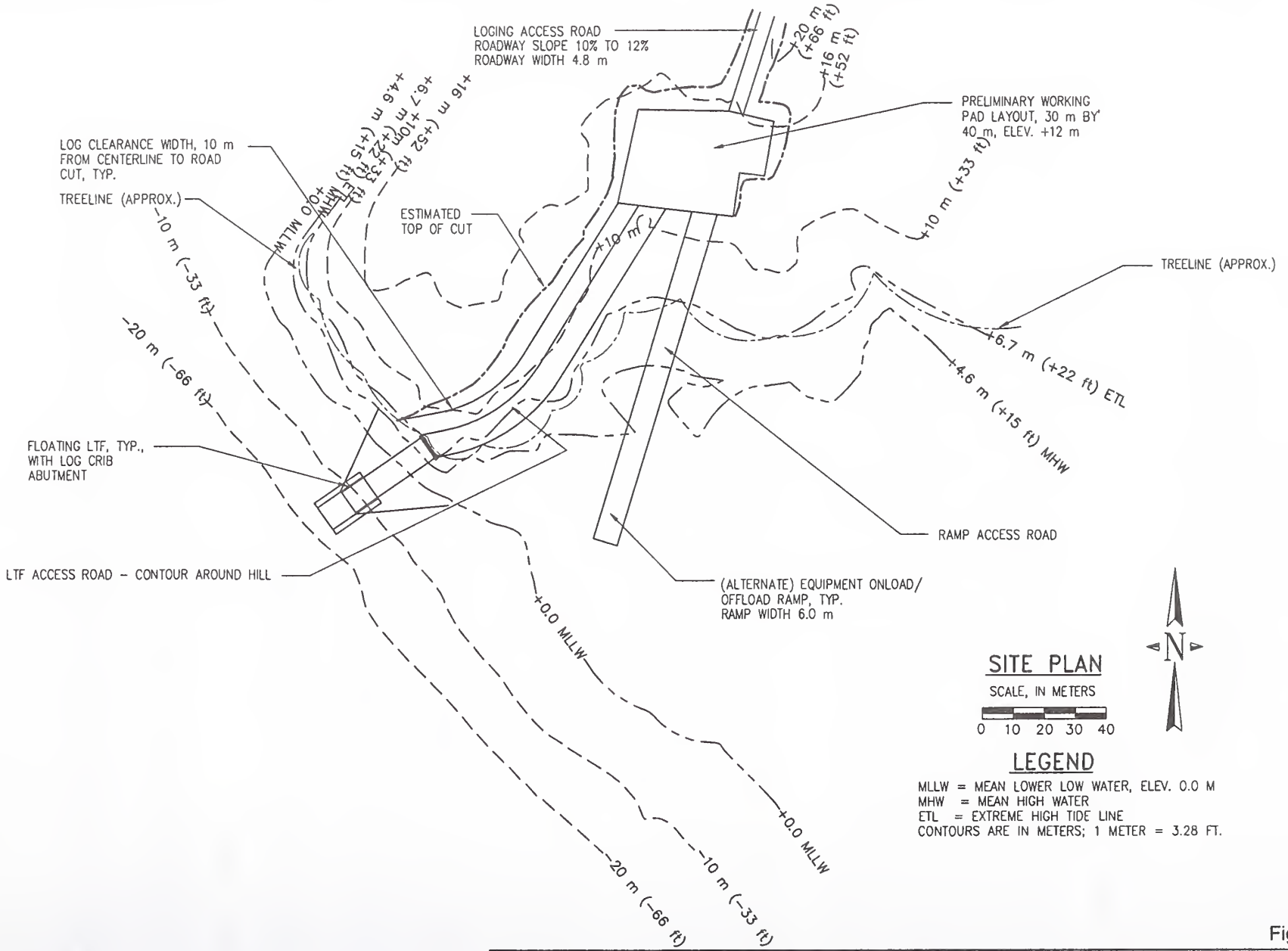


Figure D-1.

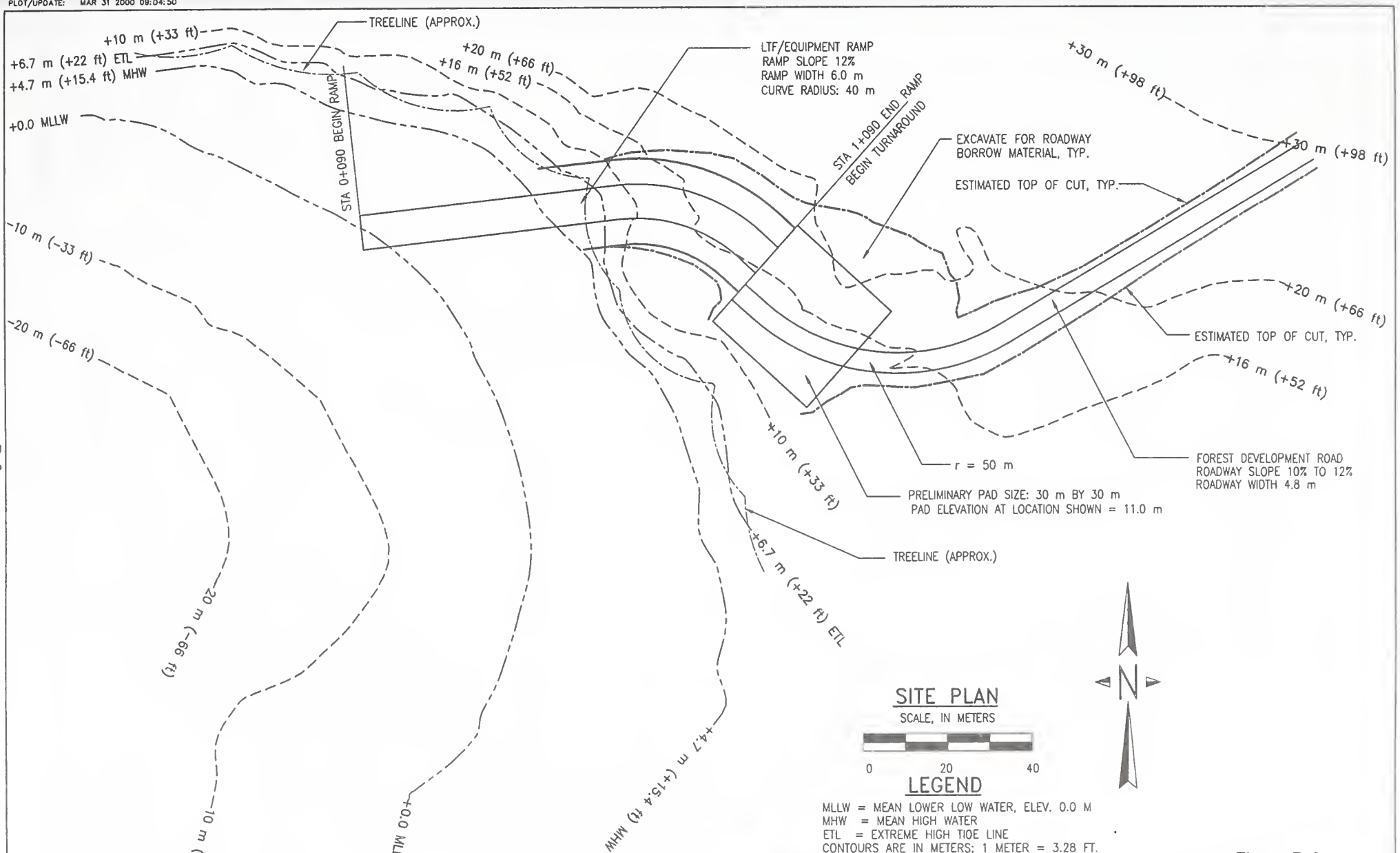
REVISION	DATE	DESCRIPTION	BY

Designed By: K. ELMORE Date 2/3/2000
Drawn By: K. ELMORE Date 2/3/2000
Checked by: _____ Date _____

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
REGION 10 TONGASS N.F.

JENKINS COVE LTF
PRELIMINARY SITE PLAN

Drawing No. _____ Page _____ of _____



SITE PLAN

SCALE, IN METERS

0 20 40

LEGEND

MLLW = MEAN LOWER LOW WATER, ELEV. 0.0 M
MHW = MEAN HIGH WATER
ETL = EXTREME HIGH TIDE LINE
CONTOURS ARE IN METERS; 1 METER = 3.28 FT.

Figure D-2.

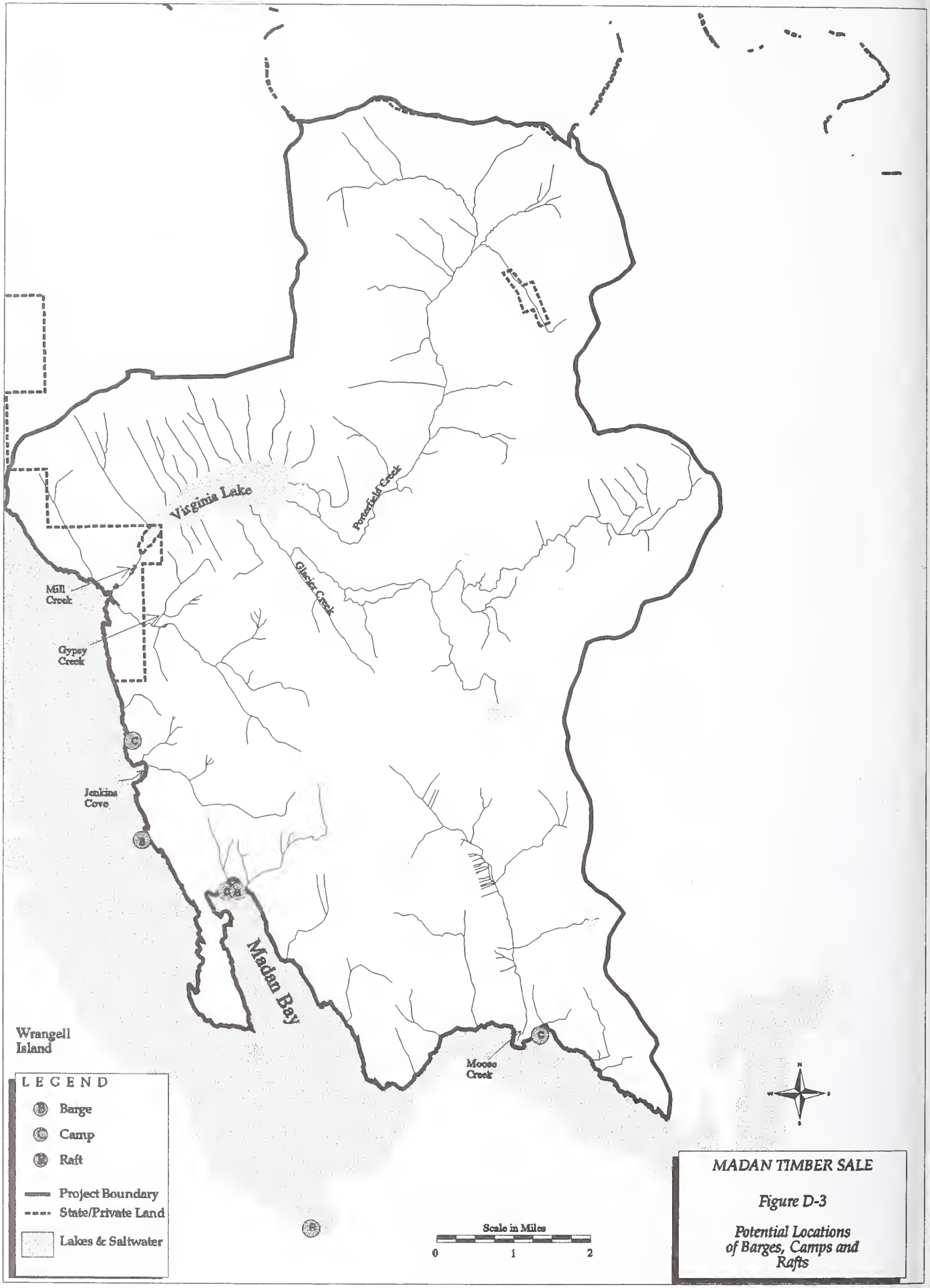
REVISION	DATE	DESCRIPTION	BY

Designed By: K. ELMORE Date 2/3/2000
Drawn By: K. ELMORE Date 2/3/2000
Checked by: Date

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
REGION 10 TONGASS N.F.

MOOSE CREEK LTF
SITE PLAN

Drawing No. Page of



MADAN TIMBER SALE

Figure D-3

Potential Locations of Barges, Camps and Rafts

/adams1/madan/amls/ps-8x11.aml - April 03, 2000 - barges.hpg

site. However, no spawners or carcasses have been observed there and no juvenile anadromous fish of any species were found in the lower reaches of the stream.

The mouth of Moose Creek (an anadromous fish stream) is over 500 feet shoreline distance from the Moose Creek LTF site.

S2. Protected Locations: Choose sites in weather-protected waters with bottoms suitable for anchoring and with at least 20 acres for temporary log storage and log booming.

Protection from wind and high seas is limited. All sites considered are somewhat exposed to southeasterly winds.

S3. Upland Facility Requirements: Choose sites with proximity to at least five acres of relatively flat uplands. The LTF should provide at least 60 linear feet of operating face along the water.

Jenkins Cove and Moose Creek LTFs are within 500 feet of proposed sort yards. These sort yards will be within the 1000 foot beach fringe. The size of the sort yards will be limited to about four acres each.

These sites will require at least 70 feet of tree clearing at the high water line for passage of log bundles. The actual operating face of the LTF structures would be narrower, only wide enough to handle equipment to be loaded and unloaded. There is adequate room at the sites for 60 feet of operating face along the water, however, visual mitigation measures incorporated into the LTF design may limit the operating faces.

S4. Safe Access to a Facility from the Uplands: Choose sites where access roads to the LTF can maintain a grade of ten percent or less.

The access roads can be constructed at a 10-15% grade.

S5. Bark Dispersal: Choose sites where currents are likely to disperse sunken or floating wood debris.

According to the Fish and Wildlife Service (1997) "flushing potential appeared good" at the Jenkins Cove site. Although no similar conclusion was reported at the selected Moose Creek site, current was noted during the dive survey. Both of the proposed sites were recommended as suitable for LTFs.

S6. Site Productivity: Choose sites with the least productive intertidal and subtidal zones.

According to the Fish and Wildlife Service (1997 and 1998) overall species diversity and abundance at both of the proposed sites was relatively low. These sites were not described as productive compared to some other sites examined in 1997.

S7. Sensitive Habitat: Avoid sites on or adjacent to sensitive habitats: extensive tideflats, salt marshes, kelp or eelgrass beds, seaweed harvest areas or shellfish concentration areas.

Neither of the proposed sites are located on or adjacent to sensitive habitats.

S8. Safe Marine Access to Facilities: Choose sites that are safely accessible to tugboats with log rafts at most tides and on most winter days.

Tide changes may affect accessibility at the site and barges may not be able to be loaded or unloaded when the tide is below +1 foot. Winter weather (wind and high seas) may be a limiting factor at the site since the location is not well protected. Winter weather is likely to be a limiting factor for all logging operations.

S9. Storage and Rafting: Choose sites where stored logs, log bundles, or log rafts will not ground at low tide. Minimum depths of 40 feet Mean Lower Low Water are preferred for log storage areas.

Sites selected for log rafting provide minimum water depths as preferred.

S10. Bald Eagle Nest Trees: Avoid sites within 330 feet of bald eagle nests.

There are no documented bald eagle nests near Jenkins Cove. At Moose Creek, a documented nest is probably within 330 feet of the proposed LTF site. [An alternative LTF site on the east side of Moose Creek presented greater impacts to fresh water quality and fish habitat than the proposed site. Problems with the east Moose Creek LTF are documented in the planning file]. Field surveys conducted in 1997 and 1998 indicate that this nest either no longer exists or was not currently active. The area will continue to be surveyed each year to determine if the nest is active; if it is active, LTF construction and other logging activities will be subject to timing restrictions unless a variance is obtained from the Fish and Wildlife Service.

Construction and Operation Guidelines

C1. LTF Design: Design LTFs to be least environmentally damaging as practicable, considering economics, facility requirements, physical site constraints, site usage (timber volume) and duration, water quality and habitat mitigation, and other potential uses.

Most environmental concerns are addressed through the siting guidelines described above for the site. Remaining concerns associated with erosion control, water quality, and visuals are addressed through design measures and operating guidelines described below.

Physical constraints due to steep topography, as well as visual objectives, present design challenges at the sites. The LTFs will require separate upland sites for log sorting, storage, and equipment maintenance. Separation of the sort yards from the LTF sites will reduce the amount of bare ground, and equipment activity adjacent to marine waters, thereby, reducing risks associated with sediment transport, oil spills, and other potential hazards to marine water quality.

We anticipate a maximum potential wood volume of about 32 MMBF from this sale. Log transfer facilities are utilized to transport logs to salt water at both Jenkin's Cove and Moose Creek under all action alternatives except one. The exception is Alternative 5 which does not enter Moose Creek drainage or develop the Moose Creek LTF. A low angle shot rock ramp is the most likely design for the Moose Creek site and a floating LTF the most likely for Jenkin's Cove.

C2. Fill Structures: Design and construct fill structures to prevent erosion, pollution, and structural displacement.

Existing beach topography will be incorporated into the design as feasible. Fill structures will be necessary to provide bulkheads and minimize access road grades coming into the LTFs. These structures will be minimum height native log and/or stable rock revetments reinforced with riprap below storm tide level to protect fill from erosion. The bulkhead for the floating LTF will be removed upon completion of the sale.

C3. Timing of Inwater Construction: If necessary, limit adverse impacts to marine resources and avoid conflicts with other users through construction and operation timing restrictions.

Both LTFs were located to avoid adverse impacts to marine resources. No construction or timing restrictions are proposed to protect marine resources or to avoid conflicts with other users

C4. Bark Accumulation Management: Use Best Management Practices to control intertidal and submarine accumulations of bark and other debris.

LTF design will ensure low entry speed of log bundles into the water. Some bark and debris will inevitably accumulate in the water during entry and rafting operations. Log booms will contain most of the floating and near-submerged debris that may be of concern to boaters in the area. The contract administrator will ensure that the operator is aware of this concern. The contract will include provisions to ensure that the operator immediately removes logging-related debris from the water. The monitoring plan also addresses this concern.

C5. Solid Waste Management: Remove solid wastes, including wood, generated from the LTF and dispose of it at an approved upland solid waste disposal site.

The contract will include provisions to ensure proper disposal of solid waste in accordance with NPDES and other permits. Disposal methods may vary with type of waste accumulated. Daily cleanup of the LTF is required when accumulations of bark and other wood debris are present.

C6. Bark Accumulation: Comply with permitting agency cleanup requirements (if any) if intertidal and submarine bark accumulations exceed standards (100% coverage exceeding one acre or an accumulation exceeding ten centimeters at any point).

To date, cleanup has not been required at existing LTF sites known to exceed these standards. There is still some question as to whether cleanup is feasible or even beneficial. Cleanup efforts will require cooperative efforts between the Forest Service and permitting agencies. If cleanup or remediation plans are developed, they would address alternative transfer devices and methods, operational practices, and removal of bark from the ocean bottom. Remediation plans would be approved by ADEC and permitting agencies.

C7. Bundle Speed: Control log bundle entry into receiving waters to the slowest speed practicable.

The floating log slide LTF is designed to meet this requirement.

C8. Surface Drainage Management: Use Best Management Practices to control surface water runoff from LTFs.

Sort yards have been located well away from LTFs to minimize bare ground adjacent to marine waters. Grade control, sediment detention ponds, cross-drains and site cleanup requirements will address erosion and sediment transport associated with surface water runoff.

C9. Control of Hydrocarbons: Utilize oil pollution prevention plans (BMP 12.8) and oil pollution contingency plans (BMP 12.9) to minimize petroleum products entering waters.

Petroleum product storage and equipment servicing and refueling will be controlled through specific contract provisions. Spill Prevention Control and Countermeasure plans provide organizational structure and procedures for responding to oil spills.

C10. Onshore Log Storage: Where feasible, give preference to onshore storage and barging of logs.

A barging facility would require more sophisticated deep water LTFs. Log transfer from the LTF to the barge would be intermittent due to tidal water depth changes. Barge facilities also require a larger than normal decking area to accommodate the intermittent nature of tidal change and LTF/barge transfer. This would have significant effects upon sale economics. While transportation costs of a barge are more economical than a raft, barging requires more log handling which can off set the economics of transportation. For these reasons, the LTF-barge only alternative was eliminated from further analysis. While the costs associated with barge only are considered prohibitive, the effects resulting from placing log bundles into the water and rafting are considered acceptable at both of the proposed LTF sites.

C11. Facility Maintenance and Reclamation: Maintain active and intermittent LTFs and restore abandoned LTFs.

The floating log slide LTF at Jenkin's Cove will be removed upon completion of logging operations. The low angle shot rock ramps at Moose Creek and Jenkin's Cove will be maintained as part of the forest transportation system.

Monitoring and Reporting Guidelines

M1-6. Monitoring Requirements: Monitor for bark accumulations, oil sheen, surface runoff associated with LTF construction, operation and maintenance. Assure that corrective actions occur if necessary.

The LTF permits will specify monitoring requirements and methods. Typically, bark accumulation is monitored annually at the beginning of each operating season according to specific protocols by SCUBA surveys at active

LTFs. Waters in the vicinity of the LTF are monitored daily for the presence of visible oil sheens during LTF operation.

M7. Report results of monitoring annually.

A summary of LTF monitoring results is available and reports are submitted annually to EPA and ADEC. LTF permits establish reporting procedures.

Appendix E

Mitigation Measures by Harvest Unit and Road

Appendix E

Site-specific Mitigation Measures Incorporated into Unit and Road Design

The specific mitigation measures that are applied to selected units and/or roads are identified in this section. Listed below is a summary of the Forest Plan Mitigation Measures. The source(s) of each general measure are listed after the measure in terms of individual Forest Plan standards and guidelines (see Chapter 4 of the Forest Plan) or BMPs (see Appendix C of the Forest Plan and Chapter 10 of FSH 2509.22, Region Soil and Water Conservation Handbook). A summary table showing the units to which the specific measures apply is found herein.

Karst and Cave Resources

K1 Avoid Effects on Karst/Cave Features: Avoid road construction or modify harvest unit design to avoid impacts on karst or cave features. (KARST - III4)

K3 Other Specific Protection Measures for Karst/Cave Features: Develop site-specific protective measures for karst and cave features. (KARST - III4)

Fish, Water, and Soils

F1 Riparian Buffers: Establish no-harvest and selective cut buffers along streams and around lakes to protect riparian areas as defined by the Riparian Standards and Guidelines. Protect buffers from adjacent harvest activities (e.g., directional felling, split yarding, suspension requirements). (RIP2, BMP 12.6)

F2 Directional Felling Along Buffers: Trees identified for harvest will be felled to avoid riparian areas designated for "no commercial harvest" and stream courses. (RIP2-II)

F3 Class III/IV Stream Protection: Split yard and directionally fall trees away from Class IV streams without buffers. (RIP2-II)

F4 Yarding Across Streams: Directionally fall and fully suspend logs where yarding is to be done across streams or the full length of a stream or drainage. (RIP2-II)

F5 Fish Passage: Maintain fish passage at Class I and II stream road crossings using properly designed stream crossing structures (consult the Aquatic Habitat Management Handbook, FSH 2609.24). (FISH112-IV)

F6 Use of Bridges: Install bridges at designated stream crossings to minimize the amount of sediment entering streams and/or to ensure good fish passage (TRAN 214-II)

F8 Siting of Road-Stream Crossings: Modify the location of road-stream crossings to correspond with stable stream reaches. (TRAN214-II)

F9 Routing of Roads near Streams: Modify road routes to avoid locations near fish-bearing streams. (TRAN214-II)

F10 Routing of Roads through Wetlands and Other Sensitive Areas: Modify location of Forest Development Roads to minimize impact to wetlands, floodplains, estuaries, and tidal meadows. (TRAN214-III)

F11 Harvesting Timber in/near Wetlands and Floodplains: Modify unit design or logging system to avoid or minimize damage to muskegs, other wetlands, or floodplains. (S&W112-I, BMP 12.4 and 12.5)

F13 Stormproofing Roads: Design system roads with oversized culverts, outfall riprap, armored dips adjacent to culverts, substantial ditch blocks, drivable waterbars, and/or other measures to prevent culvert failure or erosion during periods of inactivity. (TRAN22-I)

F15 Avoid Harvesting High Hazard Soils: Modify unit design to avoid very high mass movement areas, including slopes greater than 72 percent. (S&W112-I, BMP 13.5)

F16 Soil/Water Protection along Roads on Very High Hazard Soils: Where avoidance of road construction along unstable slopes is not possible, take special precautions with fill to prevent soil erosion, stream sedimentation, and mass wasting or require full bench construction and end hauling of excavated material. (S&W112-I, TRAN 214-II, and BMP 14.7)

F17 Soil/Water Protection along Roads on High Hazard Soils: Where avoidance of road construction along unstable slopes is not possible, take special precautions with fill to prevent soil erosion, stream sedimentation, and mass wasting or require full bench construction and end hauling of excavated material. (S&W112-I, TRAN 214-II, and BMP 14.7)

F18 Suspension Requirements to Protect Soils: Use partial- to full-suspension logging systems in areas with high mass movement potential or McGilvery soils. (S&W112-I, BMP 13.9)

Timber

T1 Maintain Advanced Regeneration: Maintain advanced regeneration within the units to meet reforestation needs and stand objectives. (TIM111-2-I)

Wildlife and Threatened/Endangered/Sensitive Species

W1 Provide Habitat Diversity by Using the Clearcutting with Reserves System: Provide for greater habitat diversity on a stand level over time by using clearcutting with reserve trees (even-aged system) as a harvest prescription (see Appendix G to Forest Plan FEIS). (WILD112 - III)

W5 Patch or Strip Clearcutting: Provide for greater habitat diversity on a stand level over time by using patch or strip clearcutting (two-aged or uneven-aged systems) as a harvest prescription (see Appendix G to Forest Plan FEIS). (WILD112-III)

W6 Provide Habitat Diversity by Using the Uneven-aged Harvest System: Provide for greater habitat diversity on a stand level over time by using the selection method (uneven-aged system) as a harvest prescription (see Appendix G to Forest Plan FEIS). (WILD112 - III)

W7 Leaving Nonmerchantable Trees and Snags: Provide for greater habitat diversity on a stand level over time by leaving most nonmerchantable trees and snags after harvest. (WILD112 - III)

W8 Restrictions on Helicopter Yarding: Modify helicopter yarding routes and/or timing of helicopter activity to avoid important wildlife habitats (active bald eagle nest sites). (WILD112-XII)

W9 Road Closures: Close roads to motorized use to protect wolves and other species from over harvest. (WILD112)

W13 Protection of Bald Eagle Nest Trees/Other Sites and Timing of Activities: Avoid all activity, modify unit or road design, and/or limit timing of activities, near bald eagle nest trees, perch trees, and winter roost sites in accordance with the Interagency Agreement established with the USFWS. (WILD112-V)

W31 Protection of Sensitive Plant Species: Modify unit boundaries or road routing to avoid habitats supporting populations of sensitive plant species. (TE&S-II)

RECREATION AND TOURISM

R1 Access Restrictions for Recreation: Close or restrict access on roads to maintain remoteness of areas after harvest. (REC112-II)

Scenery

V1 Meet Visual Resource Objectives by Using the Clearcutting with Reserves System: Reduce visual contrast with adjacent areas by using clearcutting with reserve trees (even-aged system) as a harvest prescription (see Appendix G to Forest Plan FEIS). (VIS11 - III)

V5 Patch/Strip Clearcutting: Reduce visual contrast with adjacent areas by using patch or strip clearcutting (two-aged or uneven-aged systems) as a harvest prescription (see Appendix G to Forest Plan FEIS). (VIS11-III)

V6 Meet Visual Resource Objectives by Using the Uneven-aged Harvest System: Reduce visual contrast with adjacent areas by using the selection method (uneven-aged system) as a harvest prescription (see Appendix G to Forest Plan FEIS). (VIS11 - III)

V7 Leaving Nonmerchantable Trees: Reduce visual contrast with adjacent areas by leaving most nonmerchantable trees after harvest. (VIS11 - III)

V8 Modification of Unit Boundaries: Modify unit boundaries to ensure that the harvest unit meets the proposed VQO in partial retention and retention areas. (VIS11-II)

V11 LTF Design: Use low profile LTF design to minimize visibility from Visual Priority Travel Routes and Use Areas. (VIS11-II)

V13 Landscape Architect Review: Use landscape architect for review of final layout to ensure that VQO will be met.

Appendix Table E-1. Site-specific mitigation measures applied to individual harvest units by alternative.

					Site-Specific Mitigation Measures For harvest Units[1/]																								
	Alternative				Karst & Cave		Fish, Water, & Soils							Timber		Wildlife & TES Species							Scenery					
Units[2/]	2	3	4	5	K1	K3	F1	F2	F3	F4	F11	F15	F18	T1		W1	W5	W6	W7	W8	W13	W31	V1	V5	V6	V7	V8	V13
J-1	1	1		1			1	1	1		1			1		1			1				1			1	1	1
J-3			1				1	1	1		1			1				1			1				1			
J-4		1	1				1	1	1		1			1				1			1				1			
J-5	1	1		1			1	1						1		1			1			1	1			1		1
J-5			1				1	1						1				1				1			1			
J-10	1	1		1					1					1		1			1				1			1		
J-10			1						1					1				1							1			
J-13	1	1		1			1	1					1	1		1			1				1			1	1	
J-13			1				1	1					1	1				1	1						1		1	
J-30	1			1					1		1			1		1			1				1			1		
J-30		1	1						1		1			1				1							1			
J-31	1			1			1	1			1	1		1				1	1						1	1		
J-31		1	1				1	1			1	1		1				1							1			
J-32	1			1			1	1			1			1				1	1						1	1		
J-32		1	1				1	1			1			1				1							1			
J-33	1						1	1	1		1		1	1				1							1			
J-36	1						1	1	1		1		1	1				1							1			
J-37		1	1				1	1	1					1				1							1			
J-42	1			1			1	1	1				1	1				1	1	1					1	1		
J-42		1	1				1	1	1				1	1				1		1	1				1			
J-49	1	1		1					1					1		1			1		1		1			1		1
J-50	1			1					1				1	1				1	1						1	1		
J-50		1	1						1				1	1				1							1			
J-50		1	1						1		1			1				1							1			
J-50	1	1		1			1	1						1		1			1				1			1		1
J-201		1	1				1	1	1		1		1	1				1		1	1				1			
J-202		1	1				1	1	1		1		1	1				1							1			
J-203		1	1				1	1	1		1			1				1							1			
J-201		1	1				1	1	1		1			1				1							1			
V-56	1		1											1		1			1				1			1		
V-97	1		1				1	1						1		1			1				1			1		
V-61	1		1				1	1	1		1			1		1			1			1	1			1		
V-64	1		1				1	1						1		1			1				1			1		
V-71	1		1									1	1	1		1			1				1			1		
V-78	1		1											1				1							1			1
V-93	1		1											1		1			1				1			1		
V-93	1		1											1		1			1				1			1		
V-97	1		1						1					1		1			1				1			1	1	1
V-111	1		1			1	1	1				1		1				1							1			1
V-112	1		1				1	1	1		1			1				1							1			
M-117	1	1	1						1					1		1			1				1			1		
M-119	1	1	1				1	1	1	1		1		1		1			1				1			1		
M-123	1	1	1				1	1	1	1			1	1		1							1					
M-127	1	1	1				1	1					1	1			1			1				1				
M-123	1	1	1				1	1			1			1			1			1				1				
M-135	1	1	1				1	1						1				1	1	1					1	1		
M-140	1		1			1								1		1			1				1			1		
M-148	1		1								1		1	1		1			1				1			1		
M-150	1		1										1	1				1	1						1	1		
M-156	1	1	1				1	1						1			1		1					1		1		
M-161	1	1	1				1	1			1		1	1			1							1				

1/ These mitigation measures include changes and mitigation measures that were implemented throughout the unit design process.

2/ Units that have more than one prescription (i.e., different prescriptions for the various alternatives) are listed twice so that the mitigation measures can be distiguished based on the different alternatives.

Appendix Table E-2. Site-specific mitigation measures applied to individual roads by alternative.

Appendix Table E-2. Site-specific mitigation measures applied to individual roads by alternative.

Roads	Site-Specific Mitigation Measures for Roads[1/]																	
	Alternative				Karst		Fish, Water, & Soils								Wildlife		Rec.	Scenery
	2	3	4	5	K1	K3	F5	F6	F8	F9	F10	F13	F16	F17	W9	W13	R1 [2/]	V11
10	1	1	1[3/]	1			1	1	1	1	1	1			1	1	1	1
1000-300	1			1							1	1			1		1	
1000-500	1			1							1	1			1		1	
1010	1	1		1			1	1	1		1	1			1		1	
1010-200	1	1		1								1			1		1	
1010-210	1	1		1							1	1			1		1	
1020	1			1							1	1			1		1	
1050	1			1	1	1					1	1			1		1	
1050-200	1			1							1				1		1	
20	1	1	1							1		1	1	1	1	1	1	1
2010	1		1		1	1						1			1		1	

1/ These mitigation measures include changes and mitigation measures that were implemented thoughout the unit design process. Note that several measures have been applied (e.g., F5 and F8 were applied at 2 -3 locations along the 10 Road).

2/ These mitigation measures may or may not be applicable depending on which Road Management Option is chosen.

3/ Only approximately 0.2 mile of the 10 Road would be built under this alternative.

Appendix F

Road Management Options and Operations and Maintenance Cost

Appendix F

Road Management Options and Operation and Maintenance Costs
Madan Project Area

Traffic Management Strategies

The following five strategies would be utilized to manage traffic on system roads:

1. **Encourage.** We would include destination signing at the entrance to the road in conjunction with the route marker. The road is shown on Forest visitor maps. Roads having this strategy would be maintained at Level 2.
2. **Accept.** We would provide only a route marker at the road entrance. If map clarity can be maintained we would show the route on Forest visitor maps. Roads having this strategy would be maintained at Level 2.
3. **Discourage.** Normally this would be accomplished by warning or information signs. Roads having this strategy would be maintained at Level 2.
4. **Eliminate.** The road would be physically blocked to traffic by culvert removal, gates, or berms. Roads having this strategy would be maintained at Level 1.
5. **Prohibit.** In addition to physically blocking the road to traffic, the closure would be legally enforced. Roads having this strategy would be maintained at Level 1.

Road Maintenance Strategies

Maintenance Level 2: This level is assigned to roads open for limited passage of traffic. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation or other specialized uses. Log haul may occur at this level. Roads in this maintenance level are normally characterized as single lane facilities intended for use by high-clearance highway vehicles. Passenger car traffic is not a consideration.

Maintenance Level 1: This level is assigned to intermittent service roads during the period that management direction requires roads to be closed or otherwise blocked to traffic. Basic custodial maintenance is performed to protect the road investment and to protect adjacent resources. Drainage structures and runoff patterns are maintained. These roads may be suitable for non-highway vehicles, but there use would be discouraged. Over time it is anticipated that brush and trees will vegetate the roads, making them unsuitable for non-highway vehicles. These roads may be suitable and open for non-motorized uses.

Road Storage: This is the process of putting a road into a closed condition which protects resources including soils, water quality, fisheries, and wildlife. These roads may be left in this condition for many years. The road remains on the forest road transportation inventory and will be reopened at a future date. Work involved in road storage includes: 1) establishing drainages across the roadway that are self-maintaining and that effectively prevent erosion; 2) removing culverts and bridges and reestablishing natural drainage patterns of streams and bypassing ditch relief culverts with waterbars; and 3) returning the roadway to resource productivity through natural or planted vegetation (grass, browse, or trees).

Stormproofing: This process leaves drainage structures in place, but provides waterbars, rolling dips, outslopes, and other features to ensure controlled runoff until any needed maintenance can be performed on the primary drainage system.

Road Management under Alternative 2 (Proposed Action), Road Management Option A

Leave most of the road system open, with selective road closure for short segments of the system. Roads left open following the sale would be stormproofed by providing drivable waterbars/rolling dips when necessary. Roads scheduled for closure would be placed in storage with drainage structures removed and natural drainage patterns reestablished. Roads would be routinely inspected and maintenance would be performed at the level indicated. The types of vehicles considered for the traffic management strategy include passenger vehicles (PV), high-clearance vehicles (HCV) , non-highway vehicless (NHV), bicycles (BB), and hikers (H). This option is displayed on the road cards in Appendix C.

Appendix Table F-1. **Traffic Management and Maintenance Strategies for Alternative 2 under Option A.**

		Traffic Management Strategies				
Rd Segment	**Maintenance Strategy**	**Encourage**	**Accept**	**Discourage**	**Eliminate**	**Prohibit**
10	5.00 miles					
MP 0.00-5.00	Stormproof and mtce. level 2	BB, H	HCV, NHV		PV	
1050	1.75 miles					
MP 0.00-1.75	Stormproof and mtce. level 2	BB, H	HCV, NHV		PV	
1050-200	0.14 miles					
MP 0.00-0.14	Storage and mtce. level 1		H	BB, NHV	HCV, PV	
1000-300	0.84 miles					
MP 0.00-0.84	Storage and mtce. level 1		H	BB, NHV	PV, HCV	
1000-500	0.45 miles					
MP 0.00-0.45	Storage and mtce. level 1		H	BB, NHV	PV, HCV	
1010	2.14 miles					
MP 0.00-2.14	Stormproof and mtce. level 2	BB, H	HCV, NHV		PV	
1010-200	0.66 miles					
MP 0.00-0.66	Storage and mtce. level 1		H	BB, NHV	PV, HCV	

1010-210	0.43 miles					
MP 0.00-0.43	Storage and mtce. level 1		H	BB, NHV	PV, HCV	
Rd Segment	**Maintenance Strategy**	**Encourage**	**Accept**	**Discourage**	**Eliminate**	**Prohibit**
1020	1.75 miles					
MP 0.00-1.75	Stormproof and mtce. level 2	BB, H	HCV, NHV		PV	
1020	0.28 miles					
MP 1.75-2.03	Storage and mtce. level 1		H	BB,NHV	PV, HCV	
20	2.84 miles					
MP 0.00-2.84	Stormproof and mtce. level 2	BB, H	HCV, NHV		PV	
2010	1.50 miles					
MP 0.00-1.50	Stormproof and mtce. level 2	BB, H	HCV, NHV		PV	
	1.52 miles					
MP 1.50-3.02	Storage and mtce. level 1		H	BB, NHV	PV, HCV	

Total stormproof and maintenance Level 2, Option A: 14.9 miles
Total storage and maintenance Level 1, Option A: 4.3 miles

Road Managegment under Alternative 2 (Proposed Action), Road Management Option B

All system roads would be closed after timber harvest, either by berm closure or by placing in storage. Roads closed by berms following the sale would be stormproofed by providing driveable waterbars/rolling dips. Roads scheduled for storage would have drainage structures removed and natural drainage patterns reestablished. Roads would be routinely inspected and maintenance would be performed at Level 1. The types of vehicles considered for the traffic management strategy include passenger vehicles (PV), high-clearance vehicles (HCV) , non-highway vehicles (NHV), bicycles (BB), and hikers (H).

Appendix Table F-2. **Traffic Management and Maintenance Stragies for Alternative 2 under Option B**

		Traffic Management Strategies				
Rd Segment	**Maintenance Strategy**	**Encourage**	**Accept**	**Discourage**	**Eliminate**	**Prohibit**
10	5.00 miles					
MP 0.00-6.75	Stormproof, gate & mtce. level 1	H, BB		NHV	HCV, PV	
1050	1.75 miles					
MP 0.00-6.75	Stormproof, gate & mtce. level 1	H, BB		NHV	HCV, PV	

		Traffic Management Strategies				
Rd Segment	**Maintenance Strategy**	**Encourage**	**Accept**	**Discourage**	**Eliminate**	**Prohibit**
1050-200	0.14 miles					
MP 0.00-0.14	Storage and mtce. level 1		H	BB, NHV	PV, HCV	
1000-300	0.84 miles					
MP 0.00-0.84	Storage and mtce. level 1		H	BB, NHV	PV, HCV	
1000-500	0.45 miles					
MP 0.00-0.45	Storage and mtce. level 1		H	BB, NHV	PV, HCV	
1010	2.14 miles					
MP 0.00-2.14	Stormproof, gate & mtce. level 1	BB, H		NHV	HCV, PV	
1010-200	0.66 miles					
MP 0.00-0.66	Storage and mtce. level 1		H	BB, NHV	PV, HCV	
1010-210	0.43 miles					
MP 0.00-0.43	Storage and mtce. level 1		H	BB, NHV	PV, HCV	
1020	1.75 miles					
MP 0.00-1.75	Stormproof, gate & mtce. level 1	BB, H		NHV	HCV, PV	
1020	0.28 miles					
MP 1.75-2.03	Storage and mtce. level 1		H	BB, NHV	PV, HCV	
20	2.84 miles					
MP 0.00-2.84	Stormproof, gate & mtce. level 1	BB, H		NHV	HCV, PV	
2010	1.5 miles					
MP 0.00-1.50	Stormproof, gate & mtce. level 1	BB, H		NHV	HCV, PV	
	1.52 miles					
MP 1.50-3.02	Storage and mtce. level 1		H	BB, NHV	PV, HCV	

Total stormproof, berm closure, and maintenance Level 1, Option B: 14.9 miles
Total storage and maintenance Level 1, Option B: 4.3 miles

Operation and Maintenance Costs

Maintenance Level 2 Road Systems

High-use road systems: These roads are typically represented by those tributary to a community such as the system of roads on Wrangell Island. Annual daily traffic (ADT) amounts to approximately 20 - 30 vehicles or higher, depending on the season.

Moderate-use road systems: These roads are typically represented by island systems which have saltwater access, but do not have a community directly tributary to them. These roads have periods of time with concentrated high use, but usually have an ADT of less than 10. Zarembo Island is representative of this type of road system.

Low-use road systems: These roads are typically represented by island or mainland systems which may or may not have salt water access. There are few attractors and subsequently they have an ADT of less than 5. The Frosty Bay road system on the mainland is representative of this type of road system.

Maintenance Level 2 Costs

Road maintenance costs are a primarily a function of wear and tear caused by vehicle traffic. The cost for fully maintaining a Level 2 high-use road is $1,008 per mile per year. This cost includes road blading, bridge and culvert maintenance, brush removal, ditch cleaning, and slough/slump removal.

Maintenance Level 2 moderate use roads have 40% less traffic than high-use roads and accordingly the frequency of maintenance required is less. Certain work activities such as brushing and hand road maintenance require the same effort as high use roads and therefore use a cost for Level 2 moderate use roads of $605 per mile per year.

Maintenance Level 2 low-use roads have 65% less traffic than high-use roads and accordingly the frequency of maintenance required is substantially less. Surface rock replacement is not a consideration and the frequency of heavy equipment use is low. Proposed roads in the Madan Project Area are included in this category of low-use roads. Cost for long-use Maintenance Level 2 roads is $353 per mile per year.

Maintenance Level 1 Road Systems

Maintenance Level 1 roads would be closed and access for motorized highway vehicles would be blocked by berms or gates. The cost of maintaining roads at this level is estimated at $211 per mile per year.

Other Road Maintenance Cost Centers

Stormproofing:	$ 5,000/mile
Gate Installation	$ 3,000/each
Road Storage	$15,000/mile
Reopen Roads	$30,000/mile
Recondition Roads	$ 3,000/mile

Appendix G

Project-Specific Monitoring Plan

Appendix G

Project-Specific Monitoring Plan

Project-Specific Monitoring

The following are specific monitoring projects for this timber sale.

Cultural Site Preservation
Objective: To determine if there is adequate protection of a cultural site. Monitoring effort is not needed under Alternative 5.

Method: Conduct field inspections and/or aerial photography at the lowest low tides before, at regular intervals during, and after timber operations.

Action: If it is determined that timber operations are causing damage to the site, operations will be halted until alternate protection measures or mitigation can be implemented.

Cost: Approximately $1,500

Deer Winter Habitat
Objective: To compare deer utilization of various silvicultural treatment (greater than 50% retention) areas to unharvested areas and areas harvested using conventional clear-cut methods.

Method: Conduct deer pellet group counts annually for five years, then every five years.

Action: The results will be used to develop future planning.

Cost: Approximately $15,000

Scenic Resources
Objective: To determine if harvest prescriptions were effective in meeting the visual quality objective.

Method: Evaluate implementation and effectiveness immediately after and two years following harvest.

Action: Adjust prescriptions as needed in future planning efforts.

Cost: Approximately $2,000

LTF Monitoring
Objective: Comply with permit monitoring requirements.

Method: Depending on permit requirements, monitoring may include dive surveys for bark deposition. Waters in the vicinity of LTF's are inspected regularly for visible oil sheen.

Action: Will depend on permit requirements. Visible oil sheen will require immediate attention to identify source and implement contingency plans.

Cost: $1,000

Management Indicator Species (Resident Fish) for Forest Plan Monitoring

Objective: Evaluate resident fish population and habitat trends.

Method: A pilot test was conducted at two sites in Gypsy Creek as part of a Tongass National Forest-wide effort to develop protocols for monitoring trends in populations and habitat for resident cutthroat trout. Fish populations and habitat surveys were conducted in 1999 according to forest-wide protocols. If the sites were selected as representative of the forest, data collection will continue up until and after logging activity is completed.

Action: No action is anticipated for the Madan project. Results will be used to determine overall trends and may be applied to adapting future projects.

Cost: If the Gypsy sites are selected, monitoring will be funded as a portion of the Tongass-wide monitoring plan. Each site will cost approximately $2,000 per year to monitor.

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