



U.S. Department of the Interior
Bureau of Land Management
Arcata Field Office

and

California Department of Fish and Game

September 2003



Headwaters Forest Reserve Proposed Resource Management Plan and Final EIS/EIR

VOLUME I





United States Department of the Interior



BUREAU OF LAND MANAGEMENT

Arcata Field Office
1695 Heindon Road
Arcata, CA 95221-4573
www.ca.blm.gov/arcata

Dear Reader:

Enclosed for your review is the Final Environmental Impact Statement (FEIS)/Environmental Impact Report (EIR) for the Headwaters Forest Reserve Management Plan (RMP). The Draft Environmental Impact Statement (DEIS) and RMP was published in May 2002, and was followed by a 90 day public comment period. Changes based upon public comments and agency reviews have been incorporated into this document and all portions of the Draft RMP have been reprinted in order to portray these changes. Comments and responses are contained in Chapter 7 of the FEIS.

The FEIS contains the proposed RMP, which is a refinement of the preferred alternative presented in the draft. The proposed plan is the Bureau of Land Management's (BLM) proposed action.

All parts of this proposed plan may be protested. Protest should be sent to the following address:

Director (210), Bureau of Land Management,
Attention: Brenda Williams
P.O Box 66538
Washington, D.C. 20035

The overnight address (fedex or usps) for next day delivery:

Director (210), Bureau of Land Management,
Attention: Brenda Williams
1620 L Street, N.W., Suite 1075
Washington, D.C. 20036

Faxed protests will be considered as potential valid protests provided (1) that a signed faxed letter is received by the Washington Office protest coordinator by the closing date of the protest period and (2) that the protesting party also provides the original letter by either regular or overnight mail postmarked by the close of the protest period.

Please direct faxed protests to:

BLM Protest Coordinator
(202) 452-5112

Protests should be filed with the Director within the official 30-day review period following the publication of this document's Notice of Availability (NOA) in the Federal Register. It is anticipated that the NOA will appear October 10, 2003 with a protest filing deadline of November 10, 2003. A protest should contain the following information:

- The name, mailing address, telephone number, and interest of the person filing the protest.

- A statement of the issue or issues being protested.
- A Statement of the part or parts being protested.
- A copy of all documents addressing the issue or issues that you submitted during the planning process or a reference to the date the issue or issues were discussed by you for the record.
- A short concise statement explaining why the BLM State Director decision is believed to be incorrect.

At the end of the 30-day protest period, the proposed plan, excluding any portions under protest, shall become the final. Approval shall be withheld on any portion of the plan under protest until final action has been completed on such protest. The Final Resource Management Plan and Record of Decision will be published this fall.

Sincerely,

A handwritten signature in black ink, appearing to read "Lynda J. Roush". The signature is written in a cursive style with a long, sweeping underline.

Lynda J. Roush
Field Manager

**Headwaters Forest Reserve
Proposed Resource Management Plan
and Final EIS/EIR**

Volume I

Prepared for:

USDI Bureau of Land Management and
California Department of Fish and Game
1695 Heindon Road
Arcata, CA 95521-4573
Contact: Lynda Roush
707/825-2300

Prepared by:

Jones & Stokes
2600 V Street
Sacramento, CA 95818-1914
916/737-3000

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Jones & Stokes. 2003. Headwaters Forest Reserve proposed resource management plan and final EIS/EIR. Volume I. September. (J&S 00090.) Sacramento, CA. Prepared for USDI Bureau of Land Management and California Department of Fish and Game, Arcata, CA.

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Acronyms and Abbreviations

ACEC	Area of Critical Environmental Concern
BLM	Bureau of Land Management
CDF	California Department of Forestry and Fire Protection's
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNDDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
dbh	diameters at breast height
DFG	Department of Fish and Game
DOI	U.S. Department of Interior
EIR	environmental impact report
EIS	environmental impact statement
EIS/EIR	environmental impact statement/environmental impact report
ESA	Endangered Species Act
ESUs	Evolutionarily Significant Units
FLPMA	Federal Land Policy and Management Act
HCP	Habitat Conservation Plan
LWD	large woody debris
MOU	memorandum of understanding
MWD	moderate woody debris
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLCS	National Landscape Conservation System
NMFS	National Marine Fisheries Service
NWSRS	National Wild and Scenic River System
PALCO	Pacific Lumber Company
PWA	Pacific Watershed Associates
Reserve	Headwaters Forest Reserve

RNA	Research Natural Area
ROD	Record of Decision
RSRF	risk of stand-replacing fire
SRMA	Special Recreation Management Area
STC	Simpson Timber Company
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VRM	Visual Resource Management

Chapter 1. Introduction



Chapter 1. Introduction



Background

Located in the mountainous north coast region of California (Figure 1-1), Headwaters Forest was acquired by the Secretary of Interior and the State of California on March 1, 1999, to preserve the last unprotected large stand of old-growth redwood forest. Unique ecological values of the forest include

- a highly intact, functioning old-growth forest ecosystem that has very large old-growth redwood and Douglas-fir trees,
- a high diversity of plant species in the forest understory,
- nesting of threatened marbled murrelets and northern spotted owls, and
- undisturbed headwater stream habitat for threatened coho and chinook salmon and steelhead trout.

The federal legislation authorizing acquisition of the forest

- established a specific boundary and points of access,
- called for joint federal-state acquisition, with management by the federal government and an easement to guarantee conservation management granted to the state, and
- established the requirement for the development of a management plan.

The acquisition was part of a comprehensive agreement between the Department of Interior (USDI) and Pacific Lumber Company (PALCO) that created a natural reserve – the Headwaters Forest – and required PALCO and the U.S. Fish and Wildlife Service (USFWS) to complete a Habitat Conservation Plan (HCP) for PALCO’s remaining lands in Humboldt County (200,000 acres). The HCP provides a mechanism under the Endangered Species Act (ESA) for PALCO to “take” listed species in the course of their timber operations (Section 10). Monitoring of marbled murrelet populations and watershed conditions in the pristine habitats of the Headwaters Forest is called for in the HCP to provide baseline information for understanding effects of timber

management on PALCO's remaining lands. The HCP states that the "... primary benefit to the murrelet associated with the proposed project is the public acquisition of the Headwaters Forest . . . arguably the most important parcel of habitat in private ownership in the 3-state range of the marbled murrelet" and notes that it is being placed "... under permanent protection". The acquisition was the pivotal conservation measure of the HCP. Also, as part of this HCP, the California Department of Fish and Game (DFG) issued a 2081 permit to PALCO that allow "incidental take" of listed wildlife species on PALCO's remaining lands, which was also an integral part of the overall strategy for acquisition of the Headwaters Forest and protection of threatened and endangered species inhabiting it. The HCP states that "... approximately 20 years after issuance of the incidental take permit, marbled murrelet habitat on the property (private) would be at its lowest expected amount, mostly confined to the uncut old-growth and residual stands . . ." At that time, the Headwaters Forest would contain 35% of that habitat.

The specific 7,472-acre tract acquired includes 3,088 acres of unharvested redwood groves surrounded by 4,384 acres of previously harvested forest and brushlands. The U.S. Department of Interior Bureau of Land Management (BLM) is charged with management of the Headwaters Forest Reserve (Reserve), and the California Department of Fish and Game (DFG) represents the state's interests in Reserve management. The Deed of Conservation Easement for the state interest conveys to the state an oversight responsibility to ensure that "all human activities with the Headwaters Forest shall be consistent with the stated goals and purposes of (the Act)", and the Memorandum of Understanding (MOU) signed by BLM, DFG, and the California Secretary for Resources directs the management agencies to plan and manage the Reserve for its "fish and wildlife habitat and other ecological values as full cooperating partners".

Purpose of and Need for Management Plan (Project Objective)

The federal legislation authorizing the Reserve (1998 Interior Appropriations Bill) directed the Secretary of Interior to prepare a long-term management plan for its management. It established the following management goal for the plan:

"conserve and study the land, fish, wildlife, and forests occurring on such land, while providing public recreation opportunities and other management needs."

This document is the required management plan. It has been jointly developed by BLM and DFG to provide direction for future management actions.

The need for the plan is to assure that human activities are compatible with the ecological integrity and preservation of the Reserve's lands, fish, wildlife, and forest. As required by the authorizing legislation (see Chapter 2), the plan addresses requirements for species management, the conduct of research and monitoring activities, public access, provision of minimal facilities, and a management budget (Chapter 4). In particular, it addresses watershed and forest restoration actions that are needed to protect and promote long-term ecological integrity and provide conservation management.

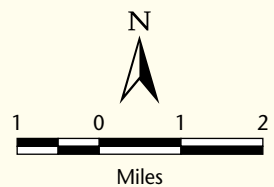
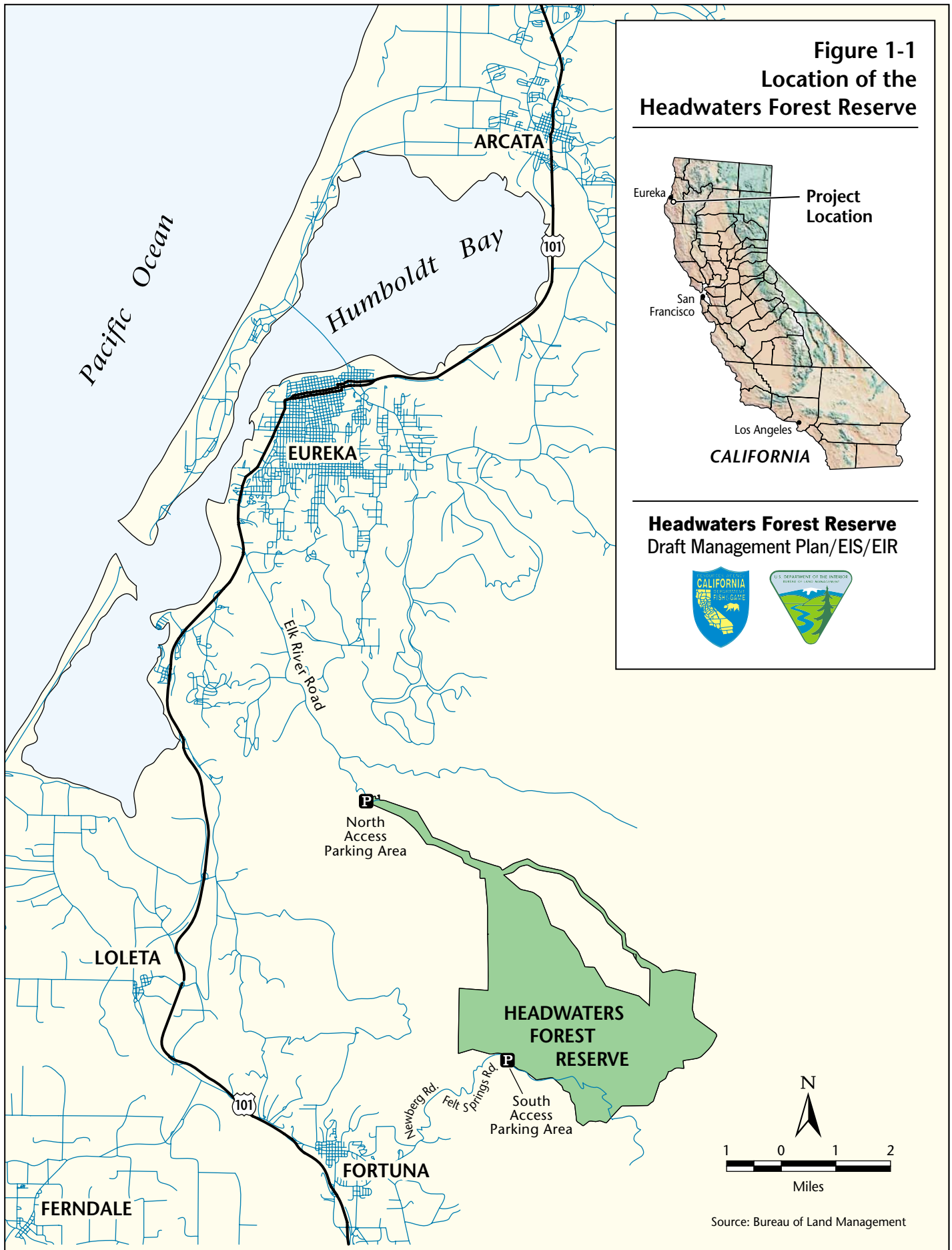
Planning Period and Plan Revision

This plan is intended to provide the basis for sound management of the Reserve for at least the next 10–15 years. Management must be adaptive, and stewardship of the Reserve will occur in

**Figure 1-1
Location of the
Headwaters Forest Reserve**



**Headwaters Forest Reserve
Draft Management Plan/EIS/EIR**



Source: Bureau of Land Management

the context of natural succession of forest characteristics and fish and wildlife use. The managing agencies recognize that the plan must be able to adapt to changing circumstances, such as new scientific information, new environmental laws, changing public demands, new management opportunities, or an addition to the Reserve (not foreseen at this time). For this reason, plan monitoring and evaluation schedules will be established as plan-implementation actions to ensure that the effects of planning decisions are tracked and reviewed on a regular basis. Evaluations will determine whether specific planning decisions remain valid or need to be revised.

A *plan amendment* normally involves changing or adding management decisions that do not change the fundamental character of the overall plan or any of its major elements. A *plan revision* is made in response to significant new information or issues that warrant a major change in the management direction of the plan or one of its major elements. BLM planning guidelines specify that plan revisions may be considered in the following instances:

- in response to an evaluation of consistency with new laws, regulations, and policies;
- upon determination that implementing the plan's decisions is not achieving the desired outcomes or meeting the plan's goals;
- when new science, data, or other information indicate a need to change decisions;
- upon determination that the plan no longer provides adequate management direction; or
- when new proposals or actions not evaluated in the plan are put forth.

Both plan amendments and plan revisions require compliance with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

NEPA/CEQA Provisions

General

NEPA and CEQA require that agencies proposing to plan or implement actions that may alter the environment evaluate potential environmental effects of such action and disclose them to decision makers and the public. If an action may result in significant adverse effects, the agency must identify feasible alternatives or planning/mitigation measures that can avoid or substantially lessen the identified impact.

This document is a joint resource management plan, environmental impact statement (EIS), and environmental impact report (EIR) that is required by NEPA and CEQA because significant adverse environmental effects could result from implementation of some land-use alternatives. This document both presents management goals and direction for long-term Reserve management and defines and evaluates alternative management approaches for specific issues identified in a public scoping process (Chapter 2). The foreseeable effects of each management alternative (Chapter 5) are identified and compared (Chapter 6).

This document is the draft version of the resource management plan/EIS/EIR, made available for public review and comment. As required by NEPA and CEQA, comments on this draft document will be reviewed, and the document will be modified accordingly. Once a final document is prepared and statutory appeal periods have transpired, the management plan will be formally adopted and implementation will begin.

Programmatic Aspects

This document addresses future management actions at a land-use planning and program level and indicates the extent and magnitude of several types of actions, such as watershed restoration, forest restoration, and development of recreation facilities, including a trail system. Implementation of these programs will entail several years. Individual projects will be formulated, designed in detail, reviewed for potential environmental effects, modified as warranted, and implemented. Any environmental documents that must be prepared for future projects will be tiered to this document. This document provides an assessment of project effects that are generally expected to occur with program implementation, but further site-specific analysis will be conducted as necessary.

Impact Baseline and No-Action Alternative: Interim Management

The baseline for assessing benefits and impacts in this document is the current condition of the Reserve under interim management policies established by BLM in March 1999 (Federal Register 1999). Future continuation of this baseline is one of the management alternatives considered for each of the various programs governed by this plan.

Process and Required Approvals to Achieve Final Plan and Final EIS/EIR

The draft version of this document was made available for a 90-day public review period. At the close of this period, all submitted comments were evaluated and revisions to the draft plan were made. Revisions that improve the ability of BLM to meet the established management goals were adopted, and this document represents the proposed resource management plan and final EIS/EIR. After allowance for final review of the plan/EIS/EIR, BLM will issue a record of decision for plan adoption and implementation, and DFG will issue a notice of determination to jointly adopt the plan.

Concurrent to this process, BLM has formally consulted with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) to obtain opinions about whether implementation of the plan is likely to jeopardize the continued existence of the several listed threatened and endangered species. This proposed plan and final EIS/EIR embodies provisions to avoid species jeopardy and to minimize incidental take of those species.

Organization of This Document

This plan/EIS/EIR is composed of the following sections.

- Chapter 2, “Planning Framework,” describes the legal and regulatory framework within which the plan must be formulated, as well as planning issues identified during public scoping, and planning criteria (extent of analysis, range of alternatives, and planning assumptions).
- Chapter 3, “Affected Environment (Environmental Setting) and Interim Management of the Reserve,” is an analysis of current environmental conditions and the current management situation.

- Chapter 4, “Management Goals and Direction,” discusses the management goals and management policy for the several program areas addressed by the plan:
 - species management,
 - watershed and forest restoration,
 - research management,
 - fire management,
 - recreation access management,
 - cultural resource management,
 - management of areas having wilderness characteristics,
 - special areas designation and management,
 - resource monitoring and evaluation, and
 - management revenue.
- Chapter 5, “Management Alternatives,” is a set of 10 management issues and several alternatives for resolving each of them. The management agencies’ proposed alternatives are identified, as well as the alternatives for continuing the interim management policies.
- Chapter 6, “Environmental Consequences (Environmental Effects and Alternative Comparisons),” is an analysis of the effects, both beneficial and adverse, of implementation of the management goals and direction for each of the identified alternatives.
- Chapter 7, “Comments and Responses to Comments on the Draft Plan/EIS/EIR”, presents comments on the draft version of this document that were received during a public review period and states the sponsoring agencies’ responses to those comments.
- Chapter 8, “References Cited,” includes a complete bibliography of documents cited.

Following these main sections are several appendices that support analyses and conclusions of the planning process, as well as a list of preparers, individuals and organizations receiving notice of this document, and an index. Appendix N presents BLM’s proposed *supplemental rules* for management of the Reserve.

Chapter 2. Planning Framework



Chapter 2. Planning Framework



This chapter describes the framework for management planning for the Reserve. The major elements of this framework, addressed in separate sections in this chapter, include

- existing direction for land-use planning and management (including existing requirements and guidelines for land-use planning and management, which provide the framework and point of departure for management direction articulated in Chapters 4 and 5 of this plan);
- planning issues identified during the scoping process; and
- planning criteria (which include extent of analyses required, appropriate range of alternatives, and underlying assumptions needed for successful development of the management plan).

Existing Direction for Land-Use Planning and Management

This section describes existing public policy direction affecting management options and planning processes for the Reserve, as prescribed in current laws, regulations, interagency agreements, manuals and handbooks, and existing approved plans. Applicable direction includes both legal requirements and management guidelines. Legal requirements include federal-state agreements and federal and state laws and regulations adopted pursuant to those laws. Management guidelines, which are useful but are not obligatory, are derived from related resource management plans.

Legal Requirements

Reserve Legislation

In legislation authorizing the purchase of the Headwaters Forest, Congress directed the Secretary of the Interior to prepare a long-term plan for its management in consultation with the State of California (1998 Interior Appropriations Bill). Congress established the following management goal for this plan:

“conserve and study the land, fish, wildlife, and forests occurring on such land, while providing public recreation opportunities and other management needs.”

Additionally, Congress directed that the plan

shall guide general management of the Headwaters Forest and address the following management issues:

- scientific research on forests, fish, wildlife, and other such activities that shall be fostered and permitted on the Headwaters Forest;
- providing recreation opportunities on the Headwaters Forest;
- access to the Headwaters Forest;
- construction of minimal necessary facilities within the Headwaters Forest so as to maintain the ecological integrity of the Headwaters Forest;
- other management needs;
- an annual budget for management of the Headwaters Forest, which shall include a projected revenue schedule (such as fees for research and recreation) and projected expenses.

This legislative direction mandates a hierarchy of priorities in land management, in which resource conservation, maintenance of ecological integrity, and research are the primary purposes of creating the Reserve. Recreation, facilities development, and management needs must be subordinate to this primary purpose.

The legislation established the boundary of the Reserve and an access point at the northern end. A right-of-access to the southern portion of the Reserve was negotiated before the acquisition transaction was closed. That access was secured by grant of easement from Pacific Lumber Company (PALCO) to BLM along the Felt Springs Road, which connects to Humboldt County’s Newburg Road. The established boundary provides a direct access to the northern portion of the Reserve from Humboldt County’s Elk River Road. The acquisition legislation also required that future additions to the Reserve can only be made through federal legislative action.

State of California Conservation Easement and Memorandum of Understanding

For the State of California’s interest in the acquisition of the Reserve, the state was granted a conservation easement on February 16, 1999, to ensure that all human activities within the Reserve will be consistent with the management goal established in the enabling federal legislation (“conserve and study the land, fish, wildlife, and forests occurring on such land, while providing public recreation opportunities and other management needs” [HR 2107, Section 501]). After the conservation easement was granted, a memorandum of understanding (MOU) was signed on May 5, 1999, between the designated federal and state management agencies—BLM and DFG—and the secretary of the California Resources Agency that directs both BLM and DFG to plan and manage the Reserve for its “fish and wildlife habitat and other ecological values as full cooperating partners.”

Endangered Species Acts

The federal Endangered Species Act (ESA) provides a means for conserving ecosystems upon which endangered and threatened species depend, and it requires that federal agencies shall conserve endangered and threatened species (16 USC 1531[b,c]). The Reserve provides habitat for

- southern Oregon/northern California coasts coho salmon (*Oncorhynchus kisutch*), California coastal chinook salmon (*O. tshawytscha*) and northern California steelhead trout (*O. mykiss*), federally listed threatened species;
- marbled murrelet (*Brachyramphus marmoratus*), a federally listed threatened species and state-listed endangered species;
- northern spotted owl (*Strix occidentalis caurina*), a federally listed threatened species; and
- bald eagle (*Haliaeetus leucocephalus*), a federally listed threatened species.

Approval of the Reserve management plan is considered a major federal action that the managing agency has determined may affect these species; therefore, a consultation under Section 7 of ESA, must be completed (40 CFR 402).

The Reserve is designated as critical habitat for the marbled murrelet, coho salmon, and chinook salmon. Critical habitat is defined in ESA as a specific area within the geographical area occupied by the species that provides the physical and biological features essential to the conservation of the species. These lands may require special management consideration (USC 3[5][A]). Federal agencies, such as BLM, are required to consult with USFWS (for terrestrial or nonanadromous fish species) or NMFS (for anadromous fish species) if any actions they fund, authorize, or carry out could result in the destruction or adverse modification of critical habitat.

DFG is the management authority for the California Endangered Species Act (CESA). Species listed under CESA that find habitat at the Reserve include the marbled murrelet, as previously noted. Because DFG is also the lead agency for the state for development of this plan, it will conduct an internal consultation process to ensure that proposed elements of this plan will not disturb or adversely modify the critical habitat of the marbled murrelet.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (16 USC 703–711) prohibits the take of any migratory bird that crosses international boundaries. *Take* is defined as an action or attempt to “pursue, hunt, shoot, capture, collect, or kill a bird/species” and extends to any part of such a bird, its nest, or eggs. This act applies to all persons in the United States, including federal and state agencies. To help implement the act, Executive Order 13186 (January 11, 2001) requires that any project with federal involvement address impacts of federal actions on migratory birds. The order also requires that BLM develop an MOU with USFWS embodying protocols to avoid and minimize adverse impacts on migratory bird resources when the agency undertakes an action and to restore and enhance habitat of migratory birds, as practicable. Of the approximately 900 migratory birds occurring in the United States, 122 have been selected as species of management concern at a national level and 77 occur in the Reserve. Species that are confirmed to nest in the coastal redwood forest habitats of the Reserve include hermit warbler, Vaux’s swift, Swainson’s thrush, Pacific-slope flycatcher, olive-sided flycatcher, northern spotted owl, and Allen’s hummingbird (Roush pers. comm.).

The Antiquities Act of 1906 and National Historic Preservation Act

The Antiquities Act of 1906 provides protection of cultural resources on federal lands and authorizes the president of the United States to designate National Monuments. The National Historic Preservation Act (NHPA) expands protection of historic and archaeological properties to include those of national, state, or local significance and directs federal agencies to consider effects of proposed actions on properties eligible for or included in the National Register of Historic Places. It also requires proactive management of historic resources.

Listing on the National Register of Historic Places is a means of recognizing the cultural values of a historical resource. Candidate sites are evaluated and, if certain criteria are met, nominated for inclusion on the register. For the Reserve, actual designation would be agreed on by the State of California Historic Preservation Officer after BLM submits the nomination. BLM would make the determination of suitability and complete the listing. For properties that are listed, cultural resource management plans must be prepared.

NEPA and CEQA

The Department of the Interior and BLM signed an MOU with the State of California identifying the DFG as the state lead agency. As a result, the land management plan will be assessed in a joint EIS/EIR that is consistent with NEPA and CEQA. The purpose of an EIS/EIR is to ensure that decision makers are aware of the environmental consequences of a reasonable range of alternative actions. In addition, CEQA places an affirmative requirement on DFG to ensure that policy established by this plan will prevent unnecessary environmental damage, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representative plant and animal communities.

Federal Land Policy and Management Act

The Federal Land Policy and Management Act (FLPMA) (43 USC 1701–1782) describes federal policy for all lands administered by BLM. This policy requires the BLM to manage these lands to

- employ the principles of multiple use and sustained yield, except that where a tract of land has been dedicated to specific uses according to other provisions of law (e.g., the Reserve), it be managed in accordance with such law;
- protect the quality of the scientific, scenic, ecological, environmental, archaeological, and historic values;
- preserve and protect certain public lands in their natural condition (considered as areas of critical environmental concern);
- consider the relative scarcity of the values involved and the availability of alternative means and sites for realizing those values;
- provide for outdoor recreation and human occupancy and use; and
- periodically and systematically inventory and project present and future uses through a land-use planning process coordinated with other federal and state planning processes.

Management Guidelines

Management guidelines applicable to the Reserve are found in BLM's planning regulations and in four adopted resource management plans for the region or for adjoining lands.

BLM Resource Management Planning Regulations

The BLM planning process is governed by regulations established pursuant to FLPMA (43 CFR 1600) that require a comprehensive planning approach. Planning requirements are extensive and include a resource-based means of determining desired outcomes and allowable uses or needed actions to achieve the desired outcomes. These regulations are embodied in Section 1601 of BLM's land-use planning manual and section H-1601-1 of BLM's land-use planning handbook (issued November 22, 2000) (USDI BLM 2000a). They include procedural requirements for

- conducting a scoping process to determine issues and concerns;
- assessing information;
- analyzing the management situation;
- formulating desired outcomes;
- identifying allowable uses and needed actions;
- maintaining consistency with federal, state, and local policies and programs;
- coordinating evaluations with those impact assessments required under NEPA; and
- providing opportunities for public comment and participation.

The regulations require that BLM establish visual resource management zones and recreation management zones, and consider special designations for lands within the Reserve, including Area of Critical Environmental Concern (ACEC) and Wild and Scenic River, as well as nominations of cultural properties to the National Register of Historic Places.

Arcata Resource Area Resource Management Plan

The Reserve is within the boundaries of the BLM Arcata Field Office in northwestern California. Management of BLM lands is addressed by an existing resource management plan for the area (USDI BLM 1995a). The plan describes conservation management for a system of late-successional forest reserves, designated as ACECs. The plan does not directly apply to the Reserve, but it provides guidance in managing late-successional forest reserves within the Arcata Field Office jurisdiction to maintain and enhance ecological integrity. Enhancement activities include stand density management of previously harvested forest stands to accelerate recovery of late-successional forest communities without programmed timber harvest and watershed restoration through control of runoff and sediment production.

Northwest Forest Plan

The Record of Decision (ROD) for the *Supplemental EIS for the Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl* (commonly referred to as the Northwest Forest Plan) (U.S. Forest Service and USDI

BLM 1994) amends the current land management plan for the Arcata Resource Area. An amendment to the Northwest Forest Plan in 2001 specifically exempts the Reserve from requirements of the ROD (U.S. Forest Service and USDI BLM 2001).

Several standards and guidelines of the Northwest Forest Plan are relevant to the Reserve and will be adopted in this plan. They include the Aquatic Conservation Strategy and the guidelines for managing designated *Survey-and-Manage species*. These guidelines are adopted for the Reserve because they are directed at maintenance of ecological integrity in Pacific Northwest ecosystems, and they have been developed with the best available science, reviewed by the public, and approved by the Secretaries of the Interior and Agriculture.

Threatened or Endangered Species Recovery Plans

Recovery plans, authorized under the ESA (16 USC 1533), describe goals and objectives and provide direction necessary to aid species recovery, so that species might be removed from the threatened or endangered lists. A recovery plan adopted by USFWS for the marbled murrelet is available. Recovery plans for the listed fish species are currently being developed by NMFS.

Northern Spotted Owl

The Northwest Forest Plan provides the federal contribution to the recovery of the northern spotted owl. Accordingly, the plan for the Reserve should be consistent with the Northwest Forest Plan, providing equal or higher level protection for northern spotted owl and its habitat.

Marbled Murrelet

The Reserve is in the Siskiyou-Coast Range recovery zone (Zone 4) that is identified for the marbled murrelet (U. S. Fish and Wildlife Service 1997). The importance of nesting habitat in the Reserve was recognized by USFWS when the lands were owned by PALCO. Maintenance of suitable habitat is considered critical to avoid widening the gap in the distribution of the species between Humboldt County and central California (San Mateo County). Recovery of the species requires short-term actions to stop the species' rapid population decline and long-term actions to cultivate mature forest habitat. Management actions in Zone 4, which includes the Reserve, should focus on preventing the loss of occupied nesting habitat, minimizing the loss of unoccupied nesting habitat, and decreasing the time required for the development of new suitable habitat. Additionally, development of or modification to recreation facilities near marbled murrelet habitat should be evaluated to minimize disturbance and reduce the attraction of corvids (crows and jays) that might prey on murrelets.

Pacific Lumber Company's Habitat Conservation Plan

As a part of the Headwaters transaction, PALCO agreed to manage the remainder of its lands under a Habitat Conservation Plan (HCP), pursuant to provisions of the ESA. The established HCP applies to PALCO's lands adjacent to the Reserve but not to the Reserve itself (PALCO 1999). The requirements for the conservation of species that apply to PALCO's lands provide management guidelines that may be applicable to the Reserve as well. Relevant restrictions have been embodied in the "Species Management" section of Chapters 4. In addition, the monitoring element of the management plan for the Reserve should be coordinated with the monitoring

requirement of the HCP, to the benefit of BLM, DFG, and PALCO. Some of the protocols established in the HCP require monitoring of undisturbed ecosystems within the Reserve.

National Landscape Conservation System

The Reserve is a unit of the National Landscape Conservation System (NLCS). BLM created the NLCS in 2000 to place more emphasis on the conservation of specific intact western landscapes. Units in this system must be managed consistently with their underlying authority, which is HR 2107 for the Reserve. Each unit will have its own land-use plan established. Multiple-use activities are appropriate as directed by the authorizing legislation or executive order or as determined through a management plan; however, efforts are to be made to locate major recreation or interpretive facilities in gateway communities. Visitor contact and information facilities should be located outside of these units where appropriate. Roads and trails are appropriate when needed for a specific management purpose or to access some destination or development.

Planning Issues

A planning issue is a point of concern over resource management activities or land use that may be resolved or addressed in alternative ways. The decisions made by this plan are intended to resolve issues that arise from public input and resource monitoring and to implement federal and state statutory, regulatory, and policy mandates.

A public scoping process for preparation of the management plan and related environmental impact assessment was conducted from May 18, 2000 to August 18, 2000. Public and agency input was solicited through three public meetings (in Eureka, San Francisco, and Sacramento), use of a web site offering information and electronic comment input, establishment of dedicated telephone lines for information requests and comment input, and provisions for submission of written comments by mail. A summary of the comments received was compiled (Jones & Stokes 2000).

Issues to Be Addressed

Major issues identified include

- means of balancing preservation of old-growth ecosystems and threatened and endangered species that occupy them with public recreation access, considering the extent of trail access to or within old-growth groves that may be appropriate, and the appropriate types of trail use (i.e., walking, hiking, biking, and equestrian);
- management of traffic impacts to local residents along the two county roads providing public access to the Reserve;
- appropriate level of watershed restoration via road and log-landing decommissioning throughout the harvested portions of the Reserve to improve aquatic habitat conditions;

- appropriate level of forest restoration of harvested stands to accelerate recovery of old-growth characteristics; and
- access for the disabled and elderly to old-growth forest.

Issues Dismissed

Some of the issues identified by the public during the scoping process are not appropriate matters to be addressed in the management plan. These include the following issues.

- **Acquisition of additional lands.** BLM and DFG have concluded that the legislation authorizing Reserve acquisition intends that the management plan address management of the acquired lands consistent with existing land ownership.
- **Development of alternative or supplemental access routes.** BLM and DFG have concluded that the legislation authorizing the Reserve intends that the plan address management of access along the two existing access routes that were acquired in the acquisition transaction.
- **Development of a regional trail system.** The planning process will not involve design of a regional trail system involving other lands not included in the acquisition.

Planning Criteria

Planning criteria are the ground rules that guide the development of the plan and the planning alternatives. They are based on standards prescribed by applicable laws and regulations; agency guidance; coordination with the public; coordination with other federal, state, and local agencies and Indian tribes; and professional judgement. Planning criteria include

- the extent of analyses needed to support planning decisions,
- the range of alternatives needed to explore means to balance preservation and utilization needs and interests, and
- underlying planning assumptions.

Extent of Analysis

The plan will be formulated in response to the Congressional requirement for preparation of a long-term management plan for the newly acquired Reserve. The analyses needed for formulating the plan and assessing management effects requires that information be compiled in the realms of

- topography, stream network, and existing road system;
- geology and soils;
- water quality and sources of sediment delivery to streams;
- vegetation types and seral stages (ecological communities formed in ecological succession);
- fire and timber harvest histories;

- fisheries and extent of anadromy;
- wildlife occurrences and habitat requirements;
- cultural resources;
- emerging recreation use, recreation needs, and recreation opportunities; and
- research and monitoring needs.

Such information has been compiled by several means. Before and after public acquisition of the Reserve, several studies were conducted that provide part of the foundation for this plan and for interim management actions before the plan is adopted. These studies, to date, are listed below.

- **Vegetation mapping and classification of the Reserve delineating plant associations and seral stages.** Mapping was compiled through extensive ground surveys of vegetation polygons derived from detailed aerial photographic analysis. Stand types were identified and new stand descriptions were developed from 59 field plots. Ten plant associations were identified in mature and old-growth stands. Harvested lands were subdivided into 13 seral stages. The study results were entered into a geographical information systems (GIS) layer. (Jimerson and Jones 2000)
- **Surveys of occurrences of marbled murrelet and northern spotted owls.** Known northern spotted owl sites were surveyed by BLM in 2000 according to USFWS-approved protocol. Suitable marbled murrelet habitat was surveyed according to approved protocol by Redwood Sciences Laboratory and PALCO from 1991–1997. Survey results were entered into GIS layers and analyzed in Ralph et al. (1997).
- **Surveys of the range of anadromy in streams draining the Reserve.** These surveys, obtained from PALCO with minor modifications by local professionals and field checks by BLM and Humboldt State University staff, established the range of coho salmon and steelhead in the Salmon Creek and Elk River watersheds within the Reserve and on adjacent lands.
- **Surveys of Survey-and-Manage species as defined by the Northwest Forest Plan.** Surveys of Survey-and-Manage lichen and fungi were conducted using field plots (McFarland and Largent 2000). Localized survey information for Survey-and-Manage wildlife has been collected through predisturbance surveys at watershed restoration sites.
 - aquatic herptofauna—systematic sampling of all aquatic habitats in the Reserve was conducted to determine the presence and distribution of aquatic reptiles and amphibians. A report is expected in spring 2002.
 - aquatic macroinvertebrates—systematic sampling of all aquatic habitats in the Reserve was conducted to determine the presence and distribution of aquatic macroinvertebrates. Species identification in BLM’s National Aquatic Monitoring Center is ongoing. A report is expected in spring 2002.
- **Inventory of invasive, nonnative plants in the Reserve.** Aerial photograph interpretation was used in conjunction with extensive ground surveys to map these plants at 1:24,000 and enter the mapping into a GIS layer.
- **Watershed restoration plans for major portions of the Reserve.** These documents include identification of all recognizable current and future sediment sources from roads within the Salmon Creek watershed, a plan and cost estimate for topographic restoration of the Headwaters Old-Growth Road, and an erosion inventory of several roads within the Elkhead Springs unit (PWA 2000a, 2000b). These plans, in conjunction with an approved

management plan and EIS/EIR, will contain the elements of watershed analysis required by the Northwest Forest Plan.

- **A cost estimate for road decommissioning throughout the Reserve.** The study includes review of the Pacific Watershed Associates 2000 erosion site inventories; a sample inventory of former logging roads in the lower Little South Fork Elk River and Elkhead Springs areas; development of average unit costs for two levels of restoration (hydrologic stabilization and full recontour) for each subwatershed in the Reserve; and development of a GIS layer showing the locations of inventoried roads and landings. (PWA 2001)
- **An inventory of recreation use and recreation use attitudes.** This study consisted of two parts. The first part is the result of a recreation survey conducted at the Elk River Trailhead in 2000. This study assessed frequency and intensity of use and attitudes toward use of the Reserve. The second part is a mail-out survey assessing attitudes of prospective users. (Humboldt State University Academic Foundation 2000, Humboldt State University Academic Foundation 2001)
- **A cultural resource inventory of the Reserve.** Pursuant to Section 110 of the NHPA, a cultural resources survey of the Reserve was initiated by BLM in 2000 and conducted by Humboldt State University Foundation (HSUF) under a cooperative agreement. The survey consisted of a formal records search, archival research, oral history interviews, a systematic archaeological field survey, formal recording of sites, mapping and photo-documenting discovered resources, developing a GIS cultural resources layer, conducting preliminary site-significance assessments, developing management recommendations, and preparing a report (Humboldt State University Academic Foundation 2001).

In addition to these sources of information, the following planning analyses have been conducted by BLM staff and their planning consultants:

- compilation of a detailed geologic map of the Reserve;
- assessment of the fire history of the Reserve;
- compilation of timber harvest history of the Reserve;
- evaluation of the effects of density management of forest species on the growth and development of second-growth stands;
- evaluation of potential trail routes in the Reserve, based on terrain characteristics;
- assessment of regional recreational needs and opportunities, by recreation type;
- evaluation of the experience of shared trail use among hikers, bicyclists, and equestrians;
- assessment of disturbance factors for marbled murrelets and northern spotted owls;
- analysis of effects of human activities on the attraction of scavenger bird species (i.e., corvids);
- analysis of effects of horse presence and horse waste products on spread of pathogens or nonnative plants; and
- review of recent experience of the recreational fee demonstration program for federal lands and the state park fees program.

The studies and analyses noted above provide a sound basis for formulation of the management plan and evaluation of planning alternatives as required by NEPA and CEQA and BLM's planning guidelines.

Range of Alternatives

The range of alternatives must accommodate the range of reasonable management strategies that could resolve the identified public issues and management concerns for management of the Reserve. These issues and concerns were discussed in the preceding section.

All of the alternatives considered in detail must be consistent with the overriding purpose for which the Reserve was created—the protection and restoration of old-growth and aquatic ecosystems. The need for this focus was described in the “Existing Planning Direction” section above. Consistent with the identified issues and concerns and the overriding purpose of the Reserve, alternatives for Reserve management must be formulated for

- intensity of watershed restoration, ranging from no restoration, in addition to that previously approved through 2002, to full stabilization and recontouring to natural topography of all sites contributing, or likely to contribute, sediment to the Reserve’s streams;
- intensity of forest restoration, ranging from no forest restoration and complete reliance upon natural recovery of harvested stands, to moderately intense tree density management to nurture more rapid recovery of old-growth characteristics;
- availability of the southern access to the public, ranging from no access to individual automobile access at visitors’ discretion, and including the interim alternative of guided access;
- extent of trail access throughout the Reserve, ranging from limiting public access to riparian corridors away from old-growth groves, to extensive passage through old-growth groves;
- nature of trail use, ranging from no use by bicyclists and equestrians to extensive use where trail conditions are appropriate, support facilities can reasonably be provided, and user conflicts can be minimized;
- potential special-area designations for some or all of the Reserve, including Area of Critical Environmental Concern, Research Natural Area, Wild and Scenic River System, and State of California Ecological Reserve; and
- use of access fees, ranging from no fee to a universal fee or an in-lieu donation of labor to help maintain the Reserve.

Within the ranges noted above, intermediate alternatives must also be formulated to provide potential means for balancing competing needs and interests.

Planning Assumptions

Several assumptions underlie the planning process; they are listed below. The basis for some of these assumptions was previously described; others are set forth here to illuminate intent in formulating elements of the plan.

- The plan will be consistent with the various existing authorities described in the “Existing Direction for Land-Use Planning and Management” section at the beginning of this chapter.
- The plan will be based on the information, analysis, and range of alternatives described above.

- The Reserve will be primarily managed to protect and help recover populations of threatened and endangered species, with primary focus on marbled murrelet, northern spotted owl, coho salmon, chinook salmon, and steelhead, which are known to inhabit the Reserve. The Reserve will be managed to be available to protect and help recover any additional threatened or endangered species of old-growth ecosystems that may become listed in the future.
- The plan will promote a program of scientific research and resource monitoring for the Reserve, consistent with the preservation purpose for which the Reserve was created and to expand the current knowledge of the Reserve's resources.
- Recreational activities allowed in the Reserve will be those that foster education and interpretation of the Reserve's unique biological resources, maintain ecological integrity, and can be supported with minimal necessary facilities.
- The extent of the Reserve and access routes to the Reserve have been firmly established by Congress. No new access routes to the Reserve or land addition to the Reserve will be considered in plan formulation or recommended in the management direction established by the plan.
- A regional trail system will not be developed as a part of this plan.
- Public motorized vehicle use will not be allowed in the Reserve.
- Fire management in the Reserve will be conducted consistent with the unique old-growth values of the Reserve, and fuel treatment and fire suppression strategies will differ between old-growth forests and second-growth, recovering stands.
- Evaluations for inclusion in the Wild and Scenic River System, or designation as a State of California Ecological Reserve, will be conducted as part of plan formulation, and recommendations for such designations may be part of the management direction established by the plan.

Chapter 3. Affected Environment (Environmental Setting) and Interim Management of the Reserve



Chapter 3. Affected Environment (Environmental Setting) and Interim Management of the Reserve



Physical Environment

Location

The 7,472-acre Reserve is located in the northwestern Coast Ranges of California near Humboldt Bay in Humboldt County (Figure 1-1), part of California's north coast region. It is reached year round by Elk River Road from the city of Eureka (6 miles) or seasonally for BLM tours by Newburg Road from the town of Fortuna (4 miles). These two-lane rural county roads connect to U.S. 101, which links the San Francisco Bay Area to the Eureka Bay area. The Reserve is located in rugged upland terrain, extending over two sets of parallel ridges and drainages (Figure 3-1). It includes the headwaters of three streams: South Fork Elk River, Little South Fork Elk River, and Salmon Creek (Figure 3-2). The entire Reserve drains to Humboldt Bay.

Climate

Climate in the 100- to 2,100-foot-elevation valleys and ranges comprising the Reserve is typically characterized by cool, wet, maritime atmospheric conditions with rainy winters and cool to warm, cloudy or foggy, low-precipitation summers. Annual precipitation at the Reserve is estimated to be 39 inches, mostly in the form of rain, although snowfall occasionally occurs. Fog drip is common in summer and ameliorates harsh summer temperatures and moisture extremes during critically dry periods. Temperature ranges at the Reserve are moderated by proximity to the Pacific Ocean. Average monthly highs at Eureka range from 61.5 °F in summer to 54.8 °F in winter. Lows range from 52 °F in summer to 42.1 °F in winter. Wind is highly variable, but prevailing westerlies from the Pacific Ocean in summer and southwesterly flow during cyclonic

storms in winter are typical and bring humid conditions. Periodically, however, easterly wind from the hot interior of California creates dry conditions for multi-day periods in summer or fall.

As with all of California, precipitation tends to vary substantially from year to year in response to global atmospheric and oceanic conditions. Annual precipitation has ranged from 18 to 74 inches in Eureka. El Nino conditions bring a wetter, longer rainy season, and La Nina conditions bring low rainfall. Sequences of both dry and wet years have been observed historically, and longer such sequences have been inferred from paleoclimatological studies. During the summers of drought periods, offshore wind can create very dry conditions in the Reserve's forests.

Geology and Soils

Two main types of rocks occur in the Reserve—the older and more resistant sedimentary rocks of the Yager Formation and a sequence of geologically younger rocks known as the Wildcat Group. The Yager and Wildcat rock units can be viewed as two distinct units—an underlying hard “basement” (the Yager Formation) overlain by a mantle of softer younger rocks (the Wildcat Group). The older Yager rocks are well cemented and resistant to erosion while the Wildcat rocks are very soft, weakly cemented, and very susceptible to erosion. The Wildcat Group typically underlies most of the forested areas and upper slopes within the Reserve, and the Yager Formation is only exposed in the stream bottoms and inner gorges of the main tributaries (Figure 3-2). (USDI BLM 1999b, 2000; Ogle 1953; Kilbourne 1985; Kilbourne and Morrison 1985)

Stream channel deposits derived from the Yager Formation are typically composed of hard sandstone and conglomerate pebbles, cobbles, and boulders, with smaller amounts of sand and silt. Soils formed from the Yager sediments have abundant rock fragments and sand components and the soils are well drained and moderately resistant to erosion.

The Wildcat Group is composed of soft, poorly consolidated marine sandstones, siltstones, and claystones. All these rocks are weakly cemented, highly erodible, and prone to slope movement, and small streamside landslides are especially common on these younger rocks within the Elk River and Salmon Creek watersheds. These landslides are most often caused by streambank erosion, which destabilizes oversteepened hill slopes in stream corridors. The soft rocks of the Wildcat are also easily eroded and broken down into their fine components—sand, silt, and clay. The Wildcat rocks are the most susceptible to surface or sheet erosion where rock exposures lack vegetative cover, especially along recently built logging roads, landings, and skid trail networks. Fine sediments from these exposed unvegetated areas are transported during rainstorms and are eventually deposited in streams.

Based on past geologic reports and recent field inventories of potential erosion sites, future erosion and sediment delivery to streams within the Reserve can be expected to be highest for rocks of the Wildcat Group. These rocks are the dominant rock types in the Reserve, the most easily eroded, and the most susceptible to fill failures.

Most of the past logging and road building activities within the Reserve have taken place on rocks of the Wildcat Group. Old roads and landings along the inner gorge area of the South Fork of Elk River, and roads and landings located just upslope of the inner gorge in the Salmon Creek drainage pose the highest risks of failure in the near future. The most serious erosion hazards are abandoned stream crossings on roads and road fill perched over stream channels. These erosion hazards have a high potential to deliver large amounts of sediment directly into streams, which would result in damage to aquatic habitat.

Soils developing on the rock units within the Reserve (loams to clay loams of the Larabee and Hugo Series) have good nutrient availability, moisture holding capacity, and fertility. They are capable of producing substantial forest biomass where slopes are stable and soil surfaces are protected from raindrop impact and runoff. In areas of past logging, even where soil has been highly disturbed, the Wildcat derived soils generate new vegetation quickly. The soft rocks break down quickly into soil size particles, and the numerous fractures and unconsolidated character of the rock allow roots to penetrate easily. The Wildcat siltstones and claystones hold water for long periods of time, allowing for better regrowth of vegetation and a rapid recovery of landslide and erosion sites.

Minerals

Locatable mineral potential within the Reserve is very low. Potential for oil and gas reserve is moderate. There are existing oil and gas leases within the southwest corner of the Reserve. The federal government retains one-half of the mineral interest in the original Pacific Lumber Company lands now within the Reserve, with the remaining interest subject to a proposed purchase into federal ownership. The mineral estate for lands previously held by Elk River Timber Company are entirely in federal ownership.

Social Environment

Adjacent Land Use

Lands adjacent to the Reserve are predominantly commercial timberlands, owned and managed for timber production by the Pacific Lumber Company (PALCO) and Simpson Timber Company (STC). Timber harvests are presently taking place or are planned on lands near the Reserve.

Lands along Elk River Road, from the edge of Eureka to the northwest tip of the Reserve at the Reserve's Elk River Trailhead, are in rural residential use. Lands along the Newburg Road from Fortuna to the edge of PALCO's forests are also in rural residential use, with homes closely bordering the roadway. At the end of the Newburg Road, a locked gate prevents unauthorized access onto Felt Springs Road, which is a log-haul road owned and maintained by PALCO. Felt Springs Road accesses the southern boundary ridge and traverses the southeastern portion of the Reserve to adjoining timberlands. An easement granted to BLM secures a restricted public right of access by motor vehicle along this road, which is regulated by BLM.

Timber Management History

The Reserve's watersheds are typical of the north coast region where intensive management of the land for timber production has occurred over the last four decades or longer (Figure 3-3), although logging began in the Reserve in the late 1800s. Until 1999, the upper Salmon Creek, upper South Fork Elk River (Elkhead Springs area), and upper Little South Fork Elk River watersheds were owned and managed for forest product production by PALCO, and the lower Little South Fork watershed and South Fork Elk River corridor were under the ownership of Elk River Timber Company. In 1999, private timberlands in both areas were transferred to the Secretary of Interior for preservation purposes and now comprise the Reserve.

PALCO lands in the upper Salmon Creek watershed remained uncut and unroaded through the 1960s. In the mid- to late 1970s, more than approximately 500 acres in the headwaters of Salmon Creek were roaded for timber access, and some areas along the roads were harvested. By 1981, several hundred acres of land just upstream from the adjoining STC property had been shelterwood or seed-tree harvested and tractor yarded. Although these harvests represented the first entry in the upper Salmon Creek watershed, much of the upper watershed still remained in a natural condition.

By 1987, some new road construction, road reconstruction, and about 40 acres of clear-cutting had occurred in the upper Salmon Creek basin. In the early 1990s, a road was constructed over the divide from the Salmon Creek watershed into the headwaters of the Little South Fork Elk River. Along with approximately 1.5 miles of road construction, about 15 acres of old-growth redwood forest was harvested along the road alignment. Between 1987 and 1994, harvesting (mostly by tractor yarding) and road construction continued on PALCO lands, and perhaps half or more of the upper Salmon Creek watershed was harvested. From 1994 to 1999 some additional road reconstruction and upgrading was performed on PALCO lands in the upper basin, but by then, roading and harvesting had been significantly curtailed over the entire area.

By 1974, road construction and timber harvesting occurred in the lower Little South Fork Elk River watershed. Most of the lower lands in this watershed were clearcut with tractor yarding and are composed of second-growth forest. Subsequent road entries were made as recently as the 1990s, when the upper portion of this watershed was clearcut.

The Upper South Fork River watershed (Elk Head Springs area) has been entered for timber harvesting at several different times. Logging haul roads were built in the 1970s, and the upper area was harvested at that time. The eastern part of the watershed was clearcut with tractor yarding in the 1980s, but the majority of the watershed was only partially harvested at that time. Between 1987 and 1994, the areas that had been partially harvested were clearcut.

Biological Resources

Watershed and Aquatic Habitat Conditions

General Watershed Conditions

Approximately 60% of the Reserve (4,400 acres) was entered for timber harvest prior to its designation as a Reserve. This harvesting required the development of over 35 miles of roads (Figure 3-1), widened periodically to serve as log landings, and the falling, skidding, and removal of large forest trees. Nearly 9% of the harvested area was disturbed for roads and landings, which included 122 stream crossings (Figure 4-1). An estimated 49 major road-induced landslides are now present (PWA 2001). Except for some locations where various selection harvest methods were employed (i.e., *seed-tree harvested* areas), forest canopies were completely removed in harvested areas (clearcut). Overall, the entry for timber harvest significantly degraded watershed conditions in terms of its ability to intercept, store, delay, and filter runoff. The unharvested portion of the Reserve (3,000 acres), however, comprises a dense old-growth forest and exhibits pristine watershed conditions.

Because most of the Reserve was harvested by tractor logging, most of the log haul roads were placed near streams (because logs must be dragged downhill). Direct rainfall and concentrated runoff entrain sediment from road and landing surfaces and generally deliver it directly to nearby

streams. In many locations, gullies form where runoff is concentrated, further increasing sediment generation, or saturated road and landing fills fail directly into streams. Where roads cross the numerous streams on the Reserve, culverts or “Humboldt crossings” (logs placed in the stream parallel to streamflow) were installed. As these roads have not been maintained for several years, many of these stream crossings have become plugged. Plugged culverts can impound runoff and subsequently erode large sections of roadbeds, delivering additional sediment to the stream system. The relationship of road systems to stream sedimentation has been well documented (Furniss et al. 1991, Amaranthus et al. 1985, Reid and Dunne 1984, Beschta 1978, Megahan and Kidd 1972, Brown and Krygier 1971).

Skid trails are also extensive within the Reserve. Most of the older skid trails have revegetated, while most of the more recent ones are still very visible. The headwaters of the South Fork Elk River (Elkhead Springs area) has the highest density of skid trails in the Reserve; one area has 94 miles of skid trail per square mile of land. In some cases, skid trails divert water onto exposed soils or unstable areas, which results in additional surface erosion or mass failure, both contributing additional sediment to streams.

Sediment sources in the Reserve, as well as potential plans for watershed restoration, have been addressed by Pacific Watershed Associates (PWA) in three reports (2000a, 2000b, 2001). Much of the data in this section is taken from the PWA inventories.

General Aquatic Habitat Conditions

Aquatic habitats in the Reserve include the headwaters of Salmon Creek, approximately five miles of the South Fork Elk River, including its headwaters at Elkhead Springs, and the entire Little South Fork Elk River. South Fork Elk River supports coho salmon, chinook salmon, steelhead, and cutthroat trout within the Reserve boundaries. The lower 0.25 mile of Little South Fork Elk River also supports both salmon and steelhead, but a barrier prevents migration into the upper reaches of the drainage (Figure 3-5). In the Reserve, Salmon Creek does not now support anadromous runs of these species, but they are present downstream of the Reserve. Migration barriers may be preventing access to the Reserve (non-anadromous cutthroat trout are found within the Reserve). These streams also support resident rainbow trout, sculpin, and threespine stickleback.

All of these streams are well shaded, have cold water temperatures, and have ample large woody debris within the stream channels. Within the Reserve boundaries, the temperature of Salmon Creek never exceeds 60° F, and temperature of Little South Fork Elk River appears to remain below 65° F in summer. Salmon Creek has numerous deep pools with a large amount of large woody debris where it passes through old-growth forest. However, fine sediment (silt) covers channel-bottom substrates. South Fork Elk River contains many pools, some of which are deep, but it contains large amounts of fine sediment as well. South Fork Elk River (including the Little South Fork) appears to carry high sediment loads during the rainy season. Sediment introduced into all three streams has most likely decreased the size and depth of many pools relative to the unharvested condition, tending to somewhat elevate water temperatures (Fuller pers. comm.).

Fine sediment observed in all of these streams is sufficient to

- inhibit salmon from digging spawning redds (nests),
- limit water flow through the redds (which can cause eggs or newly hatched fish to suffocate),
- inhibit newly hatched fish escape from spawning gravel,

- limit primary photosynthetic production,
- depress benthic invertebrate abundance, and
- increase gill erosion.

Conditions within Specific Watersheds

Upper Little South Fork Elk River Watershed

The 1,500-acre upper Little South Fork Elk River watershed is almost entirely covered with unharvested, old-growth forest. This heavily vegetated, undisturbed watershed produces high-quality streamflow to help maintain suitable aquatic habitat conditions in the downstream reaches of the South Fork Elk River. Sediment loads are relatively small, and aquatic habitats are generally in pristine condition. The watershed was penetrated by a single logging road near the end of the timber harvesting era (referred to herein as the *Headwaters Old-Growth Road*). This 0.9-mile road with three stream crossings was partially decommissioned and recontoured in August–September 2000, following an environmental assessment (USDI BLM 2000) and is expected to be fully decommissioned by 2002.

Lower Little South Fork Elk River Watershed

This steep watershed includes 1,200 acres of harvested lands tributary to the Little South Fork Elk River from its confluence with the South Fork upstream to the northern edge of the main Headwaters Forest grove (1.6 miles). The mainstem channel has a steep gradient, limiting anadromy to the lower quarter mile as noted. This area has nearly 10 miles of logging roads that have 20 stream crossings and an estimated eight landslides. The main road accessing the harvested lands from the Elk River corridor is used as a trail, but it is poorly routed for continued use, requiring high maintenance. Forest cover has begun to dominate much of the area: 77% of its second-growth forest has already reached or exceeded early-mature forest stage. Fine sediment is abundant in the stream channel.

Salmon Creek Watershed

The 3,000-acre Salmon Creek drainage encompasses the entire south end of the Reserve. The Reserve contains all of the headwaters of the stream. The main stem flows for nearly two miles through unharvested old-growth forest, where it is isolated from harvested areas in southern portions of the watershed by a streamside corridor of old-growth forest. Although the Salmon Creek watershed contains up to one-third of the old-growth forest in the Reserve, 65% of the watershed acreage has been heavily roaded and logged. Nearly 15 miles of abandoned logging roads with 50 stream crossings are present. As a result, numerous roads and landings are in inner gorge locations, perched above the streams and episodically contribute massive amounts of sediment to the Salmon Creek system. Twenty-two road-related landslides are present. As previously noted, channel-bottom sediment is extensive. Industrial forest lands downstream of the Reserve, where salmon and steelhead are found, have recently initiated road decommissioning. Roads directly adjacent to Salmon Creek within the Reserve are in the process of being removed (late summers of 2000 and 2001).

Upper South Fork Elk River Watershed (Elkhead Springs Area)

Reserve lands comprise approximately 1,100 acres of the 1,300-acre headwaters of the South Fork Elk River (85%). Only 400 acres, or 31%, of this watershed has unharvested old-growth forest. Harvested areas (69% of the watershed) contain many roads (an estimated 9.6 miles of roads with 48 stream crossings and eight landslides). These areas are recently harvested and contribute significant sediment to the river and its tributaries, which are occupied anadromous fish habitat. This watershed had highest densities of roads and upslope diversions of runoff within the Reserve. Fine sediment is abundant in the river channel.

South Fork Elk River Corridors

These two South Fork Elk River corridors (from the Elk River trailhead to slightly downstream of the confluence with the Little South Fork, and from the confluence upstream to the Elkhead Springs area) comprise narrow parcels of public land along the South Fork Elk River. The width of the downstream corridor averages nearly 0.2 mile (700–1,200 feet); width of the upper corridor averages less than 0.1 miles (300–500 feet). Much of the corridor land supports mountain riparian forest. Conifer forests within the corridors were harvested for timber, and second- and third-growth stands have replaced them. Lands in the tributary watersheds, except for the Reserve's Elkhead Springs area previously described, have been and continue to be managed for timber production under an approved HCP. Management of the Reserve's upland watersheds will therefore have only a limited effect on the extensive fine sediment and existing anadromy in the corridor reach of the river. Appropriate watershed restoration within the corridor would be limited to controlling erosion and stability of the Elk River Road, a former logging haul route that now serves as the primary trail into the northern portion of the Reserve. This road presently requires a high level of maintenance due to erosive substrate and location adjacent to river.

Forest Vegetation

The natural vegetation of the Reserve is coniferous forest, dominated by coastal redwood. Douglas-fir (on northerly slopes) and tanoak (on southerly slopes) naturally occur in association with redwood over large areas of the Reserve (Tables 3-1 and 3-2). Other forest trees include grand fir, Sitka spruce, western red cedar, western hemlock, and in riparian zones, red alder. Natural understory species include salal and evergreen huckleberry. (Jimerson and Jones 2000.)

As previously described, 60% of the Reserve has been harvested, beginning in the late 1800s and continuing through most of the 1990s. The remaining 40% has remained relatively undisturbed. The timber harvesting significantly altered the natural vegetation, suppressing certain species and favoring others. This has created a mosaic of forest stands that are more accurately characterized by postharvest age than by potential vegetation. For purposes of Reserve management, therefore, it is important to consider the Reserve's vegetation in terms of seral stage, rather than simply natural plant associations. With the present cessation of timber harvesting, vegetation at the Reserve will tend to evolve back to a natural condition (which may differ somewhat from the preharvest condition) as characterized in Tables 3-1 and 3-2. Proposed forest restoration actions (Chapter 4) can assist in creating structure and species composition approaching preharvest conditions.

Table 3-1. Extent of Potential Natural Vegetation Types in the Headwaters Forest Reserve

Plant Association	Acres	Percent of Reserve
Redwood–Douglas-fir subseries		
Redwood–Douglas-fir/salal–evergreen huckleberry	3,369	45
Redwood–Douglas-fir/swordfern	712	10
Redwood-tanoak subseries		
Redwood-tanoak/evergreen huckleberry–salal	2,825	38
Redwood-tanoak/swordfern	38	<1
Redwood–western red cedar subseries		
Redwood–western hemlock/evergreen huckleberry–salal	123	2
Redwood–western hemlock/salmonberry/swordfern	22	<1
Redwood–grand fir subseries		
Redwood–grand fir/salal/swordfern	125	2
Redwood–red alder subseries		
Redwood–red alder/salmonberry	169	2
Redwood–Sitka spruce subseries		
Redwood–Sitka spruce/thimbleberry	89	1
Redwood–western red cedar subseries		
Redwood–western red cedar/swordfern	2	<1
Total	7,472	100

Source: Jimerson and Jones 2000

Table 3-2. Environmental Characteristics of Vegetation Types in the Headwaters Forest Reserve

Plant Association	Elevation (feet)	Aspect	Slope	Slope Position
Redwood–Douglas-fir/salal–evergreen huckleberry	1,120–1,760	NE	5–45%	Middle-upper 1/3
Redwood-tanoak/swordfern	1,700–1,910	S, W	45–85%	Middle-lower 1/3
Redwood-tanoak/evergreen huckleberry–salal	920–2,140	SW, SE	15–65%	Upper-middle 1/3
Redwood–Douglas-fir/swordfern	330–1,700	NW, NE	5–80%	Upper-lower 1/3
Redwood–western hemlock/evergreen huckleberry–salal	1,150–1,640	NW, SW	10–80%	Middle-lower 1/3
Redwood–western hemlock/salmonberry/swordfern	600–700	W	2–5%	Streamside
Redwood–grand fir/salal/swordfern	1,060–1,690	NW, NE	15–55%	Upper-lower 1/3
Redwood–red alder/salmonberry	50–800	NW	2–5%	Streamside
Redwood/Sitka spruce/thimbleberry	40–120	N, W	1–5%	Lower 1/3
Redwood–western red cedar/swordfern	380–620	N	40–65%	Lower-middle 1/3

Source: Jimerson and Jones 2000

Forest Seral Stages

The following is a description of the various forest seral stages that have been mapped at the Reserve (Figure 3-4) (Jimerson and Jones 2000). Seral-stage delineations are a useful basis for special-status plant management, wildlife-species management, forest restoration action, and management of recreation access over the next few to several decades.

The primary subdivisions of seral-stage forest types are unharvested and harvested, applying to 42% and 58% of the Reserve, respectively (Table 3-3).

Table 3-3. Seral Stages of the Headwaters Forest

Seral Stage	Acreage	Percent of Reserve
Unharvested Forest		
Old-growth	1,947	26
Late-mature	434	6
Midmature with pre-dominant trees	519	7
Midmature	188	3
Early mature with pre-dominant trees	23	<1
Shrub/forb natural	5	<1
Harvested Forest		
Seed-tree harvested	433	6
Late-mature harvested	9	<1
Midmature harvested	838	11
Early-mature harvested with pre-dominant trees	153	2
Early-mature harvested	598	8
Pole harvested	1,677	22
Shrub-sapling harvested	<u>647</u>	<u>9</u>
Total	7,472	100

Note: "Pre-dominant trees" indicates that larger individuals are beginning to dominate the stand.

Source: Jimerson and Jones 2000

Unharvested Forest

Unharvested portions of the Reserve are generally not considered for active management in this plan, with the exception of the development of some trail access into them under certain alternatives. The seral stages found in the Reserve are described below.

- **Old-growth.** Old-growth forest, covering 1947 acres (26% of the Reserve), typically has 30–40 trees per acre, primarily redwood and Douglas-fir. They usually occur as widely spaced individuals, generally with diameters at breast height (dbh) greater than 60 inches and ages greater than 200–500 years. A variety of age classes of conifer species are represented with a high degree of both vertical and horizontal structural complexity. Understory vegetation is well developed and there is a significant component of large woody debris (LWD) on the forest floor.

- **Mature.** Because of natural substrate and topographic conditions, as well as wind and fire history, a substantial portion of the unharvested forest is not strictly considered “old-growth” but comprises somewhat younger groves considered “mature.” Occupying 1,164 acres (16% of the Reserve), these stands differ as a matter of degree rather than kind from the old-growth groves; in fact they tend to grade into one another. They tend to have fewer old-growth attributes, but are capable of attaining them. Average tree ages and diameters tend to be less, and stocking densities tend to be higher, with a larger Douglas-fir component. Understory vegetation is also well-developed with a significant LWD component.

Harvested Forest

Harvested portions of the Reserve are considered for active management in this plan, with the goal of accelerating successional change to natural mature and old-growth conditions (Chapter 4). Forest seral stages and riparian zones at the Reserve are described below.

- **Seed-tree harvested.** Approximately 6% of the Reserve (433 acres) was harvested by seed-tree silvicultural prescriptions in which scattered single trees or small groups of mature or old-growth trees were retained across the harvest area, usually with random spacing. (This seral stage is referred to as *old-growth harvested* by Jimerson and Jones 2000) These stands generally have two distinct strata of conifers and a less-well-developed understory and LWD component. The overstory is composed of the residual trees, and the understory is usually a uniform pole or shrub-sapling stand with characteristics similar to pole or shrub-sapling stands described below.
- **Mature harvested.** These stands, covering 1,598 acres (21% of the Reserve), are generally more than 30 years old, representing regeneration in the earliest harvest units of the Reserve. They are highly variable in species compositions and structures. Average stem diameters are greater than 16 inches, and maximum stand height is greater than 100 feet. In general, redwood dominates the stands (44% to 71%), with Douglas-fir as the other principal species. Minor constituents, but often locally dense, include tanoak, western hemlock, and grand fir. Understory layers are better developed than in the pole/sapling stands because stand densities are less due to managed thinning and natural thinning processes. Principal understory species are salal, evergreen huckleberry, red huckleberry, salmonberry, and thimbleberry. Variability of stand structure depends on the history of management and/or natural processes. Some stands show characteristics similar to the pole stands (i.e., emerging dominance differentiation and little structural diversity), while older stands show strong variability in individual tree form and have highly variable structures, both vertically and horizontally.
- **Pole harvested.** These stands, covering 1,677 acres (22% of the Reserve), are composed of extremely dense stands of young conifer trees generally 15–35 years of age. Typically, 500–2,500 trees are present per acre. A sample regeneration survey showed Douglas-fir dominance (78%), with redwood and grand fir percentages of 21% and 1%, respectively. Tanoak is present in these stands but is a very minor component once these stands are well established. Structurally, the stands typically have a single overstory layer, with some understory composed of salal and evergreen huckleberry. The trees have diameters ranging from 6–14 inches dbh, and sometimes as large as 20 inches. Stand heights range from 40 to 75 feet.

Because of the density of these stands, live crown ratios are low and crown-base height is relatively high. These stands are extremely dense where they have developed on skid trails and layouts (i.e., beds prepared for the purpose of reducing breakage during the felling of large trees). Eventual overstory trees have begun to establish dominance over slower-

growing trees that are at less of an advantage because of their siting, the availability of sunlight, etc. This overstory selection will accelerate through the pole stage.

- **Shrub-sapling harvested.** This type, covering 647 acres (9% of the Reserve), has developed on ground that was clearcut 10–15 years ago. The dominant vegetation is broad-leaved shrubs with hardwood and conifer saplings, seedlings, and sprouts. The young conifers are primarily seeded Douglas-fir and redwood stump sprouts, variably stocked from 500 to 3,000 per acre. Pacific madrone and tanoak are generally present in minor percentages, but in some instances tanoak is a major component and displaces conifer stocking. Relative species compositions and canopy percentages have not yet been inventoried. Redwood stump sprouts are scattered throughout the areas, but Douglas-fir seedlings are clumped, with extreme densities on old skid trails and layouts.
- **Riparian zones.** Vegetation along watercourses and seep areas in unharvested forests is dominated by redwoods and huckleberry. In harvested forests, it is dominated by hardwoods such as red alder and big leaf maple and by conifers such as western red cedar, Douglas-fir, Sitka spruce, and grand fir. Crown canopy closures are usually 90–100%, with well-developed vertical structure. The LWD component is also usually well developed.

Special-Status Plants, Fungi, Lichens, and Bryophytes

This section describes special-status vascular plants, fungi, lichens, and bryophytes (mosses, liverworts, and hornworts) that occur or may occur in the Reserve. Fungi, lichens, and bryophytes are collectively referred to as cryptogams.

Vascular Plants

Special-status plants are plants that are legally protected under ESA, CESA, or other regulations and species that are considered sufficiently rare by the scientific community to qualify for such listing. Special-status plants are species in any of the following categories:

- plants listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.12 [listed plants] and various notices in the Federal Register [proposed species]);
- plants that are candidates for possible future listing as threatened or endangered under ESA (61 FR 40: 7596-7613, February 28, 1996);
- plants listed or proposed for listing by the state as threatened or endangered under CESA (14 CCR 670.5);
- plants listed as rare or endangered under the California Native Plant Protection Act (California Fish and Game Code, Section 1900 et seq.);
- plants that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines, Section 15380);
- plants considered by the California Native Plant Society (CNPS) to be “rare, threatened, or endangered in California” (lists 1B and 2 described in Skinner and Pavlik 1994);
- plants listed by CNPS as species about which more information is needed to determine their status;

- plants of limited distribution (lists 3 and 4 described in Skinner and Pavlik 1994), which may be included as special-status species on the basis of local significance or recent biological information; and
- plants listed as sensitive, special-interest, or “Survey-and-Manage” by U.S. Forest Service (USFS) Region 5 (Forest Service Manual 2670), California BLM, or the 2001 record of decision for amendments to the Northwest Forest Plan (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001).

General field surveys for special-status plants have been conducted in the Reserve in conjunction with cryptogam surveys and forest stand examinations. Because of the types of habitats present in the Reserve, few special-status vascular plant species or populations are expected to occur. During other survey work in the Reserve, two CNPS List 4 species have been observed, including heart-leaved twayblade (*Listera cordata*) and Kellogg’s lily (*Lilium Kelloggii*) (Wheeler pers. comm.). A list of special-status plants with potential to occur in the Reserve was developed through a search of the latest versions of the California Natural Diversity Data Base (CNDDB), CNPS Electronic Inventory, and descriptions of the vegetation types of the project area (Jimerson and Jones 2000, Wheeler pers. comm.). Special-status plants that may occur in the Reserve, their listing status, and known geographic distribution and ecological information are summarized in Table 3-4.

Fungi, Lichens, and Bryophytes (Cryptogams)

No fungi, lichens, or bryophytes, collectively known as cryptogams, are currently listed or are candidates for listing under ESA or CESA. However, the CNPS has developed a list of lichens and bryophytes that are considered rare. In addition, the Northwest Forest Plan contains a list of Survey-and-Manage species that includes fungi, lichens, and bryophytes (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001).

McFarland and Largent (2000) are conducting protocol-level surveys to identify cryptogams in representative plots in the Reserve. Complete surveys for cryptogams require at least five years of studies, and only two years have been completed to date. Fifty-six permanent monitoring plots at least 0.10 hectare in size were established throughout the forest and distributed among sites that capture the range of vegetation communities, seral stages, slope exposures, and slope positions in the Reserve. The plots were revisited multiple times on a weekly or biweekly basis during mushroom season and after storm events from 1999 through spring 2001, and all species of cryptogams were recorded. Survey-and-Manage species, the number of plots in which they were identified, and their microhabitat requirements are summarized in Table 3-5.

A total of 458 species of fungi, lichens, and bryophytes have been recorded to date in the Reserve. The Reserve supports a relatively rich composition of fungal species, with 340 species identified to date. The most species-rich sites for fungi include north-to-east facing midslopes with a redwood/Douglas-fir overstory and a tanoak/huckleberry understory. Young, early-successional, even-aged and monotypic forest stands that were previously logged supported the fewest number of cryptogam species. Exceptions occurred where some late-mature trees had been retained in the harvested stands (i.e., seed-tree harvested stands), which provided source populations of cryptogams to repopulate the site (McFarland and Largent 2000).

A total of 24 Survey-and-Manage fungi species have been identified in the Reserve. Three fungal Survey-and-Manage species have been found only once in the Reserve and have not been

Table 3-4. Special-Status Vascular Plants with Potential to Occur in the Headwaters Forest Reserve

Common and Scientific Name	Legal Status ^a		Ecological Information
	Federal/State/CNPS	Geographic Distribution	
Small groundcone <i>Boschniakia hookeri</i>	--/--/2	Western north Coast Ranges; Del Norte, Humboldt, Mendocino, and Marin Counties; Oregon, Washington	North coast coniferous forest, parasitic on <i>Gaultheria shallon</i> and <i>Vaccinium</i> sp.; blooms April–August
Northern clustered sedge <i>Carex arcta</i>	--/--/2	North coast; Del Norte, Humboldt, Mendocino, and Tulare Counties; Idaho, Oregon, Washington	Bogs and fens, moist places in north coast coniferous forest, 60–1,400 meters in elevation; blooms June–August
Flaccid sedge <i>Carex leptalea</i>	--/--/2	North Coast Ranges, central coast; Del Norte, Humboldt, Marin, and Trinity Counties; Idaho, Oregon	Bogs and fens, mesic meadows, marshes and swamps, 0–790 meters in elevation; blooms May–July
Meadow sedge <i>Carex praticola</i>	--/--/2	North coast, central and southern Sierra Nevada; Del Norte, Humboldt, Madera, Mono, and Tuolumne Counties; Idaho, Oregon, Washington	Mesic meadows; blooms May–July
Clustered lady’s-slipper <i>Cypripedium fasciculatum</i>	S&M (C) SC/--/4	Northwestern California, Cascade Range, northern Sierra Nevada, southwestern San Francisco Bay area; Idaho, Oregon, Utah, Washington, Wyoming	Lower montane coniferous forest, north coast coniferous forest, usually serpentinite seeps and streambanks, 100–2,000 meters in elevation; blooms March–July
Mountain lady’s-slipper <i>Cypripedium montanum</i>	S&M (C) --/--/4	Del Norte, Glenn, Humboldt, Madera, Mendocino, Modoc, Mariposa, Plumas, Shasta, Sierra, Siskiyou, Sonoma, Tehama, Trinity, Tuolumne, and possibly San Mateo and Santa Cruz Counties; Idaho, Oregon, Washington, Wyoming	Broad-leaved upland forest, lower montane coniferous forest; blooms March–July
Coast fawn lily <i>Erythronium revolutum</i>	--/--/2	Del Norte, Humboldt, Mendocino, Siskiyou, and Sonoma Counties; Oregon and Washington	Moist areas and streambanks within bogs and fens, broadleaf upland forest, north coast coniferous forest, 0–1,065 meters in elevation; blooms March–June
American manna grass <i>Glyceria grandis</i>	--/--/2	Scattered occurrences in the north coast and Sierra Nevada; Humboldt, Mariposa, and Placer Counties	Wet places, bogs and fens, meadows, marshes, streambeds and lake margins; blooms June–August
Redwood lily <i>Lilium rubescens</i>	--/--/4	Del Norte, Humboldt Lake, Mendocino, Napa, Santa Cruz, Shasta, Siskiyou, Sonoma and Trinity Counties	Broad leaved upland forest, chaparral, montane coniferous forest, serpentinite; elevation 30–1,715m; blooms June–August.

Table 3-4. Continued

Common and Scientific Name	Legal Status ^a		Ecological Information
	Federal/State/CNPS	Geographic Distribution	
Kellog's lily <i>Lilium kelloggii</i>	--/--/4	Del Norte and Humboldt Counties; Oregon	Openings and roadsides in North Coast coniferous forests 3-1300m; blooms June–August
Heart-leaved twayblade <i>Listera cordata</i>	--/--/4	Del Norte, Humboldt, Mendocino, and Siskiyou Counties; Nevada, Oregon, Washington	Bogs and fens, lower montane coniferous forest, North Coast coniferous forest; blooms February–July
Running-pine <i>Lycopodium clavatum</i>	--/--/2	Humboldt County; Idaho, Oregon, Washington	Marshes and swamps, mesic North Coast coniferous forest, in shady and semi-exposed forest floors 60–610 meters in elevation; blooms July–August
Leafy-stemmed mitrewort <i>Mitella caulescens</i>	--/--/2	Del Norte, Humboldt, Mendocino, Siskiyou, and Tehama Counties; Idaho and Oregon	North coast and lower montane coniferous forest, broad-leaved upland forest, meadows; 610–1,700 meters in elevation; blooms May–July
Indian-pipe <i>Monotropa uniflora</i>	--/--/2	Del Norte and Humboldt Counties; Oregon, Washington	Broad-leaved upland forest, north coast coniferous forest, often under redwoods or western hemlock, 10–200 meters in elevation; blooms June–July
Howell's montia <i>Montia howellii</i>	SC/--/2	Western north Coast Ranges; Del Norte, Humboldt, and Trinity Counties; Oregon, Washington, British Columbia	Meadows, north coast coniferous forest, freshwater emergent wetland, including meadows and other vernal wet areas in Douglas-fir forest, annual grasslands, vernal pools, compacted soils, 0–400 meters in elevation; blooms March–May
Maple-leaved checkerbloom <i>Sidalcea malachroides</i>	--/--/1B	North coast and northern central coast from Humboldt County to Monterey County; Oregon	Coastal scrub, perennial grassland, redwood forest, Douglas-fir forest, often in open, often disturbed areas, 2–760 meters in elevation; blooms May–August
Siskiyou checkerbloom <i>Sidalcea malviflora</i> ssp. <i>patula</i>	SC/--/1B	Del Norte and Humboldt Counties; Oregon	Coastal bluff scrub, coastal prairie, and North Coast coniferous forest, 15–700 meters in elevation; blooms May–June
Coast checkerbloom <i>Sidalcea oregana</i> ssp. <i>eximia</i>	--/--/1B	Del Norte and Humboldt Counties	Lower montane coniferous forest, meadows, and North Coast coniferous forest, gravelly soils, 0–1,800 meters in elevation; blooms June–August

Table 3-4. Continued

Common and Scientific Name	Legal Status ^a		Ecological Information
	Federal/State/CNPS	Geographic Distribution	
Trifoliolate laceflower <i>Tiarella trifoliata</i> var. <i>trifoliata</i>	--/--/3	Humboldt and Trinity Counties; Oregon	Lower montane coniferous forest, north coast coniferous forest; blooms June

Note: With one exception, none of the plants in this table have been detected in the Reserve, but surveys for them have not yet been conducted. The heart-leaved twayblade has been observed at 1 location in the harvested/unharvested portion of the Reserve.

^a Listing Status

Federal

- E = listed as endangered under the federal Endangered Species Act.
- SC = species of concern; species for which existing information indicates it may warrant listing but for which substantial biological information to support a proposed rule is lacking.
- S&M = Survey-and-Manage Species as defined in the 2001 Northwest Forest Plan ROD. Category C species are uncommon, predisturbance surveys are practical; identify and manage high priority sites for conservation.
- = no status definition.

State

- E = listed as endangered under the California Endangered Species Act.
- = no status definition.

California Native Plant Society

- 1A = presumed extinct in California.
- 1B = rare, threatened, or endangered in California and elsewhere.
- 2 = rare, threatened, or endangered in California but more common elsewhere.
- 3 = plants about which more information is needed to determine their status.
- 4 = plants of limited distribution, a watch list.

Sources: California Native Plant Society (CNPS) 2000.
California Natural Diversity Database (CNDDB) 2001.
Skinner, M. W., and B. M. Pavlik 2000.
California Department of Fish and Game 2001.
Wheeler pers. comm..

Table 3-5. Fungi and Lichen Survey-and-Manage Species Identified in the Headwaters Forest Reserve

Fungi	Survey-and- Manage Category*	Number of Plots	Microhabitats
<i>Cantharellus subalbidus</i>	D	6	Duff under tanoak
<i>Chalciporus (Boletus) piperatus</i>	D	2	Duff under conifers
<i>Clitocybe subditopoda</i>	B	1	Duff under conifers/hardwoods
<i>Collybia racemosa</i>	B	2	Old fungi, in conifer duff
<i>Craterellus (Cantharellus) tubaeformis</i>	D	7	Terrestrial on rotting wood, humus
<i>Dermocybe humboldtensis</i>	B	1	Hardpacked soil
<i>Galerina vittaeformis</i>	B	2	Rotting wood, sometimes with moss
<i>Gomphus clavatus</i>	B	10	Duff under tanoak
<i>Gomphus floccosus</i>	F	3	Duff under tanoak
<i>Gyromitra infula</i>	B	1	Hardpacked soil under Douglas-fir
<i>Hydnum umbilicatum</i>	B	9	Duff under tanoak
<i>Mycena quinaultensis</i>	B	2	Hypogeous under conifer
<i>Mycena tenax</i>	B	3	Duff under conifers
<i>Otidea leporina</i>	B	1	Duff under conifers/hardwoods
<i>Otidea onotica</i>	F	1	Duff under conifers/hardwoods
<i>Phaeocollybia fallax</i>	D	1	Duff under conifers/hardwoods
<i>Phaeocollybia olivacea</i>	B	1	Duff under conifers/hardwoods
<i>Plectania melastoma</i>	F	9	Conifer and hardwood small woody debris
<i>Ramaria araiospora</i>	B	3	Duff under tanoak
<i>Ramaria botrytis</i> var. <i>aurantiiramosa</i>	B	2	Duff under tanoak
<i>Ramaria gelatiniaurantia</i>	B	3	Duff under conifers
<i>Ramaria largentii</i>	B	2	Duff under conifers
<i>Ramaria verlotensis</i>	B	1	Duff under conifers

Fungi	Survey-and- Manage Category*	Number of Plots	Microhabitats
<i>Rickanella swartzii</i> (<i>R. setipes</i>)	B	1	Soil under conifers
Lichens			
<i>Lobaria oregana</i>	A	3	Mossy branches and trunks of hardwoods and conifers
<i>Nephroma bellum</i>	F	1	Mossy branches and trunks of hardwoods
<i>Usnea longissima</i>	A	11	Branches of older conifers

* Survey-and-Manage Categories:

- A Rare; manage all known sites and minimize inadvertent loss of undiscovered sites; conduct predisturbance and strategic surveys.
- B Rare; manage all known sites and minimize inadvertent loss of undiscovered sites; predisturbance surveys are not practical; conduct strategic surveys.
- C Uncommon; identify and manage high-priority sites; conduct predisturbance and strategic surveys.
- D Uncommon; identify and manage high-priority sites; predisturbance surveys are not practical; conduct strategic surveys.
- F uncommon or concern for persistence unknown; determine if species meets basic criteria for Survey-and-Manage status based on new information; management of known sites not required; conduct strategic surveys.

Source: McFarland and Largent 2000.

identified on other BLM lands in California. These relatively rare species include *Clitocybe subditopoda*, *Dermocybe humboldtensis*, and *Gyromitra infula*.

Relatively few lichen and bryophyte species have been identified in the Reserve compared to other public lands in the region. The lichen and bryophyte list is still being compiled; the expected completion date is summer 2001. To date, three Survey-and-Manage lichens have been identified in the forest, one of which, *Usnea longissima*, is also considered rare by the CNPS. Two bryophyte genera, *Tetraphis* and *Buxbaumia*, were identified during the cryptogam surveys. Both of these genera have species that are Survey-and-Manage species, but characteristics for species-level identification were lacking.

Invasive Nonnative Plant Species

Several nonnative plant species occur in the Reserve, some of which are considered invasive. Surveys and mapping of invasive weed populations for the entire Reserve were completed in 2001. Weed species identified to date have been recorded as part of other survey work in the forest.

In general, most invasive nonnative plants are restricted to areas of past disturbances to the soil and forest cover. Old-growth forests and stands with high-crown closure do not provide suitable habitats for most weed species. The most widespread invasive weed in the project area is pampas grass (*Cortaderia jubata*), which occurs throughout the project area on roadcuts and other disturbed sites lacking forest cover. Other invasive species include Himalaya berry (*Rubus discolor*) and English ivy (*Hedera helix*), which occur along the South Fork Elk River (Wheeler pers. comm.). The northwest portion of the Reserve near the Elk River Trailhead and the historical town of Falk contain the greatest number of nonnative species, generally associated with historical landscaping. Most of these species are not considered invasive and are unlikely to spread to other parts of the Reserve.

Aquatic Species and Habitat Needs

Common Species

As described under “General Aquatic Habitat Conditions” above, the Reserve includes the headwaters of Salmon Creek, South Fork Elk River, and Little South Fork Elk River, which contain populations of anadromous and freshwater resident fish species. Common native fish species that may be found in these waterways include sculpin (*Cottus* spp.), threespine stickleback (*Gasterosteus aculeatus*), and nonanadromous (i.e., resident) rainbow steelhead and cutthroat trout (*Oncorhynchus clarki clarki*).

Special-Status Species

As previously discussed, four species of anadromous salmonids occur in or near the Reserve: chinook salmon, coastal cutthroat trout, coho salmon, and steelhead (Table 3-6). Three evolutionarily significant units (ESUs) are listed as threatened under ESA, and one species, coho salmon, is a state-candidate endangered species. The three federally listed ESUs are the California coastal chinook salmon ESU, the southern Oregon/northern California coho salmon ESU, and the northern California steelhead ESU. In addition, critical habitat, which

includes the riparian zones of the Reserve, has been designated under ESA for the southern Oregon/northern California coasts coho salmon and California coastal chinook salmon ESUs. Critical habitat is defined as specific areas, both occupied or unoccupied, that are essential to the conservation of a listed species and that may require special management considerations or protection. NMFS conducted a status review of the southern Oregon/California coasts coastal cutthroat trout ESU and determined that this ESU was not presently in danger of extinction, nor was it likely to become so in the foreseeable future. However, coastal cutthroat trout are a DFG state species of special concern.

Pacific salmon and trout are indicators of a properly functioning aquatic ecosystem because they require cool, clean water, complex channel structures and substrates, and low levels of silt. Excessive water temperatures, high turbidity, sedimentation of habitats, loss of cover and habitat complexity, sport and commercial harvest, pollution, poor hatchery practices, and migration barriers are some of the factors that have contributed to the decline in population abundance of wild stocks for all four species. The establishment of conditions, constraints, and practices that maintain watershed integrity and restoration of problem areas that continue to degrade aquatic habitats are primary objectives needed to restore anadromous salmonid populations.

The information presented below on the life history of coho and chinook salmon, steelhead, and coastal cutthroat trout is based on Shapovolov and Traft (1954), Moyle (1976), and Moyle et al. (1995).

Coho Salmon

Adult coho salmon leave the ocean and migrate up coastal rivers and streams in the fall and early winter. Most spawning occurs in November–January. Females excavate redds (nests) in clean gravel with their tails. Eggs are deposited in the redds where they incubate for 2–3 months, depending on water temperature. Incubation times are inversely related to water temperature; higher water temperatures result in shorter incubation times. After hatching, the young emerge from the gravel and take up residence in the streams. Optimal habitat for young appears to be deep pools containing rootwads and boulders in heavily shaded stream sections. Juvenile coho salmon rear in freshwater for approximately one year before emigrating to the ocean as smolts. As previously noted, coho salmon occur in the South Fork Elk River within the Reserve boundaries and in Salmon Creek downstream of the Reserve (Figure 3-5).

Chinook Salmon

Adult chinook salmon leave the ocean and migrate up coastal rivers and streams in the fall to spawn. Most spawning occurs in October–December. Spawning behavior and egg incubation is similar to that described for coho salmon. After hatching, young chinook salmon rear in their natal streams for a relatively short time before emigrating to the ocean in spring, although a few juveniles may overwinter in freshwater before emigrating. As previously noted, chinook salmon occur in the South Fork Elk River within the Reserve boundaries (Figure 3-5).

Steelhead

Adult steelhead leave the ocean and migrate up coastal rivers and streams in late fall and winter. Spawning can occur from December through April and probably peaks in January–March. Spawning behavior and egg incubation are similar to that described for coho salmon. After

Table 3-6. Special-Status Fish and Wildlife Species of the Headwaters Forest Reserve

Common and Scientific Name	Status ^a		Habitats	Occurrence in Headwaters Forest
	Federal/State	California Distribution		
Oregon shoulderband snail <i>Helminthoglypta hertleini</i>	SM/--	Klamath region, from Douglas County, Oregon to Siskiyou County, California; suspected to occur in Arcata Field Office lands but not in the Reserve	Talus and rocky substrates with permanent ground cover, fissures, piles of woody debris	Minimal suitable habitat present; no confirmed detections
Church's sideband snail <i>Monadenia churchi</i>	SM/--	Butte, Humboldt, Shasta, Siskiyou, Tehama, and Trinity Counties area; suspected to occur within Arcata Field Office lands but not in the Reserve	Rocky outcroppings, talus, lava rock substrates, limestone outcroppings, especially in riparian areas	Suitable habitat present; no confirmed detections
Shasta chaparral snail <i>Trilobopsis roperi</i>	SM/--	Shasta County; not expected to occur within the Reserve area	Within 100 meters of lightly to heavily shaded rockslides, limestone outcroppings, caves, and draws	No suitable habitat present; no confirmed detections
Tehama chaparral snail <i>Trilobopsis tehamana</i>	SM/--	Tehama, Butte, and Siskiyou Counties	Within 100 meters of lightly to heavily shaded rockslides, limestone outcroppings, caves, talus, and woody habitat	No suitable habitat present; no confirmed detections
Steelhead trout <i>Oncorhynchus mykiss</i> Northern California ESU	T/--	Redwood Creek, Humboldt County to Gualala River, Mendocino County; known to occur in Reserve	Cold, clear water with clean gravel of appropriate size for spawning; most spawning occurs in headwater streams; steelhead migrate to the ocean as smolts to feed and grow until sexually mature	Confirmed present
Chinook salmon <i>Oncorhynchus tshawytscha</i> California Coastal ESU	T/--	Redwood Creek, Humboldt County to the Russian River, Sonoma County; fall-run chinook known to occur in Reserve; critical habitat designated	Cool, clear water with spawning gravel; migrate to the ocean to feed and grow until sexually mature	Confirmed present

Table 3-6. Continued

Common and Scientific Name	Status ^a		Habitats	Occurrence in Headwaters Forest
	Federal/State	California Distribution		
Coho Salmon <i>Oncorhynchus kisutch</i> Southern Oregon/Northern California Coasts ESU	T/C	Cape Blanco, Oregon to Punta Gorda, California; known to occur in Reserve; critical habitat designated	Cool, clear water with spawning gravel; migrate to the ocean to feed and grow until sexually mature	Confirmed present
Coastal cutthroat trout <i>Oncorhynchus clarki clarki</i> Southern Oregon /California Coasts ESU	SC/SSC	Coastal streams from Eel River north	Small, low-gradient streams and estuarine habitat with clear, cool waters, shade, and instream cover	Confirmed present
Del Norte salamander <i>Plethodon elongatus</i>	SC/SSC	Coastal portions of Del Norte County and northern Humboldt County	Humid coastal forests among rocks and rubble of riverbeds, road fills, talus, and rock outcrops	Suitable habitat present; predisturbance surveys conducted; no detections
Southern torrent (seep) salamander <i>Rhyacotriton variegatus</i> (= <i>olympicus</i>)	SC/SSC	Northwestern California forests in Del Norte, Humboldt, western Siskiyou, Trinity, and Mendocino Counties; known to occur in the Reserve	Seeps, springs, and high-gradient reaches of small forested streams; usually found in or adjacent to cool, shallow water beneath rocks or organic debris	Confirmed present
Northern red-legged frog <i>Rana aurora aurora</i>	SC/SSC	Del Norte, Humboldt, and western Siskiyou Counties; known to occur in the Reserve	Usually found near ponds or other permanent water bodies with extensive vegetation	Confirmed present
Foothill yellow-legged frog <i>Rana boylei</i>	SC/SSC	Klamath, Cascade, north Coast, south Coast, and Transverse Ranges; through the Sierra Nevada foothills up to approximately 6,000 feet (1,800 meters) south to Kern County	Creeks or rivers in woodlands or forests with rock and gravel substrate and low overhanging vegetation along the edge; usually found near riffles with rocks and sunny banks nearby	Suitable habitat present; no confirmed detections
Tailed frog <i>Ascaphus truei</i>	SC/SSC	Northwestern California from Del Norte County south to central Sonoma County and east as far as southwest Shasta County	Cool, perennial, swiftly flowing streams in redwood, Douglas-fir, and yellow pine forests	Confirmed present

Table 3-6. Continued

Common and Scientific Name	Status ^a		Habitats	Occurrence in Headwaters Forest
	Federal/State	California Distribution		
Northwestern pond turtle <i>Clemmys marmorata marmorata</i>	SC/SSC	California range extends from Oregon border of Del Norte and Siskiyou Counties south along coast to San Francisco Bay, inland through Sacramento Valley, and on the western slope of Sierra Nevada; range overlaps with that of southwestern pond turtle through the Delta and Central Valley to Tulare County	Woodlands, grasslands, and open forests; occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation	Suitable habitat present; no confirmed detections
Osprey <i>Pandion haliaetus</i>	--/SSC	Nests along the north coast from Marin County to Del Norte County, east through the Klamath and Cascade Ranges, and the upper Sacramento Valley; important inland breeding populations at Shasta Lake, Eagle Lake, and Lake Almanor and small numbers elsewhere south through the Sierra Nevada; winters along the coast from San Mateo County to San Diego County	Nests in snags or cliffs or other high, protected sites near the ocean, large lakes, or rivers with abundant fish populations	Confirmed present; 1 nest site in Reserve
Bald eagle <i>Haliaeetus leucocephalus</i>	T/E	Nests in Siskiyou, Modoc, Trinity, Shasta, Lassen, Plumas, Butte, Tehama, Lake, and Mendocino Counties and in the Lake Tahoe Basin; reintroduced into central coast; winter range includes the rest of California, except the southeastern deserts, very high altitudes in the Sierras, and east of the Sierra Nevada south of Mono County; range expanding	In western North America, nests and roosts in coniferous forests within 1 mile of a lake, a reservoir, a stream, or the ocean	Suitable habitat present; no confirmed detections
American peregrine falcon <i>Falco peregrinus anatum</i>	--/FP	Permanent resident on the north and south Coast Ranges; may summer on the Cascade and Klamath Ranges south through the Sierra Nevada to Madera County; winters in the Central Valley south through the Transverse and Peninsular Ranges and the plains east of the Cascade Range	Nests and roosts on protected ledges of high cliffs, usually adjacent to lakes, rivers, or marshes that support large populations of other bird species	Suitable habitat present; no confirmed detections

Table 3-6. Continued

Common and Scientific Name	Status ^a		Habitats	Occurrence in Headwaters Forest
	Federal/State	California Distribution		
Marbled murrelet <i>Brachyramphus marmoratus</i>	T/E	Nesting sites from the Oregon border to Eureka and between Santa Cruz and Half Moon Bay; winters in nearshore and offshore waters along the entire California coastline; known to occur in Reserve	Mature, coastal coniferous forests for nesting; nearby coastal water for foraging; nests in conifer stands greater than 150 years old and may be found up to 35 miles inland; winters on subtidal and pelagic waters often well offshore	Confirmed present
Northern spotted owl <i>Strix occidentalis caurina</i>	T/SSC	A permanent resident throughout its range; found in the north Coast, Klamath, and western Cascade Ranges from Del Norte County to Marin County; known to occur in Reserve	Dense old-growth forests dominated by conifers with topped trees or oaks available for nesting crevices	Confirmed present
Little willow flycatcher <i>Empidonax traillii brewsteri</i>	SC/E	Summer range includes a narrow strip along the eastern Sierra Nevada from Shasta County to Kern County, another strip along the western Sierra Nevada from El Dorado County to Madera County; widespread in migration	Riparian areas and large, wet meadows with abundant willows for breeding; usually found in riparian habitats or edges of clear cuts during fall migration	Low potential, suitable habitat in Elk River corridor for migrants
California red tree vole <i>Arborimus pomo</i>	SC/SSC	North Coast Ranges from Sonoma County to the Oregon border; known to occur in Reserve	Inhabits old-growth forests of Douglas-fir, redwood, or montane hardwood-conifer species	Confirmed present
Pacific fisher <i>Martes pennanti pacifica</i>	SC/SSC	Coastal mountains from Sonoma County to Del Norte County, through Cascades to Lassen County; also from Fresno County through the Sierra Nevada but is believed to be extirpated from the northern Sierra Nevada	Mixed conifer habitats with high overstory cover; preference for riparian areas and other ecotonal habitats	Suitable habitat present; no confirmed detections

Note: ESU = Evolutionarily significant unit.

^a Status definitions:

Federal

- E = listed as endangered under the federal Endangered Species Act.
- T = listed as threatened under the federal Endangered Species Act.
- PE = proposed for federal listing as endangered under the federal Endangered Species Act.
- PT = proposed for federal listing as threatened under the federal Endangered Species Act.
- C = species for which U.S. Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list.
- SC = species of concern; species for which existing information indicates it may warrant listing but for which substantial biological information to support a proposed rule is lacking.
- SM = Survey-and-Manage species.
- = no listing.

State

- E = listed as endangered under the California Endangered Species Act.
 - T = listed as threatened under the California Endangered Species Act.
 - R = listed as rare under the California Native Plant Protection Act. This category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.
 - C = candidate species for listing under the California Endangered Species Act.
 - SSC = species of special concern in California.
 - FP = fully protected.
 - = no listing.
-

hatching, young steelhead rear in freshwater for 1–3 years before emigrating to the ocean as smolts. Smolt emigration typically occurs during spring (March–June). As previously noted, steelhead occur in the South Fork Elk River up to the headwaters, the lower 0.25 mile of the Little South Fork Elk River, and Salmon Creek below the Reserve boundary (Figure 3-5).

Coastal Cutthroat Trout

In Northern California, coastal cutthroat trout begin to leave the ocean and migrate up spawning streams after the first fall rains. Spawning typically occurs in January or February. Cutthroat typically spawn and rear farther upstream than do steelhead or coho salmon, which are competitively dominant over cutthroat trout. Spawning behavior and egg incubation are similar to that as described for coho salmon. After hatching, young coastal cutthroat trout rear in freshwater for up to five years, although some spend their entire lives in freshwater. After migrating to sea, juvenile cutthroat trout remain close inshore and most remain in the estuary. Adult coastal cutthroat trout spend one to several years in saltwater but may migrate upstream each year to spawn. As previously noted, anadromous coastal cutthroat trout occur in the Reserve's South Fork Elk River up to the headwaters and in Salmon Creek downstream of the Reserve. A non-anadromous population exists in Salmon Creek within the Reserve (Figure 3-5).

Factors Affecting Abundance of Anadromous Salmonids

The Elk River and Salmon Creek watersheds once supported abundant runs of native anadromous salmonids. Habitat loss and degradation is the human-caused factor that has had the greatest effect on the abundance of anadromous salmonids. Other factors that have contributed to low abundance relative to historical conditions include commercial and sportfishing harvest, changes in ocean temperature and prey availability, entrainment in diversions, continued habitat degradation, contaminants, species interactions (e.g., presence of or predation by nonnative species), and artificially propagated stocks.

Relative to historical conditions, the Elk River and Salmon Creek watersheds have been highly modified. Timber harvesting has occurred in the upland areas for more than a century, while the lowland areas bordering Humboldt Bay have been leveed and drained and converted for agricultural purposes (e.g., pasture). The Humboldt Bay estuary and surrounding wetlands receive contaminated runoff from agricultural lands and roadway surfaces and discharges from industries and municipalities. As a consequence of a century of watershed disturbances, large quantities of sediment have been introduced into the rivers and streams within these watersheds. As previously described, excessive sediment input into streams has degraded spawning and rearing habitat for fish by filling in pool habitats and causing stream gravels to have a higher-than-normal percentage of fine sediments (PALCO 1999). In Salmon Creek, the combination of accumulated sediments and woody material has formed numerous debris jams that have created partial and sometimes complete barriers to migrating fish (California Department of Fish and Game 1984). Farther downstream, the large volume of sediment introduced into the bay and estuary has contributed to sedimentation of habitats, causing aquatic organisms to be displaced or completely buried. Levees that have been constructed along the lower watercourses have separated the river and stream channels from their floodplain. Floodplain habitats are important nursery areas and refugia for many aquatic organisms, including anadromous salmonids.

Current Monitoring and Restoration Programs

In response to the continual decline in abundance of anadromous salmonids, various agencies and resource conservation groups have initiated monitoring programs to assess the current status of fish populations and habitat conditions in the region, including streams within the Elk River and Salmon Creek watersheds. For example, a multiyear, regional abundance survey of juvenile coho salmon in the Mad River-Redwood Creek Hydrologic Unit was initiated in 1999 to monitor abundance in, among others, the Humboldt Bay tributaries. Similarly, in response to a heightened interest in the potential effects of altered stream temperatures on salmonids and other aquatic organisms, a regional stream temperature assessment was initiated to identify thermally sensitive streams and to characterize temperature regimes of the various watersheds across the region. Both of these programs are part of the Humboldt State University Foundation, Forest Science Project. In addition to these monitoring programs, other monitoring efforts include water quality monitoring on Salmon Creek in the Humboldt Bay National Wildlife Refuge by the USFWS and summer water temperature monitoring on Reserve streams by BLM.

Restoration projects within the Elk River and Salmon Creek watersheds below the Reserve include decommissioning of inner gorge roads along Salmon Creek and vegetation planting, channel realignment, and tidal gate modification along Salmon Creek within the wildlife refuge. Within the Reserve, BLM initiated an interim watershed restoration and emergency sediment reduction program in 2000 to reduce the threat of immediate erosion and to prevent further deterioration of streams. In addition to road repair and emergency sediment reduction, BLM is performing trail maintenance along South Fork Elk River to reduce sedimentation to the South Fork and Little South Fork Elk River.

Wildlife Species and Habitat Needs

Common Species

North coast coniferous forest habitats provide food, cover, and unique habitat elements for many wildlife species (Mayer and Laudenslayer 1988, Schoenherr 1992). More than half of the forest land on the Reserve has been disturbed, at some level, by timber harvesting practices. As a result of this disturbance, a variety of habitat types currently occur in the Reserve. The following is a discussion of five distinct habitat types (shrub-sapling harvested, pole harvested, mature harvested and unharvested, old-growth, and riparian forest) and examples of common wildlife species associated with these habitats.

Shrub-Sapling Harvested Habitat

Shrub-sapling harvested habitat consists of recently clearcut forests that are now dominated by broad-leafed shrubs (salal and blue blossom) with coniferous seedlings and saplings. Common wildlife species that are able to tolerate drier, warmer temperatures include ensatina (*Ensatina eschscholtzii*), gopher snake (*Pituophis melanoleucus*), western fence lizard (*Sceloporus occidentalis*), Bewick's wren (*Thryomanes bewickii*), California ground squirrel (*Sceloporus beecheyi*), black-tail deer (*Odocoileus hemionus*), and striped skunk (*Mephitis mephitis*).

Pole Harvested Habitat

Pole harvested habitat consists of dense stands of young conifers, especially Douglas-fir. Common wildlife species found in this habitat include pacific tree frog (*Hyla regilla*), western skink (*Eumeces skiltonianus*), western terrestrial garter snake (*Thamnophis elegans*), dark-eyed junco (*Junco hyemalis*), Trowbridge shrew (*Sorex trowbridgei*), and bobcat (*Lynx rufus*).

Mature Harvested and Unharvested Habitat

A wide variety of wildlife species inhabit the mature forest stands (both harvested and unharvested), which include early, mid-, and late-mature seral stages. Mid- and late-mature forests provide habitat for amphibians such as clouded salamander (*Aneides ferreus*) and Pacific giant salamander (*Dicamptodon ensatus*). Reptiles such as northern alligator lizard (*Gerrhonotus coeruleus*) and sharp tailed snake (*Contia tenuis*) are commonly found in a variety of forest habitats. Bird species found in forests dominated by Douglas-fir include Steller's jays (*Cyanocitta stelleri*), northern flicker (*Colaptes auratus*), and Pacific slope flycatcher (*Empidonax difficilis*). Common mammals found in mature stands are Allen's chipmunk (*Tamias senex*), long-eared myotis (*Myotis evotis*), mountain beaver (*Aplodontia rufa*), gray fox (*Urocyon cinereoargenteus*), and black bear (*Ursus americanus*).

Old-Growth Habitat

Old-growth habitat provides a cool, moist environment for a variety of wildlife species, several of which can only find their nesting or foraging grounds within this habitat type. Moisture-loving animals, such as insects, amphibians, and mollusks, tend to thrive in old-growth forests (Schoenherr 1992). Banana slugs (*Ariolimax* ssp.) and other detritus feeders are an important and conspicuous component of this habitat because they process organic material throughout the forest floor. Amphibian species commonly found include Pacific giant salamander, clouded salamander, California slender salamander (*Batrachoseps attenuatus*), and northwestern salamander (*Ambystoma gracile*). Common bird species include pileated woodpecker (*Dryocopus pileatus*), Vaux's swift (*Chaetura vauxi*), Swainson's thrush (*Catharus ustulatus*), varied thrush (*Ixoreus naevius*), and brown creeper (*Certhia americana*). Mammal species that depend on old-growth habitat include California red-backed vole (*Clethrionomys occidentalis*), red tree vole (*Arborimus pomo*), silver-haired bat (*Lasionycteris noctivagans*), and northern flying squirrel (*Glaucomys sabrinus*).

Riparian Forest Habitat

Riparian forest habitat provides food, water, and migration and dispersal corridors, as well as escape, nesting, and thermal cover for many wildlife species (Mayer and Laudenslayer 1988). Wildlife species associated with riparian forest habitat include black salamander (*Aneides lugubris*), tailed frog (*Ascaphus truei*), rubber boa (*Charina bottae*), and Anna's hummingbird (*Calypte anna*). Common mammals that could occupy this habitat include raccoon (*Procyon lotor*), spotted skunk (*Spilogale gracilis*), and Virginia opossum (*Didelphis virginianus*).

Migratory Birds

Of the approximately 900 migratory birds occurring in the United States, 122 were selected as species of management concern at a national level (Chapter 2). Migratory bird species on this list that occur within the Reserve's coastal redwood forest habitat include hermit warbler, Vaux's swift, Allen's hummingbird, olive-sided flycatcher, and Pacific-slope flycatcher.

Special-Status Wildlife Species

Various information was gathered and reviewed to develop a list of threatened, endangered, candidate, and other special-status wildlife species that exist or could exist in the Reserve. Several data sources were reviewed to develop this list, including database records from the DFG's California Natural Diversity Database (CNDDDB) (2001), Survey-and-Manage species lists (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001), USFWS species lists (April 2001), PALCO's HCP (1999), published and unpublished literature, and results of protocol-level field surveys. Table 3-6 lists special-status fish and wildlife species with potential to occur in the project area and describes the federal and state status for the species identified. The table includes comments about the geographic distribution, habitat requirements, and range of the species. Two special-status, terrestrial species known to occur on the Reserve are listed as threatened or endangered: the marbled murrelet and the northern spotted owl. The following is a brief discussion of special-status species with the potential to occur in or near the Reserve.

Birds

Marbled Murrelet

Marbled murrelet populations in California have declined significantly (U.S. Fish and Wildlife Service 1997). At present, no concentrated marbled murrelet nesting populations occur along the California coast south of the Reserve until San Mateo County, south of San Francisco (U.S. Fish and Wildlife Service 1997). Scattered nesting occurs at Humboldt Redwoods State Park, on PALCO lands, at Alder Creek, near Fort Bragg, and in other locations. Approximately 25% of the marbled murrelet reproductive activity in the southern Humboldt region may occur in the Reserve (Ralph et al. 1997).

In its recovery plan for the marbled murrelet, USFWS recommends the maintenance and development of suitable habitat in relatively large continuous blocks, specifically including the Reserve, which is designated critical habitat for the species (U.S. Fish and Wildlife Service 1997). The Reserve currently contains suitable marbled murrelet nesting habitat in most of the intact old-growth, late mature, mid-mature, and mid-mature with predominants (3,088 acres), and in seed-tree harvested forests (433 acres), together representing 47% of the Reserve. Under the critical-habitat designation, actions in the Reserve should not adversely affect marbled murrelet habitat. Suitable nesting habitat for the marbled murrelet is low elevation, mature to over-mature coniferous stands. Younger stands are also suitable for nesting if they contain large trees with nest platforms. Nest platforms include large branches, deformities, or debris platforms created by mistletoe infestations. The current range of the marbled murrelet in California is considered to be up to 45 miles inland from the coast (U.S. Fish and Wildlife Service 1997).

Disturbance near nests may interrupt normal breeding behavior and result in a failed nesting attempt. Such outcomes are especially onerous for species with a low rate of reproduction, such as the marbled murrelet. Protection of nesting marbled murrelets generally focuses on protecting

suitable habitat and minimizing the potential for noise and visual disturbance that may adversely affect breeding birds. According to Long and Ralph (1998), however, anecdotal data supports the theory that nesting marbled murrelets are relatively tolerant of loud noises. They conclude that marbled murrelets are not easily disrupted from nesting attempts by human disturbance, except in situations where humans have confronted murrelets at or very near the nest. Hamer and Nelson (1998) preliminarily investigated the effects of several disturbance types on nesting activity. They found that human presence near a nest tree caused adults to abort feeding or flush from the nest limb. According to this research, visual human disturbance caused disruption in nesting activity, while noise disturbance from human presence did not result in a reaction by adult nesting marbled murrelets.

A potential indirect effect that is perhaps more significant than disturbance is the risk of predation on marbled murrelet eggs and chicks. The only defense mechanism a nesting marbled murrelet has from predators is to remain hidden at the nest and to travel to and from the nest without being detected. Forests with trails and roads will alter bird community composition by enhancing forest-edge habitat used by generalist species and known nest predators, such as Steller's jays (Hickman 1990, Miller et al. 1998, Marzluff and Balda 1992, Nelson and Hamer 1995). Predation on marbled murrelets by corvids (birds in the family Corvidae, such as jays and ravens) has been documented by Singer et al. (1991). Furthermore, corvids are attracted to human garbage. Corvid monitoring in the Reserve during 2001 and 2002 indicated that Steller's jays are abundant and widespread in open areas and that at least four pairs of common ravens are present (Hawks pers. comm.). Many rural residences and the towns of Fortuna (which has a waste disposal facility), Rohnerville, Fernbridge, Loleta, and Field's Landing are located near the Reserve, and general recreation and timber management activities take place in the area; therefore, the potential for corvid intrusion into the Reserve is significant.

Marbled murrelet occupying behavior has been identified at 44 of 70 survey stations in the Reserve (Figure 3-6). Actions that indicate occupying behavior include circling above and below canopy, flying through at or below canopy and stationary calling. Detections that do not indicate occupying behavior include flying over canopy or nonstationary auditory detections. It is assumed there is nesting activity where occupying behavior is observed. Nesting activity within the Reserve occurs primarily within the old-growth unharvested portions of the Reserve, but visual detections are often recorded in cleared areas and along roads because surveyor visibility is greater in these areas.

USFWS estimates that activities within 0.25 miles of a marbled murrelet nest site may adversely affect nesting behavior (U.S. Fish and Wildlife Service 2000). Approximately two-thirds of the suitable habitat within the Reserve has been surveyed for marbled murrelets. All suitable habitat is considered occupied for the impact analyses in this document.

Northern Spotted Owl

This species inhabits old-growth and late-successional forests in the Pacific Northwest and northern California. The survival of the owl depends on maintaining adequate well-distributed nesting, roosting, and foraging (NRF) habitat throughout the species' range. The components of NRF habitat include a multilayered, multispecies canopy with large overstory trees, large trees with various deformities, accumulations of fallen trees, and open space below the canopy for owls to fly (Thomas et al. 1990). Suitable dispersal habitat is also an important component of the owl's recovery because it provides a critical link to blocks of NRF habitat. Dispersal habitat consists of forest stands with adequate tree size and canopy closure.

The Reserve is within the California Coastal biogeographic subprovince in the range of the northern spotted owl and contains suitable NRF and dispersal habitat, as well as known nest sites

and activity centers for the species. Protocol-level surveys from the last several years indicate that six northern spotted owl sites occur in the Reserve. Five of the owl sites have been reproductive pairs and one has been a non-reproductive pair. Approximately 4,469 acres of the Reserve (62%) is considered to be suitable nesting habitat (Table 3-7). Fifty-one known owl nesting sites are located on land in Humboldt, Mendocino, and Trinity Counties managed by BLM’s Arcata Field Office.

Table 3-7. Existing Suitable Nesting Habitat for Northern Spotted Owl and Marbled Murrelet in the Headwaters Forest Reserve*

Seral Stage	Northern Spotted Owl (acres)	Marbled Murrelet (acres)
Unharvested Forest		
Old-growth	1,947	1,947
Late-mature	434	434
Midmature	188	188
Midmature with predominant trees	519	519
Harvested Forest		
Seed-tree harvested	443	433
Midmature harvested	794	-
Early-mature harvested	62	-
Early-mature harvested with predominant trees	92	-
Pole harvested	-	-
Total	4,469	3,521

* Criteria for habitat suitability are as follows:
Northern spotted owl: \$21" DBH, \$40% canopy closure.

A search of the CNDDDB and survey results from the BLM indicate that the known nest sites are within both unharvested old-growth areas and some mature harvested stands. All nest sites are within 0.25 mile of harvested areas (Figure 3-7).

The current threat to northern spotted owl populations within the Reserve is the presence of at least three pairs of barred owls observed in or near the Reserve, which are able to outcompete northern spotted owls for habitat and available prey.

Bald Eagle

Nesting habitat for this species includes conifer forests (Zeiner et al. 1990) associated with a lake, river, or other large body of water. Nest trees are typically dominant or co-dominant trees in a mature or old-growth stand (Lehman 1979). Winter habitat for this species is generally large trees with open crowns near large creeks, rivers, or lakes that have an available supply of fish (Lehman et al. 1980). PALCO has conducted bald eagle surveys on the Reserve and adjacent lands. No bald eagles were observed, and no nesting activity is known or suspected to be occurring on or near the Reserve (PALCO 1999, U.S. Fish and Wildlife Service and California Department of Forestry and Fire Protection 1999).

American Peregrine Falcon

This species nests primarily on cliff ledges. They have been known to nest on small outcrops in other portions of their range (Zeiner et al. 1990). In 1999, PALCO conducted peregrine falcon surveys in the vicinity of the Reserve. As required by their HCP, surveys were conducted within 0.5 mile of timber harvest plans in suitable habitat. No peregrine falcons were observed at that time, and no nesting activity is known or suspected to be occurring on or near the Reserve. The species could occur irregularly during migration.

Osprey

The osprey population has substantially increased over the last 30 years. This species is always associated with large water bodies (e.g., lakes, reservoirs, large rivers) where the species preys on fish. Nests are usually within 1,000 feet of water but are occasionally as far away as one mile (Airola and Shubert 1981). Nest sites consist of a large stick nest typically constructed on the top of tall, broken-top trees or snags. Nest sites are usually in open forest habitats for easy accessibility (Zeiner et al. 1990). One known osprey nest occurs in the Reserve.

Little Willow Flycatcher

This species nests in wet meadows with abundant willows. Occurrences of the little willow flycatcher in the north coast are limited to the Six Rivers National Forest and along the Eel River (Sterling pers. comm.). It is suspected that these birds were not nesting but over-summering in the north coast area. Except for shrub-sapling harvested areas, the upland forested areas of the Reserve do not contain suitable nesting habitat for little willow flycatchers, but the riparian habitat in the Elk River Corridor of the Reserve does contain suitable habitat.

Amphibians and Reptiles

Southern Torrent Salamander

Southern torrent salamanders occur in seeps, springs, and high-gradient reaches of streams in coniferous forest habitats (Corkran and Thoms 1996). Southern torrent salamanders have been detected in the Reserve and on adjacent PALCO lands.

Northern Red-Legged Frog

This species inhabits permanent pools, marshes, and slow-moving streams with dense streamside vegetation (Stebbins 1972). This species is rarely observed away from streamside habitats and finds escape cover in water at least three feet deep. Permanent or nearly permanent pools are required for larval development. Northern red-legged frogs have been detected in the Reserve and on adjacent PALCO lands.

Foothill Yellow-Legged Frog

This species inhabits streams and rivers in woodlands, chaparral, and forests (Stebbins 1985). The species requires shallow, flowing water in small to moderate streams with at least some cobble-sized substrate (Hayes and Jennings 1988). The frogs have been found in streams without cobble (Fitch 1936, Zweifel 1955), but it is not known if foothill yellow-legged frogs live in such habitats regularly (Hayes and Jennings 1988). Suitable habitat for the foothill yellow-legged frog exists within the riparian portions of the Reserve, but this species has not been detected within the Reserve. The foothill yellow-legged frog has been detected regionally in the Eel and Van Duzen Rivers.

Tailed Frog

This species lives in fast, small, permanent forest streams with clear cold water. Darkly shaded shallow water with cobble or boulder substrates are important habitat components for survival and reproduction of the tailed frog. Adults can be found away from streams during winter rains

and occasionally on warm, humid cloudy days (Corkran and Thoms 1996). Presence of this species within the Reserve is well-documented (Fuller pers. comm.).

Northwestern Pond Turtle

The northwestern pond turtle is thoroughly aquatic, preferring the quiet waters of ponds, reservoirs, and sluggish streams (Stebbins 1985). This species leaves the water to bask on rocks or logs and to deposit eggs along the streambank or in adjacent uplands. Northwestern pond turtles may overwinter in upland sites, which may enable them to occupy creeks or waterways that dry out for several months each year. This species has been detected in or near major watercourses in Yager and Eel watersheds but not in the Reserve or on adjacent PALCO lands.

Mammals

Pacific Fisher

The Pacific fisher species inhabits intermediate- to large-tree seral stages of coniferous forests and deciduous riparian habitats with a high percent canopy closure. Hollow logs, trees, and snags are an important habitat component because fishers den in protected cavities (Zeiner et al. 1990). The BLM conducted Pacific fisher surveys in the Reserve using four bait/photo stations in 1999 and 2000. The Pacific fisher was not detected during these surveys (Hawks pers. comm.). Regionally, the Pacific fisher occurs throughout the Humboldt Bay region.

Survey-and-Manage Wildlife Species

The Reserve lies within the Northwest Forest Plan area requiring surveys for Survey-and-Manage mollusks (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001). These species are: Oregon shoulderband snail, Church's sideband snail, Shasta chaparral snail, and Tehama chaparral snail. Surveys were conducted where ground-disturbing activities are to occur for all Survey-and-Manage mollusks, at which time only one Survey-and-Manage mollusk species was found, the Papillose tail-dropper slug (*Prophysaon dubium*). As of January 2001, this species is no longer considered a Survey-and-Manage mollusk (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001).

Surveys were also conducted for the Del Norte salamander, which was formerly listed as a Survey-and-Manage Category "D" species. Suitable habitat for the Del Norte salamander includes talus slopes, rock outcrops, and rocky areas along riverbanks, road cuts, and road fill areas (Corkran and Thoms 1996). In addition, suitable habitat requires protection from sunlight by an overstory canopy that maintains cool, moist conditions on the ground. All road segments decommissioned on the Reserve to date were surveyed to protocol for this species prior to ground-disturbing activity, but none were detected.

Interim Management of Biological Resources

Species Preservation Management

Interim management for species preservation has several elements embodied in various program areas addressed by this plan:

- **Watershed restoration**—logging road and landing decommissioning, sediment reduction actions (installing water bars, improving road drainage, eliminating water diversions), and

trail repair to reduce sediment yield and protect and enhance stream habitats within and downstream of the Reserve.

- **Forest restoration**—limited to removal of invasive nonnative pampas grass along the southern access road and along the two open trails.
- **Recreation management**—sponsoring guided interpretive walks, addressing local school classes, hosting school field trips to engender concern and care of the Reserve's resources, controlling visitation to prevent disturbance to nesting marbled murrelets and northern spotted owls, watershed degradation, and other activities that threaten preservation of ecosystem integrity.
- **Research and monitoring management**—regulating scientific studies to minimize impacts of human intrusion into old-growth forests through a set of guidelines for researchers' behavior and by limiting their access seasonally and hourly to protect listed nesting species.

The watershed restoration work currently being conducted in the Reserve through fiscal year 2002 was approved under an existing environmental assessment (USDI BLM 2000) and biological opinions (U.S. Fish and Wildlife Service 2000, National Marine Fisheries Service 2000). Under the resulting biological opinion of July 12, 2000, issued by USFWS, incidental take was authorized on 792 acres of marbled murrelet nesting habitat between August 6 and September and on 445 acres of nesting habitat between September 1 and September 15, for one breeding season between 2000 and 2002.

At present no forest restoration density-management actions have been planned, approved, or carried out.

Watershed Restoration

Watershed restoration planning began shortly after the Reserve came into public ownership, resulting in a series of restoration planning documents (PWA 2000a, 2000b, 2001). Road and landing removal actions according to these plans commenced in summer 2000 and are continuing in summer 2001. These actions involve removal of the road into the primary old-growth grove and of six road segments adjacent to streams in the watersheds of both Salmon Creek and the Little South Fork Elk River. Full recontouring of these roads to near-original grade is the target level of restoration. In addition, sediment reduction actions are being undertaken on the Salmon Creek Road, which now serves as the Salmon Creek Trail, and extensive trail repairs are being conducted on the Elk River Trail, which was also formerly a logging road.

Research and Monitoring

The following elements are currently monitored:

- various ecological parameters as specified in PALCO's HCP (conducted by PALCO representatives), including radar and conventional surveys for marbled murrelets within the Reserve and on adjacent PALCO lands;
- high-risk sediment sources and watershed restoration site recovery;
- recreation activity, including magnitude and pattern of visitation and adherence to established rules regarding off-trail prohibition and discarding of food wastes;

- possible occurrences of Survey-and-Manage species before any watershed restoration activities; and
- northern spotted owl activity centers.

A corvid monitoring plan has also been developed to establish a baseline sample of corvid abundance within the Reserve. Surveys will be conducted before this management plan is implemented. The study will involve corvid surveys at point-count stations in the Elk River Corridor, Elkhead Springs area, Alicia Pass area, and Salmon Pass area and stations located in the interior of old-growth stands. Once a baseline has been determined, BLM will be able to use this population estimate for comparison to future monitoring results.

BLM is also providing funding for a study in Redwood National Park on the effects of human disturbance on nesting marbled murrelets. This study will not be conducted within the Reserve.

Fire Regime and Hazard

Natural Fire Regime

Fire in the cool, humid climatic environment in which the forest stands of the Reserve are located is not considered to be a major risk (Viers 1981 and 1982). Significant fire events in this regime apparently have a low frequency of occurrence in old-growth redwood forest. Wildfire occurred with an average frequency of 80 to more than 400 years in the forests of coastal Oregon prior to widespread European settlement (Morris 1934, Juday 1976, Morrison and Swanson 1990, Agee 1991 and 1993). Viers (1981) indicates that fires in natural stands here may have average return intervals greater than 500 years. Fire recurrence in second growth stands may be considerably more frequent. Although lightning is considered to be an important potential source of ignition, the typically high humidity during storm events retards the ignition and spread rate of fire. However, because some management alternatives considered in this report would increase opportunities for fire ignition (public access) or fuel loading (forest restoration), it is important to further assess current fire risk.

Fire Risk

Two aspects of an assessment of current risk of stand-replacing fire (RSRF) are important for the Reserve: sources of ignition and conditions affecting spread of fire. In the Reserve, ignition can come primarily from two sources, lightning strikes and human presence. Postignition fire behavior is determined by a number of factors, including topography, wind speed and direction, and fuel condition, which includes fuel moisture, fuel loading, and fuel structure. A risk assessment for planning purposes can focus on human sources of ignition and topographic and fuel-load conditions affecting fire spread.

Ignition

Ignition can come from four sources: lightning strikes, off-Reserve burning, within-Reserve management activities using fire, and activities related to human use of the Reserve. As noted, most lightning strikes occur on ridge tops, and spread of lightning fire is only a risk during a relatively infrequent combination of extreme wind and dry fuel conditions during lightning

storms. At present and in the foreseeable future, management of the Reserve does not involve use of prescribed fire (except for pile burning in stand density management areas; see Chapter 4).

Fire spreading into the Reserve as a result of off-site ignition is possible. The lands of the Reserve are not isolated topographically from potential off-site ignition sources; they are both upslope and upcanyon from non-Reserve lands. Such fires could result from four ignition sources off of the Reserve: lightning strikes, trash burning in rural residences, recreation activity, and forest management activity. These sources are difficult to affect through management of the Reserve.

Human-caused ignition by those approaching or using the Reserve is an important potential source of wildfire, and degree of public access is a key factor of risk. Ignition of wildfire along access roads is probably not a major threat, however. Only one road provides access to the southern perimeter of the Reserve from the normally locked Newburg gate. From the gate, 75% of the road up to the Salmon Pass trailhead is in a topographic position where it is separated from the Reserve by a ridge; therefore, fire burning through lower timberlands and reaching the Reserve boundary would tend to stall at the ridge top without having the upslope preheating effect and would tend to be controllable (although adverse wind conditions could negate this tendency). The remaining 25% of the road, the portion between the Salmon Pass trailhead and Alicia Pass, stays on the ridge top, with the Reserve lands to the north. Again, fires ignited on the ridge top would tend not to easily descend into the Reserve. Except for the Salmon Pass Trailhead, the portion of the road on the ridge top is not open to the public. This road actually continues on through the southern portion of the Reserve, where it is used only for private commercial log-haul purposes.

The existing Elk River Corridor Trailhead and trail constitute another zone where consideration of human-caused fires is important. This corridor is characterized by riparian vegetation along a river, and the adjacent conifer forest has been reduced in volume by past logging. It is situated in a topographic position that has elevated atmospheric humidity and fuel moisture. If ignition were to occur, spread rates would be relatively low. The existing wide trail provides good accessibility for fire suppression.

At present, no facilities for camping or cooking fires are provided in the Reserve, and fires are prohibited. Thus, the most significant threat of wildfire from ignitions within the Reserve is associated primarily with trail day use beyond the Elk River Corridor.

Spread of Fire

Slope position and condition of vegetation are the key factors affecting fire spread. Quantitative data about fuel loading and structure are not available for the Reserve, and standardized fuels models have not been developed. However, two key elements of fire spread that can be evaluated are the relative topographic position of various seral stages and general fuel condition based on seral stage.

Topographic Position

In general, fire ignited in vegetation in the lower third slope position starts relatively slowly, but because of generally elevated fuel moisture conditions it can burn uphill with increasing rates of spread and intensity. Fire ignited in the midslope position tends to have a greater rate of ignition success and immediate spread but less uphill slope distance is available for fire to gain momentum. Fire ignited on the ridge has the greatest initial success because of generally lower

fuel moisture and higher wind exposure, but rate of spread and intensity are usually low. For the existing trail system, approximately 5.43 miles, 84% of the total trail distances are in positions on the lower third of the slopes and 16% are on midslope and upper third positions (Table 3-8).

Table 3-8. Topographic Position of Existing Trails

Trail	Trail Distances Relative to Slope Position (miles)			
	Lower 1/3		Upper 2/3	
Elk River Corridor	2.94		0	
Little South Fork Elk River	0.40		0.86	
Salmon Creek	<u>1.23</u>		<u>0</u>	
Total Distance	4.57		0.86	
Percent of Total Distance	4.57	84%	0.86	16%

Vegetation Condition

Typical stand conditions of three seral stages are considered to contribute to elevated RSRF. These stages are the shrub-sapling harvested, pole harvested, and seed-tree harvested. These stands have combinations of fuel-size-class distributions, fuel load densities, and structures (both vertical and horizontal) that promote fire. They have low canopy-base heights and high canopy-bulk densities that promote vertical fire development into crown fires. A total of 29% of the existing trail distance is in these stands. The remaining 71% is in stands having lower risk associated with stand fuel condition (mature harvested).

The mature harvested seral stage has widely varying characteristics, and the associated RSRF depends on the evolutionary stage of the stand. Generally, these mature seral stages include stands 30–80 years old. Natural processes of mortality, thinning, dominant tree emergence, and mosaic development are occurring to various degrees, and associated fire risk varies greatly as a function of shading, humidity, understory development, and vertical connectivity. In the early periods of development, these mature stands exhibit similar conditions and RSRF to the sapling/pole stands, and in the later periods they exhibit conditions more like old-growth stands, which generally have low RSRF.

The unharvested old-growth stands generally have high levels of shading, elevated fuel moisture, considerable rates of decomposition on the forest floor, and relatively low understory volume. They also lack vertical connectivity and are dominated by large fire-resistant trees.

Integration of Fire Risk

Table 3-9 presents for each seral stage

- a subjective fuels condition risk factor (1–5 rating, with five the highest),
- the distribution by two relative slope positions, and
- a resulting RSRF rating.

Table 3-9. Risk of Stand-Replacing Fire of Various Seral Stages and Topographic Positions

Seral Stage	Fuels Condition Risk Factor (1–5)	Total Acres	Lower 1/3 Acres	Risk of Stand-Replacing Fire	Percentage of Total Area	Upper 2/3 Acres	Risk of Stand-Replacing Fire	Percentage of Total Area
Shrub-sapling harvested	4	652	207	Moderate	3	445	High	6
Pole harvested	5	1,677	314	High	4	1,363	Extreme	18
Mature harvested	3	2,762	823	Low to moderate	11	1,939	Moderate to high	26
Seed-tree harvested	3	433	236	Low to moderate	3	197	Moderate	3
Unharvested old-growth	1	1,947	635	Low	8	1,312	Low	18

Table 3-10 summarizes the acreages of the Reserve having the various levels of fire risk. As shown, approximately 40% of the Reserve is characterized by low and low-moderate RSRF (primarily the unharvested old-growth stands) but almost 30% has high and extreme RSRF (principally the sapling/pole and shrub stands). The combination of the relatively high proportion of stands with elevated fuel-condition risk and the topographic position of these areas poses a significant threat of wildland fire.

Table 3-10. Summary of Existing RSRF at the Reserve

Risk of Stand-Replacing Fire	Area (acres)	Percent of Total Area
Low	1,947	26
Low to moderate	1,059	14
Moderate	404	6
Moderate to High	1,939	26
High	759	10
Extreme	1,363	18

The highest proportion of high and extreme RSRF are in the Salmon Creek watershed, where pole harvested stands are widespread. The Upper South Fork Elk River watershed has the next highest proportions because of the presence of both pole harvested and shrub-sapling harvested stands. The Lower Little South Fork Elk River has the least proportion of high and extreme RSRF, because of the widespread presence of the older mature harvested stands.

A major concern is the risk of spread of fire into the unharvested old-growth stands from adjacent high-risk stands (the pole and shrub-sapling seral stage stands and pole- and shrub-dominated openings in seed-tree harvested stands). Such stands could introduce fire from below into the old-growth at relatively high rate of spread and intensity. In the Upper South Fork Elk River watershed of the Reserve, however, the old-growth stands are fairly well protected because they generally occupy lower slope positions and the high-risk stands are either in small isolated patches or are located upslope of the old-growth. No trails enter this area of the Reserve. A permanent timber-haul road does cross this area, but it is not open to public use.

The central old-growth grove of the Reserve is significantly threatened on both the north and south by the presence of pole and shrub-sapling stands downslope. Trails enter both of these areas. Most of these stands are located on relatively –more –humid, northern-facing slopes. In the Little South Fork Elk River watershed, pole, shrub-sapling, and early mature stands border the old-growth downslope. In the Salmon Creek watershed, a large expanse of pole harvested stands and smaller areas of shrub-sapling stands and seed-tree harvested stands border the old growth. These stands are generally on northeast-facing slopes above the old growth that remains in the inner gorge of the creek and extends up the southwest-facing slope. In one central location, however, an unthinned pole stand approximately 100 acres in size extends across the inner gorge and up the south-facing slope for nearly ½ mile, presenting a high risk of fire intrusion into the adjacent old growth.

Visual Resources

The aesthetic or visual qualities of the Headwaters Forest are some of its most outstanding attributes. Natural landscapes of magnificent towering trees, clear streams, and rolling coastal mountains define the character of the core old-growth redwood forest. However, in some of the previously harvested areas, the landscape has reduced visual qualities. Sharp contrasts are created by road corridors, exposed soil, blocks of different height trees, etc., and reduce the visual qualities, particularly on the 1,550 acres that comprise the most recently harvested areas.

Cultural Resources

Known Resources

Eight archaeological sites have been located and formally recorded within the Reserve (Humboldt State University Academic Foundation 2001). Seven are historic period archaeological sites, and one is a prehistoric site; of the historic sites, one also has a reported but unconfirmed prehistoric component.

Two of the historic sites are very complex, with multiple features spatially associated in various loci. These include the *townsite of Falk and the Elk River Mill and Lumber Company*, with 14 major recorded loci, and *Maggie’s Camp*, with three loci, both within the Elk River Corridor. The historic townsite of Scribner, founded before Falk, may have been a prehistoric campsite for indigenous people. Also within the Elk River Corridor is one of two linear historic sites, the complex *Bucksport and Elk River Railroad Company* system, a logging railroad.

A second linear historic site is a well-preserved segment of the *Old Military Trail*, built in the 1850s by U.S. troops stationed at Fort Humboldt. From Falk, it traverses the central old-growth grove of the Reserve along the ridgetop between Salmon Creek and Little South Fork Elk River and is suspected to exit the Reserve’s southeastern boundary. It coincides with a recent jeep road and was most likely the route of a prehistoric Indian trail. The single prehistoric site recorded at the Reserve is located on the ridgetop adjacent to the trail and indicated prehistoric habitation.

Consultation with representatives of the Table Bluff Reservation Band of Wiyot Indians, the Bear River Band of Rohnerville Rancheria, and Blue Lake Rancheria has not revealed any sacred or traditional cultural places within the Reserve.

Resource Condition

All the historic sites within the Reserve have been disturbed by either natural erosion or human activity. Logging affected the Old Military Trail in the southeast portion of the Reserve, but in the old-growth grove, the trail is well-preserved and retains its integrity of place. Other disturbances include digging for old bottles and structure demolition by fire authorities. However, historic structures remain standing and retain historical integrity. The prehistoric site remains undisturbed.

Interim Management

Interim management of cultural resources at the Reserve has consisted of three elements:

- conducting the cultural resources survey noted above;
- developing interpretive information regarding the townsite of Falk and disseminating it to the public via trailhead interpretive signs, interpretive walks, and presentations in local schools; and
- patrolling historic structures and other sites to prevent vandalism.

Recreation Activities

Access to the Reserve

As noted at the beginning of this chapter, the Reserve is accessible year round by Elk River Road from the city of Eureka (6 miles) or seasonally for BLM tours by Newburg Road connecting to Felt Springs Road from the town of Fortuna (4 miles), both of which are situated on U.S. 101 in the Humboldt Bay area. Elk River Road is a paved two-lane minor collector road, while Newburg Road is a paved two-lane rural residential road with homes closely bordering the roadway. Felt Springs Road is a private natural-surface, two-lane arterial log haul road. BLM has a public easement over this timber company road, which must be accessed through a locked gate. Graveled turnouts have been installed by BLM. Only motor vehicles are allowed on the road, and stopping is prohibited.

Elk River Road, providing access to the northern portion of the Reserve, terminates at the Reserve Boundary where an improved parking area and trailhead (Elk River Trailhead) are located on Reserve property. The improvements include a graveled surface parking area, suitable for cars but not trailers, fencing to prohibit vehicles from entering the Reserve, an information kiosk, and temporary restrooms. A gate prevents motorized vehicle access beyond the trailhead.

Where Felt Springs Road first reaches the ridge along the southern boundary of the Reserve at Salmon Pass, another trailhead—Salmon Pass Trailhead—is located. Improvements are similar to those at Elk River Trailhead. Public travel on Felt Springs Road beyond this point is currently restricted, although the road continues to Alicia Pass along the same ridge, where additional public access is considered in this plan. Felt Springs Road continues on into the southeastern portion of the Reserve, where it is used for timber management activities on adjoining private timberlands under an existing right-of-way.

Existing Trail Network

The former logging road into the northern portion of the Reserve now serves as the Elk River Corridor Trail. This trail extends up the South Fork Elk River with a gentle gradient for 2.9 miles through a narrow riparian corridor of the Reserve. The old road surface is paved for the lower half mile, after which it has a graveled surface. Adjoining lands are private timberlands. Near the confluence of the South Fork and Little South Fork, the trail becomes the Little South Fork Elk River Trail, which climbs steeply for 2.7 miles through harvested timberlands along a former logging road to near the edge of the main old-growth grove on the divide between Salmon Creek and Elk River. Off-trail hiking and access into the old-growth grove at this point are discouraged. Users must return as they came for a round-trip hike of 11.2 miles.

The Salmon Creek Trail, formerly a logging road from the Felt Springs Road at Salmon Pass, provides access to the southern portion of the Reserve. The trail begins with a gentle slope but eventually descends steeply to the inner gorge of Salmon Creek, 1.3 miles from the trailhead. At this point the trail turns east and heads up the inner gorge of Salmon Creek for 0.6 mile, allowing continuous viewing of the southern edge of the main old-growth grove in the canyon bottom and on the opposite slope. Entry into the grove is also discouraged here, and users must return by the same route—a round trip of nearly four miles.

Interim Access and Use Limitations within the Reserve

In March 1999, interim management guidelines for the Reserve were published that allow for day-use pedestrian access only. They do not allow use of vehicles, (whether motorized and nonmotorized), possession of firearms, overnight camping, and equestrian use in the Reserve (*Federal Register* 1999). Trail use was made subject to seasonal closure during wet weather to minimize sediment yield and trail damage. Elk River Trailhead is open to the public year-round, only during daylight hours, although use of Elk River Corridor Trail may not be allowed during wet conditions. Felt Springs Road and Salmon Creek Trailhead are open only to guided hikes. Activities along the Elk River Corridor and Little South Fork Elk River Trails are monitored daily by BLM back-country rangers, who are available to provide information and assist visitors. The interim guidelines also subject collecting of vegetation to a special use permit process.

Visitation and Visitor Preferences

Visitation and Use

A study of visitation to the Reserve was developed from information cards completed by 2,305 visitors who registered at the Elk River Trailhead between June 1999 and March 2000 (USDI BLM 2000). The survey revealed that 75% of all Reserve visitors were from Humboldt County. Approximately 12% and 10% were from the San Francisco Bay Area and Sacramento Area, respectively. Seventy-four percent of the visitors said it was their first trip to the Reserve, and 96% said they would return. Most of the visitor use occurred in June and July (monthly average was 356 hikers). Use declined during August–October (monthly average was 278 hikers), and the least use occurred November through March (monthly average = 151 hikers), which is the rainy season. This level of visitation is relatively light compared to visitation at state and national parks in the region; an average of only 12 persons per day used the primary access to the Reserve during the peak use season.

The majority of visitors to the Reserve only hike the Elk River Corridor Trail. Only 13% of visitors reported that they also hiked the Little South Fork Elk River Trail to the terminus near the main old-growth grove in the Reserve. The amount of hiking that visitors completed varied during the survey period, however; after October a higher percentage of people hiked shorter distances (0–3 miles). Visitors' primary reasons for visiting the Reserve included hiking, exploring, seeing old-growth forest, seeing the result of all of the attention and controversy of the Headwaters forest acquisition, showing it to friends and relatives, exercising, birdwatching, relaxing, and walking dogs (Humboldt State University 2000).

Visitor Preferences

A survey of the preferences of visitors to the Reserve was conducted from July to September, 1999 (Humboldt State University 2000). Reserve visitors were contacted on a stratified random sampling basis for onsite interviews and submittal of a mail-back questionnaire. Of the 580 persons contacted, 411 returned completed surveys (71%).

Only 8% of the respondents indicated they saw too many other hikers, indicating that lack of solitude was not an issue. Twenty-five percent of visitors said they noticed resource impacts caused by other recreationists, primarily litter and dog excrement. Twelve percent of visitors complained that the behavior of others interfered with their enjoyment; the most common problems cited were off-leash dogs and bicycles (bicycle use is in violation of the interim management policy for the Reserve).

When asked what problems they experience with the Reserve, 35% of visitors considered both the lack of information about the area's history and culture and the lack of additional trails to be major or moderate problems. Other problems considered to be major or moderate were the lack of information about trails (30%), litter (25%), trail erosion (21%), pets off-leash (19%) and human waste (17%).

When asked about the importance of services and facilities provided by the BLM, visitors rated the following as important or very important: trailhead signs having necessary information (85%), and opportunity for personal freedom (77%).

Visitors were asked about their support or opposition toward a list of possible management options and permitted activities. More than 90% of respondents support hiking, nature study, and wildlife viewing activities. A majority of visitors opposed hunting (88%), pets off-leash (64%), mountain biking (58%), and horseback riding (58%). A majority of visitors supported providing more trailhead parking (62%) and charging a small user fee (58%).

Suitability for Special-Area Designations

Some of the Reserve's lands and resources may qualify for special designation under certain federal and state laws or administrative regulations, including Area of Critical Environmental Concern/Research Natural Area (ACEC/RNA), Special Recreation Management Area, National Register of Historic Places, National Wild and Scenic River, and State of California Ecological Reserve. Each special-area designation has certain qualifying criteria. The characteristics of the Reserve germane to these criteria are discussed in *Designation and Management of Special Areas* in Chapter 4. Evaluations of eligibility and suitability for designation of areas with wilderness characteristics and Wild and Scenic Rivers are presented in appendices G and H.

Socioeconomic Environment

Locally Affected Communities

Humboldt County

Humboldt County's economy developed around agriculture, logging and lumber milling, and ocean fishing. Its population has steadily increased, and the unemployment rate has decreased, over the past 20 years. Humboldt County has a current estimated population of 127,000, with a median age of 33. Retail trade now dominates local commerce, followed by health care, manufacturing, and accommodations and food service. The county's median per capita income is relatively low (\$20,500) compared to \$39,595 for California and \$33,300 nationally. Humboldt had a high unemployment rate of 6.3% in 1999 (compared with 5.2% in California and 4.2% nationally) (U.S. Census Bureau 2001), and the lowest labor wage rate (\$7.25/hour for a skilled employee) in 26 U.S. labor markets. Housing costs in Humboldt County are low for California but typical of the nation, with a median home price of \$142,000 (CICG 2001), (compared with a statewide median price of \$240,000 and a national median price of \$135,000) (McAllister 2000). The county government maintains an extensive road system throughout the county, which includes the two roads that provide access to the Reserve.

Eureka

Eureka, bordered on one side by Humboldt Bay and on the other by mountains, had its roots since the 1850s in the timber and commercial fishing industries. The city has 28,600 residents within 17 square miles. It is the county seat of Humboldt County. Colleges in Humboldt Bay area (but outside of the city) include College of the Redwoods south of the city and Humboldt State University in Arcata, a town of 16,000 residents eight miles to the north (Eurekaweb.com 2000).

City of Fortuna

The City of Fortuna covers approximately five square miles and is located 16 miles south of Eureka on U.S. 101. Fortuna is the largest city in Humboldt County south of Eureka and has a population of approximately 10,200. The area within the city limits is mostly residential, with the surrounding area predominately rural. Much of the employment in the Fortuna area is related to timber and agriculture. However, within the city the largest percentage of employment is in retail trade and manufacturing. Recreation and tourism also contribute significantly to the city's economy. Because of its location, the city has served as commercial center for the residents of southern Humboldt County, enabling the city to maintain a relatively stable economy and employment rate during seasonal fluctuations in the timber and tourism industries. (City of Fortuna, 1993)

Regional Recreation Opportunities

Humboldt County provides diverse recreation opportunities for its residents and visitors. Public recreation sites include beaches, rivers, and old-growth redwood forests (Figure 3-8). Numerous parks offering a wide range of recreation opportunities are located within a 60-mile radius of the Reserve. The closest parks with stands of old-growth redwood are Grizzly Creek Redwoods

State Park (15 miles east), Humboldt Redwoods State Park (30 miles south), and Prairie Creek Redwoods State Park and Redwood National Park (50 miles north). These parks provide a full array of recreation opportunities and facilities, including a combined total of 170 miles of trails. Much of the trail mileage traverses old-growth redwoods, allowing visitors to directly access some of the world's tallest and most impressive forests. In addition, all three parks offer camping and picnicking. Humboldt Redwoods and Prairie Creek offer backpacker/mountain bicyclist backcountry camps, and Humboldt Redwoods offers an equestrian camp. These parks have very high use compared to the Reserve, with a combined total of more than 1.2 million visitors annually.

During the scoping process for development of this plan, in addition to hikers, mountain bicyclists and equestrians expressed the desire for use of the Reserve. Off-highway vehicle users did not express a desire for use of the Reserve. Currently, 19 public recreation sites in Humboldt County permit equestrian recreation and 12 sites allow mountain bike use in the county. The extent, quality, and challenge of trails for these uses vary among these sites. Recreation use on private lands is generally prohibited without special permission. PALCO and Simpson Lumber Company, large landholders in the area, do not provide public access to their properties for any recreation uses without prior approval.

Information below is based on a telephone survey of managers of eight of these recreation sites to evaluate the quality of recreation experiences available to equestrians and bikers (Table 3-11). Managers of the following sites were contacted in November and December of 2000: Clam Beach, Mad River Beach, Humboldt Redwoods State Park, Trinidad State Beach, King Range National Conservation Area, Sinkyone Wilderness State Park, Redwoods National and Prairie Creeks Redwoods State Parks, and Arcata City Forest.

Equestrian Opportunities

When asked to rate the availability of equestrian opportunities, managers from five of the seven sites indicated that their sites are underutilized by equestrians. Some of the sites are forest environments. Six of the sites are considered to have good or high quality riding trails and adequate parking for horse trailers. Five of the sites have direct trail access from offsite locations. The extent of trails on individual sites ranged from three miles to 50 miles, with a combined total of more than 178 miles between the seven recreation sites. Three sites have adequate watering sources, and three sites have plans to increase capacity, including the BLM King Range National Conservation Area and adjacent lands such as the Redwoods-to-the-Sea Corridor linking to Humboldt Redwoods State Park.

Mountain Biking

Managers of five sites also addressed the availability of mountain biking opportunities. All indicated adequate biking access from urban/suburban areas. Only one manager indicated his site was nearing capacity; the other four managers believed their sites are underutilized by mountain bikers. Some of the sites are forest environments. The extent of trails on individual sites ranged from seven miles to 46 miles, with a combined total of approximately 146 miles. The quality of trails ranges from moderate to high, and the level of challenge ranges from easy to difficult. Four sites have plans to increase capacity, including the BLM King Range National Conservation Area.

Multiple-Use Trails and Recreation Conflicts

Interim management of the Reserve has limited recreation use to hiking, but mountain biking and equestrian uses are being considered in this plan. Multiple-use trails, while common, pose the potential for conflict among users. The most frequently mentioned conflict among the surveyed park managers in the region was between mountain biking and other users. Equestrian park visitors complain that the fast-moving bikes frighten horses and disrupt their recreation experience. Pedestrians complain of being surprised and feeling physically endangered by unexpected encounters with cyclists. These observations are not unique to Humboldt County, as they have been described in other areas.

Management Revenues

Existing Funding for Reserve Management

Fees are not currently charged for access to the Reserve, either for recreation access or research access. Funding from Reserve management is derived exclusively from Congressional appropriations to the Secretary of Interior for BLM. In the original budget for Reserve management submitted in 1997, the State of California was expected to contribute one third of the annual operation costs, but no state funds have been allocated to management of the Reserve yet. BLM has been providing \$1.2–1.3 million per year from federal appropriations for Reserve management since the Reserve's inception.

Federal/State Experiences with Recreation User Fees

Federal Fee Demonstration Program

In 1993, Congress enacted deficit reduction by passage of Public Law 103-66, the Omnibus Budget Reconciliation Act of 1993, which amended the Land and Water Conservation Fund Act of 1965. This fee legislation directed a number of changes in the BLM recreation fee program. In the 1996 Interior appropriations bill, Congress provided BLM the authority to establish a demonstration program to test the collection, retention, and reinvestment of new admission and users fees. This new Recreational Fee Demonstration Program allows BLM to use all of the fee income for meeting costs of operating the site where they are collected. As noted in Chapter 2, the federal legislation that created the Reserve requires that the assessment of fees for recreation and research be considered in this management plan.

Fees charged to date under the demonstration program range from \$3 to \$5 for daily use/parking permits and typically are \$40 for seasonal passes. Visitation to BLM's 95 sites in the program in 1999 was relatively unchanged from visitation in years before the program began. All of the federal participating agencies report high public acceptance of the fee program. Approximately 90% of visitor respondents to agency surveys said the level of fees is "about right" or "too low." However, some recreation user groups, such as the International Mountain Bicycling Association and the Backcountry Horsemen of Washington, oppose user fees. They argue that public lands should be funded by taxes, that charging fees discriminates against low-income families and that, because of the program, recreation interests that generate the most income (OHV use, power boating) will take precedence over lower impact activities.

Table 3-11. Status of Regional Recreation Opportunities

Facility	Clam Beach and Mad River Beach County Parks	Humboldt Redwoods State Park	Trinidad State Beach	King Range NCA	Sinkyone Wilderness State Park	Redwoods National/Prairie Creek State Parks	Arcata City Forest
Equestrian Opportunities							
Suitable parking for horse trailers	Yes	Yes	Yes	Yes	Yes	Yes	No
Direct trail access from offsite locations	Yes	Yes	Yes	Yes	Yes	Yes	No
Quality of onsite riding trails	High	Good	Good	Average	Average	High	High
Extent of trails	7 miles	50 miles	3 miles	46 Miles	15 miles	49 miles	7.5 miles
Trail-use conflicts	Bikes vs. hikers and horses; dogs off leash	Horses vs. bikes	None	None	Horses vs. bikes	None	Horses vs. bikes, hikers vs. bikes
Suitable watering sources	No	Yes	No	Limited	Yes	Adequate	No
Use versus capacity	Underutilized	Moderate	Underutilized	Underutilized	Underutilized	Underutilized	Moderate
Plans for increasing capacity	No	Yes	No	Yes	No	Yes	Yes
Mountain Biking Opportunities							
Direct access from offsite locations	Yes	Yes	NA	No	No	Yes	Yes
Extent of onsite biking trails	7 miles	30–40	NA	46 Miles*	11 Miles	45 miles	10.5 miles
Quality of trails	Flat, paved	High (roads)	NA	High	Moderate (roads)	Moderate	High
Challenge of trails	Not challenging	Moderate to difficult	NA	Moderate to difficult	Moderate	High	High
Trail-use conflicts	Bikes vs. hikers and horses; dogs off leash	Horses vs. bikes	NA	None	Horses vs. bikes	None	Horses vs. bikes, hikers vs. bikes
Use versus capacity	Underutilized	Moderate	NA	Underutilized	Moderate	Underutilized	Moderate; nearing capacity
Plans for increasing capacity	No	Yes	NA	Yes	No	Yes	Yes
Contact	Bob Walsh	Don Beers, Dave Stockton	Don Beers	Robert Wick	Don Beers	David Bower	Staff of Arcata Department of Environmental Services

* An additional 50 miles are currently open but are in a Wilderness Study Area and would be closed to biking use if Congress designates this area as wilderness.

At some sites, BLM provides no-fee days for select groups, such as economically disadvantaged persons, educational institutions, and volunteers.

California State Park Fee Waiver Program

In 2000, California state parks reduced user fees by approximately 50% in an attempt to induce more visitation by low-income persons. It was estimated that fee reduction will increase attendance by 30% in urban areas and 10% in rural areas. Day-use fees were reduced from \$5 to \$2 in Humboldt-area state parks in July 2000. This reduction increased attendance at some facilities, such as Patrick's Point State Park, which experienced a 40% increase in attendance, comprised primarily of surfers. Attendance at most other facilities—those with more general recreation activity—were relatively unaffected by the policy change (Wilbur pers. comm.).

Chapter 4. Management Goals and Direction



Chapter 4. Management Goals and Direction



Introduction

This chapter presents the proposed management direction for the Reserve that is common to, or independent of, the alternatives eventually selected. In providing detailed management direction, it also provides a framework for the consideration of alternatives.

Management policy in this chapter is given for nine program areas comprising management of the Reserve:

- preservation of old-growth species and habitat (species management),
- restoration of old-growth and aquatic ecosystems (watershed restoration and forest restoration),
- research management,
- fire management,
- visual resource management,
- management of recreation access,
- cultural resource management,
- management of areas having wilderness characteristics,
- designation and management of special areas,
- resource monitoring and evaluation, and
- management revenue.

For each program area, management policy is given in three parts:

- management goals, which include desired outcomes;
- management direction, which includes allowable uses and needed actions; and
- implementation guidelines, which will guide implementation of the management direction.

Primary Focus of Reserve Management

The federal legislation authorizing acquisition of the Headwaters Forest established a primary management goal:

“To conserve and study the land, fish, wildlife, and forests . . . while providing public recreation opportunities and [meeting] other management needs.”

This primary management goal for the Reserve is also reflected in agreements between the federal and state agencies that share management responsibility for the Reserve.

The *primary focus of Reserve management* is to restore and maintain its ecological integrity and to study its ecological processes so as to improve that management. Recreation and other necessary management activities will be constrained as necessary to be consistent with the primary goal.

The Headwaters Forest was acquired by the people of the United States to conserve a unique remnant of the old-growth coastal forest of northwestern California that was once extensive but is now limited to a few parks and reserves in the region. The Headwaters old-growth forest is unique among these remnants because of its mix of large redwood and Douglas-fir tree species in association with other conifer species and its diversity of understory species. Conservation of this old-growth forest requires that its natural ecological structure, functions, and processes be preserved in unharvested groves and restored in the harvested forests stands that were included within the Reserve.

Management of this old-growth reserve will involve identification of needed research and protection of

- native species from human and mechanical disturbance that may inhibit their abundance and recovery,
- natural vegetation from invasion of exotic plants and degradation from human intrusion,
- special-status native animals from exotic animals, and
- all resources from fire.

Restoration of ecological functions and processes of harvested forests will involve

- reduction in sediment movement from disturbed forests to streams;
- minimization of unnatural drainage patterns;
- acceleration of plant succession in timber harvested areas;
- improvement of structural complexity in harvested areas;

- improvement of old-growth buffers;
- eventual elimination of forest fragmentation; and
- to the extent practicable, elimination of exotic organisms.

To the extent that they do not compromise these primary goals of Reserve management, opportunities will be provided for access to recreation values and for research that will promote better reserve management.

Species Management

Management of threatened and endangered species, as well as management of the Reserve's plant, fish, and wildlife species in general, has several important elements: restoration of natural watershed condition and process, restoration of second-growth forests to achieve old-growth characteristics, control of visitation, management of wildland fire, and management of monitoring and research. Those management program elements are described in detail in the subsequent major sections of this chapter.

This section addresses aspects of those program elements that are directly related to preservation and recovery of important species that inhabit the Reserve. It sets forth restrictions on various types of disturbance activities that are required to avoid jeopardizing the continued existence of the threatened and endangered species and other special-status species that populate the Reserve. Special-status species that occur or may occur in the Reserve are shown in Table 3-6 (in Chapter 3). Threatened or endangered species include coho salmon, chinook salmon, steelhead trout, marbled murrelet, northern spotted owl, and bald eagle.

Management Goals

Management goals for the Reserve will focus on restoring and enhancing habitat for those species uniquely adapted to old-growth forests. Past timber harvest in the Reserve has resulted in fragmented habitat, which supports nonendemic, edge-tolerant species, as well as endemic, old-growth-dependent species. For this reason, species richness as a whole is not a good measure of management success for the Reserve (Verner 1986).

The desired outcome of species management in the Reserve is the continued presence of all existing old-growth-dependent species that comprise or use the Reserve's forests, streams, or riparian systems and an expansion of populations of these species consistent with the Reserve's gradually increasing carrying capacity as a result of watershed and forest restoration programs. The desired outcome includes provisions for recreation access to the Reserve at times and in locations that minimize adverse effects to activities of old-growth-dependent species.

Accordingly, the following general management goals are established for species management in the Reserve:

- Protect all extant populations of old-growth-dependent fish, wildlife, and plant species that occur on the Reserve from activities that could threaten their population survivability.
- Increase populations of old-growth-dependent species commensurate with the capacity of recovering old-growth ecosystems.

- Where practicable and consistent with the overall size of the Reserve and other management considerations, restore populations of native species.
- Meet the other species-specific goals described below.

Species-Specific Goals, Management Direction, and Implementation Guidelines

Management actions specific to each species or species group are presented in this section, following a species-specific goal.

Aquatic Species

Management Goals

The Reserve has high capacity for the long-term conservation of threatened anadromous salmonids in the north coast region. The desired outcome of management of the Reserve's aquatic habitats is the expansion of high-quality spawning, rearing, and migration habitat for anadromous salmonids, including coho and chinook salmon, steelhead, and coastal cutthroat trout. Over time, watershed restoration and forest restoration should create properly functioning aquatic habitat conditions, which are essential to protect, maintain, and enhance the current populations and genetic integrity of threatened anadromous salmonids. Protection and restoration of aquatic habitats and the processes that shape and maintain their watersheds will be the primary goal. This goal is consistent with the "Aquatic Conservation Strategy" objectives of the Northwest Forest Plan.

Management Direction

Timber harvesting in the Reserve has degraded salmonid habitats, primarily through sedimentation, removal of overstory cover, and interruption of the cycling of large woody debris (LWD). Watershed and forest restoration will reverse these cumulatively significant adverse effects. Roads and log landings and some skid trails will be decommissioned where practicable to reduce the amount of sediment discharged to the Reserve's aquatic habitats (see "Watershed Restoration"). Tree density management will accelerate the recovery of watershed cover and LWD cycling (see "Forest Restoration"). Careful consideration of the timing of watershed and forest restoration activities will avoid or minimize the potential for physically disrupting anadromous fish or contributing sediments to streams when key fish life stages are present.

The suite of proposed actions that will promote the recovery of fish populations includes

- reducing sediment input to streams by road and log-landing decommissioning;
- reestablishing connectivity of the stream network by eliminating present and potential future fish barriers at road crossings and, when appropriate, at existing debris jams;
- reducing sediment input to streams by accelerating restoration of dense watershed cover through tree density management;
- promoting conifer growth along riparian areas;

- in some instances, enhancing channel habitat complexity by installing in-stream habitat structures, in consultation with DFG; and
- precluding off-trail hiking and sportfishing within the Reserve.

Implementation Guidelines

The potential for direct and indirect impacts on fish and critical fish habitat during trail-system development and restoration activities will be avoided or minimized by use of implementation guidelines specified in “Management of Recreation Access” and “Restoration of Old-Growth and Aquatic Ecosystems” below. Those guidelines address trail construction and maintenance, and field implementation of watershed and forest restoration actions.

The guidelines of direct benefit to fisheries that apply to watershed and forest restoration and trail-system development actions are listed below.

- Soil-disturbing activities will not normally be permitted in the rainy period, October 15–May 1, to minimize the potential for delivery of sediment to streams from surface erosion or mass-wasting events. Furthermore, such activities will not occur during summer when rainfall exceeds 0.25-inch during a 24-hour period. In such cases, soil-disturbing activities will not resume until after the soil is no wetter than is found during normal dust-abatement watering or light rainfall and it is determined that the soil will not rut (is not saturated beyond its plastic limit) or pump fines (i.e., extrude fine sediment when weight is applied to the surface). However, soil-disturbing activities may be permitted to continue after October 15 on a case-by-case basis when fall rains are delayed. Similarly, activities may be initiated prior to May 1 following dry winters on a case-by-case basis when it is determined that soil conditions are no wetter than are found during normal dust-abatement activities or light rainfall and the soil will not rut or pump fines.
- Emergency sediment-reduction work (e.g., unblocking culverts, stabilizing failing slopes or road prisms) may occur during the rainy-season closure period if necessary to prevent culvert stream diversion, or slope failure from contributing massive volumes of sediment directly to watercourses.
- Nonemergency activities requiring heavy equipment use in, or disturbance to, stream channels (e.g., removing culverts and road fills, installing habitat structures, removing debris jams that block migrating fish) will be permitted only during June 1–October 15 but before the fall migration of adult fish.

Marbled Murrelet

Management Goals

The desired outcome for management of the marbled murrelet is to preserve existing nesting habitat and expand nesting habitat to the entire Reserve. This is also USFWS’s desired outcome for this species at the Reserve as established in its recovery plan for this species (U.S. Fish and Wildlife Service 1997).

Both short-term and long-term goals for management of the Reserve are established to achieve this outcome. Short-term goals are listed below.

- Increase reproduction and survivorship of the marbled murrelets within the Reserve. Detailed life history information and demographic data are scant for the marbled murrelet, but long-term bird counts and demographic modeling indicate a long history of population decline. Declining populations decrease the ability of the species to recover from random adverse events such as large wildfires and oil spills. A large productive population is more likely to have the resilience to withstand environmental uncertainties.
- Maintain and protect all forest stands that are occupied by marbled murrelets or stands that are considered suitable nesting habitat. It is more effective to protect existing habitat than to create new habitat. Factors of concern are fire, flood, disease, and windthrow.
- Maintain and protect all forest stands that provide physical buffers to the suitable stands although they do not provide suitable nesting habitat. Buffers are important in increasing the effectiveness of extant suitable habitat.

The following are the long-term goals:

- Increase stand size of late-successional and old-growth forests. Larger stands have a greater core area that is not degraded by the influences of edge effects (e.g. humidity, temperature, predator access).
- Connect isolated late-successional and old-growth forest stands.
- Increase acreage of forest containing interior forest conditions (i.e., not susceptible to edge effects).
- Regrow late-successional and old-growth forest over the largest amount of the reserve practicable.

On the scale of the Reserve, reaching the long-term goals would result in nearly doubling the amount of quality nesting habitat for marbled murrelet and increasing the viability of the murrelet population by reducing bird vulnerability to natural and human-caused catastrophes. Meeting the goals would also enable marbled murrelets to more easily avoid their predators because they could use their cryptic coloring and secretive behavior in a much larger area that would make them more difficult to detect. Restoration of large-tree, thick multiple-canopy forest stands would increase visual and auditory separation of murrelets from the potential disturbance of human activities.

These goals are consistent with the Marbled Murrelet Recovery Plan and the Northwest Forest Plan.

Management Direction

- Implement silvicultural practices on all earlier successional harvested stands practicable that accelerate development of the maximum amount of contiguous suitable marbled murrelet nesting habitat.
- Implement road closure and decommissioning actions on the maximum practicable acreage to reunite the largest possible number of isolated and fragmented late-successional and old-growth stands in the Reserve.
- Develop and implement a program to reduce fuel hazards within the Reserve.
- Maximize marbled murrelet productivity and survivability through

- minimizing actions that may cause auditory or visual disturbances to marbled murrelets by judiciously buffering human activities and motorized equipment operation with distance, topographic screening or vegetative screening, and establishing seasonal and/or hourly operating periods as determined in consultation with USFWS to balance marbled murrelet needs with recovery actions for threatened fish species and limited human use; and
- supporting continued research into murrelet disturbance to further quantify and refine auditory and visual disturbance parameters.
- Minimize the availability of human food waste and other trash, which may serve as a source of food for predators (specifically corvids) of marbled murrelets. Accomplish this through educating visitors and limiting human activities near marbled murrelet nesting habitat.
- Initiate corvid frequency monitoring to detect trends in areas of visitor use, in early-successional vegetation, and in old-growth core areas (optimum marbled murrelet occupied sites).

Implementation Guidelines

The management direction for management of marbled murrelet habitat will be achieved by use of the following guidelines.

- No suitable habitat for the marbled murrelet will be removed or degraded.
- To the extent practicable all recreation access, restoration activities, trail construction or maintenance activities, or other work requiring use of motorized equipment will be buffered from marbled murrelet nesting habitat during the period March 24–September 15 by using vegetative screening or topographic screening and establishing seasonal operating periods or a distance buffer of up to 0.25 mile, as determined in consultation with USFWS to balance protection needs with recovery actions for threatened fish species.
- During the marbled murrelet breeding season, visitor use in all areas of the Reserve, except for the Elk River Corridor, may be restricted to the period between two hours after sunrise and two hours before sunset.
- Signs will be posted at all trailheads and along trails near potential routes into the old-growth stands informing visitors that off-trail hiking is prohibited year-round.
- Information on the importance of not feeding corvids (or other wildlife) and removing all food wastes and other trash from the Reserve will be provided to visitors, researchers, and management personnel. To convey this message, informational signs will be posted at trailheads and informational brochures will be provided to researchers, monitors, restoration contractors, and annual visitation permit holders (if permits are required).
- Rangers will be present to monitor and enforce visitor compliance with seasonal and hourly closures, prohibition of off-trail hiking, and prohibition of discarding food waste and other trash and to remove any food wastes and trash encountered.
- Picnic sites (short pathways and picnic tables) will be limited to the Elk River corridor.

Northern Spotted Owl

Management Goals

The desired outcome for the threatened northern spotted owl is protection of existing habitat and expansion of suitable habitat for nesting, roosting, foraging, and dispersal habitat at the Reserve. This goal is consistent with the Northwest Forest Plan objectives to restore and enhance old-growth habitat within the range of the northern spotted owl. The recovery of this threatened species may depend on providing large, contiguous blocks of old-growth habitat. For this reason, management of the Reserve will contribute to the recovery of the species on a regional scale.

Management Direction

The above goal will be achieved by restoring old-growth forests in previously harvested stands and minimizing disturbance to nesting owls. The restoration of up to 1,080–2,757 acres (depending upon the selected alternative) of previously harvested stands (as noted above) and the natural succession of stands in older harvested areas will eventually provide owls with a significant increase in suitable nesting, roosting, foraging, and dispersal habitat. Observing limited operating periods and no-disturbance buffers will minimize potential for disturbance to nesting owls. Monitoring known owl sites and periodic surveys of the entire Reserve will help determine the response of owls to implementation of the plan.

Implementation Guidelines

The above management direction will be achieved by use of the following guidelines.

- No suitable habitat for the northern spotted owl will be removed or degraded during watershed restoration, forest restoration, or trail development.
- To the extent practicable, all recreation access, restoration activities, trail construction or maintenance activities, or other work requiring use of motorized equipment will be buffered from northern spotted owl nesting habitat during the period February 1–July 31 by use of vegetative screening or topographic screening and establishment of seasonal operating periods or a distance buffer of up to 0.25 mile, as determined in consultation with USFWS.
- Signs will be posted at all trailheads and along trails near potential routes into the old-growth stands informing visitors that off-trail hiking is prohibited year-round.

Bald Eagle and Osprey

Management Goals

The desired outcome for these special-status species in the Reserve is maintenance and restoration of suitable roosting habitat.

Management Direction

The above goal will be achieved by conducting surveys for bird occurrences incidental to other monitoring and management activities, protecting any identified nests from human and

mechanical disturbance, restoring natural old-growth ecosystems, and restoring and protecting aquatic habitats, as previously described.

Implementation Guidelines

If nesting of the species occurs at the Reserve, restoration activities will not occur within 0.5 mile of any nest during the breeding seasons:

- for bald eagle, January 15–August 15 or until the young have fledged; and
- for osprey, February 1–August 1 or until the young have fledged, unless field evaluation by a qualified biologist indicates that topographic or vegetative screening, or the birds’ responses to existing disturbance, indicate that a smaller buffer will be adequate.

Migratory Birds

Management Goals

The desired outcome for migratory birds with potential to occur in the Reserve is to maintain or enhance current levels of use. The following management goals are consistent with Executive Order 13186 for Conservation of Migratory Birds (January 11, 2001):

- Avoid and minimize, to the extent practicable, adverse impacts on migratory bird resources when conducting forest and watershed restoration activities.
- Restore and enhance old-growth habitat for migratory birds.
- Prevent or abate pollution or detrimental alteration of environmental characteristics of benefit to migratory birds.

Management Direction

The above management goals will generally be achieved by restoring watershed and forest, observing limited operating periods, and restricting human access described for other species above. Appropriate site-specific alterations of planned actions will be made to minimize disturbance to nesting species, to the extent feasible. Ongoing monitoring of wildlife in the Reserve will provide information about changes in migratory bird use over time.

Implementation Guidelines

The deliberate removal of migratory bird nests during restoration activities is prohibited.

Amphibians and Reptiles

Management Goals

The desired outcome for special-status amphibians and reptiles in the Reserve is the restoration of aquatic and terrestrial habitat suitable for old-growth-dependent species. The southern torrent

salamander, foothill yellow-legged frog, northern red-legged frog, tailed frog, and northwestern pond turtle are California state species of special concern and federal species of concern that potentially occur in stream habitats in the Reserve.

Management Direction

The above goal will be achieved by restoring natural ecosystems and avoiding disturbance to known populations during restoration implementation.

Implementation Guidelines

Disturbance of special-status amphibians and reptiles will be avoided to the extent practicable.

Survey-and-Manage Wildlife Species

Survey-and-Manage species refers to those species identified in the Northwest Forest Plan that because of rarity, endemism, or lack of information about the species might not be adequately protected by the broad-scale ecosystem approach of the Northwest Forest Plan (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001).

Management Goals

The desired future outcome of Reserve management is expanded knowledge about the occurrence and habitat needs of these species and the expansion of suitable habitats for them.

Management Direction

Identified populations of Survey-and-Manage species will be considered during restoration or trail-construction activities. Larger-scale regional surveys (strategic surveys) for these species will continue to be conducted by BLM and annual results entered into a regional database for evaluation.

Implementation Guidelines

The Northwest Forest Plan standards and guidelines for Survey-and-Manage species contains management components for six categories of species. If any Survey-and-Manage species are identified in the Reserve, the appropriate guidelines will be applied (Appendix B).

Special-Status Vascular Plant Species

Only one special-status vascular plant species, heart-leaved twayblade, has been identified in the Reserve. There is a low probability of identifying additional populations of special-status vascular plant species populations because of the types of habitats and the location of the Reserve. Many of the special-status plants with potential to occur in the Reserve specialize in nonforested habitats, such as meadows, seeps, bogs or fens, and therefore any found populations

are likely to be highly localized to these specific habitats. Two Survey-and-Manage species, clustered lady's-slipper (*Cypripedium fasciculatum*) and mountain lady's-slipper (*C. montanum*) have potential to occur in the Reserve (see "Survey-and-Manage Species" below).

Management Goals

The desired outcome for the special-status vascular plants at the Reserve is maintained or increased species richness. Goals are to protect and monitor populations of identified special-status vascular plant species and to avoid adversely impacting identified populations as a result of other management actions.

Management Direction

The primary management direction is to identify and avoid or protect localized populations during management activities. In general, watershed restoration actions will take place on roads, trails, landings, and other previously disturbed environments. Maple-leaved checkerbloom (*Sidalcea malachroides*), a CNPS List 1B plant, tends to be associated with these disturbed habitats. Forest restoration activities will focus actions on thinning previously harvested stands in upland habitats. Several species, including mountain lady's-slipper, maple-leaved checkbloom, Siskiyou checkerbloom, Indian pipe, and leafy-stemmed mitrewort, have potential to occur in these habitats.

Watershed and forest restoration activities will accelerate the return of old-growth forest types in the Reserve. It is acknowledged that old-growth forest types do not provide suitable or preferred habitats for the special-status species with potential to occur in the Reserve.

Implementation Guidelines

The management direction for special-status vascular plant species will be achieved by use of the following guidelines:

- Extensive cryptogam and forest stand density surveys will be conducted for special-status vascular plants with potential to occur in the Reserve.
- The extent of identified populations will be mapped, population size will be estimated, and habitats will be described.
- Direct adverse effects on special-status plants will be minimized or avoided to the extent feasible through project design, location of project activities, and observance of buffer areas around identified populations.
- Impacts will be avoided on habitats (typically bogs and fens) occupied by western lily (*Lilium occidentale*).
- Guidelines for Survey-and-Manage species (clustered lady's-slipper and mountain lady's-slipper) specified in the 2001 NFP ROD (Appendix B) will be implemented.

Survey-and-Manage Plant Species

“Survey-and-Manage” was developed in the Northwest Forest Plan as a mitigation measure for timber harvesting to provide additional protection for species that, because of rarity, endemism, or lack of information about the species, might not be adequately protected by the broad-scale ecosystem approach of the Northwest Forest Plan (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001).

Management Goals

The desired future outcome of Reserve management is compilation of more information about Survey-and-Manage species and protection of habitat for rare species and high-priority sites for uncommon species. The long-term goal is to meet stability and distribution objectives for these species.

Management Direction

Management of the Reserve will focus on restoring watersheds and old-growth forest habitats and maintaining or enhancing species richness. Survey-and-Manage species, by definition, are associated with old-growth forest habitats, and therefore management goals for forest stands will be consistent with Survey-and-Manage plant and cryptogam species richness in the long term. The standards and guidelines for Survey-and-Manage species contains management components for six categories of species. For any Survey-and-Manage species identified in the Reserve the appropriate guidelines will be applied (Appendix B).

Surveys for the presence of Survey-and-Manage species will continue. To date, no vascular plant species, 24 fungus species, and three lichen species in the Survey-and-Manage category have been identified. It is considered a high probability that additional Survey-and-Manage species will be identified.

Implementation Guidelines

Extensive plot surveys will be conducted within the Reserve and on late-successional reserves managed by the Arcata Field Office. Strategic Surveys will continue to be conducted by BLM and USFS. All results will be entered into a regional database for evaluation. Future monitoring of Survey-and-Manage species populations will occur as needed.

Invasive Nonnative Plants

Management Goals

The desired outcome for the invasive nonnative plants in the Reserve is the absence of infestations. The goals are to eliminate all existing populations and to prevent the establishment of new populations.

Management Direction

The management goal will be achieved through an inventory and mapping of nonnative plant populations in the Reserve (to be conducted in 2001), establishment of a priority for removal actions, and implementation of weed removal.

To prevent the establishment of new populations of invasive nonnative plants, specific weed prevention measures will be taken during management activities, and public education and outreach will be used to enlist visitors to help in preventing infestations.

Implementation Guidelines

Following completion of weed mapping and inventory, direct removal of weed infestations will occur using hand tools. Herbicides will not be used. Sites targeted for removal will be prioritized based on species of the invader, degree of invasiveness, size of the population, and location adjacent to vectors or suitable habitats.

During restoration project implementation, appropriate practices for prevention of the introduction or spread of invasive nonnative plants will be employed, including

- using certified weed-free mulch and straw in watershed restoration actions, and
- using native seed mixes for watershed revegetation.

To minimize the potential for introductions of invasive nonnative plant populations into the Reserve by equestrians, education and outreach actions will be implemented. If an alternative is chosen that provides for equestrian use, visitors will be provided with information and recommendations for managing equestrian use in a manner that minimizes the potential for introduction of seed of invasive nonnative plants (see “Implementation Guidelines for Recreation Access”).

Restoration of Old-Growth and Aquatic Ecosystems

The restoration program for the Reserve is intended to restore natural ecological functions and processes of old-growth forests, riparian forest corridors, and aquatic habitats. Accordingly, the restoration program addresses both

- reduction of sediment from roads, landings, and skid trails, or other previously disturbed areas, to benefit coho salmon, chinook salmon, steelhead, and other aquatic species; and
- tree and shrub density management to nurture old-growth characteristics in previously harvested stands and watershed restoration sites to benefit marbled murrelet, northern spotted owl, and other species that depend on old-growth forests, as well as aquatic species.

Watershed Restoration

Management Goals

The desired outcome of management of the Reserve's watersheds involves restoration of natural patterns of runoff and natural levels of sediment movement through watersheds and streams. Combined with the restoration of old-growth forest in timber-harvest areas (as described in the forest restoration section below), watershed restoration would re-create high-quality aquatic habitats in and downstream of the Reserve, to the benefit of endangered anadromous fish species and other aquatic organisms.

Consistent with the watershed restoration concepts of the Aquatic Conservation Strategy of the Northwest Forest Plan, the following goals are established, in the following sequence of priority, to achieve the desired outcome:

- Maintain aquatic refugia within undisturbed old-growth forest habitat by keeping those systems intact and ensuring that natural processes operating within those systems are left undisturbed. These intact areas would serve as core areas of optimal habitat.
- Restore affected watersheds that have the highest potential for restoration and would provide the maximum benefits for aquatic species. Adjacency to existing undisturbed old-growth systems or stream segments and public control over the majority of land in the watershed, are factors that further elevate priority. These watersheds would serve to expand the size and effectiveness of core areas of optimal habitat.
- Continue watershed maintenance of the corridors along the main South Fork Elk River to reduce sediment inputs to the river. Because uplands are not in public control, effectiveness of more extensive watershed restoration treatments there would be limited.

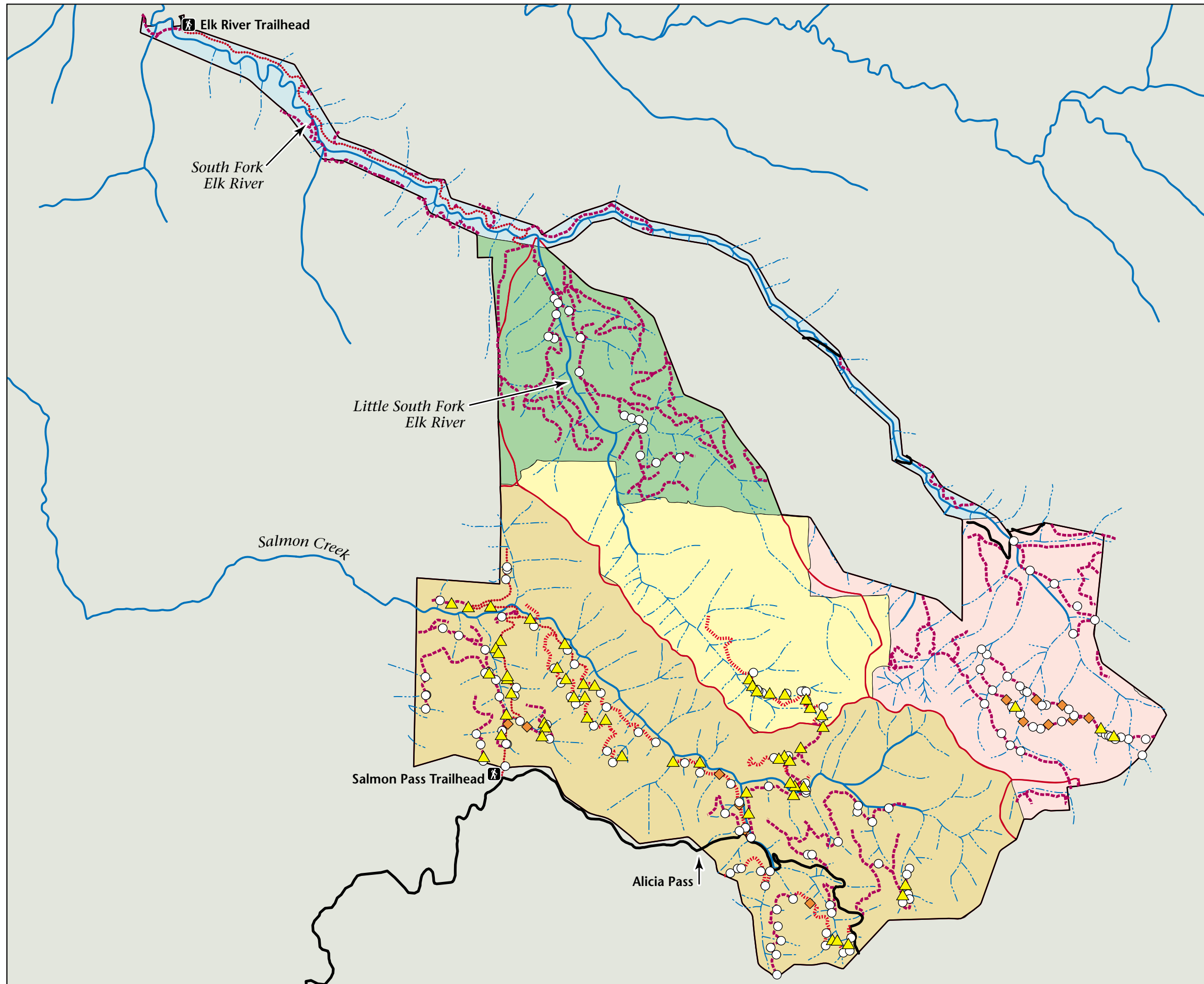
Management Direction

Watershed Restoration Actions

Watershed restoration will involve decommissioning roads, log landings, and to the extent practicable, skid trails in the Reserve that are contributing or have the potential to contribute significant amounts of sediment to the Reserve's aquatic habitats. Work will include roadbed decommissioning, full excavation of stream crossings, and slope stabilization. Actions will include complete removal of culverts or Humboldt crossings, involving complete removal of fill material at stream crossings, decompaction of road surfaces by ripping, and, depending on the selected alternative and available funding, moving road fills into road cuts to recontour the surface to preroad conditions. The use of heavy equipment such as excavators, bulldozers, backhoes, and dump trucks will be required. Activities will be balanced to minimize disturbance where adjacent to marbled murrelet habitat and to minimize sedimentation in streams. Projects can be cleared for northern spotted owls through surveys or limited operating periods where necessary. Vegetation that has colonized these roads and must be removed for these actions will be used to mulch the finished soil surfaces.

Table 4-1 and Figure 4-1 indicate the approximate extent of work that will be required to minimize the significant sources of sediment in each of the Reserve's watersheds, according to an inventory of high yield sites (PWA 2000a, 2000b, 2001) as well as additional field and aerial

Figure 4-1
Proposed Watershed Restoration
in the Headwaters Forest Reserve



Legend

- Reserve Boundary
- Perennial Streams
- - - Intermittent and Ephemeral Streams
- Watershed Boundaries
- Permanent Roads
- - - Roads Proposed for Decommissioning
- · · Roads Being Decommissioned
- · - Roads Being Converted to Trails

Management Units

- South Fork Elk River Corridors
- Upper South Fork Elk River (Elkhead Springs)
- Salmon Creek
- Upper Little South Fork Elk River
- Lower Little South Fork Elk River

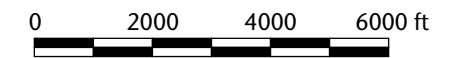
Sites

- ▲ Road or Fill Failures
- ◆ Other Sediment Sources
- Stream Crossings

Note:

Data shown on this map are preliminary and subject to change. Data for Lower Little South Fork Elk River and Upper Little South Fork Elk River are from sampling surveys and are therefore incomplete.

Headwaters Forest Reserve
Draft Management Plan/EIS/EIR



Scale = 1:39,000 (1 in = 3250 ft)

photograph analysis. Conditions in each of these watersheds were described in Chapter 3, “Affected Environment (Environmental Setting) and Interim Management of the Reserve.”

Other actions related to watershed restoration include road-to-trail conversion, trail repair, and emergency sediment reduction actions. Guidelines for trail construction appear in the Recreation Access section. Trail repair will include replacement of culverts, ditch cleaning, surface shaping, and rock surfacing. The use of backhoe, motor grader, dump trucks, and all-terrain vehicles will be required. Emergency sediment reduction includes cleaning culverts, removing culverts, constructing waterbars, constructing rock-armored swales, moving landslide material to a stable location, and applying weed-free mulch. Such emergency work may be done in the winter rainy season.

An issue related to watershed restoration is the possibility of surface development for the exercise of privately-held subsurface mineral rights over portions of the Reserve. Such development would be incompatible with the goals of the watershed restoration and species management programs for the Reserve. Therefore, as part of plan implementation, BLM will therefore seek to acquire privately-held subsurface mineral rights now affecting the Reserve.

Table 4-1. Approximate Extent of Road Decommissioning Needed in the Reserve

Watershed	Roads Mapped but not Inventoried (miles)	Decommissioned Roads ^a (miles)	Inventoried Roads (miles)	Number of Stream Crossings ^b	Number of Road Fill Failures ^b	Number of Other Sites ^b	Total Disturbed Area ^{b,c} (acres)
South Fork Elk River Corridors	7.7	0	0	No Data	No Data	No Data	No Data
Upper South Fork Elk River (Elkhead Springs)	1.7	0	7.8	48	8	7	77–89
Salmon Creek	0	5.9	14.0	50	22	2	181–201
Upper Little South Fork Elk River	0	1.5	0	3	8	0	12–15
Lower Little South Fork Elk River	8.7	0	5.1	20	8	0	71–79
Total	18.1	7.4	26.9	122	49	10	341–384

Note: Table does not include permanent roads (right-of-ways)

a Roads decommissioned 2000 through 2002

b Includes decommissioned roads and inventoried roads

c Range is for hydrologic decommissioning to full recontouring

Source: Adapted from PWA 2001.

Watershed Restoration Priorities

The factors determining priority of areas to be treated are

- the need to keep largely undisturbed old-growth forests intact as core habitat areas,
- adjacency to old-growth,
- the amount of old-growth/second-growth components,
- existing range of anadromous fish,
- the ability to control upland effects such as sedimentation,
- expediency of treatment, and
- effectiveness of treatment.

Accordingly, as summarized in Table 4-2, area priorities for watershed restoration actions are

- Priority 1: Upper Little South Fork Elk River watershed—completing restoration of the Headwaters Old-Growth Road;
- Priority 2: Salmon Creek watershed;
- Priority 3: Upper South Fork Elk River watershed (Elkhead Springs area);
- Priority 4: Lower Little South Fork Elk River watershed; and
- No Priority: South Fork Elk River corridors. (The Elk River Road will undergo hydrologic stabilization and conversion to a trail, followed by annual maintenance to minimize sediment yield.)

As described in the Forest Restoration section below, these area priorities apply to both the watershed restoration and forest restoration programs. Future funding constraints will determine how rapidly sites in various priority areas are treated.

Watershed Restoration Intensities

Two treatment intensities of Priority 1–4 sediment-yielding sites are feasible: “hydrologic stabilization” or “full recontour” to natural configuration.

- Hydrologic Stabilization includes full excavation of stream crossings to original channel configuration to approximate natural channel conditions; excavation of unstable fillslopes; storing excavated material in stable locations away from streams; and providing permanent surface drainage for the remainder of the road through ripping (decompaction), construction of cross road drains, and partial outsloping.
- Full Recontour includes full excavation of all stream crossings with 2:1 side slopes; swale excavations with 2:1 side slopes; and spoil allocation or disposal to reestablish to the maximum extent possible original topography and channel morphology.

The choice of the preferred intensity for watershed restoration in the Reserve, if adequate funding is available, including relative earthwork volumes and costs, is addressed in Chapter 5, “Management Alternatives.”

Table 4-2. Factors Determining Priority of Watersheds for Watershed Restoration

Priority	Watershed	Adjacency to Old-Growth ^a	Second-Growth Component ^b	Occupied by Anadromous Fish Species ^c	Control of Upland Effects ^d	Expediency ^e	Effectiveness of Treatment ^f
1	Upper Little South Fork Elk River	Within	Negligible	No	Yes	Very high	High
2	Salmon Creek	Within and immediate	Moderate upslope	Yes	Yes	High	Very high
3	Upper South Fork Elk River (Elkhead Springs)	Within and immediate	Large component	Yes	Yes	High	Moderate
4	Lower Little South Fork Elk River	None	All	Yes	No	Moderate	Moderate
None	South Fork Elk River Corridors	None	All	Yes	No	Moderate	Moderate

^a Describes where old-growth stands that have not been entered can be found within the watershed in relation to the drainage mainstem. “None” indicates that the watershed does not have any old-growth stands that have not been entered.

^b Describes extent and location of entered second-growth component within the watershed.

^c Indicates whether watershed is occupied by anadromous fish.

^d Indicates the extent of control of watershed effects such as tributary inputs or potential sediment sources.

^e Relative ease or ability to fully implement.

^f Relative effectiveness of a fully implemented restoration program in the watershed.

All treated areas will be mulched with native vegetation uprooted during the road-decommissioning process and scattered on top of the disturbed soil. In addition, rice straw will be used near watercourses, seeps, springs, and other areas as necessary to reduce the amount of surface erosion possible during the first two rainy seasons. Future management of revegetation is addressed in the Forest Restoration section below. Watershed restoration will not constrain future trail location, although, in some cases, trails may be constructed along alignments similar to existing roads.

Implementation Guidelines

Detailed implementation plans for some of the required treatments, and estimated needs in other areas, are given in reports prepared by PWA (2000a, 2000b, 2001).

The following operational guidelines will apply to watershed restoration actions:

- To the extent practicable, all recreation access, restoration activities, trail construction or maintenance activities, or other work requiring use of motorized equipment will be buffered from marbled murrelet and northern spotted owl nesting habitat during the periods March 24–

September 15 and February 1–July 31, respectively, by use of vegetative screening or topographic screening and establishment of seasonal operating periods or a distance buffer of up to 0.25 mile, as determined in consultation with USFWS to balance murrelet and owl needs with recovery actions for threatened fish species and limited human use. All guidelines are subject to consultation with USFWS. Pre-disturbance surveys will be conducted in suitable habitat within 200 feet of restoration projects, and occupied sites will be buffered if owls are present.

- Disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow, will be minimized.
- Vegetation will be lopped and scattered on treated road surfaces to prevent rainfall from directly affecting soils until planted vegetation is extensive. Stems will be placed in the downslope direction.
- Sidecasting will be restricted as necessary to prevent the introduction of sediment into streams.
- New culverts, bridges, and other stream crossings will be constructed and existing structures will be maintained to accommodate at least the 100-year flood, including associated bedload and debris. Crossings will be constructed and maintained to prevent diversion of streamflow out of channels and down the trail or road surface in the event of a crossing failure.
- Fish passage will be provided and maintained at all road crossings of existing and potential fish-bearing streams.
- All feasible techniques will be used to prevent any sediment from entering a drainage system during road restoration/rehabilitation work. Heavy-equipment operators with experience in watershed restoration will be sought. A BLM project inspector, or designee, should be onsite during operations to ensure that proper procedures are followed.
- Heavy equipment will be inspected daily to check for fluid leaks. Equipment that leaks lubricants or fuels will not be used until leaks are repaired. Refueling should be done outside of riparian reserves and away from stream crossings. A spill plan should be available to onsite personnel.
- Interpretive guides will be instructed to make radio contact with heavy equipment operators to warn of presence of visitors.
- Truck speeds will be limited to 10 mph where visitors may be present.
- All restoration personnel will be briefed on the importance of not discarding food scraps or refuse or attempting to feed wildlife.

Forest Restoration

Management Goals

The Reserve has extremely high capability for rapid growth and development of large trees. The desired outcome of management of the Reserve's forests involves restoration of old-growth characteristics throughout the nonriparian areas of the Reserve. Together with the restoration of natural watershed conditions, as described in the watershed restoration section above, forest restoration would recreate high quality habitats on the Reserve to the benefit of threatened marbled murrelet and northern spotted owl, other terrestrial wildlife, nonvascular plants of old-growth forest understory, threatened anadromous fish, and other aquatic organisms.

Marbled murrelet and northern spotted owl depend on certain structural attributes of forest stands and individual trees for important phases of their life cycles. Attributes to be restored are large, continuous stands of large trees that have decadent and deformed, closed, multi-layered canopies. Very large trees with thick crowns and large lateral limbs and deformities, which will develop with increasing stand age and decadence, will provide important habitat niches such as nest site platforms, nesting and roosting cavities, and overhead protection from predators.

Consistent with the habitat restoration concepts of the Northwest Forest Plan, goals for forest restoration give first priority to maintaining and restoring the integrity of existing old-growth forest stands, followed by actions to expand these habitat beyond existing core areas. The following goals are established to achieve the desired outcome:

- Maintain undisturbed old-growth forest habitat by keeping those systems intact and ensuring that natural processes operating within those systems are left undisturbed. These intact areas would serve as core areas of optimal habitat.
- Restore second-growth forests to achieve old-growth characteristics. Adjacency to existing undisturbed old-growth systems further elevates priority. This restoration would serve to expand the size and effectiveness of core areas of optimal habitat. The results of restoration will be
 - accelerated rate of succession among forest seral stages,
 - created continuity between old-growth and other seral stages as they advance successionaly,
 - restored structural diversity of the second-growth stands, and
 - enriched species composition of the second-growth stands.
- Eliminate invasive nonnative plants from the Reserve.

Management Direction

An extensive body of research has shown that stand structure characteristics become established at an early stand age and that the restoration of old-growth forest ecosystems in previously harvested stands can be accelerated through manipulating tree density. By providing appropriate spacing early in stand development, crown formation and growth rates will be dramatically improved. Stand density manipulation will be used to achieve old-growth forest attributes within shorter timeframes than in unmanaged stands. Some unmanaged stands may never attain desired old-growth characteristics due to the deleterious effects of high density on crown development and growth rates (USFS 2002).

Forest Restoration Actions

Restoration actions will involve stem-density management (tree thinnings) and tanoak control in shrub-sapling stands and sapling-dominated openings in seed-tree harvested stands, and perhaps in pole stands and pole-dominated openings in seed-tree harvested stands (see Chapter 5, “Management Alternatives”), which are the result of prior timber harvesting. First priority will be given to revegetating watershed restoration sites in old-growth areas (i.e., the Headwaters Old-Growth Road) and to treating harvested stands with old-growth remnants (i.e., stands harvested with seed-tree retention prescriptions). Harvested stands comprised of early-mature and older seral stages (i.e., stands having average stem diameters over 12 inches) will generally not be

treated because thinning would create unacceptable fuel loading or require road development for biomass removal. Though maintaining growth, thinning in older stands does not significantly affect tree and stand characteristics, as these attributes have already been established. The options for accelerating forest development may diminish substantially if stands are not thinned when young. For these reasons, a more intense forest restoration alternative, in which density management would be carried out in all previously harvested stands (high-intensity forest restoration), has been eliminated from detailed consideration (Appendix J).

Forest restoration objectives for each seral stage, including related management issues, are shown in Table 4-3. Objectives to be incorporated into restoration prescriptions include

- reducing stem densities to accelerate growth rates and succession into early- and mid-mature stages and to create more diverse and healthy stand structures;
- creating tree spacing in young stands to maximize early growth and crown development;
- developing stand structure to soften the spatial transition from old-growth to second-growth stands (i.e., reduce wildlife-related edge effects, such as elevated temperatures, lowered humidity, increased predator access, and increased con-specific [same species] competition);
- reestablishing continuous forest canopy in harvested stands with old-growth remnants;
- nurturing connectivity between old-growth stands; and
- establishing new stands on disturbed sites, which are primarily watershed restoration sites.

Table 4-4 indicates the extent of seral stages in each watershed area that may be treated. Forest seral stages in the Reserve were described in Chapter 3, “Affected Environment (Environmental Setting) and Interim Management of the Reserve.”

Forest Restoration Priorities

Factors determining the level of priority of areas to be treated are related to the potential to restore ecosystem integrity. The factors include

- fragmentation of existing forest,
- presence of seed-tree harvested areas containing legacy or residual old-growth trees with shrub- and sapling-dominated openings,
- presence of sapling and pole stands,
- adjacency to old-growth,
- expediency of treatment, and
- effectiveness of treatment.

Priority is highest for watersheds having the least fragmented old-growth forests: Upper Little South Fork Elk River watershed, the Salmon Creek watershed, and the Upper South Fork Elk River watershed (Elkhead Spring area), in that order. In these areas, priorities are highest in gaps in the existing old-growth forest, along edges of old-growth forest, and in areas that will eventually reconnect major existing stands of old-growth. Subject to these landscape priorities are the following treatment priorities, which are based on seral stage:

Table 4-3. Forest Restoration Objectives by Seral Stage

Seral Stage	Definition	Objectives	Management Issues
Disturbed	Watershed restoration sites where recent ground disturbance has resulted or will result in removal of vegetation.	Establish and nurture new forest stands emphasizing species richness.	Highly accessible and easily manipulated.
Shrub-sapling harvested	Sites of most recent clearcuts with tree diameters from 0.1 to 8 inches and typically less than 15 years of age.	Reduce sapling density to establish high-growth rates and extensive crown development as stands advance into pole harvested stage.	Highly accessible and easily manipulated. Density management results in major growth increases and optimum stand structure development (most efficient stage for density management). Residue fuel hazard is short term.
Pole harvested	Sites of older clearcuts with tree diameters from 8 to 12 inches and typically from 15 to 30 years of age.	Reduce density to accelerate succession into early- and mid-mature stages and to create more diverse and healthy stand structures. Develop stand structure to soften the spatial transition from old-growth to second-growth stands (i.e., reduce edge effects) and to nurture connectivity between old-growth stands.	Requires more logistical planning for access and manipulation. Results materialize over a longer term. Residue fuel hazard is manageable but requires follow-up program of fuels reduction.
Seed-tree harvested	Sites that were subject to shelterwood or seed-tree silvicultural prescriptions over the previous 30 years resulting in old-growth legacy trees imbedded in a patchwork of shrub/sapling and pole stands.	Accelerate ingrowth in pole and shrub/sapling stands among the residual old-growth stands to reduce edge effects and maximize habitat values.	Variability in original stand treatment requires highly variable restoration prescriptions. This type will develop old-growth forest characteristics most quickly. Accessibility and residue fuel hazard depends on whether shrub-sapling or pole stages are being treated; see shrub-sapling harvested and pole harvested above.

Seral Stage	Definition	Objectives	Management Issues
Early mature harvested (generally no restoration actions will be taken)	Sites of clearcuts or other prescriptions that are 40–60 years of age and that have had no density management. Stands are variably stocked but often overstocked with many stems exceeding 16 inches diameter.	Allow natural succession and interstand competition to determine eventual stand characteristics.	<p>Effects of density management are marginal as stand characteristics have already been established.</p> <p>Logistics, ground disturbance, and needed infrastructure are prohibitive in Reserve setting. Thinning residue from density management is of commercial size and results in major long-term fuel hazard if material is not removed from site.</p>

Table 4-4. Extent and Factors Determining Priority of Areas for Forest Restoration

Priority ^a	Area (acres)	Seral Stage ^b	Acreage ^c	Percent of Area ^c	Current Old-Growth Habitat Values in Area	Expediency ^d	Effectiveness of Treatment ^e																																																																					
1	Upper Little South Fork Elk River (1,500)	Disturbed	12–15	0.8–1.0	Very high	High	High																																																																					
		Shrub-sapling harvested	11	0.7				2	Salmon Creek (3,000)	Disturbed	181–201	6.0–6.7	High	Medium	Very high	Seed-tree harvested	223	8	Pole harvested	1,275	43	Shrub-sapling harvested	201	15	3	Upper South Fork Elk River (Elkhead Springs) (1,300)	Disturbed	77–89	5.9–6.8	High	Very high	High	Seed-tree harvested	210	16	Early-mature harvested	217	17	Pole harvested	186	14	Shrub-sapling harvested	372	29	4	Lower Little South Fork Elk River (1,200)	Disturbed	71–79	10.1–11.3	Absent	Low	Medium	Early-mature harvested	259	24	Mature harvested	663	57	Pole harvested	142	12	Shrub-sapling harvested	50	4	None	South Fork Elk River Corridors (400)	Early-mature harvested	260	52	Absent	Low	Low	Mature harvested	145	29	Pole harvested
2	Salmon Creek (3,000)	Disturbed	181–201	6.0–6.7	High	Medium	Very high																																																																					
		Seed-tree harvested	223	8																																																																								
		Pole harvested	1,275	43																																																																								
		Shrub-sapling harvested	201	15																																																																								
3	Upper South Fork Elk River (Elkhead Springs) (1,300)	Disturbed	77–89	5.9–6.8	High	Very high	High																																																																					
		Seed-tree harvested	210	16																																																																								
		Early-mature harvested	217	17																																																																								
		Pole harvested	186	14																																																																								
		Shrub-sapling harvested	372	29																																																																								
4	Lower Little South Fork Elk River (1,200)	Disturbed	71–79	10.1–11.3	Absent	Low	Medium																																																																					
		Early-mature harvested	259	24																																																																								
		Mature harvested	663	57																																																																								
		Pole harvested	142	12																																																																								
		Shrub-sapling harvested	50	4																																																																								
None	South Fork Elk River Corridors (400)	Early-mature harvested	260	52	Absent	Low	Low																																																																					
		Mature harvested	145	29																																																																								
		Pole harvested	74	15																																																																								
		Shrub-sapling harvested	13	3																																																																								

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- ^a Priority of areas for implementation based on percentage of shrub-sapling harvested, pole harvested, and old-growth harvested acreage, existing old-growth values, and expediency and effectiveness ratings. Highest priority areas have more than 50% of the area in these stand types and contain or are adjacent to stands exhibiting high-wildlife/old-growth habitat values.
 - ^b Seral stages suitable for density management are noted in bold and include “Disturbed” (i.e., roads and landings to be decommissioned), “Shrub-sapling harvested,” “Pole harvested”, and “Seed-tree harvested”, as defined in Vegetation Classification and Mapping of the Headwaters Forest Reserve (Jimerson and Jones 2000). Shrub harvested areas generally have trees in the seedling and sapling age classes.
 - ^c Range from Alternative 2B - Low Intensity Forest Restoration to Alternative 2A - Medium Intensity Forest Restoration.
 - ^d Relative ease or efficiency in fully implementing stand density manipulation.
 - ^e Relative effectiveness of manipulations in increasing old-growth habitat values.
-

- **First priority**—Seed-tree harvested stands (stands with remnant old-growth trees interspersed with shrub/sapling openings and pole stands),
- **Second priority**—shrub-sapling harvested stands (most-recently harvested stands now dominated by shrubs and saplings), and
- **Third priority**—pole harvested stands (older harvested stands now dominated by pole-sized second-growth trees).

Sites disturbed during watershed restoration activities will also be given high priority for action, which will include revegetation and subsequent density management through sapling and pole stages.

In summary, as shown in Table 4-4, area priorities for forest restoration actions are in the following order.

- **Priority 1:** Upper Little South Fork Elk River watershed—completing restoration of the Headwaters Old-Growth Road.
- **Priority 2:** Salmon Creek watershed—watershed restoration sites, seed-tree harvested, shrub-sapling harvested, and pole harvested stands.
- **Priority 3:** Upper South Fork Elk River watershed (Elkhead Springs area)—watershed restoration sites, shrub-sapling harvested, and pole harvested stands.
- **Priority 4:** Lower Little South Fork Elk River watershed—watershed restoration sites, shrub-sapling harvested, and pole harvested stands.
- **No Priority:** South Fork Elk River corridors (primarily riparian zones).

As described in the Watershed Restoration section above, these area priorities apply to both the watershed restoration and forest restoration programs. Future funding constraints will determine how rapidly sites in various priority areas are treated or if lower intensity treatments are necessary.

Forest Restoration Intensities

Two treatment intensities of Priority 1–4 areas are feasible:

- **Moderate Intensity Forest Restoration.** Density management would be conducted in both pole and shrub-sapling stands and openings. Two to three entries in shrub-sapling stands and in revegetated watershed-restoration sites would be made as needed, and a single entry would be made in pole stands considered appropriate for such action.
- **Low Intensity Forest Restoration.** Density management would be conducted only in sapling/shrub stands and openings and in revegetated watershed-restoration sites, limited to one entry.

The choice of the preferred intensity for forest restoration in the Reserve, if adequate funding is available, is addressed in Chapter 5, “Management Alternatives.”

Focus of density management will be on Douglas-fir. Redwoods, including stump sprouts, usually will not require treatment to restore a natural mix of Douglas-fir and redwood species. Some planting of redwoods will be required on watershed restoration sites.

Density-management treatments will not yield commercial forest products; all biomass will be left on-site and may be lopped and scattered, piled and burned, or chipped. Chain saws, mechanical brush cutters, and chippers may be used. Permanent or temporary roads or skid trails will not be developed for access to treatment sites, but temporary access routes may be developed where they will subsequently be removed during watershed restoration activities. Herbicides will not be used.

Control of Invasive Nonnative Species

Invasive, nonnative species will be controlled using manual or natural means. Watershed restoration followed by forest restoration will generally create sufficient shade to suppress invasive species that require exposure to full sunlight to thrive. Where openings in the forest canopy will remain (e.g., along trails), invasive, nonnative species will be controlled, and eliminated if possible, by cutting with hand tools. Herbicides will not be used. Monitoring the presence of invasive nonnative species will focus on trail corridors, especially heavily used trails and areas adjacent to trailheads.

Implementation Guidelines

The following guidelines are prescriptive details for forest restoration.

- Vegetation species composition, individual tree densities, and canopy closures will be managed in some or all of the stands comprising two or three of the five identified seral stages characterizing the Reserve: shrub-sapling harvested, pole harvested, and seed-tree harvested. Pole harvested stands may or may not be treated, depending on the selected forest-restoration alternative.
- In a medium-intensity program, shrub-sapling harvested and seed-tree harvested stands, as well as revegetated watershed restoration sites, would be entered up to three times over a 20-to-30-year time period. In a low-intensity program, only one entry would be made. Typically, single entry into the pole stands would be made in a medium-intensity program.
- Stem diameters of material removed in pole stands will be up to 12 inches, and stem diameters in the other stands will be up to six inches. Estimates of the number of trees to be cut or retained and slash weights for these program levels are given in Tables 4-5 and 4-6.
- All material will be cut using chain saws. Slash will be treated by machine chipping, lopping to 48-inch maximum lengths, or, where the previous two methods will create hazardous conditions, by hand piling and burning outside of riparian areas. The method of slash disposal will be based on amount and size of material removed from the stand, the characteristics of the residual stand, topographic/aspect conditions of the site relative to spread of fire, proximity of streams, and equipment access. Operational buffers of 100M will be established for non-fish bearing and 150M for fish-bearing streams.
- In pole stands, up to 10 stems per acre having the larger diameters (10–14 inches) may be left on the forest floor uncut as moderate woody debris (MWD) if all branches are removed and the stem lies in continuous contact with the soil surface.
- Trees will be thinned using variable-density approaches. The variable-thinning approach is an appropriate method for augmenting the natural processes that result in old-growth characteristics (as described in Chapter 6, “Environmental Consequences (Environmental Effects and Alternative Comparisons)”) and will be used where appropriate. With this

Table 4-5. Estimated Prescription Data for Alternative 2A: Medium Intensity Forest Restoration

Seral Stage	Acres Treatable	Size Classes Present (inches)	Approx. Number of Trees per Acre	Approx. Spacing (feet)	First Entry (@ T ₀) ^a			Second Entry (@ T ₀₊₁₀) ^a			Second Entry (@ T ₀₊₂₀) ^a		
					Residual Trees per Acre	Residual Spacing (feet)	Tons Taken per Acre	Residual Trees per Acre	Residual Spacing (feet)	Tons Taken per Acre	Residual Trees per Acre	Residual Spacing (feet)	Tons taken per Acre
Shrub-sapling harvested	647	Seedling (<1)	500–3,000	9.3–3.8	250–300	13.2–12.0	40–80	150–200	17.0–14.8	24	50–75	29.5–24.1	56
Pole harvested	1,677	Sapling (1–6) Pole (6–12)	1,600–2,000	5.2–4.7	150–200	17.0–14.8	192–256						
Seed-Tree Harvested	433	Seedling (<1)	1,200–1,600	6.0–5.2	250–300	13.2–12.0	35–65	150–200	17.0–14.8	16	50–75	29.5–24.1	8
Old-growth (target stand conditions)	--	Sapling (1–6)											
		Pole (6–12)											
		Seedling (<1)	1,000	6.6									
		Sapling (1–6)	300	12.0									
		Pole (6–14)	100	20.9									
		Mature (14–50)	50	29.5									
		Old-growth (>50 and >200 years)	10–30	38.1–29.5									

Assumptions:
 Seedlings: negligible weight.
 Saplings: average weight = 80 pounds.
 Pole: average weight = 320 pounds.

^a T_{subscript} refers to years from initiation of management.

Table 4-6. Estimated Prescription Data for Alternative 2B: Low Intensity Forest Restoration

Seral Stage	Acres Treatable	Size Classes Present (inches)	Approx. Number of Trees per Acre	Approx. Spacing (feet)	First Entry (@ T ₀) ^a			Second Entry (@ T ₀₊₁₀) ^a				Third Entry (@ T ₀₊₂₀) ^a				
					Residual Trees per Acre	Residual Spacing (feet)	Tons Taken per Acre	Residual Trees per Acre	Residual Spacing (feet)	Trees Taken per Acre	Tons Taken per Acre	Residual Trees per Acre	Residual Spacing (feet)	Trees Taken per Acre	Tons taken per Acre	
Shrub-sapling harvested	647	Seedling (<1)	2,000–3,000	4.7–3.8	200	14.8	72–112									
		Sapling (1–6)														
Pole harvested	1,677	Pole (6–14)	1,600–2,000	5.2– 4.7												
Seed-tree harvested	433	Seedling (<1)	1,200–1,600	6.0–5.2	100	9.3	55–75									
		Sapling (1– 6)														
		Pole (6–14)														
Old-growth -- (target stand conditions)		Seedling (<1)	1,000	6.6												
		Sapling (1–6)	300	12.0												
		Pole (6–14)	100	20.9												
		Mature (14 –50)	50	29.5												
		Old-growth (>50 and >200 years)	30–50	38.1– 29.5												

Assumptions:

- Seedlings: negligible weight.
- Saplings: average weight = 80 lbs.
- Pole: average weight = 320 lbs.

^a T_{subscript} refers to years from initiation of management.

approach, the rate of thinning will be varied throughout the stand, based on topographic/aspect conditions. The number of retained (dominant) trees for the various stand types and entries is shown in Tables 4-5 and 4-6.

- Selection of the dominant trees and of the larger poles for MWD recruitment will be a result of field evaluation of individual tree characteristics suitable for dominance and the need to remove surrounding vegetation to accelerate dominance.
- No tree thinning will be conducted in stream management zones as specified in the “Aquatic Conservation Strategy” of the Northwest Forest Plan. However, where competition for sunlight is evident, poles bordering these zones will be removed with the intent of increasing sunlight to riparian vegetation communities or of improving long-term LWD recruitment.

Research Management

Management Goals

The authorizing legislation for the Reserve requires that this plan address “scientific research on forests, fish, wildlife, and other such activities that will be fostered and permitted on the Headwaters Forest.” The desired outcome of management of research is a balance between the gathering of important scientific data, needed to understand and protect ecological integrity of the Reserve, and protecting that integrity from the intrusion of the monitoring process. BLM and DFG welcome consideration of the Reserve for research/monitoring proposals.

The management goal for achieving this outcome was given in the authorizing legislation for creation of the Reserve—“to conserve and study the land, fish, and wildlife, and forests occurring on such land while providing public recreation opportunities and [meeting] other management needs.”

A second management goal established here is to encourage research that involves monitoring and studying the Reserve’s attributes potentially affected by the management direction established by this plan and to provide baseline monitoring to measure changes/impacts from private timberland harvesting.

Management of the Reserve’s resources in unimpaired condition, while providing appropriate visitor use, requires a full understanding of resource components, their interrelationships and processes, and effects of visitation, which can be obtained only by the accumulation and analysis of information produced by scientific methods. Appropriate scientific studies should be designed to increase understanding of human and ecological processes and resources and/or to seek to understand the unique values of the Reserve. The ultimate goal of research at the Reserve must be to develop scientific understanding to further the goals for which the Reserve is established.

Management Direction

Use of Permit System

A research/monitoring permit will be required for most scientific activities pertaining to natural resources or social science studies in the Reserve that involve fieldwork or specimen collection and/or have the potential to disturb resources or visitors. When permits are required for scientific

activities pertaining solely to cultural resources, including archaeology, ethnography, history, cultural museum objects, cultural landscapes, and historic and prehistoric structures, other permit procedures apply. BLM may authorize staff to carry out official duties without requiring a permit. BLM staff must comply with professional standards and conditions normally associated with scientific research/monitoring permits issued by BLM.

BLM will approve or deny a research/monitoring permit based on an evaluation of favorable and unfavorable factors and on an assessment of perceived risks and benefits. Although BLM staff will work with applicants to arrive at a mutually acceptable research design, there may be activities where no acceptable mitigating measures are possible and the application may be denied.

Types of Research to be Conducted

Six types of research will be conducted at the Reserve. Research in the first five categories is of highest priority.

- **Pacific Lumber Company’s Habitat Conservation Plan (HCP) Monitoring Commitments.** This HCP contains specific requirements for forest ecosystem monitoring to ensure that specific thresholds are being met or not exceeded on PALCO’s timberlands or to document ecological conditions on a landscape scale. For the latter, many of these requirements involve monitoring, inventory, and research activities within the Reserve. BLM will continue to coordinate with the HCP interagency monitoring group to permit these activities as necessary on Reserve lands.
- **Marbled Murrelet Recovery Plan.** This recovery plan indicates that current population size and trend information needs to be refined through additional at-sea surveys, refined survey sampling design, and data analysis techniques. Information on marbled murrelet survivorship estimates and juvenile:adult ratios at sea also needs to be collected over a number of years (e.g., 5–10 years) to further validate the current population model. Several years are required to account for possible natural variability and the periodic occurrence of El Niño (and other warmwater) conditions that may lead to variation in breeding success.
- **Watershed Restoration and Stabilization Program.** Sediment source inventory and monitoring is critical to maintaining aquatic ecosystem integrity in both the short and long terms. BLM will continue sediment-source monitoring and assessment to prevent or minimize catastrophic releases of sediment and to gauge the success of road decommissioning and other sediment-reduction activities throughout the Reserve (see “Watershed Restoration”).
- **Compliance with Environmental Law.** Activities within the Reserve require monitoring for compliance with all environmental laws and regulations described in Chapter 2, including plan-specific mitigation monitoring under CEQA and monitoring requirements of USFWS and NMFS to ensure compliance with ESA. These laws require monitoring the effects of planning programs and implementation of mitigation measures for projects undertaken pursuant to this plan. Mitigation monitoring needs under CEQA and anticipated monitoring requirements under ESA are described in “Resource Monitoring and Evaluation” in a subsequent section of this chapter.
- **Basis for Long-Term Adaptive Management and Planning.** Highly related to but extending beyond monitoring for environmental compliance, research will be needed for assessing management of the Reserve. Management planning will be ongoing and will be based on continued ecosystem analyses and monitoring of results of plan implementation.

BLM will continue to develop data about particular aspects of the Reserve that are critical to planning decisions, including

- ❑ sediment source inventories;
- ❑ forest stands inventories;
- ❑ visitor data, both quantitative and qualitative;
- ❑ improved vegetation data;
- ❑ road and skid trail network inventories;
- ❑ nonvascular plant inventories;
- ❑ other floral and faunal monitoring and inventory; and
- ❑ possibly others.

Specific monitoring needs for implementation of this plan are described in “Resource Monitoring and Evaluation” in a subsequent section of this chapter.

- **Basic Research.** In addition to the above research and monitoring, basic research into ecosystem process, structure, and function should be conducted at the Reserve. Such research need not necessarily be focused on a current management issue but may be of value to a better understanding of the functioning of old-growth ecosystems in the north coast region. This type of research would most likely be conducted by scientists affiliated with academic institutions or government research agencies.

Criteria for Approval of Research Proposals

Several factors will be considered in evaluating proposed research at the Reserve (see “Implementation Guidelines” below). The primary factor favorable for approval is a showing that the research contributes information useful to an increased understanding of the Reserve’s resources and thereby contributes to effective management and/or interpretation of resources or addresses problems or questions of importance to science or society and shows promise of making an important contribution to such knowledge. Other important criteria must be met, however.

Implementation Guidelines

Research Proposal Evaluation Criteria

Several factors will be considered by BLM and DFG in approving research at the Reserve. Favorable and unfavorable factors, as well as specific information needs, are described in this section.

The suitability of proposed research increases when

- information is useful to an increased understanding of the Reserve’s resources and thereby contributes to effective management and/or interpretation of resources;
- information will be shared with BLM, including any manuscripts, publication, maps, and databases that the researcher is willing to share;

- problems or questions are of importance to science or society and show promise of making an important contribution to knowledge of the subject matter;
- a principal investigator and support team with a record of accomplishment in the proposed field of investigation have demonstrated ability to work cooperatively and safely and to accomplish the desired tasks within a reasonable timeframe;
- the investigators prepare occasional summaries of findings for public use, such as seminars and brochures;
- natural and cultural resources, operations, and visitors are not disrupted;
- cataloging and care of collected specimens is planned;
- detail about provisions for meeting logistical needs are provided;
- the research is supported academically and financially; and
- fieldwork, analyses, and reporting will all be completed within a reasonable time frame.

The suitability of proposed research diminishes when

- activities adversely affect the natural resources or the experiences of visitors;
- there is potential for adverse impact on natural, cultural, or scenic resources, particularly on nonrenewable resources, such as archaeological and fossil sites or special-status species;
- the research is redundant to previous research conducted in the Reserve or in other similar ecosystems (unless designed to corroborate studies in other areas);
- potential exists for creating risk of hazard to the researchers, visitors, or ecosystem integrity;
- extensive collecting of natural materials is planned or unnecessarily replicates existing voucher collections;
- substantial logistical, administrative, curatorial, or project monitoring support by BLM staff is required;
- time is insufficient to allow necessary review and consultation;
- the principal investigator lacks scientific institutional affiliation and/or recognized experience conducting scientific research; and
- scientific detail and justification are inadequate to support achieving the study objectives.

Finally, research proposals must address the following elements to receive consideration:

- power equipment or potentially hazardous materials to be used;
- numbers of staff entering the Reserve;
- duration and frequency of field visits;
- degree of staff intrusion into old-growth forest groves;
- conformance with seasonal and daily operating period closures due to marbled murrelet and northern spotted owl activity;
- conformance with wet-season operating restrictions;
- use of existing roads and trails;
- limiting of flagging, marking of survey stations, and other intrusions; and

- actions to minimize impacts on visitors, wildlife, and ecosystems (e.g., food storage, trash storage).

Research Guidelines for Overnight Occupancy and Day Use

Overnight camping for researchers will be minimized, but may be authorized on a restricted trial basis. The requirements below are intended to minimize the threat that corvids present to the threatened marbled murrelet, by avoiding human behaviors that are known to attract corvids and to minimize hourly and seasonally, the potential for disturbing murrelet nesting. Under no circumstances should a corvid have a successful feeding attempt as a result of authorized research and associated camping. The following is a preliminary list and will be updated as needed through the research permit process.

- No littering of any kind, including discharge of chemical or biodegradable substances.
- Researchers must carry a copy of their research permit on their persons and display a copy on the dashboard of vehicles parked at Reserve trailheads.
- Camping is prohibited within 0.25 mile of the old-growth groves and within 150 feet of surface water. Former log landings should be used for camping whenever possible.
- Research communication radio speakers must be no louder than a normal human voice in quiet conversation.
- Radios, CD/tape players, boom boxes, howling, and hooting are prohibited. Voices should be no louder than a normal human voice in quiet conversation.
- Tents will be dismantled by eight a.m. and will not be left standing during the day. Campsites will be dismantled, packed, and stowed under shrubbery to reduce line of sight from the air as well as from visitors.
- Avoid or minimize disturbance to vegetation, downed logs with cryptogamic communities, and other natural elements of the forest floor.
- No open campfires are allowed. Gas stoves and lanterns are allowed, contingent on current fire restrictions.

Research Permit Procedure Guidelines

The following guidelines will apply to all permit applications for research/monitoring.

- **Permit Authorization.** BLM will authorize research and monitoring proposals under 43 CFR 2920, “Leases, Permits, and Easements through issuance of a Special Use Permit.”
- **Qualified Applicants.** Any individual may apply if he/she has qualifications and experience to conduct scientific studies or represents a reputable scientific or educational institution or a federal, tribal, or state agency.
- **Processing Time Requirements.** It is recommended that application for permits be received by BLM at least 180 days in advance of first planned field activities. Projects requiring access to restricted locations or during critical nesting seasons or projects proposing activities with sensitive resources, such as threatened and endangered species or cultural sites, usually require extensive review and can require 90 days or longer to complete any needed consultations with NMFS and/or USFWS.

- **Additional Required Approvals.** In some cases, other federal or state agency permits or approvals may be required before BLM can approve an application for a research/monitoring permit. The principal investigator is required to provide BLM with copies of such permits with its application. (Applicants are encouraged to contact BLM staff to determine if additional permits may be required in conjunction with a proposed study.)
- **Location of Application.** Application materials may be obtained from the BLM Arcata Field Office at 1695 Heindon Road, Arcata, California 95521 (Phone: (707) 825-2300). All application materials must be submitted to this office.
- **Research Proposal.** Applications for research/monitoring permits must include a research proposal. Proposals must include, as appropriate, all elements outlined in the separate document *Guidelines to Researchers for Study Proposals*.
- **Proposal Review.** Each proposal will be reviewed for compliance with NEPA, the endangered species acts, and requirements of other laws, regulations, and policies. The Arcata Field Manager may also require internal and/or external scientific review, depending on the complexity and sensitivity of the work being proposed and other factors, such as the availability of staff expertise for adequate evaluation. The applicant may expedite review of a proposal by providing existing peer reviews or by providing names and addresses of appropriate persons recommended to assist in review of the proposal.
- **Timing of Review.** The time required to review the permit application and accompanying study proposal will be proportional to the type and magnitude of the proposed research/monitoring. A single visit to the Reserve for a nonmanipulative research project will require a relatively simple proposal, and the permitting decision will be expedited. A highly manipulative or intrusive investigation having the potential to affect nonrenewable, rare, or delicate resources or needing detailed planning or logistics will require more extensive and longer review.
- **BLM Response.** The principal investigator will receive notice of the approval or rejection of the application by written correspondence via mail, electronic mail, or facsimile. If modifications or changes in a study proposal initially deemed unacceptable would make the proposal acceptable, BLM will suggest them at this time. If the application is rejected, the applicant may consult with BLM staff, clarify issues, suggest modifications, and make an amended application if appropriate.
- **Performance Procedures.** If the proposal is approved, the applicant will receive a copy of a Special Use Permit, which must be signed and returned. The permit will then be validated and an approved copy returned to the applicant, at which time activities within the Reserve may begin. A list of names of all persons involved in field research must be provided to BLM. The lead field researcher must meet with assigned BLM staff at the Arcata Field Office immediately prior to the first field visit. A copy of the permit must be carried at all times by all field staff while performing authorized activities at the Reserve. The permit must also be displayed prominently on all vehicles accessing the site.

Fire Management

Management Goals

The desired outcome of management of the Reserve is a dominance of old-growth redwood and Douglas-fir forests on uplands, interspersed by mature riparian vegetation along all of the watercourses. Some patches of earlier successional seral stages would be present, as a result of

disease, windthrow, and infrequent fire. The fire regime would replicate the natural fire regime prior to the era of fire suppression and timber entry, to the degree that it is consistent with the need to protect resources of adjoining properties and the need to protect the Reserve from unnatural catastrophic fire originating on surrounding lands managed for timber production. The fire frequency would be on the order of 100 to several hundred years in old-growth stands and as low as 6–10 years in dense second-growth shrub and pole stands.

The following goals to achieve this desired outcome are established:

- Restoration of shrub-dominated sites and earlier-successional forest to old-growth forest.
- Protection of old-growth forests from catastrophic fires originating in second-growth forests either outside or inside the Reserve.
- Reduced effects of catastrophic fire on all forests and soils of the Reserve.
- Prevention of the movement of wildfire into or out of the Reserve.

Management Direction

Fuels Treatment

Fuels in second-growth forest will be reduced through tree-density reduction and brush removal in sapling and pole stands, as described in the “Forest Restoration” section above. Thinned stands will be less susceptible to spread of fire. Foliage and smaller stems from removed trees and brush will be lopped and scattered, piled and burned, or chipped. The high rate of biomass decomposition due to wet and warm maritime conditions at the Reserve will rapidly reduce flammability of lopped and scattered fuels. Broadcast burning is not proposed at the Reserve and will not be employed. Establishment of a shaded-fuelbreak network is not needed and is not appropriate, because the entire second-growth stand area will be treated to acquire the character of a shaded fuelbreak as it recovers old-growth characteristics.

Fuel loading in second-growth stands will be managed in a manner that reduces fuel loading and continuity throughout and therefore reduces fire risk. Fuels will not be managed in old-growth forest and generally not in second-growth forest once it achieves early-mature seral stage.

Fire Suppression

Modes of fire suppression will be detailed in an operational plan to be developed with CDF. Factors to be considered for any incident will be fuel loads and stand flammability, fuel and atmospheric humidity, wind direction and predictability, fire location with respect to topography and roads, risk of severe damage to old-growth forests, risk of fire escape to adjoining ownerships, and other site-specific factors. All fires will be managed to minimize loss of unharvested forest stands and impacts of fire suppression activities in old-growth.

In all areas of the Reserve, suppression response would entail a *minimum-impact strategy*, but it would recognize California Department of Forestry and Fire Protection’s (CDF’s) mandate to contain wildland fire. Suppression response would vary between fire in old-growth stands and fire in second-growth stands, recognizing that second-growth stands are the most susceptible to fire spread and have the highest capability for carrying fire into old-growth stands on the Reserve or into adjacent timber lands. Conversely, the risk of the development of a catastrophic fire is

much less for fire originating within old-growth stands than in second-growth stands, and fire there may be managed with a less aggressive response.

Implementation Guidelines

Initial attack on fires within the Reserve may be made by BLM or CDF personnel. Responsibility for suppression will lie with CDF, and fire suppression will be carried out consistent with the following guidelines wherever and whenever unacceptable risks to life and property are not created. Details of fire suppression operations will be outlined through a specific operational plan developed jointly with CDF.

Fire Suppression Strategies in Second-Growth Forest

The ridgetop road system along the southern boundary of the Reserve will be maintained by PALCO and will be the primary ridgeline road for intercepting advancing fire from either inside or outside of the Reserve. PALCO roads will also remain open to Elkhead Springs and around the vicinity of the Reserve.

Suppression strategy will reflect site-specific fuels condition and forest-restoration condition. Containment will be accomplished by using dozer lines, hand lines, or wet lines as appropriate and consistent with the minimum impact strategy. Fire lines will be tied into existing roads to the fullest extent possible. Watershed boundaries will be fully utilized, particularly around the southern boundary. During the period of recovery of second-growth forest to old-growth forest, several existing ridgetop fuelbreaks (old skid roads) within the Reserve will remain available and accessible from the south boundary.

If necessary, dozers can be used for fire suppression, but their use will be confined to ridgetops to the extent possible. Natural barriers should guide configuration of fire lines where feasible. Resource damage from dozers will be minimized, and full rehabilitation of dozer fire lines will be required after fire suppression.

Chemical retardants and foam suppressants may be used in the Reserve in second-growth stands according to appropriate guidelines to protect watercourses.

Fire-Suppression Strategies in Old-Growth Forest

Access to old-growth forest will be available from existing road systems at Salmon Pass, Alicia Pass, and the entire length of the N09 road through the southern end of the Reserve. Helispots should be developed in recent clearcuts at the north end of main old-growth grove to hasten access. Helispot development would also speed access into second-growth areas in the Little South Fork Elk River watershed.

The suppression strategy will be to monitor all fire starts and develop an appropriate management response that varies whether the fire burns on the forest floor or in the forest canopy. Vegetation type, sensitivity of the resource, and surrounding ownership limit opportunities for managing “natural” fire incidents; thus, all fires will be suppressed. Hand crews or helicopter bucket drops will be deployed to attempt to contain ground fire. For snag or individual tree fires, helicopter

bucket drops will be used. A subsequent operational plan with CDF will identify specific helispot locations and water sources.

Chemical retardants and foam suppressants may be used in the Reserve in second-growth stands according to appropriate guidelines to protect watercourses.

Visual Resource Management

BLM's Visual Resource Management (VRM) program establishes a method for determining the inherent visual qualities of the landscape and the impacts of human activities on these qualities. The program also includes methods for rating the effectiveness of rehabilitation projects and minimizing visual impacts from new projects. Appendix E describes the VRM program and VRM zones for the Reserve.

Recreation Access Management

Recreation activities in the Reserve must be consistent with the primary purpose for which the Reserve was created—preservation and restoration of old-growth forest ecosystems and related values. Accordingly, recreation on the Reserve will focus on providing recreation experiences related to old-growth and riparian ecosystems, forest and watershed restoration, and sociocultural and historical use of the Reserve. Management of the Reserve will focus on providing these experiences and not on duplicating the extensive multiple recreation activities and facilities already available at nearby state parks and other public recreation areas. The premier recreation attribute of the Reserve's old-growth forest is that it is not bisected by extensive trails and other forms of development and human use. This management focus will allow for recreation programs and uses that are unique in the Redwood Region, while meeting the mandate to give primary emphasis to ecosystem protection. Visitors accessing the proposed trails will know that they are seeing a place where nature is protected in its most pristine form. Other types of recreation activities, such as those with a sporting or competitive emphasis, are already well served by parks and other public lands in the region (see Chapter 3 for a description).

Management Goals

The desired outcome of management of public access to the Reserve is a careful balance between maintaining ecosystem integrity and providing opportunities for public environmental education and contemplation of the earth's ancient forest heritage (see Appendix F, "Visitor Management Zones"). To achieve this desired condition, the following goals for management of recreation access are established:

- Continue opportunities for year-round, outstanding environmental interpretation and education at the Reserve.
- Provide the minimal necessary facilities needed to support the recreation program.
- Enable frequent contact between visitors and managers to promote environmental education and maintenance of ecosystem integrity.

- Offer a continuing program of outreach to local and regional schools and environmental organizations to foster environmental education and support for Reserve restoration and maintenance activities.
- Minimize disturbance to adjoining residents and landowners caused by visitors to the Reserve.
- Offer interpretation of appropriate historic properties.
- Increase opportunities for visitors' sociocultural and educational experiences.
- Provide a trail network and use strategy with an appropriate level of access to the Reserve's resources.

Management Direction

Access to the Reserve

Public road access to the northwestern end of the Reserve will continue to be provided year-round by Elk River Road, which is regulated and maintained by Humboldt County.

Under some alternatives (see Chapter 5, "Management Alternatives"), access to the southern portions of the Reserve would continue to be provided seasonally by the County's Newburg Road and PALCO's Felt Spring Road. This route will continue to be closed during the rainy season. Use of the southern access may continue to be limited to guided access or may be made available to unescorted individual vehicles during appropriate periods, depending upon the alternative selected (Chapter 5). A visitor center may be developed in Fortuna to facilitate use of the southern access if need, interest, and funding are available.

General Access Provisions









By law, recreation activities in the Reserve must be supportable with minimal facilities and conducted so as to preserve ecological integrity of the Reserve's ecosystems. Parking and trailhead facilities will be developed consistent with the trail extent and trail use alternatives selected (Chapter 5). Permanent restroom facilities will be developed at the Elk River Trailhead and at Salmon Pass.

All visitor access will be provided on designated trails. Possession of firearms will not be allowed. In the Elk River Corridor, trail spurs would be constructed to the river, to cultural interpretive sites, and to picnic sites (Figure 4-2). Dogs would be allowed in the Reserve on leash or within voice control, consistent with existing county ordinance, and only on the Elk River Corridor Trail. Depending upon levels of use, dog owners may be required to pick up and dispose of dog waste. Each of these provisions for dog management will be subject to continued evaluation and adaptive management. A leash requirement or other restrictions on dog access may be considered. Throughout the Reserve, visitors will be encouraged and required to contain food items in designated picnic sites and to pack out food scraps and other waste. BLM rangers will be present in the Reserve as necessary to ensure compliance with rules and regulations and to interpret resource values to the interested public.

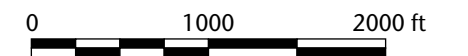
Regardless of the trail-extent and trail-use alternatives selected, all activities within the Reserve will be subject to general management direction of BLM's various visitor management zones and

Figure 4-2
Interpretive Facilities Proposed
for the Elk River Corridor

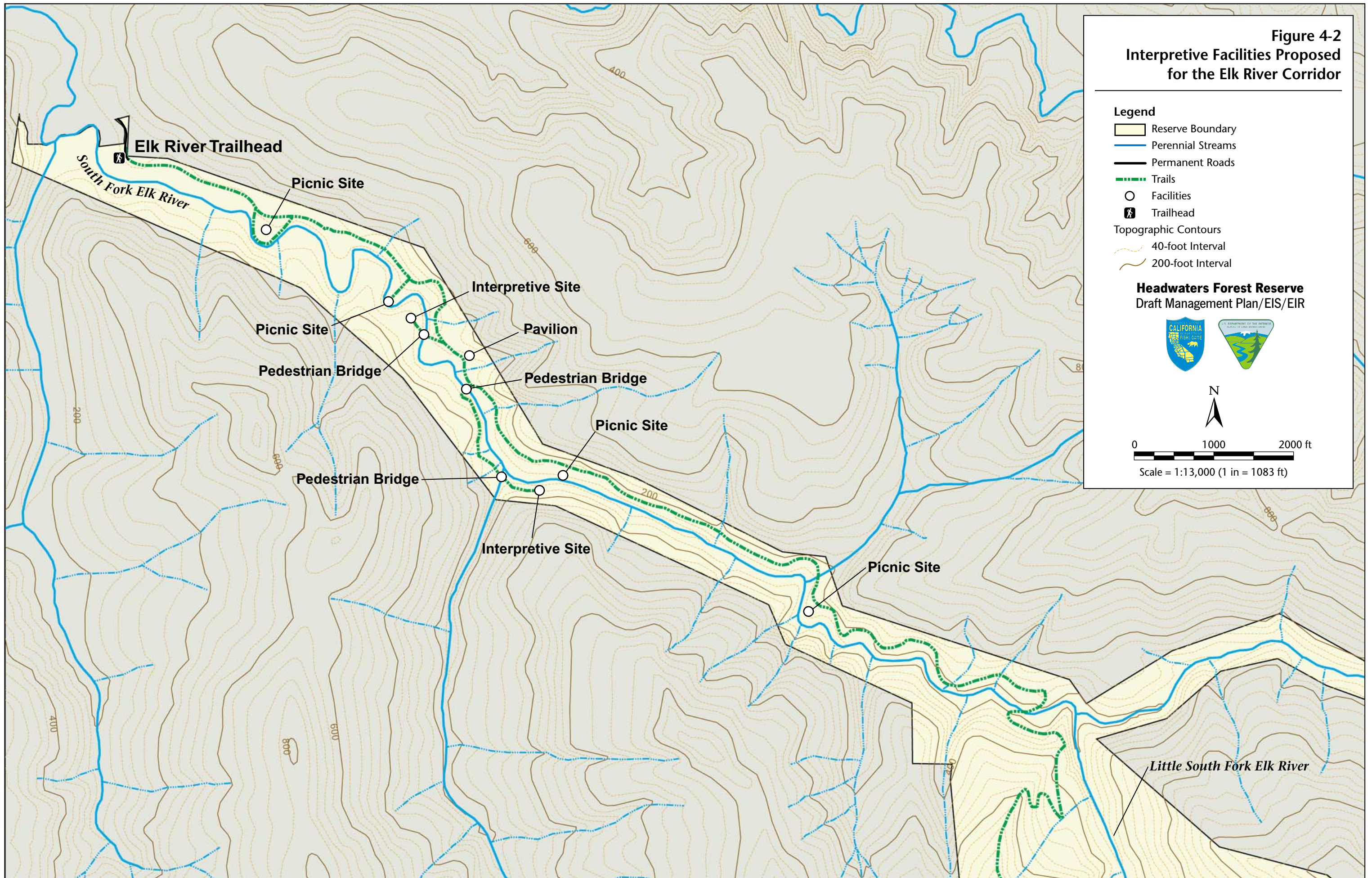
Legend

-  Reserve Boundary
-  Perennial Streams
-  Permanent Roads
-  Trails
-  Facilities
-  Trailhead
- Topographic Contours
 -  40-foot Interval
 -  200-foot Interval

Headwaters Forest Reserve
 Draft Management Plan/EIS/EIR



Scale = 1:13,000 (1 in = 1083 ft)



visual resource management classes. These zones and management guidelines are described in Appendices E and F. Three visitor management zones will be recognized:

- Zone 1, unharvested forests, will be managed to be essentially free of visitors and human-made features.
- Zone 2, harvested forests, will be managed for predominantly natural or natural-appearing environments with relatively light visitor use.
- Zone 3, Elk River Corridor, will be managed as a natural-appearing environment with considerable visitor use.

Recreation Program

The Reserve will be available to individuals and organizations for nature study and photography, interpretive walks, school and community outreach programs, and special thematic events related to the unique forest resources of the Reserve. BLM will organize or sponsor many of these activities on a regular basis, either on its own initiative or in response to requests from interested organizations. Activities will include opportunities for docent-led exploration. The purpose of these activities will be to impart environmental knowledge, foster respect for ecological systems, and nurture support for restoration and preservation of the Reserve's unique ecological resources. To facilitate participation in such activities, an open-air pavilion for recreation events would be constructed a short distance beyond the Elk River Trailhead. Interpretive kiosks would be installed at trailheads, wayside exhibits would be installed along Elk River Trail, and two short trails to historical resources would be constructed in the Elk River Corridor. The range of planned activities is described under "Implementation Guidelines" below.

Trail System and Uses

Reserve access will be facilitated by an interpretive trail system to allow visitors to experience old-growth ecosystems and riparian ecosystems along the Elk River and Salmon Creek. Alternatives for the extent of such access (Chapter 5) are formulated on the basis of the degree of visitor contact with old-growth ecosystems that would be accommodated, and therefore on the basis of the degree of preservation of old-growth and aquatic ecosystems that would be provided. In addition to the three trails now available for use, eight trails with two universal access segments are presented in Chapter 5 and analyzed in this document.

To facilitate interpretive experiences and environmental education, the primary mode of use of the trail system will be for walking and hiking. In Chapter 5 ("Management Alternatives"), alternatives for use by equestrians and bicyclists are presented. Use of some trails may be restricted on seasonal and hourly bases to protect nesting of marbled murrelet and northern spotted owl and to protect trails or access roads from erosion and impacts of use during wet conditions.

To contain the spread of food items, which could attract scavenger species in the Reserve, picnic sites will be limited to the Elk River corridor as noted above.

Extension of the Elk River Corridor Trail beyond the confluence of the South Fork and Little South Forks of the Elk River was initially considered for some alternatives but was eliminated because the narrowness of the public land corridor would serve as an inducement for trespass on

privately owned industrial forest that is currently being harvested (see Appendix J, “Alternatives Considered but Eliminated”).

Use of bicycles on all trails was initially considered for some alternatives but was eliminated because of trail safety and sediment concerns (Appendix J). Equestrian access from the southern access was initially considered for some alternatives but was eliminated because of absence of a suitable location for a parking area large enough that it could serve for horse loading and unloading (Appendix J).

Implementation Guidelines

Rules governing public use of the Reserve are specified in Appendix N.

Guidelines are given below for the range and content of the recreation program, trail construction and maintenance, and control of spread of nonnative plants into the Reserve by equestrians.

Recreation Program

Themes

The Reserve will include the following interpretive themes:

- **Value.** The unique value of the Headwaters Forest results from its diversity and rare type of habitat.
- **Dwelling place.** The Headwaters Forest is a home. In the past it was a home to Native Americans, followed by residents of Falk. Today it is critical habitat for many important plants and animals.
- **Preservation.** The Reserve was established by the efforts of many people from various levels of government and segments of the public.
- **Stewardship.** The Reserve is part of our public heritage; individuals can each make a positive contribution to the health of the Reserve so it will be enjoyed for generations to come.

Interpretive Facilities

Several facilities will be constructed at the Reserve to support the interpretive program:

- **Outdoor Interpretive Kiosk and Wayside Exhibits.** Providing orientation information and an introduction to prominent natural and cultural features in the Reserve. Material will focus on actions that reduce visitor impact.
- **Pavilion.** Situated in view of evident historical landmarks and natural features of a changing habitat, this sheltered arena will serve as a meeting area for recreation discussion and activities. It will be used for specialized thematic events, school groups, and organized walking groups.

■ **Interpretive Trails**

- *Self-guided Trail.* Guided by a pamphlet, visitors will experience marked points of unique historical interest, with information intended to promote a multicultural interest in and respect for the resources of the area.
- *Trail to Train Barn.* Guided by infrequent signs at key points along the trail, visitors will be encouraged to act responsibly in relation to remnant artifacts and natural resources.
- *Bungalow Trail.* Guided by infrequent signs at key points along the trail, visitors will be encouraged to act responsibly in relation to natural resources.

School-Focused Educational Programs

- *Preliminary school outreach programs*—programs in local schools to promote interest in preservation of the Reserve, using photographic slides or electronic presentations, to focus on historical and natural resources.
- *Headwaters-Falk historical curriculum*—a grades 4–12 curriculum focused on the townsite of Falk. (The program has already been developed and distributed to local schools, and distribution will continue.)
- *Headwaters Forest natural science curriculum*—a grades K–6 curriculum for local schools that focuses on the interpretive themes and unique natural and historical resources of the Reserve.
- *School site programs*—continued involvement with schools that participate in the preliminary school outreach program. Sessions may be preparatory to field trips.
- *Reserve field trips*—field programs presented to local school groups at the Reserve. Programs would involve hands-on, interactive approaches focused on the natural and cultural values of the Reserve designed to encourage stewardship of public lands by the younger generation.

Interpretive Programs

- *Guided interpretive walks*—guided interpretive walks that focus on the interpretive themes as expressed by the interesting natural and cultural features of the Reserve. Walks would be scheduled in the nonrainy season.
- *Community outreach programs*—a series of programs that focus on specific resource issues and historical events of relevance to the broad community.
- *Specialized thematic events*—events that take place at a centralized meeting area where a variety of walks, talks, displays, and activities will be made available. Programs will focus on a specific unique feature of the Reserve.

Trail Construction and Maintenance Guidelines

The following guidelines will be employed in the development of new trail elements, conversion of roads to trails, and maintenance of trails:

- Limit trail construction and maintenance to the non-rainy season,

- To the extent practicable, buffer all recreation access, restoration activities, trail construction or maintenance activities, or other work requiring use of motorized equipment from marbled murrelet and northern spotted owl nesting habitat during the period of February 1–September 15. Use vegetative screening or topographic screening, establish seasonal operating periods, or create a distance buffer of up to 0.25 mile, as determined in consultation with USFWS, to balance murrelet and owl needs with recovery actions for threatened fish species and human use.
- Minimize disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.
- Avoid sidecasting to prevent the introduction of sediment into streams.
- Minimize sediment delivery to streams from trails. Outsloping of the tread surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route drainage away from potentially unstable channels, fills, and hill slopes.
- Provide and maintain fish passage at all crossings of existing and potential fish-bearing streams.
- Replace culverts and bridges only during times of low streamflow but prior to upstream migration of adult anadromous salmonids. Replacement activities should avoid, to the extent feasible, removal of any riparian vegetation.
- Use materials for bridge repair, replacement, or temporary crossings that minimize the possibility of introduction of fine sediments or toxins into the drainage system.
- Minimize disturbance to riparian reserves for bridge and stream-crossing replacement. Disturbed ground should receive appropriate erosion control treatment (mulching, seeding, planting, etc.) prior to the beginning of the wet season.
- Close and rehabilitate random “social” trails that develop.
- Maintain foot trails to gradients not to exceed 10%. Pitch grades up to 15% may be used to a maximum of 100 feet, provided erosion can be prevented.
- Develop new trail treads that are 18–24 inches wide. If bicycle use of Elk River Corridor Trail is allowed, maintain tread 36–48 inches wide.
- Limit culvert use to locations where no other methods are feasible (e.g., grade dips, water bars).
- Keep switchbacks to a minimum wherever possible. Design switchbacks with curve radii as long as possible, with an absolute minimum of six feet for pedestrian use.
- Use native soil to construct new trails to the extent suitable, but use rock or harden trails where necessary.
- Consult and follow the additional trail design specifications described in BLM Handbook 9114-1.

Guidelines for Preventing the Spread of Noxious Weeds and Pathogens by Equestrians

The following guidelines for preventing the spread of noxious weeds and pathogens through any equestrian activity at the Reserve have been synthesized from the California BLM's Weed Prevention and Management Guidelines, Nevada BLM's weed prevention web site, recommendations from the University of Colorado and University of California Extension services, recommendations from the Arizona Department of Agriculture, and recommendations of University of California, Davis, faculty of the School of Veterinary Medicine.

- Post interpretive/regulatory signs at equestrian parking areas that state the following guidelines and explain that the Reserve is to be managed to maintain ecological integrity for native species and that with public cooperation the risk of nonnative species and pathogen introductions can be minimized.
- Avoid moving horses from weedy areas to weed-free areas (i.e., Headwaters) when weeds are producing viable seeds. This is a seasonal guideline; in some periods of the year, grazing on noxious weeds will not result in any viable reproductive plant parts being ingested or passed in feces.
- If horses have been grazing in a weedy area that is flowering and going to seed, place animals in a holding area for a minimum of 48 hours (96 hours is recommended), and feed them hay or pellets known to be free of weeds. This method would eliminate all existing viable seeds from the animal, and any feces dropped on public lands will not contain any nonnative, invasive weed parts capable of propagation.
- Ensure that hay and bedding in horse trailers are weed-free. If there is any question about possible weed seed content, contact the agricultural extension office in the area where the hay or bedding was produced.
- Deworm horses regularly, particularly a few days prior to visiting the Reserve.
- Develop trail watering sources that are isolated from the Reserve's streams and drainages and do not overflow and create runoff.
- Prevent horses from entering streams and streambank areas.
- Meet with local equestrian groups and provide them with information on preventing weed spread.
- Post guidelines on the Internet and make available for distribution via mail.

Cultural Resource Management

Management Goals

The desired outcomes of cultural-resource management are to preserve significant cultural resources, acquire information about past human activities that can be extracted from these resources, and communicate this information to researchers and the public. Thus, three goals are established:

- Permanently protect all significant cultural resources from natural or human-caused disturbance or destruction.

- Extract all information about past human activities that the resources may hold.
- Offer ongoing interpretation of acquired information for the public.

Management Direction

Determine NRHP Eligibility of Reserve's Properties

The primary management direction in the near term is to prepare NRHP nominations for all eligible historic properties within the Reserve and obtain a determination of which sites are suitable for listing. Three cultural properties within the Reserve are potentially eligible and will be nominated to the NRHP as follows:

- the "Old Military Trail";
- the ridgetop prehistoric site; and
- a historic district that includes the townsite of Falk, the Elk River Mill and Lumber Company millsite, the Bucksport and Elk River Railroad, Maggie's Camp, Creek House, and the End-of-the-Line site, all related to the early logging era.

The Old Military Trail is potentially eligible under NRHP criterion (a) for its association with the Indian Wars of Northwest California in the 1850s. The ridgetop prehistoric site is potentially eligible under criterion (d) for its potential to yield information important in prehistory. The thematic historic district is potentially eligible under criteria (a), (c), and (d). Because of its disturbed condition, the townsite of Scribner is recommended as ineligible for the NRHP.

A research plan leading to formal NRHP nominations for these sites will be developed and implemented. Until formal NRHP eligibility determinations are made in consultation with SHPO, each of the known sites will be managed as if it were a significant cultural resource. If sites are found suitable for listing, management plans will be prepared for each, addressing preservation actions, including management of site visitation.

Protection

BLM will enforce laws against illegal resource use by patrolling all potential NRHP sites and the locations around them where public access is likely. Administrative and physical measures to protect all historic properties within the Reserve will include monitoring of resource condition, surveillance by law enforcement personnel in potential problem areas, posting signs to inform the public of the consequences of removing or disturbing cultural resources, fencing of resources, public education, and involvement of interested parties in conformance with the Archaeological Resources Protection Act. To minimize the potential for site disturbance, cultural resource staff will help define areas unsuited to particular recreation uses, such as picnicking and trail alignment.

Information Acquisition

BLM will consult further with affected Native American tribes and schedule tours of the Reserve for their elders and youth to gather more information about traditional use areas and activities.

The process of nominating sites to the NRHP will involve acquiring further information about the potentially significant sites. An archaeological testing program will be implemented at the ridgetop prehistoric site to collect surface artifacts and analyze the site's NRHP eligibility and research potential. Resources will be collected at some of the locations around the townsite of Falk, the Elk River Mill and Lumber Company, and Maggie's Camp to assure their preservation.

Interpretation and Native American Use

A recreation program (described in "Recreation Access Management" above) will be developed around the Reserve's significant cultural properties. The program will include trailhead information signs, interpretive spur trails in the Elk River corridor, guided interpretive walks, in-school and in-Reserve educational sessions, and public events organized around historic and/or prehistoric themes.

Native American requests to practice traditional activities or participate in interpretive activities within the Reserve will be welcomed and will be approved on a case-by-case basis, consistent with the overriding purpose of Reserve management—preservation of ecosystem integrity—and other management direction in this chapter.

Implementation Guidelines

All cultural resources known or expected to occur on public land within the Reserve will be managed for their information, public, or conservation values as per BLM Manual 1623, the Federal Land Policy and Management Act, and the National Historic Preservation Act. Guidelines for managing cultural resources are found in the revised BLM 8100-series cultural resource management manual sections (up to 2001) and under the National (1997) and California State (1998) Programmatic Agreements between the Office of Historic Preservation and BLM.

If any cultural materials or sites are encountered during ground-disturbing activities within the Reserve (e.g., pavilion construction, trail construction, watershed restoration), all work will be stopped until the find is evaluated by a qualified archaeologist.

Management of Areas Having Wilderness Characteristics

Management Goals

The draft plan identified alternatives for a 4,400-acre Wilderness Study Area (WSA) and a 5,885-acre WSA within the Headwaters Forest Reserve. These proposed alternatives were since found by BLM inconsistent with Section 603 of the Federal Land Policy and Management Act of 1976 as clarified in the Utah wilderness settlement (USDI BLM 2003). These WSA alternatives were therefore dropped from further consideration. BLM/DFG recognizes that there are public lands within the Reserve having wilderness characteristics, and this section provides specific management direction for those lands.

The Headwaters Agreement, the enabling legislation (H.R. 2107), the overlying conservation easement of the State of California, and the expectations from the HCP agreement result in

management direction which under all alternatives would ensure that wilderness characteristics will be maintained and enhanced. In the enabling legislation, the intent of Congress has been clearly established with respect to the protection of the Reserve's resources.

Management Direction

Appendix G presents an assessment of wilderness characteristics of lands in the Reserve. Alternatives to manage the Reserve for the protection of wilderness values, including the proposed alternative, are presented in Chapter 5. The following direction applies to lands within the Reserve having wilderness characteristics (see Alternative 7B in Chapter 5).

Public lands with wilderness characteristics generally

- have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- present outstanding opportunities for solitude or a primitive and unconfined type of recreation;
- include at least five thousand acres of land or are of sufficient size as to make practicable its preservation and use in unimpaired condition; and
- may have ecological, geological, or other features of scientific, educational, scenic, or historical value (i.e. supplemental wilderness values).

With exceptions, public lands having these wilderness characteristics should be managed to protect these values. In addition, management of these lands will be consistent with multiple-use management of the Reserve and management of adjacent lands, particularly for the protection of watersheds and water yield, wildlife habitat, natural plant communities, and similar natural values.

With exceptions, the following activities generally are excluded from lands having wilderness characteristics:

- | | |
|------------------------------|-------------------------|
| ■ Commercial enterprises | ■ Permanent roads |
| ■ Temporary roads | ■ Use of motor vehicles |
| ■ Use of motorized equipment | ■ Use of motorboats |
| ■ Landing of aircraft | ■ Mechanical transport |
| ■ Structures | ■ Installations |

However, there are exceptions to these prohibitions and they are generally grouped into three categories:

- **Valid Existing Rights.** Prior existing rights may continue. New discretionary uses that create valid rights are not allowed.
- **Administrative Activities.** New commercial activities or new permanent roads will not be authorized. BLM may authorize any of the other generally prohibited activities if it is deemed necessary to meet the minimum requirements to administer and protect the lands with

wilderness characteristics (called the “minimum requirement exception”) and to protect the health and safety of persons within the area.

- **Other General Allowances.** Subject to limitations determined by the State Director of BLM, general allowances could include actions necessary to control fire, insects, and diseases; recurring federal mineral surveys; and commercial services to the extent necessary to support activities that are proper for realizing the recreational or other wilderness-character purposes and are compatible with the defined wilderness values.

Implementation Guidelines

- **Minimum Requirement Exception and Emergencies.** The use of motor vehicles and mechanical transport, and the construction of temporary roads, structures and installations, is allowed for emergency purposes or when consistent with management goals of the Reserve presented in this chapter and the “minimum requirement exception”.
- **Land Disposals, Rights-of-Way, Use Authorizations.** Reserve lands were acquired through specific legislation and will be retained in public ownership. They are not subject to disposal through any means, including public sales, exchanges, patents under the Recreation and Public Purposes Act, color of title Class II, or state selections.

Uses covered by prior existing rights, such as leases/permits under 43CFR2920 and rights-of-way (ROWs) may continue. A limited number of prior rights were inherent in the acquisition, and compatible uses will be accommodated for the purposes that the rights were intended. New authorizations, leases, permits, and ROWs will not be authorized, since they are considered to be new valid rights.

- **Routes of Travel.** The construction of new permanent roads will not be allowed, as directed in the watershed restoration and recreation management direction. All alternatives prescribe extensive road removals and limited trail networks, consistent with the maintenance and enhancement of wilderness characteristics. New temporary roads could be allowed if necessary to meet the minimum requirements to administer and protect the wilderness characteristics; to protect the health and safety of persons within the area; or to control fire, insects, and diseases.

Motorized or mechanized use of existing routes is not allowed subject to certain exceptions for prior existing rights, emergency response activities, and other administrative and research needs as defined elsewhere. The provisions of recommended State of California Ecological Reserve designation set forth these exceptions.

- **Mineral Leasing.** The federal lands within the Reserve are currently not open to mineral leasing. However, portions of the Reserve are subject to privately-held sub-surface rights. These represent valid existing rights. In the watershed restoration section above, this management plan calls for acquisition of subsurface rights on these split-estate holdings if possible.

No new surface occupancy leases will be issued. Non-surface occupancy leases may be issued if they will not impact the wilderness characteristics. This applies to public lands, including split-estate lands.

- **Fire Management.** Fire management is described in detail in a preceding section and will be consistent with BLM policy. Fires must be controlled to prevent the loss of human life or property. They must also be controlled to prevent the spread of fires to areas outside of

Reserve lands where life, resources, or property may be threatened. The Fire Management section prescribes a limited opportunity to allow natural-caused fires to burn within old-growth forest and prescribes aggressive fire suppression on surrounding second-growth forests, which will minimize deleterious effects of fire on lands wilderness characteristics, as well as prevent the threat of loss of life and property surrounding the Reserve.

New fire management structures are allowed if necessary to meet the minimum requirements to administer and protect resources and to protect the health and safety of persons within the area. The Fire Management section prescribes development of a heli-spot located within a second-growth area having wilderness characteristics to facilitate appropriate and safe suppression activities.

- **Forest/Vegetation Health.** Insect and disease infestations are not currently threatening the Reserve's forests and will therefore not be artificially controlled except in special instances when unforeseen loss to resources within these lands is occurring. Invasive species occur throughout the Reserve, and their control is addressed under watershed restoration, forest restoration, and recreation. Manual control measures are prescribed to maximize forest health in the Reserve and may be employed in second-growth areas containing wilderness characteristics.

Where the landscape has been impacted by past vegetation manipulation such as timber harvesting, thinning of forest stands would be allowed with the primary purpose of accelerating growth to return these impacted areas to an old-growth condition to support the primary purposes of the Reserve. No thinning is planned within areas where wilderness characteristics are identified.

- **Recreation.** Hiking is allowed on designated trails on these lands. New commercial services will only be allowed when consistent with the management goals for the Reserve set forth in this chapter and to maintain the lands wilderness character.
- **Cultural and Palaeontological Resources.** Cultural and palaeontological resources are recognized as unique and valuable. They are also important supplemental values to wilderness character. Resource inventories, studies, and research involving surface examination may be permitted as prescribed in Research Management and Cultural Resource Management sections. Salvage of archaeological and palaeontological sites; rehabilitation, stabilization, reconstruction, and restoration work on historic structures; excavations; and extensive surface collection may also be permitted for specific projects per guidelines in the cited sections.
- **Wildlife Management.** The intents of Congress and the State of California specific to wildlife management are expressed in the legislation and agreements which enabled the acquisition and directed the development of this management plan. The Species Management section prescribes wildlife management goals appropriate for old-growth forests and for second-growth forests of the Reserve. Old-growth forests will be managed in a manner that allows the processes and functions of that ecosystem to continue. Second-growth forests will be managed to accelerate the re-establishment of natural processes within the redwood forest ecosystem. The approaches to both forest types are aimed at maximizing potential habitat for old-growth dependent wildlife species and are consistent with maintaining wilderness characteristics.

Special Areas Designation and Management

Sections 201 and 202 of the Federal Land Policy Management Act (FLPMA) require that BLM “prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including, but not limited to, outdoor recreation and scenic values), giving priority to areas of critical environmental concern.” Based on such inventory, several potential special area designations may apply to part or all of the Reserve. This plan therefore addresses qualifications of Reserve lands for special designations and the implications to Reserve management of special designations. Potential special-area designations for some or all of the Reserve include

- Area of Critical Environmental Concern/Research Natural Area,
- Special Recreation Management Area,
- National Register of Historic Places,
- National Wild and Scenic River System,
- State of California Ecological Reserve, and
- Off-Highway Vehicle Designations.

Area of Critical Environmental Concern/Research Natural Area

Background

Area of Critical Environmental Concern (ACEC) is a type of special area recognized by BLM for elevating management needs and funding for public lands supporting unique and sensitive environmental resources that may be threatened with degradation or loss. An ACEC is an area for which special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish or wildlife resources, or other natural systems or process, or to protect life and safety from natural hazards.

Research Natural Areas (RNA’s) are areas that contain important ecological and scientific values and are managed for minimum human disturbance. RNA’s are primarily used for non-manipulative research and baseline data gathering on relatively unaltered community types. Since natural processes are allowed to dominate, RNA’s also make excellent controls for similar communities that are being actively managed. In addition, RNA’s provide an essential network of diverse habitat types that will be preserved in their natural state for future generations.

By nature of its establishment (Chapter 5), the entire Reserve is considered eligible for ACEC/RNA designation. The Reserve supports a unique old-growth forest of coastal redwoods and Douglas-fir and a unique forest understory comprising a great diversity of nonvascular plants. It provides freshwater habitat for three threatened anadromous fish species and nesting habitat for two threatened bird species—the marbled murrelet and the northern spotted owl.

Management Goals and Direction

ACEC/RNA designation is consistent with the desired outcome of all of the management programs addressed by this plan, but provides no additional protection, has no effect on

management, and does not elevate funding priority. ACEC is an administrative designation considered subordinate and redundant to the purposes for which the Reserve was established and is not carried forward in any alternative.

Implementation Guidelines

None.

Special Recreation Management Area

Special Recreation Management Area (SRMA) is a type of special area recognized by BLM for purposes of elevating management needs and funding for lands that require special management of recreation activities. These are areas that require special management attention due to a concentration of recreation uses or values, contain Congressionally or administratively designated areas, have similar or interrelated recreation values that require a substantial management commitment, or have recreation as a principle management objective identified through the land use planning process.

Recreation demand for the Reserve is significant, because of both the proximity to the Humboldt Bay urban area and the statewide and national attention focused on it during its creation. The legislation creating the Reserve requires that this plan address providing recreation opportunities and ensure that recreation facilities be the minimal necessary so as to maintain ecological integrity of the Reserve. Therefore, any recreation provided for in the Reserve (see “Recreation Access Management” above) must be managed carefully to ensure preservation of the Reserve’s unique environmental values. Such management will require a significant management presence and restricted scheduling of management actions – both of which will require special funding priority.

Management Goals and Direction

As with ACEC/RNA designation, SRMA designation is consistent with the desired outcome of all of the management programs addressed by this plan. Similarly, designation does not impose any additional management direction—either restrictions on allowable uses or needed management actions—to that direction prescribed in the other sections of this chapter.

Implementation Guidelines

None.

National Register of Historic Places

As previously noted, listing on the NRHP under section 106 of the National Historic Preservation Act is a means of recognizing the cultural value of an extant historical resource and of providing for its legal protection. Candidate resources are evaluated by BLM and, if certain criteria are met, nominated for inclusion on the register. Actual designation is determined by a state, federal, or tribal Historic Preservation Officer. For listed properties, cultural resources management plans must be prepared.

Three historical properties at the Reserve qualify for and will be nominated to the register. They include the townsite of Falk and the abandoned railroad, both in the Elk River corridor, and the historic military ridge trail that traverses the major ridge and old-growth grove of the Reserve. Management goals, direction, and implementation guidelines are described in the “Cultural Resources” section of Chapter 4.

National Wild and Scenic River System

The Wild and Scenic Rivers Act of 1968 (PL 90-542, as amended) established a method of providing federal protection of remaining free-flowing rivers and preserving them and their immediate environments for the use and enjoyment of present and future generations. Section 5(d)(1) of the Act provides that wild and scenic river considerations be made during Federal agency planning. Either Congress, or the Secretary of the Interior, upon the nomination of the Governor of the State of California, may designate rivers as part of the National Wild and Scenic River System (NWSRS). Pursuant to this mandate, an evaluation of river resources within the Reserve was conducted according to the three steps of the NWSRS study process (Appendix H):

- Determine what rivers or river segments are eligible for NWSRS designation.
- Determine the potential classification of eligible river segments as wild, scenic, recreational, or any combination thereof.
- Conduct a suitability study to determine if the river segments are suitable for inclusion in the NWSRS.

Management Goals and Direction

The study (Appendix H) resulted in a finding that all three streams in the Reserve are eligible and potentially suitable for inclusion:

- South Fork Elk River (1 mile recreational, 6 miles scenic);
- Little South Fork Elk River (7 miles wild); and
- Salmon Creek (5 miles scenic).

Upon study of suitability, three alternatives for inclusion were identified: include all three streams, include Salmon Creek and Little South Fork Elk River with tributary only, or include none of them. These alternatives, and their management implications are described in Chapter 5. Consequences of these alternatives are described in Chapter 6. In the case of the Reserve, inclusion of these streams in the NWSRS would neither restrict any allowable uses nor require any management actions other than those already proposed for the Reserve in other sections of this chapter, regardless of what alternatives are chosen for restoration, recreation access, or other program areas.

Implementation Guidelines

General guidelines for managing components of the NWSRS are found in the Wild and Scenic Rivers Act of 1968 (Public Law 90-542, as amended). The law calls for development of a specific management plan for each river included in the system. Before a management plan is

completed, interim management guidelines for designated Wild and Scenic Rivers would be applicable (USDI BLM 1992).

State of California Ecological Reserve

The State of California establishes ecological reserves to provide protection for rare, threatened, or endangered native plants, wildlife, aquatic organisms, and specialized terrestrial or aquatic habitat types. The California Fish and Game Commission enacts the designations.

Management Goals and Direction

Two alternatives related to ecological reserves are available: designation or no designation. These alternatives and their management implications are described in Chapter 5; consequences of these alternatives are described in Chapter 6. Designation would preclude hunting, camping, fires, swimming, and operation of aircraft or hovercraft in the Reserve, unless these uses are expressly provided for in designation action. Exceptions to these generalized prohibitions are detailed in the alternative descriptions in Chapter 5, Alternative 9A. Adopted prohibitions are included in BLM's proposed rules for management of the Reserve shown in Appendix N.

Implementation Guidelines

Guidelines for management of ecological preserves are found in the California Administrative Code for the Fish and Game Commission under Title 14, section 630 (Appendix I).

Off-Highway Vehicle Designations

Consistent with the provisions under FLPMA and other authorities listed in 43 CFR 8340.0-3, public lands must be designated as open, limited, or closed with respect to the use of off-highway vehicles.

Management Goals and Direction

Off-highway vehicle use within the Reserve is considered inconsistent with the legislated priority of preservative of ecological integrity. The Reserve is designated as closed to the use of off-highway vehicles per 43 CFR 8242.2.

Implementation Guidelines

None

Resource Monitoring and Evaluation

This section describes resource monitoring and evaluation that will be conducted by BLM and DFG as a part of implementation of this plan.

Management Goals

The desired outcome of resource monitoring and evaluation is a clear understanding of the ecological structures, function, and processes that characterize the Reserve and the effects of human intrusion on those attributes. Accordingly, the management goals for the monitoring and evaluation program are as follows:

- Provide the basis for long-term adaptive management and ongoing planning.
- Assess compliance with environmental laws.
- Ensure that direction in the authorizing legislation to maintain ecosystem integrity at the Reserve is fulfilled.

The primary environmental laws of concern are ESA, CESA, and mitigation monitoring requirement of CEQA. Regarding the former, the proposed actions described in this chapter were developed in a manner to minimize adverse effects and preclude jeopardizing the continued existence of any species due to plan implementation; thus, no additional mitigation measures are required (see Chapter 6, “Environmental Consequences (Environmental Effects and Alternative Comparisons)”). Technically, therefore, no monitoring of mitigation implementation monitoring is required under CEQA other than the monitoring required for the other purposes described above.

Management Direction

Monitoring

Table 4-7 describes the anticipated monitoring requirements for plan implementation. These requirements are arranged by program area (e.g., species management, watershed restoration, forest restoration, fire management), according to the attribute to be monitored. Monitoring results for one program area, however, will be of concern to other program areas, as indicated by the assessment of environmental consequence in Chapter 6. The table presents the following elements for the attributes to be monitored:

- attribute to be monitored,
- monitoring purpose,
- specific indicator(s) of attribute to be measured,
- appropriate frequency and duration of measurement, and
- monitoring results indicating a need for reevaluation of management actions.

Evaluation and Adaptive Responses

Monitoring results will be evaluated immediately upon collection each year and annually reevaluated as an integrated whole preceding the budget planning process. Because the purpose of monitoring is to guide plan implementation, a detailed evaluation and an adaptive response will be developed when monitoring results indicate that undesired outcomes are occurring. These adaptations may require a refinement or modification of planning direction in this chapter. If a significant management modification is indicated, an amendment of this plan may be required (see Chapter 1, “Introduction”). Significance is usually associated with monitoring results that indicate management direction for various plan elements are inhibiting achieving management goals of another plan element (e.g., a significant conflict between recreation access and species management is developing). In such cases, the required adaptation will be formulated to give priority to the primary purposes for which the Reserve was created: maintenance of ecological integrity and preservation of old-growth ecosystems.

Implementation Guidelines

Monitoring

Table 4-8 lists implementation guidelines for monitoring. All monitoring and evaluation activities will be fully documented. Monitoring and evaluation reports should indicate monitoring methodologies, results, and conclusions. Conclusions will include assessment of measured results against expected results, implications to the prospect for meeting management goals in any program area, determination of acceptability of results, and formulation of measures that could bring about desired changes to monitored attributes.

Evaluation

Data from the resource monitoring and other sources will serve as input for a formal evaluation of the planning decisions to determine progress in implementation, and to see if any amendments or revisions to the plan are necessary (see Chapter 1). The evaluation will be completed at least once every four years and will address the following questions (from BLM Handbook 1601-1):

- Are actions outlined in the plan being implemented?
- Does the plan establish desired outcomes (i.e., goals, standards, and objectives)?
- Are the allocations, constraints, and mitigation measures effective in achieving desired outcomes?
- Do decisions continue to be correct and proper over time?
- Have there been significant changes in the related plans of Indian tribes, state and local government, or other federal agencies?
- Are there new data or analysis that significantly affect the planning decisions or the validity of the NEPA analysis?
- Are there unmet needs or opportunities that can best be met through a plan amendment or revision, or will current management practices be sufficient?
- Are new inventories warranted pursuant to BLM’s duty to maintain inventories on a continuous basis (FLPMA Section 201)?

Table 4-7. Monitoring Needs for Plan Implementation

Attribute to Be Monitored	Purpose of Monitoring	Indicator to Be Measured	Frequency and Duration of Measurement	Results Indicating Need for Reevaluation of Management Actions
Species Management				
Corvid abundance	Determine corvid abundance trends	Number of corvids present on summer mornings, in point-count stations located at Salmon Pass, Alicia Pass, Elk River Corridor, Little South Fork Elk River trail area, and Elkhead Springs area	Semimonthly in summer for five years and every other year thereafter	Upward trend in corvid counts in action areas versus control areas attributable to reserve management
Marbled murrelet nesting activity	Determine murrelet use	Detections at established stations using established protocols, radar, or other methods	Per PALCO HCP monitoring	Downward trend in sightings
Spotted owl nesting activity	Determine owl use	Number and success of established territories using established protocols at known sites	Annually for five years, subsequent interval to be determined	Downward trend in number of territories or nesting attributable to reserve management
Watershed and Forest Restoration				
Potential sediment yield	Determine if precipitation and runoff conditions pose threat of imminent mass failures	Conditions throughout abandoned road system during wet season	Annually during early period of substantial rainfall, until restoration program is complete	Any threat of imminent mass failure
Actual sediment yield	Determine sediment yield to watercourses from newly-excavated stream crossings	Photographic monitoring, cross sectional measurements, and measurement of erosion voids	The first, third, and fifth year following decommissioning	If volume of sediment yield exceeds, on average, three percent of the total excavated volume of stream crossings
		Turbidity at stations on each of the three headwater streams during rising hydrographs (Elkhead Springs, Lower Little South Fork, Salmon Creek)	Annually until restoration program is complete; final measurement 10 years later	No change or statistically significant increasing trend in turbidity
Effectiveness of erosion control measures	Adaptively manage erosion control measures through compliance with erosion control monitoring plan	Visual inspection of erosion control measures, quality of run-off, and evidence of adverse erosion	At least once prior to October 15 and weekly thereafter during season of construction	Observation of significant erosion or failure of erosion control measure

Table 4-7. Continued

Attribute to Be Monitored	Purpose of Monitoring	Indicator to Be Measured	Frequency and Duration of Measurement	Results Indicating Need for Reevaluation of Management Actions
Forest stand conditions	Determine if density management is accelerating restoration of old-growth forest characteristics	Tree heights, diameters, tree form, and forest litter in sampling plots at sites established for a continuous forest inventory (Strata or locations selected to focus on old-growth buffers and fragmentation, and to compare results of different thinning treatments)	Every five years until restoration program is complete; final measurement 10, 20, and 30 years later	No statistically significant difference in growth rates or stand attributes between treated and untreated stands
Nonnative invasive plants	Determine if invasive nonnative plants are decreasing or increasing	Extent of nonnative plants in the Reserve, focused on invasive species	Every five years in perpetuity	Any increase
Aquatic habitat access	Determine if changes in range of anadromy occur in Salmon Creek	Species present in various reaches	Every five years until restoration program is complete; final measurement 10 years later	Any decreases in ranges of anadromy
Aquatic habitat conditions	Determine if changes in aquatic habitat conditions occur as a result of watershed and forest restoration	Fish spawning gravel grain sizes at selected locations in the three streams or their tributaries	Every five years until restoration program is complete; final measurement 10 years later	No change or Statistically significant departure of grain size distributions from spawning gravel size requirements
		Volume and frequency of large woody debris (LWD) in selected reaches of the three streams	Every five years until restoration program is complete; final measurement 10 years later	No change or Statistically significant decreases in volume or frequency of LWD
		Pool volume and frequency in selected reaches of the three streams	Every five years until restoration program is complete; final measurement 10 years later	No change or Statistically significant decrease in pool volume or frequency

Table 4-7. Continued

Attribute to Be Monitored	Purpose of Monitoring	Indicator to Be Measured	Frequency and Duration of Measurement	Results Indicating Need for Reevaluation of Management Actions
Research management				
Applicability of research	Determine if research is contributing to improved Reserve management	Conclusions of all research projects, with requirement that all researchers address applicability of research proposals and findings to Reserve management	Continuously	Frequent irrelevance
Impacts of research	Determine if research is adversely affecting ecosystem integrity	See <i>Species Management</i> above	--	--
Fire Management				
Fuel conditions	Determine if forest susceptibility to fire is decreasing with forest restoration	See <i>Forest Stand Conditions</i> above	--	--
Impacts of fire suppression	Determine if fire suppression is adversely affecting ecosystem integrity	Soil and watercourse disturbance following fire suppression activities	Immediately following a fire suppression incident	Any disturbance that can be countered by site restoration action
Recreation				
Visitation	Determine levels of visitation and extent of trail use	Number of persons entering the Reserve and destinations, seasonally, as registered in trailhead logbooks	Continuous compilation and annual summary	Visitation use level trend statistically higher than regional or statewide population growth; excessive concentration of use
Visitor compliance with restrictions	Determine visitor compliance with regulations	Number of warnings and citations issued by rangers, by type of violation (e.g., off-trail hiking, use of unauthorized means of transportation, littering food and other wastes, using fire, damaging vegetation)	Continuous compilation and annual summary	Statistically significant upward trend in any type of violation that exceeds trend in total visitation
Visitor safety and user conflicts	Determine if accident rates are changing	Number of reported accidents, by type (e.g., user collisions, falling, exhaustion, assault, dogbite)	Continuous compilation and annual summary	Any accident

Table 4-7. Continued

Attribute to Be Monitored	Purpose of Monitoring	Indicator to Be Measured	Frequency and Duration of Measurement	Results Indicating Need for Reevaluation of Management Actions
User conflicts	Determine if rates of user frustration are changing	Subject and content of visitor complaints about other visitors or their pets, as registered in trailhead logbooks, addressed to field rangers, or reported to Bureau of Land Management offices	Continuous compilation and annual summary	Statistically significant upward trend
Trail conditions	Determine if allowed means of travel are damaging trail systems and adjacent resources	Trail conditions in selected segments of sensitive trails, in terms of width, depth, apparent stability, erosion features and adjacent sediment deposition	Annually in perpetuity	More-than-minor trail damage to any segment, discounting natural effects of extreme precipitation events
Areas Having Wilderness Characteristics				
Wilderness characteristics	Determine if wilderness characteristics are being preserved	Condition of wilderness values	Monthly inspection and summary	Any apparent loss of wilderness value
Special-Areas Suitabilities				
Condition of special areas and resources	Determine if resource values that lead to designation are being preserved	Condition of resources listed on the National Register of Historic Places	Annual inspection and summary	Any damage or loss of value
		Stream uses and conditions of designated Wild and Scenic Rivers	Annual inspection and summary	Any apparent loss of river value upon which designation was based
		Compliance with State of California Ecological Reserve regulations; see <i>Visitor compliance with restrictions</i> , above	Annual inspection and summary	More-than-minor level of violations of Ecological Reserve regulations
<p>Note: Pacific Lumber Company (PALCO) is continuously monitoring various physical and biological attributes to meet requirements of its habitat conservation plan, and some of this monitoring is conducted in the Reserve (to establish reference conditions). Some of the monitoring needs identified in this table may be met through acquisition of PALCO's monitoring data.</p>				

Table 4-8. Costs of Reserve Management

	One-Time Costs (1,000s of \$)	Annual Costs (1,000s of \$)	Comments and Effects of Alternatives
Reserve Management			
General management	N/A	550	
Access	N/A	75	
Restoration planning	100	0	
Management planning	50	0	
Restoration			
Watershed restoration	1,523–3,994	0	Alt 1A (recontour) = 3,994 and Alt 1B (stabilize) = 1,523 ^a
Forest restoration	592–1,745	0	Alt 2A (medium intensity) = 1,745 and Alt 2B (low intensity) = 592 ^b
Exotic plant control	100	10	
Recreation			
Trail construction and maintenance	300–900	10-50	Construction: Alt 4A (extensive) = 14.4 miles new trail Alt 4B (limited) = 5.5 miles new trail Alt 4C (max preserve) = 2.9 miles new trail Annual trail maintenance: Alt 6A = 5.6 miles horse use Alt 6B = 2.9 miles horse use
Cultural site restoration/stabilization	200	10	
Facilities construction/maintenance	500	10	Parking/trailhead improvements, pavilion
Interpretation	0	100	
Fire Management			
Suppression	10	0	
Research, Monitoring, and Inventory			
Research and monitoring	125	40	
Resource inventory	10	10	
Total costs	3,510–7,734	730–770	

Note: A financial plan, as directed by the enabling legislation for the Reserve, was prepared and submitted to Congress (DOI BLM n.d.). This table updates that plan to reflect costs proposed in this management plan.

^a Pacific Watershed Associates 2001.

^b Acreage treated X \$700 per acre. Alt 2A both sapling and pole stands = 2,493 acres. Alt 2B sapling stands only = 846 acres.

- Are there new legal or policy mandates as a result of new statutes, proclamations, executive orders, or court orders not addressed in the plan?

Management Revenue and Expenditures

Management Goals

The desired outcomes and management goals for the revenues and expenditures program described in this plan are that plan implementation is fully funded and executed in the most cost-effective manner and that revenues to support Reserve management are provided primarily by governmental appropriations or grants and donations, and less so from visitation.

Management Direction

Funding of Plan Implementation

Full implementation of the proposed plan will be sought and will include completion of the selected watershed restoration program and forest restoration program within five years of final plan approval and construction of the selected trail system, including required appurtenant facilities, within three years of plan approval. The monitoring program will be implemented in the first year of plan adoption and will continue annually. Table 4-8 shows estimated costs for management of the Reserve, including one-time costs, such as for restoration or trail construction, and ongoing annual costs. Depending on the restoration and access alternatives selected, remaining one-time costs range from \$3 million to \$7.2 million. Annual operating costs are estimated to be \$530,000–\$570,000.

The current interagency agreement for funding of the Reserve includes a 2/3 to 1/3 split between the federal and state government in responsibility for public funding of both the one-time development of the Reserve and the annual management costs in perpetuity. Contributions and grants from sources will continue to be sought to help meet costs of restoring and improving the Reserve.

Efficiency of Management

The most cost-effective means of fully implementing the plan will be used. Direct management authority will reside with BLM's Arcata Field Office. The Field Manager will direct plan implementation. Staff specialists in watershed and forest restoration, recreation services, ecosystem preservation, and management services will oversee plan implementation. DFG will provide financial support and advice to the BLM Field Manager. In accordance with the MOU between BLM and DFG, and the State of California conservation easement over the Reserve, major decisions affecting the Reserve will be made jointly by BLM and DFG.

BLM will undertake plan improvements (i.e., watershed restoration, forest restoration, and construction of recreation facilities) by using contractors conducting business in the geographic area encompassed by the Northwest Forest Plan. Design of implementation projects may be done in-house or by use of contractors, whichever is most cost effective. Cost effectiveness includes

consideration of both least cost and degree of attainment of quality and schedule goals. Contractors may be either nonprofit or for-profit contractors.

Use Fees

In addition to contributions, costs of plan improvements will be met by federal-state appropriations, because these actions are logical extensions of the federal-state acquisition. These costs include costs for watershed restoration, forest restoration, and construction of recreation facilities. For meeting annual operation costs in perpetuity, some reliance upon Reserve visitors may be considered.

Alternatives for the charging of fees for interpretative/educational use are described in Chapter 5. They include four alternatives:

- **Universal user fee.** All users of the Reserve would be charged a daily user fee.
- **Guided hike user fee.** Users of the Reserve participating in guided hikes would be charged a tour fee (or would donate labor).
- **Independent user fee.** All users of the Reserve, except those participating in guided hikes, would be charged a daily user fee.
- **No fees.** Fees would not be assessed for entry into the Reserve.

One of these alternatives will be selected for final plan adoption. A partial or complete waiver of fees may be granted to educational organizations, depending on costs to be incurred by BLM.

The appropriate public use fees and implementation guidelines at the initiation of the plan-implementation period for recreation access would be determined on the basis of a fee study and business plan developed with public input and community support. At the present, fees are expected to be approximately \$3–5 per day, or \$40 annually, for walking access and \$5–10 per day, or \$40–80 annually, for bicycle and equestrian access, if a fee alternative is selected.

Researchers at the Reserve may be charged a fee for covering BLM's costs for processing of research permits. Fees will be established according to an application-specific cost estimate provided by BLM to applicants prior to application submittal and processing. A preapplication meeting between the applicant and agency staff will be required to establish the fee.

Chapter 5. Management Alternatives



Chapter 5. Management Alternatives



Introduction

Several alternative management actions for the Reserve are described in this chapter. A summary list of alternatives is provided in Table 5-1. These alternatives were formulated by an analysis of the management situation, an issue-scoping process directed at affected agencies and the public, and several subsequent planning analyses. A scoping report details the issues raised during the scoping process (Jones & Stokes 2000), and Chapter 2 describes the legal framework within which this plan must fit. The alternatives in this plan are formulated around the major public issues identified. Alternatives described in this chapter would feasibly achieve the management goals stated in Chapter 4, but with different levels of goal attainment and environmental and social impacts. Chapter 4 also describes management actions common to all alternatives. The choices involved in selecting alternatives for implementation are described in this chapter. Chapter 6 is an assessment of the environmental consequences of each of these alternatives.

Potential management alternatives were initially formulated but later eliminated from detailed consideration (Appendix J). Reasons for elimination include significant disturbance to the Reserve's resources, inappropriate use of the Reserve lands, incompatibility with adjoining landownership, inability of the land to support needed infrastructure, and user safety. Key program areas warrant the consideration of alternatives:

- Restoration of Old-Growth and Aquatic Ecosystems,
- Recreation Management,
- Areas with Wilderness Characteristics,
- Special-Area Designations, and
- Management Revenue.

Ten issues have been identified for these program areas, and alternatives have been formulated for each. Alternatives for each program area and issue are separately formulated because they are generally independent of alternatives for other program areas and issues.

Some program areas do not require alternatives, although management direction for them is included in this management plan (Chapter 4). These additional areas are common program areas for all alternatives.

- Species Management (existing requirements for protection of endangered species),
- Research Management,
- Fire Management, and
- Resource Monitoring and Evaluation.

Restrictions on various activities that are required for the conservation and recovery of threatened and endangered species (northern spotted owl, marbled murrelet, steelhead, and salmon) are not considered discretionary and have therefore not been subjected to alternatives formulation. These restrictions are described in the “Species Management” section of Chapter 4.

For all management issues, the No-Action Alternative corresponds to current management as established by the *Federal Register* notice of Interim Management Guidelines (March 19, 1999), *Headwaters Forest Reserve: Public Access (South)* (Environmental Assessment #AR-99-15), and *Watershed Restoration and Sediment Reduction for FY 2000–FY 2002* (Environmental Assessment #AR-00-03). A proposed alternative for each issue is also indicated. It should be noted that flexibility will remain with the Record of Decision (ROD) to adopt a final management alternative for each program issue that is within the range of actions addressed by the particular alternatives formulated in this chapter.

Alternatives for Restoration of Old-Growth and Aquatic Ecosystems

Two issues have been identified for which alternative resolutions are consistent with the overall purpose of forest ecosystem recovery and preservation: intensity of watershed restoration and intensity of forest restoration.

Intensity of Watershed Restoration

Issue

What level of watershed restoration should generally be pursued?

Alternative 1A: Full-Recontour Watershed Restoration (Proposed)

Most roads and landings having significant sediment yield would be fully recontoured where appropriate and feasible to natural topography and would be revegetated.

Watershed Restoration Alternatives

- Alternative 1A: Full-Recontour Watershed Restoration (Proposed)
- Alternative 1B: Hydrologic-Stabilization Watershed Restoration
- Alternative 1C: No Additional Watershed Restoration (No Action)

Forest Restoration Alternatives

- Alternative 2A: Moderate-Intensity Forest Restoration (Proposed)
- Alternative 2B: Low-Intensity Forest Restoration
- Alternative 2C: No Forest Restoration (No Action)

Recreation Management Alternatives: Southern Access

- Alternative 3A: Southern Access Available to Individual Vehicles
- Alternative 3B: Southern Access Confined to BLM Tours (No Action; Proposed)
- Alternative 3C: No Southern Access

Recreation Management Alternatives: Trail System

- Alternative 4A: Extensive Old-Growth Contact Experience*
- Alternative 4B: Limited Old-Growth Contact Experience (Proposed)
- Alternative 4C: No Old-Growth Contact Experience; Maximum Preservation of Old-Growth Forests
- Alternative 4D: Existing Trail System (No Action)

Recreation Management Alternatives: Bicycle Use

- Alternative 5A: Bicycle Use on Specially-Designed Trails*
- Alternative 5B: Bicycle Use in Elk River Corridor (Proposed)
- Alternative 5C: No Bicycle Use (No Action)

Recreation Management Alternatives: Equestrian Use

- Alternative 6A: Equestrian Use on Trails Accessed from Elk River Trailhead*
- Alternative 6B: Equestrian Use on Elk River Corridor Trails*
- Alternative 6C: No Equestrian Use (No Action; Proposed)

Areas with Wilderness Characteristics

- Alternative 7A: Entire Inventory Area Managed for Wilderness Characteristics
- Alternative 7B: Exclude Younger Harvested Stands from Management for Wilderness Characteristics (Proposed)
- Alternative 7C: No Management for Wilderness Characteristics (No Action)

Special-Area Designation Alternatives: Wild and Scenic Rivers

- Alternative 8A: All Eligible Streams Recommended for Wild and Scenic River Designation
- Alternative 8B: No Stream Recommended for Wild and Scenic River Designation (No Action; Proposed)
- Alternative 8C: Little South Fork Elk River with Tributary and Salmon Creek Recommended for Wild and Scenic River Designation

Special-Area Designation Alternatives: Ecological Reserve

- Alternative 9A: Ecological Reserve Designation Recommended (Proposed)
- Alternative 9B: No Ecological Reserve Designation Recommended (No Action)

Management Revenue Alternatives

Alternative 10A: Universal User Fee

Alternative 10B: BLM-Sponsored Tour User Fee

Alternative 10C: Non-Tour User Fee

Alternative 10D: No Fees (No Action) (Proposed)

Note:

Based on impact assessment (Chapter 6), the alternatives marked by an asterisk (*) are found to require construction of more-than-minimal recreation facilities and are therefore in conflict with legislative direction for management of the Reserve.

Alternative 1B: Hydrologic-Stabilization Watershed Restoration

Roads and landings having significant sediment yield would be reconfigured only as necessary to minimize sediment yield and would be revegetated.

Alternative 1C: No Additional Watershed Restoration (No Action)

Beyond watershed restoration actions through Year 2002 in accordance with the environmental assessment and ROD completed August 11, 2000, no further watershed restoration actions would be conducted.

Intensity of Forest Restoration

Issue

What intensity of density management should be conducted in harvested stands to accelerate restoration of old-growth forests?

Alternative 2A: Moderate-Intensity Forest Restoration (Proposed)

Density management would be conducted in pole stands, sapling/shrub stands, and openings in seed-tree harvested stands. Two to three entries on acreage currently in sapling/shrub stands and openings and in revegetated watershed-restoration sites would be made as needed. A single entry would be made on acreage currently in pole stands considered appropriate for such action.

Alternative 2B: Low-Intensity Forest Restoration

Density management would be conducted only in sapling/shrub stands and openings in seed-tree harvested stands, and in revegetated watershed-restoration sites, limited to one entry.

Alternative 2C: No Forest Restoration (No Action)

No forest restoration actions would be taken.

Alternatives for Recreation Management

Four issues have been identified that can be addressed in alternative ways: availability of access to the southern trailheads, the network of trails that support recreation access without compromising ecological integrity of the Reserve, and the extent of use of the trail network by equestrians and bicyclists. The suite of potential trail routes is described in Tables 5-2 and 5-3 and shown in Figure 5-1.

Availability of Southern Access

Issue

Should access to the southern trailhead(s) be limited to escorted vehicles or guided hikes, or should access be available to unescorted individual vehicles at visitors' discretion (during daylight hours in annual periods that avoid disturbance to breeding northern spotted owl and marbled murrelet and damage to roads and trails)?

Alternative 3A: Southern Access Available to Individual Vehicles

Access to the Salmon Pass Trailhead, and to a Universal Access Trail and an Alicia Pass Loop Trail, if those trails were developed (see Issue 4 below), would be unrestricted during appropriate periods, allowing private vehicles to traverse the Felt Springs Road from Humboldt County's Newburg Road and allowing visitors to hike (or possibly bike - see Issue 5) unescorted on Reserve trails served by the southern access route. (Note: Alternative 5A below would require that this alternative be selected). Use of the Felt Springs Road would not be allowed during periods when seasonal or hourly trail closures for the southern trails are in effect.

Alternative 3B: Southern Access Confined to BLM Tours (No Action; Proposed)

Access to the Salmon Pass Trailhead, and to a Universal Access Trail and an Alicia Pass Loop Trail, if those trails were developed (see Issue 4 below), would be available to escorted vehicles that are a part of scheduled, guided interpretive hikes. Trail use would be limited to these guided tours.

Alternative 3C: No Southern Access

Public access to the Reserve would be available to the Elk River Trailhead accessible by Humboldt County's Elk River Road. No access to the southern boundary would be provided, and Humboldt County's Newburg Road and the Felt Springs Road would only be used for administrative purposes. This alternative would not be consistent with the legislation authorizing creation of the Reserve.

Extent of Trail System

Issue

What trail system on the Reserve would best balance the need to provide recreation access to the public, while preserving the unique values of old-growth forests consistent with the purpose for which the Reserve was created?

Alternative 4A: Extensive Old-Growth Contact Experience

Opportunities would be provided for passing through old-growth forest for a considerable distance (Table 5-3, Figure 5-1). All potential trail routes shown in Figure 5-1 would be available to visitors, subject to seasonal and hourly restrictions, with the Historic Military Ridge Trail

Table 5-2. Existing and Potential Components of a Recreation Trail System for the Headwaters Forest Reserve

Description	Distance (one-way) (miles)	Gradient ^a
From Elk River Trailhead (Northern Access)		
Existing Elk River Corridor Trail (Trail #1)	A gentle-gradient trail from the Elk River Trailhead (at the terminus of Humboldt County's Elk River Road) along the South Fork of the Elk River to near the confluence of the Little South Fork and the main South Fork. Includes universal access for one mile beyond trailhead.	2.9 Nearly level; 1% average; some variation
New Elk River Corridor Trail (Trail #1)	Under all alternatives except the No-Action Alternative (Alternative 4D), the existing Elk River Trail would be reconstructed and relocated in some segments and short spurs would be added to allow contact with the South Fork Elk River and historical sites along the corridor (e.g., Falk). Picnic tables would be provided at some of these spurs.	2.9 Nearly level; 1% average; some variation
Existing Little South Fork Elk River Trail (Trail #2)	A trail ascending the Little South Fork to near the existing boundary of the primary old-growth forest on the Reserve. The existing route is east of the river.	2.7 Average 10%
New Little South Fork Elk River Trail (Trail #3)	Under all alternatives except the No-Action alternative (Alternative 4D), the existing trail would be relocated to the west side of the creek and a loop would be constructed at the upper end that extends through an island of old-growth forest, disjunct from the primary old-growth grove. A round-trip hike around the loop from the Elk River Corridor Trail would be 3.7 miles.	2.0, east loop; 1.7, west loop Average 15%
From Felt Springs Road (Southern Access)		
Existing Salmon Creek Trail (Trail #6)	An existing trail descending from the Salmon Pass Trailhead to above the inner gorge of Salmon Creek, then extending up the canyon of Salmon Creek where the primary old-growth grove can be continuously viewed. Entire roundtrip is nearly 4 miles.	1.9 (1.3 to river overlook; 0.6 up river canyon) 3% average, 12% maximum to river overlook; 2% up canyon
Salmon Creek Spur Trail (Trail #7)	A new trail from the existing Salmon Creek Trail, down a steep slope to a crossing of Salmon Creek at the edge of the primary old-growth grove.	0.1 50% ground slope requires switchbacks

Table 5-2. Continued

	Description	Distance (one-way) (miles)	Gradient ^a
Salmon Creek Trail Loops (Trail #8)	Two loops would be added to the Existing Salmon Creek Trail, returning visitors to the Salmon Creek Trailhead by different routes, while offering a shorter loop option from the parking area. These loops would allow round trips ranging from 2 to 3.6 miles. Contact with an isolated grove of old-growth forest would be provided for 0.4 miles along the shortest and longest loops.	0.7 and 1.0 new trail	Average 15%
Universal Access Trail (Trail #9)	From the road between Salmon Pass and Alicia Pass, a new trail about 400 feet long into the edge of southern old-growth grove, providing wheelchair and walking access. A parking area would be developed at the trailhead.	0.1	Nearly level
Alicia Pass Loop Trail (Trail #10)	A gentle to moderately sloping loop trail, originating at Alicia Pass, passing through the southern old-growth grove for 0.6 mile, and returning to Alicia Pass.	0.8	Average 15%
North-south through routes connecting Elk River Trailhead to Salmon Pass Trailhead			
Western Periphery Trail (Trail #5)	Connecting the New Little South Fork Elk River Trail to the Salmon Creek Spur Trail along the western boundary of the Reserve, passing through the edge of the main old-growth grove for 0.3 mile, with a designated primitive camping site in harvested forest near the junction with the New Little South Fork Elk River Trail.	1.6	9% between ridgetop and Salmon Creek
Historic Military Ridge Trail (Trail #4)	Connecting the Western Periphery Trail, at the edge of the main old-growth grove, to Alicia Pass, passing through the main old-growth grove for 2.4 miles along the ridge between the Elk River and Salmon Creek watersheds.	4.5	Gentle slopes on ridgetop; up to 15% across Salmon Creek canyon
Exhibition Routes			
Exhibition Routes	At various locations after marbled murrelet nesting season and prior to winter closure, to allow BLM-led tours to view various restoration project areas or other specific features, consistent with marbled murrelet and northern spotted owl nesting seasons and winter closure; would not involve physical trail development.	Various	Various

Table 5-3. Trail Routes of the Recreation Access Alternatives

Alternative	Trail										
	Northern Access				Southern Access					North-South Connecting Trails	
	Existing Elk River Corridor Trail ^c (#1)	New Elk River Corridor Trail ^{a,c,e} (#1)	Existing Little South Fork Elk River Trail (#2)	New Little South Fork Elk River Trail ^d (#3)	Existing Salmon Creek Trail (#6)	Salmon Creek Spur Trail (#7)	Salmon Creek Trail Loops (#8)	Universal Access Trail ^c (#9)	Alicia Pass Loop Trail (#10)	Western Periphery Trail ^b (#5)	Historic Military Ridge Trail ^b (#4)
4A: Extensive Old-Growth Contact Experience		✓		✓	✓	✓	✓	✓	✓	✓	✓
4B: Limited Old-Growth Contact Experience (Proposed)		✓		✓	✓	✓	✓				
4C: No Old-Growth Contact Experience; Maximum Preservation		✓									
4D: Existing Trail System (No Action)	✓		✓		✓						

Note: Table 5-2 describes the trail routes and figure 5-1 depicts trail locations.

^a Picnic sites would be provided along the New Elk River Corridor Trail.

^b A primitive campsite would be provided near the junction with the New Little South Fork Elk River Trail.

^c Wheelchair accessible; applies to the Elk River Corridor Trail (existing or new) to the historic townsite of Falk and to the Universal Access Trail.

^d The existing trail following an old road on the east side of the Little South Fork would be abandoned and a new trail would be constructed on the west side of the creek. A trail loop would be provided in the upper portion that enters old-growth forest.

^e The existing trail width would be narrowed, with some relocated alignments.

providing sustained contact with the old-growth forest, and the Alicia Pass Loop Trail and the Western Periphery Trail also providing considerable contact. Overnight camping at a designated primitive campsite would be allowed.

Because of the extensive trail system required, this alternative is now considered to conflict with the legislated restriction of construction to only “minimal necessary facilities”.

Alternative 4B: Limited Old-Growth Contact Experience (Proposed)

Opportunities would be provided for limited contact with old-growth groves at both the north and south portions of the Reserve, subject to seasonal and hourly restrictions (Table 5-3, Figures 5-1 and 5-2). The Salmon Creek Trail, Salmon Creek Trail loops, and the New Little South Fork Elk River Trail would provide contact with old-growth forests.

Alternative 4C: No Old-Growth Contact Experience; Maximum Preservation of Old-Growth Forests

Opportunities would be provided for experiencing riparian habitats of the Reserve, while preventing access to old-growth groves (Table 5-3, Figure 5-1). The New Elk River Corridor Trail would provide access to the riparian corridors in the northern portion of the Reserve. Use of the Little South Fork Elk River Trail and the Salmon Creek trail would be discontinued, as well as visitor access from the Newburg Road to the southern portion of the Reserve. This alternative would not be consistent with the legislation authorizing creation of the Reserve.

Alternative 4D: Existing Trail System (No Action)

The Existing Elk River Corridor Trail, Existing Little South Fork Elk River Trail, and the Salmon Creek Trail would continue to be available for Reserve access (Table 5-3, Figure 5-1).

Bicycle Use

Issue

Is bicycle use in portions of the Reserve consistent with ecosystem preservation and general public access for recreation purposes?

Alternative 5A: Bicycle Use on Specially-Designed Trails

Bicycling would be accommodated on specially-designed sloping trails where speed must be checked for biker safety and to minimize user conflicts. Trails that would be open to bicycle use include the Elk River Corridor Trail (existing or new), the new Little South Fork Elk Trail, and the existing Salmon Creek Trail. (This alternative requires that Alternative 3A above be selected.) Trail widths would be 36”–48” compared to 18–24” for pedestrians.

Because of the more extensive planforms required for bicycling trails (i.e. wider tread, increased sinuosity, and larger switchbacks, this alternative is now considered to conflict with the legislated restriction of construction to only “minimal necessary facilities”.

Alternative 5B: Bicycle Use in Elk River Corridor (Proposed)

Bicycling would be accommodated on trails with gentle slope, i.e. the Elk River Corridor Trail (existing or new). The wider clear width would need to be maintained.

Alternative 5C: No Bicycle Use (No Action)

Bicycle use would not be accommodated in the Reserve.

Equestrian Use

Issue

Is equestrian use in portions of the Reserve accessible from the Elk River Trailhead consistent with ecosystem preservation and general public access for recreation purposes?

Alternative 6A: Equestrian Use on Trails Accessed from Elk River Trailhead

Horseback riding would be accommodated on the network of trails accessible from the Elk River Trailhead, except the North-South Connecting Trails (Historic and Periphery Trails), if these trails are constructed. Available routes would therefore include the Elk River Corridor Trail (existing or new) and the Little South Fork Elk River Trail (existing or new). Trail widths would be 36"–48", compared to 18"–24" for pedestrians.

Because of the wider vegetation and obstacle clearing required for equestrian-use trails, this alternative is now considered to conflict with the legislated restriction of construction to only "minimal necessary facilities".

Alternative 6B: Equestrian Use on Elk River Corridor Trails

Horseback riding would be accommodated on trails with gentle slope that parallel the Elk River, i.e., the Elk River Corridor Trail (existing or new). The wider clear width would need to be maintained.

Alternative 6C: No Equestrian Use (No Action; Proposed)

Horseback riding would not be accommodated in the Reserve.

Alternatives for Lands Having Wilderness Characteristics

Issue

Should some portions or all of the Reserve be managed to maintain and enhance wilderness characteristics under provisions of Sections 201 and 202 of the Federal Land Policy Management Act?

Alternative 7A: Entire Inventory Area Managed for Wilderness Characteristics

The entire inventory area would be managed to maintain and enhance wilderness characteristics, comprising approximately 5,885 acres (80% of the Reserve) (Figure 5-3). This alternative would preclude bicycle use on the Salmon Creek Trail (Alternative 5A).

Alternative 7B: Exclude Younger Harvested Stands and Intensive Watershed Restoration Areas From Management for Wilderness Characteristics (Proposed)

The old-growth groves, other undisturbed forests, and older harvested stands in early-mature or later successional seral stages, approximately 4,400 acres (60% of the Reserve), would be managed to maintain and enhance wilderness characteristics (Figure 5-3) with second-growth areas of continuing forest and watershed restoration excluded.

Alternative 7C: No Management for Wilderness Characteristics (No Action)

No portion (0%) of the Reserve would be managed to maintain and enhance wilderness characteristics.

Alternatives for Special-Area Designations

National Wild and Scenic Rivers

Issue

Should eligible streams in the Reserve be recommended for inclusion in the National Wild and Scenic Rivers?

Alternative 8A: All Eligible Streams Would be Determined Suitable and Recommended for Wild and Scenic River Designation

All streams on the Reserve that meet eligibility requirements for consideration for Wild and Scenic River designation—Salmon Creek, South Fork Elk River, and Little South Fork Elk River with tributary—would be recommended for inclusion in the National Wild and Scenic Rivers System.

Alternative 8B: No Stream Recommended for Wild and Scenic River Designation

None of the streams in the Reserve would be recommended for inclusion in the National Wild and Scenic Rivers System.

Alternative 8C: Little South Fork Elk river with Tributary and Salmon Creek Recommended for Wild and Scenic River Designation (Proposed)

The Little South Fork Elk River and its major tributary, together with Salmon Creek would be found suitable and recommended for inclusion in the National Wild and Scenic River System.

State of California Ecological Reserve

Issue

Should the Reserve be recommended to the California Fish and Game Commission for designation as an Ecological Reserve under provisions of Title 14 Section 630 of the California Fish and Game Code?

Alternative 9A: Ecological Reserve Designation Recommended (Proposed)

The applicable general rules (Appendix I) for this designation would have the effect of precluding possession of firearms (including bows), camping, fires, swimming, and operation of aircraft or hovercraft in the Reserve, in addition to other management requirements that are already part of the proposed management direction of this plan. The following exceptions to the normally-applicable general rules for state designations would be recommended:

- The managing agency may authorize aircraft operation and motorized vehicle use for emergency operations, monitoring, research, and other management functions.
- Pet prohibitions on the Elk River Trail are modified as specified in Chapter 4 under Recreation Access Management, General Access Provisions of this document.
- The managing agency may authorize swimming associated with research and monitoring activities.
- Controlled overnight camping may be authorized for research and monitoring.

Alternative 9B: No Ecological Reserve Designation Recommended (No Action)

The Reserve would not be recommended for Ecological Reserve designation.

Alternatives for Management Revenue

User Fees (or In-Lieu Donations)

Issue

Should access fees (or in-lieu labor donation) be charged to users of the Reserve?

Alternative 10A: Universal User Fee

All users of the Reserve would be charged a daily user fee (or would donate labor).

Alternative 10B: BLM-Sponsored Tour User Fee

Reserve visitors participating in guided hikes would be charged a fee.

Alternative 10C: Non-Tour User Fee

All users of the Reserve, except participants in guided hikes, would be charged a daily user fee.

Alternative 10D: No Fees (No Action) (Proposed)

Fees would not be assessed for entry into the Reserve.