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December 1999

Draft –
Supplemental Environmental Impact Statement

For Amendment to the Survey and Manage, Protection Buffer, and Other Mitigating Measures Standards and Guidelines

Forest Service National Forests in Region 5 and 6 and the Bureau of Land Management Districts in California, Oregon and Washington within the Range of the Northern Spotted Owl

BLM/OR/WA/PL-00/010+1792

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Lead Agencies: Forest Service - U.S. Department of Agriculture
Bureau of Land Management - U.S. Department of the Interior

Cooperating Agency: Fish and Wildlife Service - U.S. Department of the Interior

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To the dear lone lands untroubled of men
Where no voice sounds, and amid the shadowy green
The little things of the woodland live unseen

And shall not loveliness be loved forever?

Bacchae
Euripides
5th Century BC


WASHINGTON
OREGON
CALIFORNIA
IDAHO
NEVADA
MONTANA
PACIFIC
OCEAN
Seattle
Spokane
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Portland
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Sacramento
San Francisco
Redding
Okanogan
Wenatchee
Olympic
Mt Baker Snoqualmie
Gilford Pinchot
Mt Hood
Siuslaw
Willamette
Deschutes
Umpqua
Winema
Rogue River
Siskiyou
Klamath
Six Rivers
Shasta - Trinity
Mendocino
Columbia River
Snake River
5
82
84
90
80
N
LEGEND
Spotted Owl Range
Klamath
National Forest

Figure 1

Abstract

The Forest Service and Bureau of Land Management propose to modify the Survey and Manage and other related species-specific mitigation measures for some rare and/or localized species on National Forests and Bureau of Land Management (BLM) lands within the range of the northern spotted owl. These mitigation measures are contained within the standards and guidelines of the Northwest Forest Plan (NFP) Record of Decision (USDA, USDI 1994b). This Supplemental Environmental Impact Statement (SEIS) presents three action alternatives to better identify protections needed, clarify language, eliminate inconsistent and redundant direction, and establish a process responsive to new information. Alternative 1 redefines Survey and Manage categories based on species characteristics. Alternative 2 is the same as Alternative 1 except that it removes or reassigns the 53 "uncommon" species within 5 years. Alternative 3 also builds on Alternative 1 by adding equivalent-effort surveys for rare and uncommon species for which pre-disturbance surveys are not practical and prescribing 250-meter buffers for rare sites. The preferred alternative is Alternative 1 because, based on the Draft SEIS, it best meets the underlying needs of clarifying and improving the Survey and Manage Standards and Guidelines while providing a balance between species protection and a predictable and sustainable level of timber and other outputs. Based on public comments and further analysis of this SEIS, the Agencies may, among other things, make factual corrections, modify alternatives including the Preferred Alternative, or supplement or modify its analysis (40 CFR 1503.4). The alternatives do not change the underlying purpose of the Northwest Forest Plan and do not address changes to other elements of the plan. The SEIS will supplement the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* (USDA, USDI 1994a). The Record of Decision for this SEIS will amend the management direction, as identified herein, in existing Forest Service and Bureau of Land Management plans within western Oregon, western Washington, and northwestern California.

Notice

Readers should note that the Secretary of Agriculture and the Secretary of Interior are the responsible officials for this proposed action. Therefore, no administrative review ("appeal") through the Forest Service will be available on the Record of Decision under 36 CFR 217, and no administrative review ("protest") through the BLM will be available on the Record of Decision under 43 CFR 1610.5-2.

To enable the Forest Service and Bureau of Land Management to fully analyze and use all information acquired during the review of this Draft SEIS, reviewers need to provide their comments during the established review period. Reviewers have an obligation to structure their participation to be meaningful and to alert the Agencies to their position and contentions (Vermont Yankee Nuclear Power Corp. V. NRDC, 435 US 519,553 [19978]).

Comments on this Draft SEIS should be as specific as possible and address the adequacy of the statement, the merits of the alternatives discussed, or both.

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Introduction

This Draft Supplemental Environmental Impact Statement (Draft SEIS) assesses three action alternatives for amending the species-specific management direction for some rare and/or localized species on National Forests and Bureau of Land Management (BLM) Districts in the Pacific Northwest and northern California. This management direction is contained in the land and resource management plans for National Forests and BLM units and in *The Northwest Forest Plan* (NFP) Record of Decision (USDA, USDI 1994b) and was analyzed in the Northwest Forest Plan FSEIS (USDA, USDI 1994a) which is incorporated as part of this SEIS (Appendix A) and to which this SEIS is a Supplement. The underlying needs and the purpose for developing this Supplemental Environmental Impact Statement are described in Chapter 1 and summarized below.

The selected alternative would amend those standards and guidelines in the Northwest Forest Plan that address Survey and Manage, Protection Buffers, Protection for Bats, Management of Recreation Sites to Minimize Disturbance to Species, and Protect Sites From Grazing. No species listed as "threatened" or "endangered" under the Endangered Species Act will be affected by amending these standards and guidelines. No other changes to the Northwest Forest Plan are being considered in this SEIS; there are no changes to major land allocations other than minor acreages of Late-Successional and Managed Late-Successional Reserves created by Protection Buffers, nor are there any changes to other management direction.

Background

The Northwest Forest Plan, adopted in April of 1994, provides for management of habitat for late-successional and old-growth forest related species. It is based primarily on a system of Late-Successional, riparian, and other reserves designed to provide for the habitat needs of more than 1,000 species associated with late-successional or old-growth forests on federal lands in the western portions of Washington, Oregon, and northern California. When the Northwest Forest Plan was being prepared, a concern was expressed that certain species might be so rare or isolated that the system of reserves and other elements of the Plan might not assure stable, well-distributed populations on federal lands.

To mitigate possible adverse effects to these species, mitigation measures were established in the Plan. These are Survey and Manage, Protection Buffers, Protection for Bats, Management of Recreation Sites to Minimize Disturbance to Species, and Protect Sites From Grazing. The intent of these species-specific measures was to benefit bryophytes (mosses and liverworts), fungi, lichens, mollusks (snails, slugs, and clams), amphibians (salamanders and frogs), vascular plants (plants with stems), birds (five species), mammals (lynx, red tree vole, and seven species of bats), and four groups of arthropods.

In the five years since adoption of the Northwest Forest Plan, much new information has been gained about the 414 species protected by the Survey and Manage and related species-specific standards and guidelines. Although the new information indicates that objectives for managing these species are being met, it also shows a need to correct several problems with these specific standards and guidelines. These problems result in protections beyond the level needed to meet some species objectives, difficulties in implementing the standards and guidelines, inefficient use of funds and personnel, and restrictions to timber harvest, restoration, and other management activities beyond those envisioned in the Northwest Forest Plan or needed to provide a reasonable assurance of persistence.

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The Proposed Action

The Agencies are proposing to amend portions of the Northwest Forest Plan to improve the efficiency and consistency in applying mitigation measures, while continuing to provide a reasonable level of assurance for persistence of the late-successional and old-growth forest associated species addressed by the Survey and Manage and related standards and guidelines in the Northwest Forest Plan. While retaining the overall strategy for mitigation, the three action alternatives considered in this SEIS would modify how the Agencies provide mitigation for certain species. Since the scope of this action is narrow, existing plans would continue largely, though not entirely, unmodified by any of the action alternatives.

The proposed action is to modify some of the mitigation measures identified above in the Background section of this summary. To respond to the Purpose and Need, the action alternatives variously:

- Redefine the Survey and Manage categories to better reflect the current relative rarity of the species.
- Clarify management direction and objectives for the various categories.
- Assign some species to categories that provide a different level of protection to more correctly align protection levels with the needs of the species.
- Define the process for changing protection levels for species, and for adding or removing species protection, based on changes in their relative rarity.
- Consolidate Protection Buffer and Protect From Grazing measures with similar Survey and Manage measures to eliminate redundancy.
- Clarify and amend other species-specific measures, including those for bats, and apply them to all Northwest Forest Plan land-use allocations.
- Clarify when activities require surveys.
- Clarify which activities require pre-disturbance surveys.

A decision to select one of the action alternatives presented in this Supplemental Environmental Impact Statement would amend the management direction in all existing Forest Service land and resource management plans and Bureau of Land Management resource management plans in the area of the Northwest Forest Plan (range of the northern spotted owl). The new direction would be effective on the date the decision is signed.

The Alternatives

This SEIS assesses four alternatives: No-Action and three action alternatives designed to accomplish the proposed action. The action alternatives combine and clarify the Survey and Manage, Protection Buffer, and certain other species-specific standards and guidelines in the Northwest Forest Plan. The alternatives apply to lands administered by the Forest Service and the Bureau of Land Management (BLM) within the range of the Northwest Forest Plan.

The Survey and Manage and other standards and guidelines proposed for amendment in the action alternatives were generally added as mitigation measures to the Northwest Forest Plan. These mitigation measures added protections for species for which there remained some concerns for persistence after the primary management strategies of the Plan were designed. The action alternatives propose to combine and clarify those measures to improve management efficiency and effectiveness, while meeting the underlying purpose and need in the Northwest Forest Plan. Many of the processes and procedures already established for implementing the current standards and guidelines would remain in place under the action alternatives. The alternatives do not propose to

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amend any aspect of the Northwest Forest Plan not specifically addressed in the alternatives.

The No-Action Alternative

The No-Action Alternative would continue the current direction, as provided in the Northwest Forest Plan Record of Decision (USDA, USDI 1994b), for the Survey and Manage and other mitigation measures described in the Introduction section of this SEIS. The Survey and Manage direction involves applying one or more of four possible categories to each of approximately 400 species or species groups. The four Survey and Manage categories are: Manage Known Sites, Survey Prior to Ground-Disturbing Activities, Extensive Surveys, and General Regional Surveys. The Northwest Forest Plan FSEIS Record of Decision defines, on Table C-3 ((included in Appendix B of this SEIS in the Standards and Guidelines of the No-Action Alternative), which categories apply to which species or species groups. No clear criteria are provided to indicate why a species belongs in a certain category, and also no specific provision exists for adding or removing a species, or for moving a species from one category to another when there is new information.

The Protection Buffer direction applies to 23 species, as discussed in Appendix B of this SEIS. Individual sites for 8 of the species become Late-Successional Reserves (LSRs); sites for 10 species become Managed Late-Successional Areas (MLSAs); and sites for 5 species add management direction within Matrix. Thirteen of the 23 Protection Buffer species are also included in Survey and Manage, which provides partially overlapping protection.

The standard and guideline to Manage Recreation Areas to Minimize Disturbance to Species does not name any specific species, nor does it apply to specific additional direction. It was included to remind federal managers that the Survey and Manage standards and guidelines apply to disturbances in recreation sites the same as for timber sales and other ground-disturbing activities.

The standard and guideline to Protect Sites From Grazing applies to 10 species of mollusks and 1 vascular plant species deemed particularly sensitive to grazing. Most species included in this direction are also in the Survey and Manage Standard and Guidelines.

The standard and guidelines to provide additional protection for bats add direction in the Matrix and Adaptive Management Area land allocations to protect caves, mines, and abandoned wooden bridges and buildings that bats use as roost sites. Controversial portions of this standard and guideline involve the need to handle bats for species identification and winter surveys that disturb hibernation.

The Action Alternatives

The three action alternatives combine Protect from Grazing species and most Protection Buffer species into Survey and Manage. The alternatives redefine Survey and Manage categories based on knowledge and concerns about the species and characteristics affecting practicality of surveys prior to habitat-disturbing activities. The number of categories and the management direction that apply to the species varies by alternative as shown on Table S-1 on the following page, and as described in further detail for each alternative. Each category has specific written criteria for assigning species to that category. Sixty-four species would be removed from Survey and Manage because other

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elements of the Northwest Forest Plan provide a reasonable assurance of persistence, the species are not closely associated with late-successional forests, or the species are not found in the range of the Northwest Forest Plan. The remaining 343 species are assigned to categories as shown below.

Although the action alternatives redefine Survey and Manage categories for clarity and efficiency, all four alternatives (including the No-Action Alternative) provide for various mixes of three elements of management direction: manage known sites, pre-disturbance surveys, and strategic surveys (extensive and regional surveys in the No-Action Alternative). Table S-1 shows the number of species under these three management elements, by alternative, as well as the number of species that would be removed from Survey and Manage. Some species would receive more than one management direction (Table S-2).

Table S-1. Number of Species in Each Management Direction Element by Alternative.

	Alternative			
Management Direction	**No-Action**	**Alternative 1**	**Alternative 2**	**Alternative 3**
Manage Known Sites	265	318	290	343
Pre-Disturbance Surveys	85	60	49	318
Strategic Surveys	332	343	343	343
Remove From Survey and Manage	--	64 (and 7 in part of their range)	64 (and 7 in part of their range)	64 (and 7 in part of their range)

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Table S-2. Comparison of Categories for Alternatives 1, 2 and 3 Based on Relative Rarity, Practicality of Pre-Disturbance Surveys, and Status.[1]

Alternative 1 - Redefine Categories Based on Species Characteristics

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 1A** - 49 species •Manage All Known Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 1B** - 197 species •Manage All Known Sites •N/A •Strategic Surveys (5 yrs.)	**Category 1E** - 44 species •Manage All Known Sites •N/A •Strategic Surveys
Uncommon	**Category 1C** - 11 species •Manage High-Priority Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 1D** - 17 species •Manage High-Priority Sites •N/A •Strategic Surveys	**Category 1F** - 25 species •N/A •N/A •Strategic Surveys

Alternative 2 - Remove or Reassign Uncommon Species Within 5 Years

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 2A** - 49 species •Manage All Known Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 2B** - 197 species •Manage All Known Sites •N/A •Strategic Surveys (5 yrs.)	**Category 2C** - 44 species •Manage All Known Sites •N/A •Strategic Surveys
Uncommon	**Category 2D** - 53 species •Manage All Sites Known as of 9/30/99----------> •No Pre-Disturbance Surveys ----------> •Strategic Surveys Completed in 5 years ---------->		

Alternative 3 - Add Equivalent-Effort Surveys and 250-Meter Rare Site Buffers

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 3A** - 290 species •Manage All Known Sites with 250-Meter Buffers---------->> •Pre-Disturbance Surveys ------> Equivalent-Effort Surveys---------->> •Strategic Surveys---------->		
Uncommon	**Category 3B** - 28 species •Manage High-Priority Sites---------->> •Pre-Disturbance Surveys---> Equivalent-Effort Surveys-->> •Strategic Surveys---------->		**Category 3C** - 25 species •Manage all Known Sites •N/A •Strategic Surveys

[1]*Details on management direction is in the text describing alternatives. The number of species in each category is per date of this DSEIS, and will change over time as described in the Adaptive Management section of each alternative.*

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Alternative 1 - The Preferred Alternative

Alternative 1 is designed to provide approximately the same level of protection as the Northwest Forest Plan. Survey and Manage species are grouped into six categories (1A-1F) based on level of relative rarity, ability to reasonably and consistently locate sites during surveys prior to implementing habitat-disturbing activities, and the level of information known about the species (see below). For a list of these species by category, see Table 2-2, Species to be Protected Through Survey and Manage for All Alternatives, at the end of Chapter 2.

Like Alternatives 2 and 3, this alternative combines most standards and guidelines for Protection Buffer and all those for Protect from Grazing into Survey and Manage, and edits and moves the remaining standards and guidelines for Protection Buffers and those for Additional Protection for Bats to "Standards and Guidelines Common to All Land Allocations."

Alternative 1 proposes to remove 64 species from Survey and Manage, and includes an Adaptive Management section that defines how to change species among the six categories and how to add or remove species from Survey and Manage when there is new information.

All six categories in Alternative 1 require strategic surveys. These surveys are designed to address specific questions for Survey and Manage species regarding concerns related to persistence and the need to manage to provide for species persistence.

Alternative 1 - Redefine Categories Based on Species Characteristics

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 1A** - 49 species •Manage All Known Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 1B** - 197 species •Manage All Known Sites •N/A •Strategic Surveys (5 yrs.)	**Category 1E** - 44 species •Manage All Known Sites •N/A •Strategic Surveys
Uncommon	**Category 1C** - 11 species •Manage High-Priority Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 1D** - 17 species •Manage High-Priority Sites •N/A •Strategic Surveys	**Category 1F** - 25 species •N/A •N/A •Strategic Surveys

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Six Categories of Alternative 1

Category 1A *- Rare species for which pre-disturbance surveys are practical. The objective of this category is to manage all known sites and minimize inadvertent loss of undiscovered sites. Management direction includes: manage all known sites, survey prior to habitat-disturbing activities, and conduct strategic surveys.*

Category 1B *- Rare species for which pre-disturbance surveys are not practical. The objective of this category is to manage all known sites and minimize inadvertent loss of undiscovered sites. Management direction includes: manage all known sites and conduct strategic surveys.*

Category 1C *- Uncommon species for which pre-disturbance surveys are practical. The objective of this category is to identify and manage high-priority sites to provide for species persistence. Until high-priority sites can be determined, all known sites are managed. Management direction includes: manage high-priority sites, survey prior to habitat-disturbing activities, and conduct strategic surveys.*

Category 1D *- Uncommon species for which pre-disturbance surveys are not practical or not necessary. The objective of this category is to identify and manage high-priority sites to provide for species persistence. Until high-priority sites can be determined, all known sites are managed. Management direction includes: manage high-priority sites and conduct strategic surveys.*

Category 1E *- Rare species for which status is undetermined. The objective is to manage all known sites while determining if the species meets the basic criteria for Survey and Manage and, if so, identify to which category it should be assigned. Management direction includes: manage all known sites and conduct strategic surveys.*

Category 1F *- Uncommon species for which status is undetermined. The objective is to determine if the species meets the basic criteria for Survey and Manage and, if so, identify to which category it should be assigned. Management direction includes: conduct strategic surveys*

As in the other action alternatives, all Protection Buffer species are moved to Survey and Manage categories except six species that are either dropped from these standards and guidelines, or are moved to "standards and guidelines common to all land allocations." The standard and guideline for Managing Recreation Areas to Minimize Disturbance to Species is deleted because it is not necessary for species persistence. Species and species groups associated with the standard and guideline Protect Sites From Grazing are moved to Survey and Manage, except for one species that is removed from this standard and guideline. The standard and guideline that Provides Additional Protection for Bats is modified to place management details into a Management Recommendation document to facilitate updating as new information is learned about the species.

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Alternative 2

Alternative 2 is identical to Alternative 1 for the "rare" species. Alternative 2 assumes that the 53 "uncommon" species may be the next ones to be removed from Survey and Manage and seeks to expedite that decision by concentrating efforts on completing strategic surveys within 5 years. Building on the classification system used in Alternative 1, Alternative 2 redefines Survey and Manage into four categories (2A-2D) based on relative rarity, the ability to reasonably and consistently locate sites during surveys prior to implementing habitat-disturbing activities, and the level of information known about the species (see below and Table S-2). The assignment of species into these four categories is shown on Table 2-2 (located at the end of Chapter 2).

Like Alternatives 1 and 3, this alternative combines most standards and guidelines for Protection Buffer and Protect from Grazing into Survey and Manage, and edits and moves the remaining standards and guidelines for Protection Buffers and Additional Protection for Bats to "Standards and Guidelines Common to All Land Allocations." Species moved from standards and guidelines for Protection Buffers or Grazing to Survey and Manage are also included on Table 2-2, Species to be Protected Through Survey and Manage, All Alternatives.

Alternative 2 proposes to remove 64 species from Survey and Manage, and includes an Adaptive Management section that defines how to change species among the three "rare" categories and how to add or remove species from Survey and Manage when there is new information.

All four categories in Alternative 2 require strategic surveys. These surveys are designed to address specific questions for Survey and Manage species regarding concerns related to persistence and the need to manage to provide for species persistence.

Alternative 2 - Remove or Reassign Uncommon Species Within 5 Years

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 2A** - 49 species •Manage All Known Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 2B** - 197 species •Manage All Known Sites •N/A •Strategic Surveys (5 yrs.)	**Category 2C** - 44 species •Manage All Known Sites •N/A •Strategic Surveys
Uncommon	**Category 2D** - 53 species •Manage All Sites Known as of 9/30/99---------->* •No Pre-Disturbance Surveys ---------->* •Strategic Surveys Completed in 5 years ---------->*		

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Four Categories of Alternative 2

Category 2A *- Rare species for which pre-disturbance surveys are practical. The objective of this category is to manage all known sites and minimize inadvertent loss of undiscovered sites. Management direction includes: manage all known sites, survey prior to habitat-disturbing activities, and conduct strategic surveys.*

Category 2B *- Rare species for which pre-disturbance surveys are not practical. The objective of this category is to manage all known sites and minimize inadvertent loss of undiscovered sites. Management direction includes: manage all known sites and conduct strategic surveys.*

Category 2C *- Rare species for which status is undetermined. The objective is to manage all known sites while determining if the species meets the basic criteria for Survey and Manage and, if so, identify to which category it should be assigned. Management direction includes: manage all known sites and conduct strategic surveys.*

Category 2D *- All uncommon species. The objective of this category is to manage all sites known as of September 30, 1999, and complete strategic surveys within 5 years to determine if species-specific management should be dropped, or if species should be moved to agency special status species programs or considered for Endangered Species Act listing.*

As in the other action alternatives, all Protection Buffer species are moved to Survey and Manage categories except six species that are either dropped from these standards and guidelines or are moved to "Standards and Guidelines Common to All Land Allocations." The standard and guideline for Managing Recreation Areas to Minimize Disturbance to Species is deleted because it is not necessary for species persistence. Species and species groups associated with the standard and guideline Protect Sites From Grazing are moved to Survey and Manage, except for one species that is removed from this standard and guideline. The standard and guideline that Provides Additional Protection for Bats is modified to place management details into a Management Recommendation document to facilitate updating as new information is learned about the species.

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Alternative 3

Alternative 3 builds on Alternative 1 by adding equivalent-effort surveys for species where pre-disturbance surveys are not considered practical, 250-meter buffers around occupied sites of rare species (minimum 48.5 acres), known site protection for uncommon species with status undetermined. Building on the species classifications of Alternative 1, Alternative 3 redefines Survey and Manage into three categories (3A, 3B, and 3C) based on relative rarity and the level of information known about the species (see below and Table S-2). The assignment of species into these three categories is shown on Table 2-2 (located at the end of Chapter 2).

Like Alternatives 1 and 2, this alternative combines most standards and guidelines for Protection Buffer and Protect from Grazing into Survey and Manage, and edits and moves the remaining standards and guidelines for Protection Buffers and Additional Protection for Bats to "Standards and Guidelines Common to All Land Allocations." Species moved from standards and guidelines for Protection Buffers or Grazing to Survey and Manage are also included on Table 2-2, Species to be Protected Through Survey and Manage, All Alternatives.

Alternative 3 proposes to remove 64 species from Survey and Manage, and includes an Adaptive Management section that defines how to change species among the three categories and how to add or remove species from Survey and Manage when there is new information.

All three categories in Alternative 3 require strategic surveys. These surveys are designed to address specific questions for Survey and Manage species regarding concerns related to persistence and the need to manage to provide for species persistence.

Alternative 3 - Add Equivalent-Effort Surveys and 250-Meter Rare Site Buffers

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 3A** - 290 species •Manage All Known Sites with 250-Meter Buffers----------> •Pre-Disturbance Surveys -----> Equivalent-Effort Surveys----------> •Strategic Surveys---------->		
Uncommon	**Category 3B** - 28 species •Manage High-Priority Sites----------> •Pre-Disturbance Surveys---> Equivalent-Effort Surveys--> •Strategic Surveys---------->		**Category 3C** - 25 species •Manage all Known Sites •N/A •Strategic Surveys

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Three Categories of Alternative 3

Category 3A *- All rare species. The objective of this category is to manage all known sites and minimize inadvertent loss of undiscovered sites, and to learn more about each species to better determine how it should be managed and identify to which category it should be assigned. Management direction includes: manage all known sites, practical surveys or equivalent-effort surveys prior to habitat-disturbing activities, and conduct strategic surveys.*

Category 3B *- Uncommon species, some of which pre-disturbance surveys are practical and some of which such surveys are not practical. The objective of this category is to manage high-priority sites and learn more about the species to better determine how it should be managed and identify to which category it should be assigned. Management direction includes: manage high-priority sites, practical surveys or equivalent-effort surveys prior to habitat-disturbing activities, and conduct strategic surveys.*

Category 3C *- Uncommon species for which status is undetermined. The objective is to determine if the species meets the basic criteria for Survey and Manage and, if so, identify to which category it should be assigned. Management direction includes: manage all known sites and conduct strategic surveys.*

As in the other action alternatives, all Protection Buffer species are moved to Survey and Manage categories, except for six species that are either dropped from these standards and guidelines or moved to "Standards and Guidelines Common to All Land Allocations." The standard and guideline for Managing Recreation Areas to Minimize Disturbance to Species is deleted because it is not necessary for species persistence. Species and species groups associated with the standard and guideline Protect Sites From Grazing are moved to Survey and Manage, except for one species that is removed from this standard and guideline. The standard and guideline that Provides Additional Protection for Bats is modified to place management details into a Management Recommendation document to facilitate updating as new information is learned about the species.

Comparison of the Effects of the Alternatives

Chapter 3&4 describes environmental consequences of the alternatives. The action alternatives modify and clarify Survey and Manage related standards and guidelines and propose a detailed process for using new information concerning rare and uncommon species in the future (adaptive management). The environmental consequences of the three alternatives vary as a result of differences in the management of sites and surveys for these species. The environmental effects described in the Northwest Forest Plan FSEIS (USDA, USDI 1994a) that are not associated with the proposed action of this SEIS are considered to remain valid and are incorporated by reference. The following discussion summarizes the impacts identified in detail in Chapter 3& 4.

Effects - Forest Ecosystems

The Northwest Forest Plan is an ecosystem approach to land management that focuses on habitat for late-successional and old-growth forest related species. It features a functional interconnected, late-successional and old-growth network to provide dispersal (short term) and movement between reserves (long term), and essential processes for selection, adaptation, and evolution. The major focus, as such, is on

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function, rather than structure or composition; this is a relatively "coarse" approach. The processes of succession and disturbance are expected to create a diversity of landscape pattern across the regional network.

In the long term, no significant cumulative change is anticipated in the overall functioning of succession or disturbance as a result of differences among alternatives. The Northwest Forest Plan FSEIS (USDA, USDI 1994a) concluded that the acres associated with Survey and Manage and related mitigation would have a relatively minor effect on the maintenance of a functional and interconnected, late-successional forest ecosystem. Although the number of acres associated with Survey and Manage Standards and Guidelines is greater than was anticipated (tens of thousands of acres), it is not significant in relation to the approximately 20 million acres of reserves.

The overall strategy for the Northwest Forest Plan is restoring and maintaining functional late-successional forest and old-growth forest ecosystems. The species-specific strategy of the Survey and Manage Standards and Guidelines may sometimes conflict with the management associated with the overall strategy of the Northwest Forest Plan. One example of this potential conflict is the use of prescribed burning or allowing natural burning to restore ecological functions to fire-associated forests in southern Oregon or northern California. There may be situations where species under Survey and Manage Standards and Guidelines depend on habitat that is a result of fire exclusion from the ecosystem. Information concerning ecology at both the watershed and landscape scale, as well as the local scale, is important in resolving these conflicts.

Effects - Aquatic Ecosystems

The Northwest Forest Plan was designed to protect streams, lakes, and wetlands within the range of the northern spotted owl (Figure 1). The Aquatic Conservation Strategy is a habitat-based approach developed to restore and maintain ecological health of watersheds and aquatic ecosystems contained within them on public lands. The four major components of the Aquatic Conservation Strategy (Riparian Reserves, Key Watersheds, Watershed Analysis and Watershed Restoration) provide the basis for protecting flora and fauna that is aquatic dependent or is either fully or partly riparian dependent.

The protection provided to aquatic-dependent flora and fauna with the Aquatic Conservation Strategy should result in stable well-distributed populations regardless of the alternative selected. This is due to the Riparian Reserve network and the other components and framework of the Aquatic Conservation Strategy. Riparian Reserves protect and restore functions and process of an interconnected network of aquatic systems.

The degree of protection provided by the four alternatives is in addition to the protection provided by the Aquatic Conservation Strategy. The three action alternatives require strategic surveys to collect additional information to develop and refine Management Recommendations. This provision allows management of species in isolated habitats that will supplement the protection provided for by the Aquatic Conservation Strategy.

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Effects - Air and Water Quality, Soil Productivity, and Fire Management

The Northwest Forest Plan standards and guidelines for air and water quality, and also soil productivity, have started to improve the general ecosystem health as well as management of habitat for late-successional and old-growth forest related species. Soil quality is protected through Agency standards, following "Best Management Practices" as prescribed by the Clean Water Act, and implementing the Northwest Forest Plan and Aquatic Conservation Strategy. Watershed conditions and functions are protected or restored, based on priorities, through activities identified in watershed analysis, Water Quality Recovery Plans (Clean Water Act), and/or consultation with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

There have been changes in air quality since 1994. Smoke generated from burning slash in forest management activities has declined commensurately with the decline of timber harvesting. Conversely, there has been an increase in prescribed burning for ecological health and to reintroduce fire into fire-dependent ecosystems. Slash from forest management activities tends to include heavier fuel loadings and, therefore, generates greater volumes of smoke than does burning of natural fuels for ecological reasons. The overall impact to airsheds has been a decline in smoke generated from prescribed burning by the Agencies.

In the short term, the requirements for surveys and management of known sites under all alternatives would have the potential to delay or eliminate some management activities that would otherwise benefit air, water or soil resources. Those actions that could be affected include subsoiling, fuel treatment, upland watershed restoration and riparian restoration treatments. However, in the long term under all alternatives, these conflicts are expected to be reduced or resolved through the adaptive management use of increased knowledge. The effects of the potential conflicts of Survey and Manage Standards and Guidelines with management activities that would benefit air, water or soil resources would be minor in the short term and inconsequential in the long term; this effect is based on the relatively small amount of acres (tens of thousands) associated with Survey and Manage, compared to the total of 24.4 million acres of federally managed lands within the Northwest Forest Plan area.

Effects - Bryophytes

Bryophytes include hornworts, liverworts and mosses. The habitat components important to bryophytes include live, old-growth trees, decaying wood, riparian zones, and generally the habitat characteristics achieved by more extensive and interconnected late-successional and old-growth forest conditions. The No-Action Alternative applied the Survey and Manage Standard and Guideline to 25 bryophyte species, and the Protection Buffer Standard and Guideline to 9 bryophytes. There are a total of 29 bryophytes considered under these standards and guidelines, with some species under both Survey and Manage and Protection Buffer Standards and Guidelines.

Eleven species of bryophtes would be removed from Survey and Manage and Protection Buffer Standards and Guidelines under the action alternatives, either in all or portions of their range, because they no longer meet the Survey and Manage basic criteria.

For the remaining species, the four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action

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alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the Agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

Compared to the No-Action Alternative, species would receive different management under the action alternatives as a result of applying new information and the slightly different emphasis of the alternatives. Under Alternatives 1 and 2: pre-disturbance surveys would be added for 1 bryophyte and removed for 8 bryophytes; strategic surveys would be added for 9 bryophytes; management of known sites would be removed for 1 bryophyte; and 11 bryophytes would be removed from the Survey and Manage Standards and Guidelines.

Under Alternative 3: pre-disturbance surveys would be added for 7 bryophytes and removed for 1 bryophyte; strategic surveys would be added for 9 bryophtyes; and 11 bryophytes would be removed from the Survey and Manage Standards and Guidelines.

Most of the bryophytes would have an equal or greater likelihood of a stable, well-distributed population under the action alternatives when compared to the No-Action Alternative.

For the 11 bryophytes that would be removed from the Survey and Manage Standards and Guidelines, 7 would be expected to have stable, well-distributed populations. Four species at risk for not maintaining a stable, well-distributed population do not meet the basic criteria for the Survey and Manage Standard and Guideline and could be considered for protection under the sensitive species programs of the Agencies or for listing under the Endangered Species Act.

Eighteen bryophytes species would remain on the Survey and Manage Standards and Guidelines. Stable, well-distributed populations would be expected under the alternatives as follows: 3 bryophytes under No-Action; 6 bryophytes under Alternative 1; 4 bryophytes under Alternative 2; and 7 bryophytes under Alternative 3.

For some species, the alternatives provide mitigation to the extent practical or appropriate, but the species may not have a stable, well-distributed population for reasons outside the control of the Northwest Forest Plan. This situation would exist for 7 bryophytes under No-Action; 10 bryophytes under Alternatives 1 and 2; and 11 bryophytes under Alternative 3.

For some species, some alternatives would not provide enough mitigation to maintain or achieve a stable, well-distributed population. This situation would exist for 8 bryophytes under No-Action; 2 bryophytes under Alternative 1; 4 bryophytes under Alternative 2; and zero bryophytes under Alternative 3.

Effects - Fungi

Fungi, which are neither plants nor animals, are recognized as a separate kingdom of organisms, both in structure and function. Fungi are essential to the functioning of forest ecosystems. There are 225 fungi included in the Survey and Manage Standards and Guidelines in the No-Action Alternative.

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Under all action alternatives, because they do not meet the basic criteria for Survey and Manage, 16 species are proposed to be removed from Survey and Manage Standards and Guidelines, and 1 species is proposed to be removed from part of its range. Of these 17 species, two species do not meet the basic criteria of Survey and Manage, but are at risk for a stable, well-distributed population and would be considered for sensitive species programs of the Agencies or for listing under the Endangered Species Act. One species does not occur in the Northwest Forest Plan area, five are synonyms of other species, and nine are expected to have stable, well-distributed populations.

There are 196 species of fungi under Alternative 1,and 202 species of fungi under Alternative 2, that would be either unchanged or receive greater protection compared to the No-Action Alternative. Under Alternative 3, 209 species of fungi would either be unchanged or receive greater protection compared to the No-Action Alternative. On an overall basis, the action alternatives would provide for stable well-distributed populations of fungi.

Effects - Lichens

Lichens are a conspicuous component of old-growth forest ecosystems where they play an important ecological role. The habitat components important to lichens include live, old-growth trees, decaying wood, riparian zones, and extensive and interconnected late-successional and old-growth forest conditions. Under the No-Action Alternative, the Survey and Manage Standard and Guideline was applied to 84 lichen species.

Thirty-seven species of lichens are proposed to be removed from Survey and Manage and Protection Buffer Standards and Guidelines under the action alternatives, either in all or portions of their range because they no longer meet the Survey and Manage basic criteria.

For the remaining species, the four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the Agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

Compared to the No-Action Alternative, species would receive different management under the action alternatives as a result of applying new information and the slightly different emphasis of the alternatives. Under Alternative 1, pre-disturbance surveys are added for 2 lichens; known site management is increased for 13 lichens; known site protection is removed for 1 lichen; and 37 lichens are removed from the Survey and Manage Standards and Guidelines.

Under Alternative 2, 23 lichens receive increased known site protection (for sites known as of September 30, 1999); pre-disturbance surveys are added for 1 lichen; and 37 lichens are removed from the Survey and Manage Standards and Guidelines.

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Under Alternative 3, 23 lichens would receive increased known site protection; pre-disturbance surveys would be added for 33 lichens; and 37 lichens would be removed from the Survey and Manage Standards and Guidelines.

Most of the lichens would have an equal or greater likelihood of a stable, well-distributed population under the action alternatives when compared to the No-Action Alternative.

For the 37 lichens proposed to be removed from the Survey and Manage Standards and Guidelines, 34 are expected to have stable, well-distributed populations. Three species at risk for not maintaining a stable, well-distributed population do not meet the basic criteria for the Survey and Manage Standard and Guideline and may be considered for protection under the sensitive species program of the Agencies or for listing under the Endangered Species Act.

Forty-seven lichen species would remain on the Survey and Manage Standards and Guidelines. Stable, well-distributed populations of lichens are expected under the alternatives as follows: 10 lichens under No-Action; 13 lichens under Alternative 1; 11 lichens under Alternative 2; and 13 lichens under Alternative 3.

For some species, the alternatives would provide mitigation to the extent practical or appropriate, but the species may not have a stable, well-distributed population for reasons outside the control of the Northwest Forest Plan. This situation would exist for 24 lichens under No-Action; 34 lichens under Alternatives 1; 29 lichens under Alternative 2; and 34 lichens under Alternative 3.

For some species, some alternatives would not provide enough mitigation to maintain or achieve a stable, well-distributed population of lichens. This situation would exist for 13 lichens under No-Action; zero lichens under Alternative 1; 7 lichens under Alternative 2; and zero lichens under Alternative 3.

Effects - Vascular Plants

Vascular plants are defined as those that contain conducting or vascular tissue. The Survey and Manage Standard and Guideline is applied to 18 vascular plant species under the No-Action Alternative.

Under the action alternatives, four species of vascular plants are proposed to be removed from Survey and Manage Standards and Guidelines, and two species are to be removed in part of their range. These species have been found to no longer meet all basic criteria for Survey and Manage Standards and Guidelines.

For the remaining species, the four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the Agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

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Compared to the No-Action Alternative, species would receive different management under the action alternatives as a result of applying new information and the slightly different emphasis of the alternatives. Under Alternative 1, 2 and 3, strategic surveys would be added for 11 vascular plants, and 6 vascular plants would be removed from the Survey and Manage Standards and Guidelines in all or part of their range.

Under Alternative 2, one vascular plant would receive increased known site protection, and pre-disturbance surveys would be removed for four vascular plants.

Under Alternative 3, one vascular plant would receive increased known site protection.

All six of the vascular plants to be removed from the Survey and Manage Standards and Guidelines are expected to have stable, well-distributed populations.

All 12 of the vascular plant species that would remain on the Survey and Manage Standards and Guidelines are expected to have stable, well-distributed populations. The likelihood of stable, well-distributed populations for these species would be greater under Alternatives 1 and 3 compared to the No-Action Alternative, and would be greater under the No-Action Alternative compared to Alternative 2.

Effects - Arthropods

Arthropods are invertebrates with jointed legs, a segmented body, and an exoskeleton (an external supporting covering). They include insects, crustaceans, arachnids, and myriapods. Collectively, arthropods constitute over 85 percent of the biological diversity in late-successional and old-growth forests in the Pacific Northwest.

Arthropods are treated as functional groups with many taxa represented in each group, instead of individual species. The only difference for arthropods being treated as a group, instead of individually, is that among the alternatives the three action alternatives include specific provisions for adaptive management. The conclusion of the Northwest Forest Plan FSEIS that arthropods will have a high likelihood of being stable and well distributed with gaps in their distribution would basically be unchanged by the action alternatives.

Effects - Mollusks

Mollusk species inhabiting Northwest coniferous forests include land snails, slugs, aquatic snails, and clams. As a group, mollusks are diverse in number and function and many have restricted geographic ranges and narrow ecological requirements.

There are 47 species of mollusks under the Survey and Manage Standards and Guidelines under all alternatives. Much new information has been learned from surveys concerning the range, distribution, and population numbers of many species of mollusks. New known sites have been identified for 31 species, and for 11 of these species the number of known sites has increased by at least 100 percent. These new records have resulted in an increase in the known ranges for 14 species.

Under all four alternatives, there would be 47 mollusk species under the Survey and Manage Standards and Guidelines. No mollusks would be removed from Survey and Manage Standards and Guidelines under the alternatives.

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The four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the Agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

Compared to the No-Action Alternative, species would receive different management under the action alternatives as a result of applying new information and the slightly different emphasis of the alternatives. Under Alternatives 1, 2 and 3, strategic surveys would be added for 47 mollusk species.

Alternative 1 would remove pre-disturbance surveys for 11 mollusk species and remove known site protection from 2 mollusk species. Alternative 2 would remove pre-disturbance surveys from 13 mollusk species. Alternative 3 would add pre-disturbance surveys for one mollusk species.

Under the action alternatives, 42 mollusks would be expected to have the outcome of a stable, well-distributed population. For the remaining five mollusk species that have some risk to a stable, well-distributed population, Alternative 3 would provide the best opportunity for stable, well-distributed population. Compared to the other alternatives, Alternative 1 would present a greater risk to two species of mollusks, while Alternative 2 would present a greater risk to five mollusk species. The No-Action Alternative would present the greater risk to all but two of these species compared to the action alternatives.

Effects - Amphibians

The amphibian fauna of the Pacific Northwest includes 13 species that are endemic to the Northwest Forest Plan area. Cool, moist, shady conditions found in old-growth forests, and cool, clear streams are important to amphibians. Five salamanders (Del Norte, Larch Mountain, Shasta, Siskiyou Mountains, and Van Dyke's) would be included in the Survey and Manage Standards and Guidelines under all alternatives. No salamanders would be removed from Survey and Manage Standards and Guidelines under the alternatives.

The four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

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Compared to the No-Action Alternative, species would receive different management under the action alternatives as a result of applying new information and because of the slightly different emphasis of the alternatives. Under Alternatives 1, 2 and 3, strategic surveys would be added for all five salamander species.

Alternative 1 would remove pre-disturbance surveys for the Del Norte salamander. Alternative 2 would remove pre-disturbance surveys for the Del Norte, Larch Mountain, and Siskiyou Mountains salamanders.

Under Alternatives 1 and 3, all five salamanders (Del Norte, Larch Mountain, Siskiyou Mountains, Shasta and Van Dyke's) would be expected to have stable, well-distributed populations.

Under Alternative 2, the Shasta and Van Dyke's salamanders would be expected to have a stable, well-distributed population. The Del Norte and Larch Mountain salamanders would be expected to have stable, well-distributed populations, although with somewhat greater risk for this outcome. Under Alternative 2, the Siskiyou Mountains salamander could be at a substantial risk to its population and range.

Effects - Birds

The Northwest Forest Plan Protection Buffer Standards and Guidelines address five species of birds: black-backed woodpecker, white-headed woodpecker, pygmy nuthatch, flammulated owl, and great gray owl.

The four alternatives considered in this SEIS would have nearly equal effect on late-successional birds across the broad landscape of the Northwest Forest Plan area.

For black-backed woodpecker, white-headed woodpecker, pygmy nuthatch and flammulated owl, a difference between the No-Action and action alternatives is that the action alternatives would move these four bird species from Protection Buffers applied only in the Matrix and Adaptive Management Areas, to standards and guidelines applied to all land allocations, and also would make three other changes in the written descriptions.

Unlike the No-Action Alternative, Alternatives 1, 2 and 3 would apply this standard and guideline to all land allocations, broadening the area where management attention would be given to these species. The effect in reserved land allocations should be minimal, since most of these allocations are managed for maximum potential for snag dependent species. The effect on Matrix and Adaptive Management Area land allocations would be the same as current snag levels because this standard and guideline already applies to those lands.

A change for these species in the action alternatives, compared to the No-Action Alternative, would be incorporation of specific adaptive management language; this language would allow new scientific and management information to be more readily acted on.

For great gray owl, a difference between the No-Action Alternative and the action alternatives is that the action alternatives propose to move great gray owl from Protection Buffer to Survey and Manage. This change is expected to have no difference in how the habitat for this species is identified, delineated or managed; however, it would affect the land allocation assigned to that habitat. In the No-Action Alternative, the acreage would become a Late-Successional Reserve with associated standards and guidelines applied to it. In the action alternatives, the great gray owl would be a Survey

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and Manage species, which would be afforded appropriate management analogous to that it receives currently; the acreage, however, would not be given a particular land allocation designation. The net effect to the owl and its habitat would be nearly the same. The No-Action Alternative would require a Late-Successional Reserve assessment, subject to review by the Regional Ecosystem Office for the owl site, while assessments under Alternatives 1, 2 and 3 would be managed under a Management Recommendation subject to review by the Regional Ecosystem Office.

In summary, it is expected that these species would have stable, well-distributed population under all alternatives.

Effects - Mammals

The Northwest Forest Plan FSEIS analysis of alternatives stated that the land management factors that are most important for the 15 mammal species assessed in the FEMAT report, including the four species that were part of the additional species analysis, are: presence of dead and dying trees and the logs they produce; presence of large areas of late-successional forest (Late-Successional Reserves), and protection of riparian zones.

Bats

The three action alternatives incorporate essentially the same management direction for bats and, therefore, would have an identical effect on bats. Under the action alternatives, Management Recommendations could modify the survey and identification requirements to avoid adverse effects to bats in contrast to the No-Action Alternative.

Canada Lynx

The No-Action Alternative would retain the lynx Protection Buffer Standard and Guidelines in the Matrix and Adaptive Management Area land-use allocations. The action alternatives would apply that language to all land allocations. The interagency Lynx Conservation Assessment and Strategy currently under development will include direction for land management agencies to develop the plans to provide the needed management of lynx habitat, regardless of the alternative selected.

Red Tree Vole

The Oregon red tree vole is an arboreal mammal endemic to western Oregon and extreme northwest California. Its distribution is limited to the moist coniferous forest west of the crest of the Cascade Mountains. The red tree vole depends on conifer tree canopies for nesting sites, foraging, travel routes, escape cover, and moisture. Tree voles are closely associated with old-growth forest habitat and appear very sensitive to habitat disturbance.

The No-Action Alternative, Alternative 1, and Alternative 3 provide for stable, well-distributed populations of red tree vole. Under Alternative 2, known sites would be managed as of September 30, 1999. Because of the low number of sites for the red tree vole and their poor distribution, the potential loss of sites under Alternative 2 could increase the risk that Oregon red tree vole populations may decline throughout large portions of its range and that the remaining populations could become more isolated.

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Other Mammals

The four alternatives considered in this SEIS would have nearly equal effect on late-successional mammals across the broad landscape of the Northwest Forest Plan area. The most discernible effect of the action alternatives relates to removal of 64 Survey and Manage species, which is expected to have a relatively minor effect on mammals because these species depend on the system of large reserves provided under the Northwest Forest Plan.

Effects - Early Seral Species

The Northwest Forest Plan was developed to address the federal land management issues related to late-successional associated species.

With overall timber harvest levels below that anticipated in the Northwest Forest Plan FSEIS, there is a trend of slightly less early-seral habitat on federal lands than was expected. However, the acreage of even the expected timber harvest is a very minor component of the total federal acreage.

The effects of the four alternatives in this SEIS would have a negligible effect on the abundance and distribution of early-seral habitat across the Northwest Forest Plan area and, therefore, would have little effect on the populations of early-seral associated species in the planning area. The negligible effect is the result of the relatively large extent of early-seral habitat currently, and the expectation that nonfederal lands will continue to be harvested and natural disturbances will continue throughout the Northwest Forest Plan area. This will provide an adequate acreage and distribution of early-seral habitat across the area to sustain adequate populations of species dependent upon young forest habitat.

Effects - Threatened and Endangered Species

Northern Spotted Owl

Northern spotted owl habitat and population management under the Northwest Forest Plan depends on management of large reserves with provisions for owl dispersal among the reserves. After five years of implementing the Northwest Forest Plan, experience has shown fewer impacts to the spotted owl population in the Matrix and Adaptive Management Areas than was originally expected due to lower than expected levels of timber harvest and more acreage in Riparian Reserves than originally modeled (see Introduction to Chapter 3&4).

A difference between the alternatives for the northern spotted owl is the effect on the red tree vole (*Arborimus longicaudus*). The red tree vole is an important prey for the spotted owl. Use of red tree voles as prey varies in different portions of the range of the northern spotted owl, from a low of 1 percent of its diet, to a high of 6 percent by volume. However, red tree voles may represent a higher proportion of the diet of individual owls. In coastal southwestern Oregon, the vole made up 50 percent of the prey items consumed by two owl pairs, although due to their small size, red tree voles provided 16 percent of the total diet (Forsman et al. 1984).

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Alternative 2 would increase the risk that Oregon red tree vole populations may decline throughout large portions of its range and that the remaining populations could become more isolated compared to Alternatives 1, 3 and No-Action. However, because red tree voles do not represent a large portion of the diet of most spotted owls, any effect to spotted owls from reductions of red tree vole populations is likely to be low.

The four alternatives would have an equal effect on spotted owl habitat management across the broad landscape of the Northwest Forest Plan area, which is the meaningful scale for consideration of owl populations. None of the alternatives would have an effect on the basic land management strategies for spotted owl habitat in the Northwest Forest Plan. Large reserves and habitat conditions for owl dispersal would continue to be managed appropriately in all of the alternatives. The acreage of protected habitat for Survey and Manage species, although significant for the species it is designed for, occurs as scattered, relatively small patches that have little contribution to the spotted owl population.

Marbled Murrelet

Marbled murrelet habitat and population management under the Northwest Forest Plan depends on management of large reserves, and also protection of murrelet nests wherever they occur on federal lands. The four alternatives would have an equal effect on marbled murrelet habitat management. Survey and Manage strategy is not relevant to the protection of currently occupied marbled murrelet habitat, since murrelet surveys and habitat protection measures will remain in place regardless of Survey and Manage species locations.

Other Terrestrial Threatened and Endangered Species

The Northwest Forest Plan FSEIS addressed all of the Endangered Species Act listed species in the planning area at the time it was prepared. The alternatives considered in this SEIS would have no effect on the conclusions in the Northwest Forest Plan FSEIS for listed species, as the Agencies will continue to comply with the requirements of the Endangered Species Act and also will appropriately manage habitat for the listed species.

Costs of Management

Costs of management related to implementation of Survey and Manage Standards and Guidelines are as follows (in millions of dollars per year):

No-Action Alternative:	$132 million/year
Alternative 1:	$28 million/year
Alternative 2:	$19 million/year
Alternative 3:	$44 million/year

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Socioeconomic

The number of jobs that would be supported through timber harvest under the alternatives are as follows:

No-Action Alternative:	6,170 jobs
Alternative 1:	6,310 jobs
Alternative 2:	6,990 jobs
Alternative 3:	4,590 jobs

Timber

The Probable Sale Quantity under each alternative would be as follows (million board feet per year):

Alternative	PSQ (million board feet annually)
Current Declared	811
No-Action Alternative	680
Alternative 1	695
Alternative 2	770
Alternative 3	505

S-3. Summary of Effects

	No-Action	Alt. 1	Alt. 2	Alt. 3	Comments
Species not Mitigated to the Extent Practical	80	2 (with risk un-known)	13 (Includes 2 vertebrates)	0	Species at risk of not maintaining stable, well-distributed populations.
Probable Sale Quantity[1] (Million Board Feet) (Current declared: 811 MMBF)	680 MMBF	695 MMBF	770 MMBF	505 MMBF	Analysis assumed removal of 64 species from Survey and Manage under the No-Action Alternative through other NEPA decisions within 5 years.
Acres Managed as Known Sites	205,000 acres	185,000 acres	64,000 acres	482,000 acres	Projected for 25 years of implementation.
Annual Costs: Survey and Manage Implementation (Current budget $8 million)[3]	$132 million[2]	$28 million	$19 million	$44 million	Pre-disturbance field survey costs are 75-99% of costs.
Employment (Wood Products)	6,170 (790 for 1st 5 yrs)	6,310	6,990	4,590	
Employment (Survey Related)	2,400	500	350	800	Full-time Equivalent @ $15.88/hr

[1] The NFP FSEIS used only 6 MMBF as the effect of Survey and Manage. The PSQ effects for the alternatives are based on projecting current estimated acres of known sites for 25 years, with eventual limits on 14 species. Actual PSQ will be affected by future adaptive management decisions and identification of high-priority sites in Management Recommendations.

[2] Includes $110 million for surveying fungi that requires a 5-year, multi-visit sampling protocol considered "impractical" in the other alternatives.

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Chapter 1

Purpose and Need

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Introduction

This Draft Supplemental Environmental Impact Statement (DSEIS) assesses alternatives for amending species-specific management direction for some rare and/or isolated species on federal forests administered by the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM) in the Pacific Northwest and northern California within the range of the northern spotted owl (Figure 1). This management direction is contained in the land and resource management plans for National Forests and BLM field units and in *The Northwest Forest Plan* (NFP), often referenced collectively herein as the Plan. This DSEIS incorporates and supplements the Northwest FSEIS (USDA, USDI 1994a). The underlying needs and the purpose for developing this Supplemental Environmental Impact Statement are described in this chapter.

The SEIS analysis process and document preparation is a joint effort of the Forest Service and the BLM (often referenced herein as the "Agencies"), and the U.S. Fish and Wildlife Service is assisting as a cooperating agency.

The selected alternative would amend those standards and guidelines in the Northwest Forest Plan that address:

- Survey and Manage
- Protection Buffers
- Provide Additional Protection for Caves, Mines, and Abandoned Wooden Bridges and Buildings That Are Used as Roost Sites for Bats (referenced herein as "Provide Additional Protection for Bats")
- Management of Recreation Sites to Minimize Disturbance to Species
- Protect Sites From Grazing

The proposed amendment to these standards and guidelines would not affect any species currently listed as "threatened" or "endangered" under the Endangered Species Act. Also, this amendment and SEIS does not consider other changes to the Northwest Forest Plan, does not make any changes to major land allocations except for minor acreages of Late-Successional and Managed Late-Successional Reserves created by Protection Buffers, and does not change other management direction.

Background

On April 2, 1993, President Clinton and many of his Cabinet Secretaries held a day-long forest conference in Portland, at which time he chartered the Departments of Interior and Agriculture to develop a long-term plan to relieve an impasse in the Pacific Northwest between managing to protect late-successional and old-growth forest-related species and managing for extractive uses such as timber production. President Clinton directed the Agencies to prepare a plan that would balance an appropriate level of protection for wildlife, forest health, and waterways, with the human and the economic dimensions dependent on timber sales. The President established the purpose and need for the Northwest Forest Plan by saying:

> *"First, we must never forget the human and the economic dimensions of these problems. Where sound management policies can preserve the health of forest lands, sales should go forward...*
>
> *"Second, as we craft a plan, we need to protect the long-term health of our forests, our wildlife, and our waterways... [W]e hold them in trust for future generations."* (USDA, USDI 1994a, p. 1-4; USDA, USDI 1994b, p. 3.)

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The Northwest Forest Plan resulting from this charge was adopted in April 1994. The Plan provides for management of habitat for late-successional and old-growth forest-related species based primarily on a system of Late-Successional, Riparian, and other reserves. The Plan is designed to provide for the habitat needs of more than 1,000 species associated with late-successional or old-growth forests on federal lands in the western portions of Washington, Oregon, and northern California. Of the 24.4 million federally managed acres within the range of the Northwest Forest Plan, almost 20 million are reserved for old-growth and late-successional forest conditions as Wilderness, National Parks, Late-Successional Reserves (LSRs), Riparian Reserves, and other areas (Figures 1-1, 1-2).

Agencies have been diligent in implementing the Northwest Forest Plan at all levels, and the result has been an unprecedented level of interagency cooperation and ecosystem-based management of late-successional and aquatic resources. Approximately 370 watershed analyses have been completed, assessment documents have been completed for more than 75 percent of the 7.5 million acres of Late-Successional Reserves, and plans have been completed for 9 of the 10 Adaptive Management Areas (AMA). In fiscal years 1997 and 1998, the BLM and Forest Service offered over 1.6 billion board feet of timber for sale. These accomplishments have been achieved while meeting commitments to manage, protect and restore forest ecosystems in the Northwest Forest Plan area. For example, there has been increased use of thinning in young stands region-wide to reduce the risk of wildfires and to maintain the long-term health of federal forests. Cooperative research has increased, over 690 miles of roads have been closed in key watersheds, and hundreds of culverts have been replaced. More than 75,000 acres of surveys have been conducted for Survey and Manage species.

Land Allocation Categories

Designated Areas

- Congressionally Reserved Areas
- Late-Successional Reserves
- Adaptive Management Areas
- Managed Late-Successional Areas
- Administratively Withdrawn Areas

Matrix

- Matrix

As described below, however, the Agencies have had some difficulties implementing certain elements of the Northwest Forest Plan pertaining to Survey and Manage and related measures. Additionally, in August 1999 while this SEIS was being prepared, the U.S. District Court for the Western District of Washington found implementation of the Survey and Manage standards and guides to be deficient in two ways. The Court found that language in the Northwest Forest Plan Record of Decision (ROD)(USDA, USDI 1994b) was not consistent with the Agencies 1996 written interpretation that "implementation" referred to the date that a project NEPA decision document is signed. The Court also found that the Agencies written Survey Protocol exempting some areas from red tree vole surveys was not consistent with the Northwest Forest Plan Record of Decision.

When the Northwest Forest Plan was being prepared, some concern was expressed that certain species about which little was known might be so rare or isolated that the system of reserves and other elements in the Plan would not provide reasonable assurance of stable, well-distributed populations on federal lands. This concern often originated simply from lack of scientific information about a species and its habitat and distribution. In other cases, the concern was that management direction for the seven land allocations in the Plan would not adequately protect specific local habitat needs of some species.

Because of these concerns, when options were being developed for the Northwest Forest Plan, scientists on the viability ratings panels were asked to identify "relatively minor modifications" to mitigate possible adverse effects. The suggested modifications could not involve major changes that would make the option more similar to another option (USDA et al. 1993, p. IV-47).

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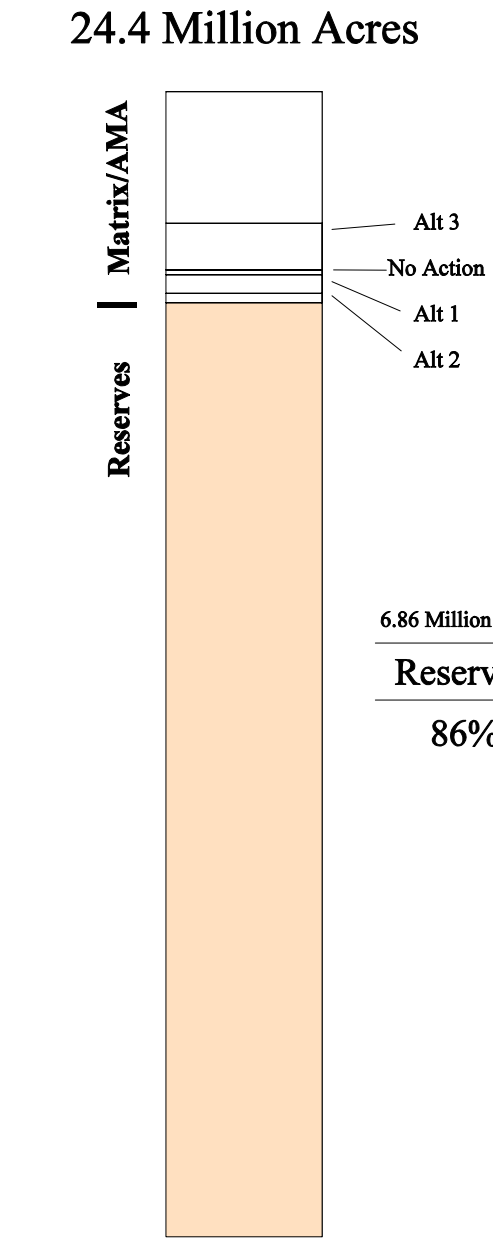
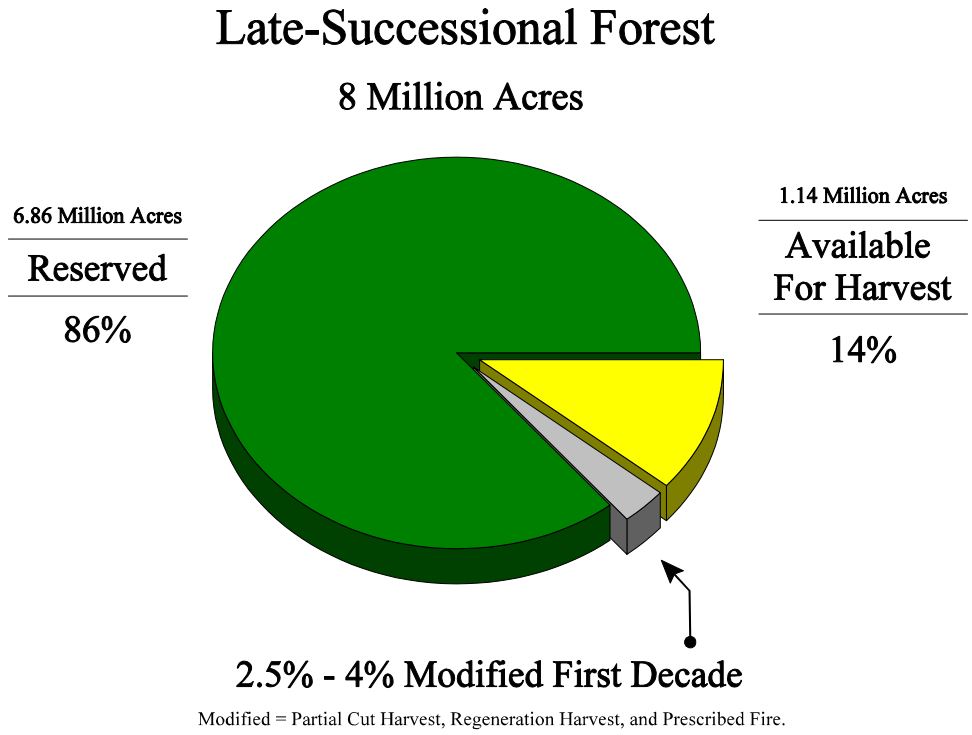
Figures 1-1 Relative Benefits to Species and 1-2 Late-Successional Forest



Relative Benefits to Species of S&M Alternatives



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Early in the planning process, species-specific standards and guidelines called "Protection Buffers" were developed for 24 species (see Appendix B of this SEIS). Near the end of the planning process, several other mitigation measures were added to the Northwest Forest Plan. Among the added measures were four that are generally species-specific (Survey and Manage, Provide Additional Protection for Bats, Management of Recreation Sites to Minimize Disturbance to Species, Protect Sites From Grazing), which are addressed in this SEIS along with Protection Buffers.

The intent of these species-specific measures was to benefit bryophytes (mosses and liverworts), fungi, lichens, mollusks (snails, slugs, and clams), amphibians (salamanders and frogs), vascular plants (plants with stems), birds (five species), mammals (lynx, red tree vole, and seven species of bats), and four groups of arthropods. These standards and guidelines have considerable overlap, providing similar or the same protection levels. For example, 13 Protection Buffer species are also included in Survey and Manage, and 8 of the 11 Protect From Grazing species are included in Survey and Manage.

In addition, the Survey and Manage Standards and Guidelines state that species may be moved to different levels of protection or be removed from the protection list when there is new information. However, the standards and guidelines do not specify the criteria for such moves in Survey and Manage, and there is no similar provision for moving or removing species in the standards and guidelines for Protection Buffers, bats, grazing, or recreation sites.

The Survey and Manage and other mitigation measures were designed to maintain the balance between late-successional/old-growth forest habitats and forest products. As a result, mitigation deemed impractical was not prescribed. For example, surveys prior to ground-disturbing activities were specified only for species that the Agencies believed could be reasonably located during such surveys. In cases where a species has characteristics that make its location difficult when surveying prior to ground-disturbing activities, the Northwest Forest Plan specified that extensive surveys were a more practical and efficient approach (USDA, USDI 1994b, p. C-5.) The Northwest Forest Plan FSEIS fully recognized this situation might raise the level of uncertainty for some species, but considered this risk appropriate given the balance of needs to be accommodated for species protection and extractive uses. Of the 10 alternatives examined for the Northwest Forest Plan, the selected alternative was deemed to provide the most appropriate level of protection for late-successional and old-growth forest related species, while providing a sustainable and predictable level of timber harvest and other forest uses. The benefits or detriments of the adopted mitigation measures on environmental, economic, and social consequences were anticipated to have "relatively minor" changes on expected outcomes of the alternatives (USDA, USDI 1994a, pp. 3&4-39).

In the five years since adoption of the Northwest Forest Plan, much new information has been gained about the 400-plus species protected by the Survey and Manage and related species-specific standards and guidelines. While the new information indicates that objectives for managing these species are being met, it also shows a need to correct several problems with these specific standards and guidelines. These problems result in protections beyond the level needed to meet some species objectives, difficulties in implementing the standards and guidelines, and inefficient use of funds and personnel.

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The Underlying Need for the Proposed Action

The Northwest Forest Plan, as stated in its FSEIS, responds to dual needs: *the need for forest habitat and the need for forest products.*

> *".... The need for forest habitat is the need for a healthy forest ecosystem with habitat that will support populations of native species (particularly those associated with late-successional and old-growth forest) and includes protection for riparian areas and waters.*
>
> *"The need for forest products from forest ecosystems is the need for a sustainable supply of timber and other forest products that will help maintain the stability of local and regional economies on a predictable and long-term basis."* (USDA, USDI 1994a, pp. 1-4)

The Survey and Manage and related standards and guidelines are among several mitigations developed to reduce negative effects and to increase protection levels above those described in Alternative 9 in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a). The Agencies are unable to fully meet the original purpose and need of the Northwest Forest Plan due to difficulties implementing the Survey and Manage and related mitigation measures. These difficulties were largely unforeseen when the Survey and Manage and related measures were added to the Northwest Forest Plan in 1994 because the mitigations, by definition, addressed species about which the Agencies had limited information at that time. The experience gained since then through implementation, along with additional information learned about the species, constitutes significant new information that needs to be addressed.

Implementation difficulties include:

- Some species protected by Protection Buffers or Survey and Manage Categories 1 and/or 2 are much more common than anticipated when the Northwest Forest Plan was prepared, which results in more restrictions on timber harvest and other management activities than needed to provide for persistence of the species. Other species have been found to need more protection than originally prescribed. For example, some species of fungi for which only a few sites are known do not require "manage known sites."

- Some Protection Buffer standards and guidelines create land allocations associated with species sites, even though the standards and guidelines for the allocation are not consistent with the needs of the species. Additionally, some Protection Buffer species are also in Survey and Manage, creating overlapping and sometimes conflicting direction.

- Because some Category 2 species (which require surveys prior to ground-disturbing activities) cannot reasonably be detected or identified in the field or with simple laboratory or office examination, projects either incur unreasonably high costs of surveying for these species, or are placed on indefinite hold while more efficient survey methods are sought.

- Overlapping and unclear direction has resulted in funding surveys that may not be necessary or are not efficient, given species protection objectives. Project costs have been unreasonably expensive and time consuming, which reduces the number of management activities that can be done because of limited funds and personnel.

- Direction for bats, some cavity-nesting birds, and Canada lynx provides management details rather than overall objectives; the details in the standards and

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guidelines for these species have become outdated as new information has become available.

- The adaptive management process is not clear, which has made it difficult for the Agencies to make changes, even though a species appears to qualify for a change in management requirements based on new information.

- The method used to identify when surveys must be completed for projects needs to be clarified to make the program manageable. Under the current interpretation of the Northwest Forest Plan, requirements to survey may arise on projects after the planning has been completed, depending on circumstances beyond the control of the Agencies. There is a need to know during the planning stages of projects whether or not the projects will be subject to survey requirements, since the information gathered in these surveys is intended to be incorprated into the design of the projects.

The Purpose

The purpose of the proposed action is to modify the Survey and Manage and related mitigation measures to better identify the protections that are needed, to clarify language, to eliminate inconsistent and redundant direction, and to establish a process that responds to new information, while continuing to meet the underlying needs of the Northwest Forest Plan identified in the 1994 Northwest Forest Plan FSEIS, including providing for the viability of late-successional and old-growth associated vertebrate species, and non-vertebrates to the extent practicable.

The Proposed Action

The Agencies are proposing to amend portions of the Northwest Forest Plan to improve the efficiency and consistency in applying mitigation measures, while continuing to provide a reasonable level of assurance for persistence of the late-successional and old-growth associated species addressed by the Survey and Manage and related standards and guidelines in the Northwest Forest Plan. While retaining the overall strategy for mitigation, the three action alternatives considered in this SEIS would modify how the Agencies provide mitigation for certain species. Since the scope of this action is narrow, existing plans would continue largely, though not entirely, unmodified by any of the action alternatives.

The proposed action is to modify some of the mitigation measures identified above in the Background section of this chapter. To respond to the Purpose and Underlying Need, the action alternatives variously:

- Redefine the Survey and Manage categories to better reflect the current relative rarity of the species.
- Clarify objectives and management direction for the various categories.
- Assign some species to categories that provide a different level of protection to more correctly align protection levels with the needs of the species.
- Define the process for changing protection levels for species, and for adding or removing species protection, based on changes in their relative rarity or knowledge of their management risk.
- Consolidate Protection Buffer and Protect From Grazing measures with similar Survey and Manage measures to eliminate redundancy.
- Clarify and amend other species-specific measures, including those for bats, and apply them to all Northwest Forest Plan land-use allocations.

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- Clarify when activities require surveys.
- Clarify which activities require pre-disturbance surveys.

A decision selecting one of the action alternatives presented in this Supplemental Environmental Impact Statement would also amend the management direction in all existing Forest Service land and resource management plans and Bureau of Land Management resource management plans in the area of the Northwest Forest Plan (range of the northern spotted owl). The new direction would be effective as of the date the decision is signed.

Scoping

Scoping is the term used to identify issues, concerns, and opportunities associated with the proposed action in an environmental impact statement. According to the Council on Environmental Quality (CEQ), scoping is specifically not required for supplements to environmental impact statements (CEQ Regulations Implementing NEPA, 40 Code of Federal Regulations [CFR] 1502.9[c][4]).

The Agencies, however, did conduct scoping for this supplemental environmental impact statement. A Notice of Intent to prepare this supplemental environmental impact statement was published in the *Federal Register* (63 FR 65167) on November 25, 1998. The Notice of Intent provided preliminary information about the proposed action and invited public comment. In late December 1998, the Agencies distributed a letter to approximately 1,200 individuals and groups identified by field units as potentially interested in this proposed action and analysis. The letter provided additional detail about this analysis and again invited public input. The Agencies received 66 letters in response to the Notice of Intent and the letter.

Scoping also borrowed from the 80 public comments to the Agencies October 7, 1998 environmental assessment proposing a one-year delay in surveys prior to ground-disturbing activities for 32 Survey and Manage species. (See "Changing Standards and Guidelines - Adaptive Management" in Chapter 2 for more detail about this environmental assessment.) In addition, the scoping built on the efforts discussed in the Northwest Forest Plan Draft SEIS (USDA, USDI 1993, pp. 1-3 and 1-4), and the public comments on the Draft SEIS (USDA, USDI 1993; and Appendix F in USDA,USDI 1994a; USDA, USDI 1994b, pp. 58-73). This scoping helped define the issues and, subsequently, the range of alternatives presented in Chapter 2 of this SEIS.

The Supplemental Environmental Impact Statement

The Council on Environmental Quality regulations implementing the National Environmental Policy Act direct that agencies supplement an environmental impact statement:

> *... if the agency makes substantial changes in the proposed action that are relevant to environmental concerns; or if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts* (40 CFR 1502.9 [c][1][i] and [ii]).

In this case, the Agencies have significant new information on the Survey and Manage, Protection Buffer, and other species-specific measures, and are proposing changes based

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on that new information. The proposed changes do not constitute an action separate and distinct from the Northwest Forest Plan and the land management plans of the Agencies, and do not warrant a new EIS. Therefore, it is appropriate to analyze the effects of the proposed action and alternatives in a supplemental EIS to the Northwest Forest Plan FSEIS and the FSEISs for the BLM and Forest Service land and resource management plans referenced in the Northwest Forest Plan or prepared subsequent to it.

The analysis in this SEIS relies heavily on the analysis in the Northwest Forest Plan FSEIS, and to a lesser extent on the environmental impact statements prepared for the land and resource management plans of the Agencies. Such data and analysis are incorporated in this SEIS by reference (per 40 CFR 1502.21) to the extent that they continue to be relevant to, and are not superseded by, the contents of this supplemental EIS.

As described above and in more detail in Chapter 2, selecting one of the action alternatives would result in amending the Agencies land and resource management plans that either incorporate, or were amended by, the Northwest Forest Plan.

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Chapter 2

The Alternatives

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This chapter includes an introduction section, followed by a discussion of the issues, origin and implementation status of standards and guidelines, adaptive management, interagency coordination and review, consultation, the relationship of standards and guidelines to the Northwest Forest Plan and of the alternatives to agency planning documents; consultation; the planning area; the four alternatives (No-Action and three action alternatives: Alternatives 1, 2, and 3); other alternatives considered but eliminated from detailed study, and comparison of the effects of the alternatives. All Chapter 2 tables, except Tables 2-1 and 2-3, are located at the end of this chapter.

Introduction

This chapter presents four alternatives: the No-Action and three action alternatives (Alternatives 1, 2, and 3) designed to accomplish the proposed action. Each action alternative proposes to amend the standards and guidelines for Survey and Manage, Protection Buffer, and certain other species-specific standards and guidelines in the Northwest Forest Plan. The alternatives apply to lands administered by the Forest Service and the Bureau of Land Management (BLM) within the Northwest Forest Plan area.

The Northwest Forest Plan, adopted in 1994, amended land management plans on all units of the Forest Service and BLM in western Washington, western Oregon, and northwestern California. The Plan provides substantial direction for managing habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. The Survey and Manage and other standards and guidelines proposed for amendment in the action alternatives were generally added, as explained in Chapters 1 and 2, as mitigation measures to the Plan.

These mitigation measures add protection for species for which there remained some concerns for persistence after the primary management strategies of the Plan were designed. The action alternatives propose to amend those measures by combining and clarifying the measures to improve management efficiency and effectiveness, while continuing to meet the resource objectives envisioned in the Northwest Forest Plan. All three action alternatives retain many of the processes and procedures established, to date, for implementing current standards and guidelines. The alternatives do not propose to amend any aspects of the Northwest Forest Plan not specifically addressed in this SEIS.

The Issues

For this SEIS, four main issues were identified. The issues originated from comments received through public scoping for this SEIS and the Northwest Forest Plan, public comments received on the October 7, 1998 environmental assessment proposing a one-year delay in surveys for some species, agency staff comments, as well as through experience with the current management direction. These issues are summarized below and serve to focus the comparison of the alternatives.

1. *Will alternatives, in concert with other elements of the Northwest Forest Plan, provide for levels of species protection envisioned in the Northwest Forest Plan*?

   As described in Chapter 1 (Purpose and Need), the alternatives seek to improve management efficiency over existing standards and guidelines by amending direction that is ambiguous, eliminating redundant and inconsistent directions, and establishing a process more responsive to new information

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continually being acquired on these species. The alternatives include provisions for changing levels of management for various species and also propose removal of some species from the Survey and Manage. The primary issue is whether the level of uncertainty from unknown information about these species can be reduced in an efficient and cost-effective manner without making substantial changes in the expected outcomes from the Northwest Forest Plan.

2. *Will alternatives focus implementation budgets and personnel to those species, habitats, and proposed activities where protection is needed to meet species objectives*?

   As described in Chapter 1 (Purpose and Need), the alternatives need to improve management efficiency. The alternatives combine and clarify direction, consolidate similar direction, and more clearly provide for adjustments to protection levels as new information is collected. The issue is whether funding and deployment of the scarce number of specialists and other personnel and resources are used efficiently to achieve the species protection objectives.

3. *Will the alternatives clarify confusing and conflicting standards and guidelines*?

   The standards and guidelines proposed for amendment in the action alternatives were derived from two separate sources (Thomas et al.1993 and Appendix J2 of USDA, USDI 1994a). The various categories of standards and guidelines from the two sources need to be integrated and clarified to provide for clear, consistent management direction and implementation over time and across administrative units. The issue is whether management guidance is clear and the processes are well described to be consistently implementable, commensurate with the objectives for managing the species.

4. *Will the level of effects on other resource outputs and activities be consistent with those intended when the standards and guidelines were adopted*?

   The Survey and Manage Standards and Guidelines were added to other elements of the Northwest Forest Plan as mitigation to improve conditions for species, but they do not guarantee absolute protection. The measures were not expected to change the resource outputs and activities described in the Northwest Forest Plan to any substantial degree. For example, the timeline for implementing the requirement to survey prior to ground-disturbing activities was delayed by several years in the Northwest Forest Plan's Record of Decision to allow time to develop Survey Protocols.

   Currently, resource management activities (ranging from stream restoration to the use of prescribed fire, and from trail construction to timber harvest) are substantially limited by the impractical survey requirements, protections for species determined to be much more common than previously known, and management direction in excess of that needed to provide a reasonable assurance of persistence. All alternatives are expected to meet species protection objectives at some level of risk and assurance. The issue is whether management direction can provide for a level of assurance of persistence sufficient to meet species objectives without unnecessarily impairing the ability of the Agencies to meet other resource needs and objectives.

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Background on Origin of Standards and Guidelines, No-Action Alternative

Protection Buffers

At the April 1993 Forest Conference in Portland, President Clinton chartered the Forest Ecosystem Management Assessment Team (FEMAT) to write a scientifically based plan for "protecting the long-term health of our forests, our wildlife, and our waterways... in balance with ...a predictable and sustainable level of timber sales and nontimber resources..." (USDA, USDI 1994a, pp. 1-4). The 10 options developed by FEMAT served as the basis for the 10 alternatives presented in the FSEIS for the Northwest Forest Plan (USDA, USDI 1994a). The FEMAT used elements from several preceding planning efforts they reviewed.

One earlier effort was the 1990 "*A Conservation Strategy for the Northern Spotted Owl*" (Thomas et al.), which was adopted by the Forest Service in 1992 and also served as the basis for the U.S. Fish and Wildlife Service Draft Northern Spotted Owl Recovery Plan (USDI unpub.1992). Another effort dates back to 1992 when the Forest Service—responding to May 28, 1992 direction from the U.S. District Court for the western district of Washington—initiated a proposal to supplement the 1990 Conservation Strategy with additional habitat protection and standards and guidelines. Key elements of the proposal to supplement the conservation strategy were in the March 1993 report of the Scientific Advisory Team (SAT), *Viability Assessment and Management Considerations for Species Associated with Late-Successional and Old-Growth Forest of the Pacific Northwest* (Thomas et al.). As explained in Chapter 1, due to concern that about 20 specific species were not adequately provided for by other elements of their recommendations, the Scientific Analysis Team wrote species-specific direction to apply wherever these species were found. The FEMAT labeled these species-specific directions "Protection Buffers" and brought them almost *verbatim* into the standards and guidelines for Late-Successional Reserves, Managed Late-Successional Areas, and Matrix (Thomas et al. 1993, pp. 291-299; USDA, USDI 1994a, pp. 2-26; and B-63 - B-71; and USDA, USDI 1994b, pp. C-19, C-21, C-26, C-28, C-45, and C-48).

As a result of the above, the various standards and guidelines for Protection Buffers comprise a mix of strategies. For example, application of the Protection Buffer standards and guidelines for most species results in adding unmapped Late-Successional Reserves or Managed Late-Successional Areas (USDA, USDI 1994b, pp. C-11 and C-26). For some species (white-headed woodpecker, black-backed woodpecker, pygmy nuthatch, and flammulated owl), application of the Protection Buffer standards and guidelines does not alter land-use allocation, but directs managing for snags in the Matrix within the ranges of these species (USDA, USDI 1994b, pp. C-45 and C-46). For the lynx, application of the standards and guidelines does not alter land-use allocation, but calls for developing a range of management plans (USDA, USDI 1994b, pp. C-47 and C-48).

Survey and Manage

The FEMAT assembled panels of experts to assess the viability of 1,120 species for seven of their ten options, including Option 9 (USDA et al. 1993, pp. IV-40 through IV-49, IV-77, and IV-185). The panels used an outcome-based scale to assess the likelihood that habitat would support populations of these species. Although the majority of these species, including the northern spotted owl and all other threatened or endangered species, rated well, the panels could not confidently say that Option 9 would provide for

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stabilized, well-distributed populations for 100 years across federal lands for some of the lichens, bryophytes, fungi, arthropods, mollusks and other species.

> FEMAT (USDA et al.1993, p. II-34) reported: *"[t]he lack of information on the species and their responses to habitat manipulations coupled with the large proportion that are inherently rare and/or locally endemic and likely sensitive to habitat disturbance gave the expert panels and our Team little confidence to predict many species/groups would find habitat well distributed within the range of the northern spotted owl for the next 100 years. These results are troubling."*

Option 9 was identified as the preferred alternative in the Northwest Forest Plan Draft SEIS published for public comment in July of 1993. In response to concerns of the public and Agency personnel about certain species, the SEIS team formed a scientist-staffed "Additional Species Analysis Team" to reconsider these species and suggest mitigation measures (Appendix J2 in USDA, USDI 1994a). This team screened species to identify which needed additional analysis, based on: species ratings in the FEMAT report, expected changes in Alternative 9 after the Northwest Forest Plan Draft SEIS, cumulative effects on species, and additional species-specific criteria (Appendix J2 in USDA, USDI 1994a, pp. J2-2 - J2-3). Through this screening process, the team identified 486 species and 4 groups of arthropods for additional analysis.

Following analysis, the team described 23 possible mitigation measures to reduce concerns. None of these mitigation measures, including the combination eventually adopted, provided maximum benefits for all species. Although these mitigation measures reduced the impacts of management actions, they are only a part of the overall strategy of the Northwest Forest Plan that provides for species persistence. Late-Successional, Riparian and other reserves, as well as many standards and guidelines, work together to provide for habitat and species. Mitigation measures adopted from this analysis into the final version of the Northwest Forest Plan include:

- Protect Sites From Grazing" (USDA, USDI 1994b, p. C-4).
- Manage Recreation Areas to Minimize Disturbance to Species" (USDA, USDI 1994b, p. C-4).
- Survey and Manage (USDA, USDI 1994b, pp. C-4 through C-6 and Table C-3).
- Provide Additional Protection for Caves, Mines, and Abandoned Wooden Bridges and Buildings That Are Used as Roost Sites for Bats (USDA, USDI 1994b, pp. C-43 and C-44).

The above four measures, along with Protection Buffers, are the extent of standards and guidelines addressed in this SEIS.

Species were assigned to Survey and Manage to increase the likelihood of a stable well-distributed population of the species across federal lands, or to decrease the likelihood of their extirpation on federal lands in the area of the Northwest Forest Plan. Species assigned to Survey and Manage were placed in one or more of four categories, numerically labeled 1-4, and also called "survey strategies" or "components." Assignment of species to one or more of these categories was generally based on available knowledge about the species, the level of protection deemed necessary, and the feasibility of conducting surveys prior to habitat-disturbing activities.

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The four Survey and Manage categories, per the Northwest Forest Plan Record of Decision (USDA, USDI 1994b, pp. C-4 and C-5), are summarized on the following chart:

Four Categories of Survey and Manage

Category 1 - Manage Known Sites - Applies to species where few sites are known.

Category 2 - *Survey Prior to Ground-Disturbing Activities* - Applies to species for which site-specific surveys were thought to be practical.

Category 3 - Extensive Surveys - Specified primarily for species whose characteristics make site-specific surveys difficult.

Category 4 - General Regional Surveys - Applies to species that are poorly known.

These categories are described in more detail in this chapter (see "Description of No-Action Alternative" section). The Survey and Manage categories have dates for them to be started or fully implemented, and similar dates were adopted in the Northwest Forest Plan Record of Decision for the Protection Buffer species. Although the Protection Buffer and the Survey and Manage Standards and Guidelines have different histories and implementation approaches, the differences between the two are not distinct. For example, 13 of the 23 Protection Buffer species are also included as Survey and Manage species (USDA, USDI 1994b, pp. C-49 to C-61). The resulting overlap creates two, sometimes conflicting, sets of direction for these species. This overlap and conflicting direction highlights the need to modify these standards and guidelines so that surveys, Management Recommendations, adaptive management, and other Survey and Manage Standards and Guidelines can be appropriately applied to these species. The complete text of the Northwest Forest Plan standards and guidelines addressed in this SEIS is included in Appendix B of this SEIS (Standards and Guidelines of the No-Action Alternative).

The Northwest Forest Plan FSEIS could only provide a very crude guess of the overall acreage involved in managing known sites of some of the Survey and Manage species (Appendix J2 in USDA, USDI 1994a, p. J2-40). The Northwest Forest Plan FSEIS estimated that the Survey and Manage mitigation measure would result in 2,500 acres protected for fungi; 24,550 acres protected for vascular plants; 7,500 acres protected for land snails and slugs (terrestrial mollusks); and 1,500 acres protected for the Larch Mountain salamander (Appendix J2 in USDA, USDI 1994a, pp. J2-16, J2-27, J2-41, J2-46). The FSEIS did not provide acreage estimates for other species and species groups, including lichens and bryophytes. The FSEIS did not provide any specific analysis of the effects of the Protection Buffer provisions, except to the extent that Protection Buffer species were also considered under the Survey and Manage mitigation measure.

The Northwest Forest Plan FSEIS disclosed that the effects discussion for maintaining a functional and interconnected, late-successional forest ecosystem was not revised from the DSEIS to reflect the Survey and Manage mitigation measure or other mitigation measures, because changes to the outcomes from these measures were expected to be relatively minor. (USDA, USDI 1994a, p. 3&4-39). Similarly, except for a 6.38 million board foot reduction in Probable Sale Quantity (timber harvest) for managing then known sites, the Northwest Forest Plan FSEIS did not quantify socioeconomic effects of these mitigation measures, noting only that these measures ... added to the uncertainty of PSQ calculations. (USDA, USDI 1994a, p. 3&4-267)

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Background on Implementation of the Standards and Guidelines (1994-1999)

Since the Northwest Forest Plan Record of Decision was signed in 1994, the Agencies have made substantial progress in developing the organizational infrastructure and biological databases necessary to implement the Survey and Manage and Protection Buffer provisions. The Regional Interagency Executive Committee (RIEC) has chartered an Interagency Survey and Manage Workgroup to develop databases, Survey Protocols, and Management Recommendations. The status of Survey Protocols and Management Recommendations is summarized in Table 2-1, as well as in Appendix C of this SEIS (Survey and Manage Accomplishments between 1994-1999).

The Agencies have sorted through historical records of Survey and Manage species, developed a database of Survey and Manage known sites, and developed an Interagency Species Management System (ISMS) designed to store Survey and Manage data in a central database available to field staff (see Appendix D). Interagency technical experts have been hired to lead extensive and general regional surveys, as well as to provide training, species identification, and technical advice.

As of November 4, 1999, the workgroup had developed Management Recommendations for 250 species for field implementation and field review, and Management Recommendations for an additional 18 species were in final editions (Table 2-1). Although Survey Protocols have been problematic, progress has been made on Survey Protocols for most species. Work done since signing of the Northwest Forest Plan Record of Decision has made it possible, to date, to survey for most Survey and Manage Category 2 and Protection Buffer species. Training about most species has been provided, and field offices have been surveying for many of these species. As a result, more than 10,000 additional survey records have been reported and entered into a data base, and thousands of new sites of species in all four categories of Survey and Manage have been found.

During 1999, the Agencies continued to make substantial progress in completing Survey Protocols and training personnel in field identification and Survey Protocols for most species. However, survey difficulties related to the species taxonomy and life history can be problematic. For example, very little is known about the range, distribution, habitat, and abundance of nearly 40 percent of Survey and Manage Category 2 and Protection Buffer species. Further, the taxonomy and life histories of some of these species continue to make surveys impractical.

As part of their overall implementation monitoring of projects, the Agencies have been monitoring compliance with Survey and Manage, Protection Buffer, and other standards and guidelines addressed in this SEIS. Monitoring has shown a high degree of compliance with these standards and guidelines (USDA, USDI 1996 and 1997).

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Table 2-1. Status of Management Recommendations and Survey Protocols as of 11/4/99.

Taxonomic Group	Total Species	Number of Management Recommendations (MRs) Completed by Species				Total Number of MRs	Number of Survey Protocols (SPs) Completed by Species In Category 2, Protection Buffer Standards & Guidelines				Total Number of SPs
		Document Version*					Document Version*				
		0.0	1.4	1.9	2.0		0.0	1.9	2.0	2.1+	
Vertebrates	7	2		5		7			2	5	7
Bryophytes	24				24	24			11		11
Fungi	152	1			151	152		7	1		8
Lichen	30			9	21	30			3		3
Mollusks	46			4	42	46			43		43
Vascular Plants	15	3			12	15			15		15
Total Species	274	6		18	250	274		7	75	5	87
Percent of Species		9%			91%	100%		8%	86%	6%	100%

Abbreviations Used in Table:
MR = Management Recommendation
SP = Survey Protocol
S&G = Standards and Guidelines

** Document Version Definition*:
0.0 - Not started.
1.4 - Being revised/edited by the Regional Ecosystem Office (REO) in preparation for review.
1.9 - In final editing.
2.0 - In REO or sent to field for use and peer review.
2.1 - Being revised based on peer review.

Changing Standards and Guidelines - Adaptive Management

The Northwest Forest Plan Record of Decision (USDA, USDI 1994b, pp. E-12 and E-13) specifies procedures for changing standards and guidelines in light of new information by stating:

> *"These standards and guidelines are based on current scientific knowledge. To be successful, it must have the flexibility to adapt and respond to new information. Under the concept of adaptive management, new information will be evaluated and a decision will be made whether to make adjustments or changes. These standards and guidelines incorporate the concept of adaptive management. This approach will enable resource managers to determine how well management actions meet their objectives and what steps are needed to modify activities to increase success or improve results.*
>
> *"The adaptive management process will be implemented to maximize the benefits and efficiency of these standards and guidelines. This may result in the refinement of standards and guidelines, land-use allocations, or amendments to Forest and District*

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> *Plans. Adaptive management decisions may vary in scale from individual watersheds, specific forest types, physiographic provinces, or the entire planning area or region. Adaptive management modifications that require changes to Regional Guides, or Forest or District Plans will be adopted following applicable regulatory procedures. However, many adaptive management modifications may not require changes to Regional Guides, or Forest or District Plans."*

Similarly, within the Survey and Manage portion of the Northwest Forest Plan Record of Decision (USDA, USDI 1994b, p. C-6), standards and guidelines specify:

> "*As experience is acquired with these requirements, agencies may propose changes to the Regional Ecosystem Office for analysis. These changes could include changing the schedule, moving a species from one survey strategy to another, or dropping this mitigation requirement for any species whose status is determined to be more secure than originally projected.*"

Consistent with the above provisions, the Regional Interagency Executive Committee and the Agencies have made minor changes and corrections to Survey and Manage and Protection Buffer provisions. These changes and corrections are summarized below:

- Vascular Plants: The taxonomic entity *Arceuthobium tsugense* was changed to *Arceuthobium tsugense* subsp. *mertensianae* in Washington only, and moved from Categories 1 and 2 to Category 4 (July 24, 1995).
- Mammals: Lynx was moved from Category 2 to Category 3 (June 11, 1996).
- Protection Buffers: *Buxbaumia piperi* was removed from Protection Buffer species status to correct an error in the Northwest Forest Plan Record of Decision (July 26, 1996).
- Arthropods: The wording was changed from Understory and forest gap herbivores to Understory and forest gap herbivores (south range) (September 10, 1996).
- Survey and Manage and Protection Buffer Species: The survey schedule for 32 Survey and Manage Category 2 and Protection Buffer species was changed from fiscal year 1999 to fiscal year 2000 based on the technical infeasibility of surveys and the lack of substantially increased risk to the species from changing the schedule (March 3, 1999). (USDA, USDI 1994b, Table C-3 for Category 2; USDA, USDI 1994b, pp. C-20 and C-27 for Protection Buffer Species.)

Need for Supplemental Environmental Impact Statement (SEIS)

Aside from the changes and corrections described above and the implementation difficulties with some of the standards and guidelines as described in Chapter 1 of this SEIS, new information has been gathered about some species within the past five years. This new information indicates that some species are much more numerous than anticipated when the Northwest Forest Plan was prepared, some species need more protection than originally prescribed, and some species requiring surveys prior to ground-disturbing activities cannot be reasonably detected or identified in the field or with simple laboratory or office examination.

Problems that make it appropriate to propose changes to the standards and guidelines for the Northwest Forest Plan include: overlapping and unclear direction that has resulted in higher than expected costs for surveys and projects; lack of criteria for moving species between categories or off Survey and Manage, which has made the

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Agencies reluctant to make all needed changes; land allocations that result from Protection Buffers and add unnecessary and sometimes conflicting direction to the species-specific Protection Buffers direction, and far more restrictions on other management activities because of the Survey and Manage and other related standards and guidelines than anticipated when the Northwest Forest Plan was prepared. The proposed changes to the standards and guidelines of the Northwest Forest Plan addressing the above problems are the subject of this SEIS.

Interagency Coordination and RIEC Review Requirement

The Standards and Guidelines for the Northwest Forest Plan specify that "decisions to change ...[NFP] standards and guidelines will be made only through the adoption, revision, or amendment of these documents following appropriate public participation, NEPA [National Environmental Policy Act] procedures, and coordination with the Regional Interagency Executive Committee" and "the amendments will be reviewed by the Regional Interagency Executive Committee to assure consistency with the objectives of these standards and guidelines" (USDA, USDI 1994b, p. E-18). The alternative proposed for selection for this SEIS will be submitted to the Regional Interagency Executive Committee (RIEC) for review prior to finalizing the Record of Decision for this SEIS.

Consultation

The biological opinion for the Northwest Forest Plan FSEIS on Alternative 9, as modified, concluded that adoption of the alternative would not jeopardize the continued existence of any listed species or result in destruction or adverse modification of any designated critical habitat for species and critical habitat listed at that time. Consultation at the Northwest Forest Plan level has been completed for all but one species that were subsequently listed or for which critical habitat was designated with the same conclusion. The remaining consultation is underway. The Survey and Manage Standards and Guidelines are part of this Plan and, therefore, are covered by these consultations. The Endangered Species Act requires reinitiating consultation "...if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion" (50 CFR 402.16). Chapter 3&4 describe the extent to which the proposed changes to Survey and Manage Standards and Guidelines would affect listed and proposed species. Based on the analysis in this draft, the action alternatives of this SEIS do not cause effects to listed species or critical habitat beyond that considered in the biological opinion of the Northwest Forest Plan and, therefore, reinitiation of consultation is not required. None of the species included in the Survey and Manage Standards and Guidelines in this SEIS are listed under the Endangered Species Act. The Canada lynx, which is in the standards and guidelines for Survey and Manage as well as Protection Buffers, is proposed for listing. Chapter 3&4 describes the effects of the alternatives on Canada lynx.

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Relationship of Standards and Guidelines With Other Elements of the Northwest Forest Plan

The Northwest Forest Plan is primarily a habitat-based set of standards and guidelines that amends or was included in Forest and BLM land and resource management plans to provide for Late-Successional Reserves, Managed Late-Successional Areas, Administratively Withdrawn Areas, and Riparian Reserves. The 16 percent of federally administered land in the Northwest Forest Plan area available for regularly scheduled timber harvest has additional standards and guidelines for Matrix and Adaptive Management Areas that specify retaining certain amounts of various habitat elements (including snags, down logs, and large trees)

To these land allocations, the Forest Ecosystem Management Assessment Team (FEMAT) added about 20 species-specific standards and guidelines called Protection Buffers for species they thought needed additional or more broad-scale protections. The resultant standards and guidelines were designed to provide for the habitat needs of more than 1,100 late-successional and old-growth forest-related species. Viability rating panels judged the Northwest Forest Plan would provide for a high likelihood of viable populations for more than 700 of these identified species, including all those listed under the Endangered Species Act, but they judged the remaining 400 somewhat lower. The lower ratings were primarily due to lack of information, which prevented confidently assigning higher ratings about the numbers, distribution, and habitat needs of those species.

Within this context, the Additional Species Analysis Team working with the SEIS Team provided mitigation standards and guidelines designed to improve the likelihood that the Northwest Forest Plan would provide for well-distributed populations of these additional 400 species across their historical range on federal lands. The Survey and Manage Standards and Guidelines is one of these mitigation measures. The Survey and Manage Standards and Guidelines is not, however, the primary protection that the Northwest Forest Plan provides for these species. The primary protection for late-successional and old-growth species is the system of large blocks of Late-Successional Reserves, the Riparian Reserve system, and other land allocations designed to protect such species. Over 80 percent of the federal forest in the Northwest Forest Plan area (Figures 1-1, 1-2) has been placed into one or more of these reserve land allocations.

Species whose persistence is provided for "by other elements of the Northwest Forest Plan" are not, or at least should not be, included in the Survey and Manage Standards and Guidelines (USDA, USDI 1994a, pp. 3&4-117, 3&4-123, 3&4-124). When new data indicates that the persistence of a current Survey and Manage species will likely be provided for "by other elements of the Northwest Forest Plan," the species should be removed from Survey and Manage.

The Planning Area

The planning area for this SEIS is the federally administered land within the range of the Northwest Forest Plan, which corresponds to the range of the northern spotted owl as defined in 1994 (see Figure 1). These lands are located in western Washington, western Oregon, and northwestern California.

Although all federal lands within the plan area are included in the analysis and, for example, are considered to contribute habitat for the Survey and Manage and other species in this SEIS, the management direction in this SEIS applies only to those lands

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managed by the Forest Service and Bureau of Land Management. No management direction is included here for other federal lands, state, private, or Native American-owned lands; however, impacts from expected management activities on these other lands were considered as part of the effects analysis in this SEIS, as appropriate and in accordance with requirements of the National Environmental Policy Act.

Relationship of Alternatives to Existing Management Plans of the Agencies

If one of the action alternatives is selected, the direction established by the Record of Decision for this SEIS will supersede management direction in the Northwest Forest Plan. It will also supersede the Northwest Forest Plan direction that amended, or was adopted, into all land management plans for Forest Service and BLM units within the range of the Northwest Forest Plan. The following text provides more specific information for the two agencies.

Bureau of Land Management

Adoption of one of the action alternatives would, consistent with 43 CFR 1610.5-5, amend the resource management plans for the Salem, Eugene, Roseburg, Medford, and Coos Bay districts in Oregon; the Klamath Falls Resource Area of the Lakeview District, also in Oregon; and the Arcata, Redding, and Ukiah field offices in California. The King Range National Conservation Area Management Plan in the Ukiah Field Office would also be amended. Because the action alternatives would modify only a small portion of each of these resource management plans, plan revisions would not be necessary (43 CFR 1610.5-6).

When a decision is made to prepare an environmental impact statement, the amending process follows the same procedure required for preparation and approval of the plan (43 CFR 1610), but consideration is limited to that portion of the plan being considered for amendment. The BLM resource management planning process includes nine steps. The planning steps that pertain to this supplemental environmental impact statement include issue identification, data collection, formulation of alternatives, estimation of effects, selection of the preferred alternative, and selection of the proposed plan amendment. If several plans are being amended simultaneously, a single environmental impact statement may be prepared to cover all amendments. (43 CFR 1610.5-5).

Forest Service

Adoption of one of the action alternatives would result in amendment of National Forest land and resource management plans for the Gifford Pinchot, Mt. Baker-Snoqualmie, Mt. Hood, Olympic, Rogue River, Siuslaw, Siskiyou, Six Rivers, Umpqua, and Willamette National Forests, as well as portions of the Deschutes, Okanogan, Wenatchee, Winema, Klamath, Lassen, Mendocino, Modoc, and Shasta-Trinity National Forests.

If an amendment to a Forest Plan results in "a significant change in the plan," the National Forest Management Act (NFMA) and its implementing regulations require that the amendment process follow the procedures used in the initial development of the plan. If the proposed change in the plan is not significant, public notification and completion of the NEPA procedures are still required (16 USC 1604 [f][4] and 36 CFR 219.10[f].) "Significant change in the plan" is determined by different criteria than those used in evaluating "significance" in the NEPA process.

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For the NFMA requirement, the Forest Service Manual (FSM 1922.51 and .52) and the Forest Service Handbook (FSH 1909.12, 5.32[3.]) provide specific direction, as follows:

FSM 1922.51 -- Changes to the Forest Plan that Are Not Significant. Changes to the forest plan that are not significant can result from:

1. *Actions that do not significantly alter the multiple-use goals and objectives for the long-term land and resource management;*

The actions proposed in these alternatives would not alter the objectives and the multiple-use goals of the Forest Plans as amended by the Northwest Forest Plan. In fact, the purpose of the alternatives is to facilitate the achievement of those goals and objectives.

2. *Adjustments of management area boundaries or management prescriptions resulting from further on-site analysis when the adjustments do not cause significant changes in the multiple-use goals and objectives for long-term land and resource management;*

The adjustments proposed in these alternatives are based on the information and analysis gained at a number of specific sites, and these adjustments do not cause changes in the multiple-use goals and objectives goals of the Forest Plans as amended by the Northwest Forest Plan. The action alternatives, if selected, would enable the land management agencies to better meet the long-term goals and objectives.

3. *Minor changes in standards and guidelines;*

Viewed in the context of the large scope of the Northwest Forest Plan and the Forest Plans for all resources, the changes proposed in the alternatives are minor. They are adjustments to a prescribed mitigation measure for the possible site-specific impacts of activities. Much of the intent and the specifics of that mitigation measure itself would remain unaltered by the changes proposed here. The proposed changes would affect only those areas with projects (primarily in the Matrix allocation, which is less than 17 percent of the plan area) and only in those areas with projects, which is well less than one percent of the plan area.

1. *Opportunities for additional management practices that will contribute to achievement of the management prescription.*

Some elements of some of the action alternatives are designed to more effectively achieve the intent of the mitigation measures while achieving the goals of the Plans.

FSM 1922.52 - Changes to the Forest Plan That Are Significant. The following examples are indicative of circumstances that may cause a significant change to a forest plan:

1. *Changes that would significantly alter the long-term relationship between levels of multiple-use goods and services originally projected (36 CFR 219.10(e));*

The changes proposed in the action alternatives would help achieve (and not alter) the relationship between the levels of multiple-use goods and services originally projected.

2. *Changes that may have an important effect on the entire forest plan or affect land and resources throughout a large portion of the planning area during the planning period.*

As noted above, the proposed changes in the Survey and Manage mitigation measure will apply to small segments of the planning area, and often only during the period that activities are occurring. This is a very small portion of the area managed by the Northwest Forest Plan.

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The comparison of the actions proposed in these alternatives with the criteria from the Forest Service Manual listed above shows that the alternatives will not result in "a significant change" to the Forest Land and Resource Management Plans. The proposed actions are minor changes in the standards and guidelines for one mitigation measure and they do not alter the multiple-use goals and objectives for long-term land and resource management. The proposed adjustments in the management prescriptions result from new information and on-site analysis and are made, in part, to maintain (and not to change) the multiple-use goals and objectives set forth in the Record of Decision of the Northwest Forest Plan.

The proposed changes will not result in any change to the Regional Guides for either Region 5 or 6 of the Forest Service. The management direction being proposed for change is found in the Forest Plans of the National Forests identified at the beginning of this section. Therefore, amendment is proposed for those Forest Plans, and not for the Regional Guides.

Authority to Amend or Modify this Decision

Although the Record of Decision for an alternative selected from this SEIS will be signed by the Secretaries of Agriculture and Interior, decisions concerning implementation or modification of the adopted amendments to standards and guidelines rest with the line authorities of the individual Agencies and planning regulations and processes applicable to them, as described in the Northwest Forest Plan Record of Decision (USDA, USDI 1994b, p. 58).

Description of the No-Action Alternative

The No-Action Alternative would continue current management direction as described in the background sections in Chapter 1 and earlier in this chapter. The following direction, which is a portion of the Northwest Forest Plan Standards and Guidelines, is the direction proposed for amendment by the action alternatives described in this chapter. The complete text of the standards and guidelines to be amended appears in Appendix B of this SEIS (Standards and Guidelines of the No-Action Alternative). Additional details about the background of all standards and guidelines, except for the Protection Buffer species, are in Appendix J2 of the Northwest Forest Plan FSEIS (USDA, USDI 1994a).

Survey and Manage

The Survey and Manage direction involves applying one or more of four possible categories (numbered 1-4) to each of approximately 400 species or species groups. Each category has a phase-in implementation period that varies by species. The Survey Protocols and Management Recommendations developed for these species include brief descriptions of the nature and objective of surveys, and also require coordination through the Regional Ecosystem Office. The four Survey and Manage categories are described below:

Category 1 - Manage Known Sites
This category applies to species where few sites are known. This standard and guideline applies to sites known as of the adoption of the Northwest Forest Plan, as well as newly found sites.

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Category 2 - Survey Prior to Ground-Disturbing Activities
This category applies to species for which surveys were thought to be simple, or for which there was a high concern and for which surveys prior to ground-disturbing activities were thought practical. This standard and guideline provides for development of Survey Protocols and site management standards. They also provide for implementing the surveys for six species by 1997 and the remainder by 1999. (The 1999 date for 32 of these species was changed to the year 2000 by a decision notice issued March 3, 1999. See the section entitled "Changing Standards and Guidelines - Adaptive Management" earlier in this chapter.)

Category 3 - Extensive Surveys
This category is specified primarily for species whose characteristics make site and time-specific surveys difficult. Surveys are to find high-priority sites for species management, and surveys are to be done "...according to a schedule that is most efficient." This standard and guideline recognizes, and the Northwest Forest Plan FSEIS considers, that: "[t]his strategy entails some risk because some species sites may be disturbed prior to completion of surveys." Surveys must be underway by 1996, but no final implementation date is specified.

Category 4 - General Regional Surveys
This category applies to species that are particularly poorly known. The standards and guidelines are designed to acquire additional information and to determine necessary levels of protection. The information gathered "..may be useful in refining these standards and guidelines to better provide for these species.." These surveys were to be initiated by fiscal year 1996 and completed within ten years.

Table C-3 of the Northwest Forest Plan FSEIS (provided in Appendix B of this SEIS) defines which of the above four categories of Survey and Manage (1-4) apply to which species or species groups. A species of high concern or with known sites might be assigned to Category 1 and also to Category 3, and a species of less concern might only be assigned to Category 3. Survey and Manage requires annual status reports be submitted to the Regional Ecosystem Office, and also provides for changing categories or dropping mitigation although the criteria for such changes are not indicated. No clear criteria are provided to indicate why a species belongs in a certain category, and also no specific provision exists for adding or removing a species, or for moving a species from one category to another when there is new information.

Protection Buffers

The Protection Buffer direction applies to 23 species, as discussed in Appendix B of this SEIS. Individual sites for 8 of the species become Late-Successional Reserves (LSRs); sites for 10 species become Managed Late-Successional Areas (MLSAs); and sites for 5 species add management direction within the Matrix. One MLSA species (*Buxbaumia piperi*) was removed from the Protection Buffer species list in 1996 because its inclusion was an error (see the section entitled "Background: Implementation of the Standards and Guidelines [1994-1999]" earlier in this chapter). Survey strategies and phase-in periods for implementing the four Survey and Manage categories are specified for each Protection Buffer species. Thirteen of the 23 Protection Buffer species are also included in Survey and Manage, which provides partially overlapping protection.

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Manage Recreation Areas to Minimize Disturbance to Species

This direction does not name any specific species and does not apply specific additional direction. It was included to remind federal managers that the Survey and Manage Standards and Guidelines apply to disturbances in recreation sites the same as for timber sales and other ground-disturbing activities. This measure was deemed particularly important since a disproportionately high number of "known sites" was located around developed recreation areas.

Protect Sites From Grazing

This direction applies to 10 species of mollusks and 1 vascular plant species deemed particularly sensitive to grazing. Most species included in this direction are also in the Survey and Manage Standards and Guidelines.

Provide Additional Protection for Bats

This standard and guideline applies to the Matrix and Adaptive Management Area land allocations to protect caves, mines, and abandoned wooden bridges and buildings that bats use as roost sites. Controversial portions of this standard and guideline are: the need to handle bats for species identification, and winter surveys that disturb hibernation.

Adaptive Management

The standards and guidelines state that the Agencies may, as they acquire experience, submit a proposal to the Regional Ecosystem Office to make changes to the Survey and Manage requirements. Such "...changes could include changing the schedule, moving a species from one survey strategy to another, or dropping this mitigation requirement for any species whose status is determined to be more secure than originally projected." In the absence of a described process or criteria for such changes, however, the Agencies have hesitated to use this authority for other than the few minor corrections and changes described earlier in this chapter. There is no similar process for changing or removing species for Protection Buffers, Recreation Sites, Grazing, or Bats, other than the adaptive management discussion on pages E-12 through E-15 of the Northwest Forest Plan Record of Decision, which is applicable to all standards and guidelines.

Introduction to the Action Alternatives - Background on the Origin, Theme, and Objectives of Each Alternative

The needs the Agencies are responding to, and the actions proposed in response to those needs, are described in general terms in the Needs, Purpose, and Proposed Action sections earlier in this chapter. Specific details about the design of the action alternatives, and a comparison between them, are described below. Following this section are the standards and guidelines for each of the three action alternatives. The No-Action Alternative is summarized earlier in this chapter, and the standards and guidelines for the No-Action Alternative are in Appendix B of this SEIS.

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The No-Action Alternative defines Survey and Manage categories based on the management action required. One species can be in two or three categories, and there is no information about why the species is in a certain category. Therefore, a species might be in "extensive surveys" for various and,often vastly different, reasons. For example, some species need extensive surveys to gather information to identify high-priority sites for management, while another species in the same category needs information to decide if the species even occurs in the Northwest Forest Plan area. The current direction makes it difficult to design surveys that meet management objectives for a species.

The No-Action Alternative also includes Protection Buffer and Protect From Grazing Standards and Guidelines. These measures provide similar, often overlapping and sometimes conflicting direction for some of the same or related species. There is also specific management direction for lynx, bats, and four species of cavity-dwelling birds. The action alternatives all propose changes to these provisions to permit them to better incorporate new information now and in the future.

For Survey and Manage, there are basically only three potential management actions: manage known sites, surveys prior to habitat-disturbing activities, and landscape-scale surveys. Landscape scale surveys are known as extensive and regional surveys in the No-Action Alternative, and as strategic surveys in the action alternatives. Surveys prior to habitat-disturbing activities are also known as pre-disturbance surveys. The action alternatives continue to apply these three management actions, or elements, but apply them differently or to different species to meet the objectives of the alternative.

Alternative 1

Alternative 1 was designed by managers and taxa specialists to combine Protection Buffer and Protect from Grazing Standards and Guidelines into Survey and Manage, and to redefine Survey and Manage into six categories defined by the needs and characteristics of the species, while providing approximately the level of protection intended in the Northwest Forest Plan. The six categories in Alternative 1 are split between species that are "rare," versus those that are "uncommon." Rare species are known from a few to moderate number of sites; the known distribution, characteristics, habitat, and other factors indicate that all sites for these species should be managed for species viability, at least until more is known about the species. Uncommon species, on the other hand, are relatively more abundant, and although there is still a concern for persistence, not all known sites are needed. A Management Recommendation may be written to define the high-priority sites that must be managed for species persistence.

Alternative 1 categories are also defined by whether or not characteristics of the species make location of the species likely during pre-disturbance, site-specific surveys. If a species is large enough and blooms regularly enough to be routinely visible at predictable times, proposed activity areas can be field-surveyed with a relatively high confidence that the species will be detected if it exists in the area. If characteristics of the species makes locating them during pre-disturbance surveys less likely, the species are assigned to a different category placing more emphasis on landscape-scale surveys. In such cases, landscape scale surveys are a more effective and efficient way of locating habitats and determining the best species management strategy. A further division of categories occurs when so little is known about a species that there is uncertainty as to whether it exists in the Northwest Forest Plan area, is closely associated with late-successional forests, or the category to which it should be assigned cannot be determined. Such cases with only a handful of sites are considered "rare," while others are considered "uncommon."

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The arrangement of the six categories of Alternative 1 is shown below, along with the management elements applicable to each category and the number of species assigned to each. A species can only be assigned to one category. The assignments are the result of a detailed, three-step review of existing and new information by taxa specialists as described in Appendix F of this SEIS (Species Review Process). The species review process also found that 64 species no longer need to be included in the Survey and Manage Standards and Guidelines because they are sufficiently protected by other elements of the Northwest Forest Plan, are not closely associated with late-successional forests, or are not found within the range of the Northwest Forest Plan. The categories to which each species was assigned are shown on Table 2-2 at the end of this chapter. Changes in level of management from the No-Action Alternative, including listing of species being removed from Survey and Manage, and the disposition of Protection Buffer and Protect from Grazing species, are shown on Tables 2-4 through 2-10 at the end of Chapter 2.

Alternative 1 - Redefine Categories Based on Species Characteristics

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 1A** - 49 species •Manage All Known Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 1B** - 197 species •Manage All Known Sites •N/A •Strategic Surveys (5 yrs.)	**Category 1E** - 44 species •Manage All Known Sites •N/A •Strategic Surveys
Uncommon	**Category 1C** - 11 species •Manage High-Priority Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 1D** - 17 species •Manage High-Priority Sites •N/A •Strategic Surveys	**Category 1F** - 25 species •N/A •N/A •Strategic Surveys

Compilation of 1999 field survey data is expected to be completed during the public comment period for this Draft SEIS. The Species Review Process Team will meet to determine if new data suggests the need to change any species category assignments. Any changes will follow the same process, using criteria described in the Adaptive Management section in each of the action alternatives, and be reflected in a revised Table 2-2 in the Final SEIS.

The three elements of management direction in the No-Action Alternative (with extensive and regional surveys combined into one) are applied to each category, depending on the needs of the species in that category. The arrangement of species in the categories of Alternative 1, however, clarifies details and objectives for each of the three management elements. Management of known sites, for example, can be plainly separated into manage all known sites or manage high-priority sites, depending on the relative rarity of the species. The objectives of strategic surveys in Category 1B, for another example, are substantially different from the objectives of such surveys in Category 1F. The specific requirements of each element are described in detail in the description and in the standards and guidelines of each alternative.

Alternative 1 provides for periodic review of information about each species. Alternative 1 also provides for moving a species from one category to another based on criteria for each category. There is also provision for adding or removing species from Survey and Manage based on meeting the basic criteria.

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The Purpose and Need for the proposed action is narrow, and the information known about these species is, by definition, limited. Therefore, the two other action alternatives described in this SEIS also build on the species classifications of Alternative 1, using the subdivisions of relative rarity, survey practicality, and known information.

Alternative 2

Alternative 2 is identical to Alternative 1 for the "rare" species, because so few sites exist for these species that the loss of undiscovered sites might be detrimental to species persistence. However, Alternative 2 assumes that the 53 "uncommon" species are the most likely species to be removed from Survey and Manage Standards and Guidelines in the near future, and seeks to expedite that process. More than 75 percent of the currently known sites for the 343 Survey and Manage species are for these 53 uncommon species.

For Alternative 2, management of known sites is fixed at September 30, 1999 levels (affecting 28 species including 4 species of vertebrates), and pre-disturbances surveys are dropped (affecting 11 species including 3 vertebrates). Strategic surveys, however, must be completed within 5 years for the 53 species. At the end of 5 years, this category is dropped from Survey and Manage, and information from the strategic surveys is used to decide whether species are adequately provided for by other existing standards and guidelines including the Northwest Forest Plan system of reserves, or whether the species should be assigned to the Agencies special status species programs or considered for listing under the Endangered Species Act. In their special status species programs, the Forest Service and BLM have broad latitude to write appropriate conservation direction up to, and including, requiring surveys prior to habitat-disturbing activities and managing known sites as needed for conservation of the species. The categories of Alternative 2 and the management elements applicable to each category are summarized as shown below.

Alternative 2 - Remove or Reassign Uncommon Species Within 5 Years

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 2A** - 49 species •Manage All Known Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 2B** - 197 species •Manage All Known Sites •N/A •Strategic Surveys (5 yrs.)	**Category 2C** - 44 species •Manage All Known Sites •N/A •Strategic Surveys
Uncommon	**Category 2D** - 53 species •Manage All Sites Known as of 9/30/99----------> •No Pre-Disturbance Surveys ----------> •Strategic Surveys Completed in 5 years ---------->		

The classification of species by relative rarity and survey practicality used in Alternative 2 is the same as Alternative 1, so the alternatives are directly comparable. The 53 uncommon species in Category 2D are the same as those in Categories 1C, 1D, and 1F in Alternative 1.

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Alternative 3

Alternative 3 also builds on the categories of Alternative 1, but adds additional protection for species. One added measure is that occupied sites for rare species are assured microclimate protection by specifying a 250-meter buffer (minimum 48.5 acres.) For species for which pre-disturbance surveys are not considered practical, Alternative 3 requires an equivalent-effort survey. Finally, manage known site protection is extended to the "uncommon status, unknown species," (Category 3C). These management elements, and the categories to which they apply, are summarized below.

Alternative 3 - Add Equivalent-Effort Surveys and 250-Meter Rare Site Buffers

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 3A** - 290 species •Manage All Known Sites with 250-Meter Buffers---------->** •Pre-Disturbance Surveys ------> Equivalent-Effort Surveys---------->** •Strategic Surveys---------->**		
Uncommon	**Category 3B** - 28 species •Manage High-Priority Sites---------->** •Pre-Disturbance Surveys---> Equivalent-Effort Surveys-->** •Strategic Surveys---------->**		**Category 3C** - 25 species •Manage all Known Sites •N/A •Strategic Surveys

Table 2-3. Number of Species in Each Management Direction Element by Alternative.

Management Direction	Alternative			
	No-Action	Alternative 1	Alternative 2	Alternative 3
Manage Known Sites	265	318	290[1]	343
Pre-Disturbance Surveys	85	60	49	318[2]
Strategic Surveys	332[3]	343	343[4]	343
Remove From Survey and Manage	--	64 (and 7 in part of their range)	64 (and 7 in part of their range)	64 (and 7 in part of their range)

[1] Locks known sites at 9/30/99 level for additional 53 species.
[2] Includes "equivalent-effort" surveys, which are similar in conduct.
[3] Extensive and regional surveys combined in No-Action Alternative.
[4] Includes 53 species that must be done in 5 years.

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Similarities in the Three Action Alternatives

As described above, the three action alternatives presented in this chapter (Alternatives 1, 2, and 3) are alike in several ways. These alternatives would:

- Redefine Survey and Manage categories based on relative rarity, survey practicality, and level of knowledge about the species. The new categories clarify species objectives and application of management direction.
- Combine standards and guidelines for Survey and Manage and Protect from Grazing, as well as most Protection Buffer species, into a single more comprehensive Survey and Manage section.
- Retain the following Survey and Manage elements from the Northwest Forest Plan: Manage Known Sites, Survey Prior to Implementation of Habitat-Disturbing Activities, and Landscape-Scale Surveys.
- Improve management efficiency while continuing to meet the underlying needs of the Northwest Forest Plan.
- Clarify objectives of the Survey and Manage categories.
- Include an adaptive management section explaining how new information is evaluated and also how to move species from one category to another category and how to remove species from Survey and Manage.
- Include a process for adding species to Survey and Manage if they meet its basic criteria.
- Move the remaining standards and guidelines for Protection Buffers and Additional Protection for Bats to "Standards and Guidelines Common to All Land Allocations." The standards and guidelines for these species are amended to provide overall objectives, and the existing management details become interim Management Recommendations.

Differences in the Three Action Alternatives

The three action alternatives vary in their number of Survey and Manage categories, the application of the three elements of management direction in each of these categories (manage known sites, pre-disturbance surveys, and strategic surveys), and in the timing and application details for some of the management elements. These factors affect implementation efficiency, the manner and relative level in which a species is protected, and the effectiveness of the alternatives in meeting the Purpose and Need.

Provisions Common to Alternatives 1, 2, and 3

Existing Standards and Guidelines Are Amended: The standards and guidelines in the Northwest Forest Plan Record of Decision (USDA, USDI 1994b) for Survey and Manage; most Protection Buffers; Protect Sites From Grazing; and Manage Recreation Areas to Minimize Disturbance to Species (displayed in Appendix B of this SEIS) would be removed in their entirety and replaced as described below for Alternatives 1, 2, or 3. The standards and guidelines for Provide Additional Protection for Caves, Mines, and Abandoned Wooden Bridges and Buildings That Are Used as Roost Sites for Bats; and for some Protection Buffers (also displayed in Appendix B) would be amended and made applicable to all land allocations as described in the alternative descriptions.

Species Removed From Survey and Manage and Related Standards and Guidelines: Species shown as "Off" in all or part of their ranges under Alternatives 1, 2, and 3 on Table 2-2 (and also listed separately on Tables 2-4 and 2-5) would be removed from Survey and Manage and/or Protection Buffer management, and current "known sites" of these species would be released for other resource activities. Reasons for removing species

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are: recorded numbers of a species indicate its persistence is no longer of concern; many sites of some species are protected by reserves or other Northwest Forest Plan standards and guidelines; or a species was determined not to be closely associated with late-successional or old-growth forests or not found within the Northwest Forest Plan area (see Tables 2-4 and 2-5 for species-specific discussions). Species that would be removed only because they are not closely associated with late-successional or old-growth forests would be considered for the special status species programs of the Agencies.

Arthropods: In the No-Action Alternative, arthropods are included only as four functional groups. The action alternatives continue this grouping. For arthropods, references in these alternatives to species or taxa apply only to these four functional groups, and no individual species will be added to Survey and Manage. Agency special status species programs and the Endangered Species Act are available should a species be of concern.

Annual Status Reports

Interagency, annual status reports will be prepared that will include, at a minimum, results of adaptive management changes, status of Management Recommendations and Survey Protocols, a summary of the Strategic Survey Plan (including the status of strategic surveys), and significant new management direction.

Monitoring

The Survey and Manage Standards and Guidelines will continue to be monitored under existing monitoring plans. These plans include monitoring outlined in the Northwest Forest Plan Record of Decision and existing monitoring plans of the Agencies. The Regional Ecosystem Office will continue to coordinate regional monitoring for implementation and effectiveness.

Three Basic Criteria for Survey and Manage

- The species must occur within the Northwest Forest Plan area, or occur close to the NFP area and have potentially suitable habitat within the NFP area.
- The species must meet the criteria for being closely associated with late-successional or old-growth forest (see Appendix E).
- The reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence.

Survey and Manage Basic Criteria

The action alternatives clearly specify the Survey and Manage basic criteria (see below), all three of which must be met for a species to be included in the Survey and Manage Standards and Guidelines.

Only published taxonomic entities meeting the three basic criteria can be added to Survey and Manage. Species no longer meeting these criteria will be removed from Survey and Manage. The process for adding or removing a species is described in the Adaptive Management section for each alternative. The following section describes "persistence" and the criteria used to determine when there is concern for persistence. The criteria defining "reasonable assurance" of persistence, and likewise identifying which species may be added or removed from Survey and Manage, are different in Alternative 2 than in Alternatives 1 and 3.

Persistence

The Northwest Forest Plan was designed to provide for habitat to support species closely associated with late-successional and old-growth forests on federal lands, well distributed throughout their historic range, for at least 100 years (USDA, USDI 1994a, p. 3&4-116). This overall objective is summarized simply as "persistence" within

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this SEIS. Maintaining persistence for a species, therefore, means to provide habitat within the area of the Northwest Forest Plan that will support a species well distributed across its historic range on federal lands for at least 100 years. Persistence is always uncertain, however, and the best a plan can do is to provide reasonable assurance of persistence, making all practicable effort and assessing the resources to which the plan applies. As described in Appendix J2 (p. 2-6) of the Northwest Forest Plan FSEIS (USDA, USDI 1994a), Survey and Manage was a mitigation designed to increase the likelihood that the Northwest Forest Plan will provide for persistence. Estimating the likelihood of the Plan to provide for persistence of a particular species is largely a task for people who have expert knowledge about species and taxa. Among the factors considered in determining persistence are range, distribution, number, and abundance of individual populations (see adaptive management standards and guidelines under each alternative).

In general, all three action alternatives in this SEIS have measures designed to help the Northwest Forest Plan provide for the persistence of late-successional and old-growth forest related species. However, the alternatives have different ways of providing for persistence and, therefore, different levels of certainty or risk to persistence. Like the mitigation measures in the Northwest Forest Plan, these alternatives do not provide every species with a defined minimum level of assurance of persistence, partly because doing so would incur undue impacts to other objectives of the Plan. The standards and guidelines proposed in the action alternatives are designed to achieve a reasonable assurance of persistence, adequate to provide for the viability of late-successional and old-growth associated vertebrate species, and non-vertebrates to the extent practicable, as stated in the Purpose for this SEIS.

Chapter 3&4 of this SEIS provides information about the effects to species expected under each alternative. It will be the responsibility of the decision-maker to use this information to determine if laws, regulations including those requiring viability, and the Purpose and Need for the proposed action are met. The discussions of effects to species in Chapter 3&4 provide the decision-maker with the information needed to determine compliance with the National Forest Management Act resource regulation for fish and wildlife (viability.)

Concern for Persistence

The Survey and Manage basic criteria and other standards and guidelines in the alternatives refer in various ways to “persistence” in objectives and criteria statements used to place species under the various categories. This is because multiple factors are used in judging concern for persistence, reasonable assurance of persistence, and risk. In few cases will a single factor determine concern for persistence. Because the combination and number of factors used in judging concern vary by species, there is no clear formula for reaching a conclusion. Therefore, professional judgement is required to weigh the various factors. For conclusions to be approximately repeatable, however, it is important to provide assumptions, criteria, and logic to serve as a basis for the professional judgement.

Concern for persistence is key to understanding Survey and Manage objectives. When the reserve system and other standards and guidelines of the Northwest Forest Plan do not appear to provide a reasonable assurance of persistence (which is one of the Survey and Manage basic criteria), *there is a concern for persistence*. When there is reasonable assurance that other elements (other than Survey and Manage) of the Northwest Forest Plan provide for persistence, *there is little or no concern for persistence*, and the species should be removed from Survey and Manage.

One or more of the following criteria may indicate a concern for species persistence. These factors must be considered, aside from Survey and Manage, in the context of

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other standards and guidelines of the Northwest Forest Plan, and must apply within the Northwest Forest Plan area.

- Low-to-moderate number of likely extant known sites/records in all or part of a species range.
- Low-to-moderate number of individuals.
- Low-to-moderate number of individuals at most sites or in most populations.
- Very-limited to somewhat-limited range.
- Very-limited to somewhat-limited habitat.
- Distribution within habitat is spotty or unpredictable in at least part of its range.

Note: The criteria for adding *new* species in Alternative 2 are different. See the adaptive management section for that alternative.

Factors indicating there is little or no concern for persistence are listed below. Usually, most of these factors need to be true to indicate that a concern for persistence does not exist. These factors must apply within the Northwest Forest Plan area.

- Moderate-to-large number of likely extant sites/records.
- High proportion of sites and habitat in reserve land-use allocations.
- Sites are well distributed within the species range.
- Matrix prescriptions or other elements of the Northwest Forest Plan provide for species persistence.
- Limited number of sites within reserves, but the proportion or amount of potential habitat within reserves is high and there is a high probability that the habitat is occupied.

Concern for persistence is based on current knowledge and, therefore, is transitory. While concern will remain for some species that are truly rare, concern for many species will be alleviated as more information is gathered through pre-disturbance surveys and strategic surveys. A species that no longer has concern for persistence will be removed from Survey and Manage as described in the adaptive management section for each alternative.

Relative Rarity

The three action alternatives subdivide species having concern for persistence by their relative rarity, as either "rare" or "uncommon." The relative rarity subdivision is based on such factors as numbers of populations, distribution, commonality of habitat, population trends, numbers of individuals, and so forth. Placement of species in management categories depends largely on their relative rarity as described below. Management directions for "rare" and "uncommon" species are not the same, because they have different levels of risk to persistence. Like concern for persistence, this subdivision is based on current knowledge and, therefore, is transitory.

A determination that a species is "rare" is based on a combination of information, as described in the criteria for each category. A species may be "rare" if it has: limited distribution; a low number of sites or individuals per site; highly specialized habitat requirements; declining habitat or population trends; reproductive characteristics that limit population growth rates; restricted distribution pattern relative to range or potential habitat; and/or narrow ecological amplitude.

A determination that a species is "uncommon" is based on information that indicates a species may have: more widespread distribution; higher number of sites; low-to-high number of individuals per site; more stable populations or habitats; less restricted distribution pattern relative to range or potential habitat; and moderate-to-broad ecological amplitude (see criteria under each category).

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Management Recommendations

Each alternative requires management of some or all known sites for some species. Management Recommendations are documents that address how to manage known sites and that provide guidance to Agency efforts in conserving Survey and Manage species. The document describes the habitat parameters that will provide for persistence of the taxon at that site. Until Management Recommendations are written, known sites will be managed to maintain persistence of the taxon at that site. The interim management will apply information in Appendix J2 of the Northwest Forest Plan FSEIS (USDA, USDI 1994a) and from appropriate literature, and will also rely on professional judgement. Each alternative allows exceptions to managing sites where professional judgement, coupled with locally specific information and advice from taxa specialists about the species, identifies occasional sites not needed for persistence. Proposed exceptions are subject to review by the Regional Ecosystem Office. The Regional Ecosystem Office may develop criteria that would exempt some exceptions from review.

Management Recommendations for uncommon species may also identify high-priority sites that must be managed to provide for persistence of the taxon (or the procedures for designating such sites locally), as well as sites that no longer need to be managed for the benefit of those species. Management Recommendations may also identify areas where it is no longer necessary to continue surveys prior to implementing habitat-disturbing activities or strategic surveys for the taxon. The documents may also provide information on natural history, current species status, species distribution, management goals and objectives, specific management actions or recommendations, and needs for information and research—particularly to the extent such information supports identification of high-priority sites or survey priorities. As more information becomes available, Management Recommendations are expected to be updated to either reduce or expand survey requirements or site management. Management Recommendations written prior to the Record of Decision for this SEIS may continue to be used, unless superseded by later versions.

Management Recommendations for "rare" species do not identify "high-priority" sites, because generally all sites are considered to be needed for a reasonable assurance of persistence. In cases where a proposed Management Recommendation has information indicating that some sites are not needed for persistence and management of "high-priority" sites is appropriate, the species should be moved to a category of "uncommon" species concurrent with approval of the Management Recommendation. This does not apply to the occasional exceptions, as provided in the standards and guidelines for each category.

Strategic Surveys

Strategic surveys are landscape-scale surveys designed to address specific questions for Survey and Manage species that relate to specific objectives for each category, and that address the need to manage to provide for a reasonable assurance of species persistence. Acquiring information from strategic surveys will help address fundamental questions of Survey and Manage species: Is there a concern for persistence? Is the species rare or uncommon? What is the appropriate management for the species? Do the reserve land allocations and other standards and guidelines of the Northwest Forest Plan provide a reasonable assurance of species persistence?

Strategic surveys can also help narrow habitat descriptions and define geographic range for future surveys. Strategic surveys could also provide important information on population status, life history, and habitat use to improve site management and

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selection of high-priority sites for management. The surveys could be accomplished through various approaches (such as acquiring information from field surveys, herbaria, museums, literature, field units and other sources; and using various analytical tools such as building and validating habitat models).

Because specific objectives of strategic surveys may vary by category, the specific information gathered may differ by species. Strategic surveys are completed when any of the following apply:

- The objectives of the surveys (such as specific information needs) have been accomplished, and further surveys are not likely to contribute significant information regarding persistence of the species.
- Adequate sites or habitats for the species have been located and are appropriately managed to provide reasonable assurance of persistence for the species.
- All known potential habitat of the species has been surveyed, and there is little likelihood that additional undiscovered sites of the species will be located by further surveying.

Strategic Survey Plan

A Strategic Survey Plan is developed at the range-wide or regional scale, with the intent to address how the Agencies will accomplish the strategic surveys required by the selected alternative. This document would identify survey needs (from both biological and managerial approaches) and prioritize survey efforts. The Strategic Survey Plan may focus on the needs of either the individual species, or the broader taxa groups. In the latter case, the Management Recommendation should focus on the species level. Protocols developed to guide implementation of strategic surveys will be part of the Strategic Survey Plan or tiered to it.

Surveys Prior to Habitat-Disturbing Activities

Description: In each alternative, some categories of species require that surveys of proposed project units or stands be conducted prior to implementing habitat-disturbing activities. These are "clearance" surveys that focus on the project unit using transects, involve complete area searches, or focus on priority habitats or habitat features, according to the Survey Protocol for each species. In most cases, these surveys are referred to simply as *surveys prior to habitat-disturbing activities*, or *pre-disturbance surveys*, and are specified only for species whose physiological characteristics make them likely to be located with a practical effort. For other species (those that have characteristics of such an extremely small size or that have irregular blooming cycle, both of which make identification during surveys less likely), Alternative 3 prescribes "*equivalent-effort*" surveys. The distinction between these surveys is described in more detail below.

Habitat-Disturbing Activities

Habitat-disturbing activities are disturbances likely to have a significant negative impact on the species habitat, its life cycle, microclimate, or life support requirements. The evaluation of the scope and intensity of the anticipated negative impact of the project on habitat or life requirements should include an assessment of the type, timing, and intensity of the disturbing activity. "Habitat-disturbing" is not necessarily the same as "ground-disturbing;" helicopter logging or logging over snow-pack, for example, may not disturb the ground but might clearly affect microclimate or life cycle habitat factors. Conversely, an activity having soil-disturbing effects might not have a large enough scope to trigger a need to survey. Such a case would be the installation of a sign post within a campground. Routine maintenance of existing structures and improvements is

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not considered a habitat-disturbing activity. Examples of routine maintenance may include pulling ditches, clearing encroaching vegetation, and falling hazard trees.

The responsible official should seek specialists' recommendations to help determine the need for a survey based on site-specific information. In making such determination, the line officer should consider the probability of the species being present on the project site, as well as the probability that the project would cause a significant negative effect on the species habitat.

Determining When Surveys Are Required

The intent of *surveys prior to habitat-disturbing activities* is to have information about these species for use in project analysis, formulation of alternatives, evaluation of effects, and decision making. Therefore, this information is needed before a NEPA decision document is signed for the project. *For the purpose of applying the Survey and Manage Standards and Guidelines, the date of the decision document for a project or activity will be considered as the date that projects are implemented*.

Determining Practicality of Surveys Prior to Habitat-Disturbing Activities

Information gathered through surveys is intended to reduce the risk to persistence resulting from incomplete knowledge. Examples of incomplete knowledge may include whether a species is present on a project area prior to implementing habitat-disturbing activities, or broader questions about species such as their habitat requirements, abundance, and distribution. The survey levels identified for the various categories, while not eliminating uncertainty or incomplete information, are designed to provide information to assess reasonably foreseeable effects related to persistence and to allow sufficient protection for persistence.

Surveys prior to implementing habitat-disturbing activities are considered "practical" if a reasonable effort is likely to determine the presence of a species on a specific area. The alternatives specify such surveys only where that standard can be met. This definition of practical is intended to be the same as that described in the Northwest Forest Plan Record of Decision as being not "difficult" (Appendix J2 in USDA, USDI 1994a; USDA, USDI 1994b, pp. C-5 and C-6).

Surveys prior to implementation of habitat-disturbing activities are not considered "practical" if any of the following factors apply:

- The species does not, annually or predictably, produce identifying structures.
- The species is so minuscule or cryptic as to be barely visible.
- Critical identification characteristics of the species are visible during only a short or unpredictable time period.
- The species cannot be readily distinguished in the field and needs more than simple laboratory or office examination to confirm its identification.
- Surveys require unacceptable risks to human safety or to the species itself.
- Surveys cannot be completed in two field seasons (approximately 7-18 months).
- Credible survey methods for the species are not known or cannot be developed within a reasonable time period (approximately one year).

Practicality of surveys, therefore, relates to the ability to confidently answer questions incident to incomplete information through surveys, while avoiding unreasonable costs or spending unreasonable time.

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Equivalent-Effort Surveys

Like Alternatives 1 and 2, Alternative 3 requires surveys prior to habitat-disturbing activities for many species for which such surveys are "practical" as described above. Alternative 3 also requires "equivalent-effort" surveys for many species whose characteristics make detection during such surveys less likely and, therefore, do not qualify as "practical." Equivalent-effort surveys are conducted similar to practical surveys (prior to implementing habitat-disturbing activities and to the same intensity and effort—usually one field season and no more than two) during the seasons of the year when the likelihood of detecting the species is highest. Because species characteristics make detection more difficult, however, equivalent-effort surveys are only designed to locate the species if it occurs in an identifiable condition during a reasonable survey time period (no more than two field seasons). The survey is an "equivalent effort" to practical surveys, with adjustments made to work around one or more of the factors described above that make determining presence of the species unlikely.

There are only two differences between equivalent-effort surveys and practical surveys. One difference is that equivalent-effort surveys may need to accommodate one or more of the practicality factors listed above. The other difference is that equivalent-effort surveys do not meet the standard of "likely to determine the presence" of a species because the characteristics of these species make finding sites less certain.

Survey Protocols

Survey Protocols for surveys conducted prior to implementing habitat-disturbing activities will include instructions for locating the species. The instructions would include such information as: likely habitat where the species is of concern, geographical area and substrate where the species is typically located, and timing of surveys to best locate the species, as well as appropriate search and sampling techniques, and detailed guidance for identifying the species. Protocols may also identify habitat conditions where surveys are *not* needed for a reasonable assurance of persistence. Supplemental information may include field identification guides and techniques for simple laboratory examination.

The new versions of protocols will apply to future projects requiring surveys. The Record of Decision for this SEIS will not invalidate existing Survey Protocols or previous surveys, and the Agencies may continue to use these Survey Protocols in conducting pre-disturbance surveys until they are revised. If the Record of Decision does not result in a change in status for a species that required pre-ground disturbing surveys under the No-Action Alternative, the requirement for pre-ground disturbing surveys for these species will be immediately effective for all new activities.

Protocols will be prepared for species newly assigned to a category requiring surveys prior to habitat-disturbing activities, whether the category assignment is through the selected alternative in this SEIS or a future decision to move a species into such a category. The protocols will be prepared by the end of the fiscal year following the fiscal year the species was added. The implementation date for activities will depend on the number of years a survey is required. If a protocol requires one year of surveys, activities may be implemented for one additional fiscal year before pre-disturbance surveys are required. If a protocol requires two years of surveys, activities may be implemented for two additional fiscal years before pre-disturbance surveys are required. For example, if a species is added to this category on January 1, 2001, the protocol will be prepared no later than September 30, 2002, and (assuming a one-year protocol) the protocol will apply to activities implemented after September 30, 2003.

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Preparation of a protocol earlier than the due date does not change the implementation date. If protocols are prepared earlier than required, agencies will have more lead time for surveys and related project planning.

Documents Subject to Review by the Regional Ecosystem Office

Three documents are referenced in these standards and guidelines for the three action alternatives: Management Recommendations, Survey Protocols, and Strategic Survey Plan. Each document plays an important role in accomplishing Survey and Manage objectives. The documents are the responsibility of management working closely with taxa experts; they are developed by taxa experts and land managers (at any administrative level) for use at field offices of the BLM and Forest Service. The documents are subject to review by the Regional Ecosystem Office to ensure they identify and integrate the habitat or life-history factors key to managing the species to the level of protection intended in the standards and guidelines. The Regional Ecosystem Office may develop criteria to exempt certain documents from review. Revisions to these documents follow the same process.

Alternative 1 - the Preferred Alternative

Introduction

Alternative 1 is designed to provide approximately the same level of protection as the Northwest Forest Plan. Survey and Manage species are grouped into six categories (1A-1F) based on level of relative rarity, ability to reasonably and consistently locate sites during surveys prior to implementing habitat-disturbing activities, and the level of information known about the species or group of species, as shown below.

Alternative 1 - Redefine Categories Based on Species Characteristics

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 1A** - 49 species •Manage All Known Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 1B** - 197 species •Manage All Known Sites •N/A •Strategic Surveys (5 yrs.)	**Category 1E** - 44 species •Manage All Known Sites •N/A •Strategic Surveys
Uncommon	**Category 1C** - 11 species •Manage High-Priority Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 1D** - 17 species •Manage High-Priority Sites •N/A •Strategic Surveys	**Category 1F** - 25 species •N/A •N/A •Strategic Surveys

The six categories make it easier to clarify species objectives and apply specific management direction, compared to the No-Action Alternative, partly because Alternative 1 assigns each species to only one category. The standards and guidelines of Alternative 1 describe the objective, assignment criteria, and management direction for each category.

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Like Alternatives 2 and 3, this alternative combines most standards and guidelines for Protection Buffer and all of those for Protect Sites From Grazing into Survey and Manage, and edits and moves the remaining standards and guidelines for Protection Buffers, as well as those for Additional Protection for Bats, to "Standards and Guidelines Common to All Land Allocations." Species in Protection Buffers and Protect Sites From Grazing proposed for placement in Survey and Manage are included on Table 2-2 (Species to be Protected Through Survey and Manage for All Alternatives) located at the end of this chapter. Alternative 1 proposes removing 64 species from Survey and Manage and related standards and guidelines (see Table 2-4), and removing 7 species for part of their range (see Table 2-5). The reason for proposing these species removals is that new information or reexamination of existing information indicates the species do not meet the Survey and Manage basic criteria. Changes in the level of management between Alternative 1 and No-Action are listed, by species, in Tables 2-8 and 2-9, and summarized by taxa group on Table 2-10.

Similar to Alternatives 2 and 3, Alternative 1 includes an adaptive management section defining how—when there is new information in the future—to change species among the six categories and how to add or remove species from Survey and Manage.

The section in this chapter entitled "Provisions Common to Alternatives 1, 2 and 3" is incorporated as part of the standards and guidelines for Alternative 1.

Survey and Manage

These standards and guidelines apply within all land allocations; however, the Survey and Manage provision for each species will be directed to the range (or portion of range) of that species and to the particular habitats where concerns exist for its persistence. The Survey and Manage Standards and Guidelines will benefit species closely associated with late-successional and old-growth forests including certain amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropod groups. Information about these species acquired through implementing this standard and guideline should facilitate project planning, adaptive-management changes, and adjustments to these provisions.

Table 2-2 (Species to be Protected Through Survey and Manage), located at the end of this chapter, shows which species are addressed in the Survey and Manage provision and the assignment of these species into the six categories (1A, 1B, 1C, 1D, 1E, and 1F, described below).

Description of Categories

The following text describes the six categories (1A-1F) in Alternative 1. In text discussions these alternatives are referenced as 1A, 1B, etc., to link the category to Alternative 1. The category discussions include additional information that clarifies the linkage between objectives and management actions of each category and describes the criteria for assigning species to the various categories. A taxon, or range-defined portion of a taxon, can be assigned to only one category.

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Category 1A (Rare; Pre-Disturbance Surveys Practical)

Objective: Manage all known sites and minimize inadvertent loss of undiscovered sites.

Criteria for assigning a species to Category 1A are:

- The species is rare and all known sites or population areas are likely to be necessary to provide reasonable assurance of species persistence, as indicated by one or more of the following:
  - Low number of likely extant sites/records on federal lands indicates rarity.
  - Species not well distributed within its range or habitat.
  - Limited number of individuals per site.
  - Highly specialized habitat requirements (narrow ecological amplitude).
  - Dispersal capability limited relative to federal habitat.
  - Microsite habitat limited.
  - Reproduction or survival not sufficient.
  - Low number of sites in reserves or low likelihood of sites or habitat in reserves.
  - Habitat fragmentation that causes genetic isolation.
  - Factors beyond management under the Northwest Forest Plan affect persistence, but special management under the NFP will help persistence.
  - Declining habitat trend.
- Pre-disturbance surveys are practical.

Management Direction:

Manage All Known Sites. Current and future known sites will be managed according to Management Recommendations. The size of the area to be managed depends on the habitat and requirements for the species. Management may range from maintaining one or more habitat components (such as down logs or canopy cover) to complete exclusion from disturbance for many acres, and may allow loss of some individuals, areas, or elements not affecting continued site occupancy. All known sites will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the Regional Ecosystem Office.

Professional judgement, Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations. (See glossary for definition of "known site.") One fungus species (*Bridgeoporous nobilissimus*) has few known sites; management areas of all useable habitat up to 600 acres are to be established around the known sites of this species to protect those populations until the sites can be thoroughly surveyed and site-specific measures prescribed.

Survey Prior to Habitat-Disturbing Activities. Surveys will be conducted at the project level prior to implementing habitat-disturbing activities, and in accordance with Management Recommendations or Survey Protocols, so as to avoid loss of undiscovered sites by habitat-disturbing activities. Species sites found as a result of these surveys will be managed as known sites. These surveys are designed so that a reasonable effort is likely to determine the presence of a species on a specific area. Such surveys are specified when losing undiscovered sites of a species could increase the risk to persistence.

Strategic Surveys. The objective of strategic surveys in this category is to narrow habitat descriptions or to define geographic range for future surveys. Strategic surveys could find additional new sites and also provide important information on population status, life history, and habitat use to improve site management. Species sites found as a result of these strategic surveys will be managed as known sites.

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Strategic Surveys may address one or more of the following:

- Are known sites still extant?
- What is the habitat of the species?
- Identify high-probability habitat for survey to find new sites.
- Where else does the species occur? Find new sites.
- Collect habitat information to assist with managing the species.
- What is the status of the population (such as number of individuals, size)?
- What is the distribution of the species relative to the land-use allocations established in the Northwest Forest Plan?

Category 1B (Rare; Pre-Disturbance Surveys Not Practical)

Objective: Manage all known sites and minimize inadvertent loss of undiscovered sites.

Criteria for assigning a species to Category 1B:

- Same as Category 1A, except that pre-disturbance surveys are not practical.

Management Direction:

Manage All Known Sites. Current and future known sites will be managed according to Management Recommendations. The size of the area to be managed depends on the habitat and requirements for the species. Management may range from maintaining one or more habitat components (such as down logs or canopy cover), to complete exclusion from disturbance for many acres, and may allow loss of some individuals, areas, or elements not affecting continued site occupancy. All known sites will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the Regional Ecosystem Office. Professional judgement, Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations.

Strategic Surveys. The objective of strategic surveys in this category is to find additional new sites and to characterize the habitat, which will improve the ability of the Agencies to know where to survey and how to manage the species. To minimize inadvertent loss of undiscovered sites, the areas with highest risk to loss of potential habitat are given highest priority. For this reason, do not implement habitat-disturbing activities in old growth (as defined in the glossary) in fiscal year 2006 (fiscal year 2011 for fungi) and beyond, unless strategic surveys have been completed according to the protocol in the Strategic Survey Plan for the general geographic area that encompasses the project area. Do not adjust the sampling intensity, repetitions, or design to include specific stands or proposed activity units because of this requirement.

Information from past and ongoing survey efforts will be incorporated. Species sites found as a result of strategic surveys will be managed as known sites.

Strategic Surveys may address one or more of the following:

- Are known sites still extant?
- What is the habitat of the species?
- Identify high-probability habitat for surveys to find new sites.
- Where else does the species occur? Survey high-probability habitat at highest risk to find new sites.
- What is the distribution of the species relative to the land-use allocations established in the Northwest Forest Plan?
- Collect habitat information to assist with managing the species.
- What is the status of the population (such as number of individuals, size)?

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Category 1C (Uncommon; Pre-Disturbance Surveys Practical)

Objective: Identify and manage high-priority sites to provide for reasonable assurance of species persistence. Until high-priority sites can be determined, manage all known sites.

Criteria for assigning a species to Category 1C are:

- The species is uncommon, and not all known sites or population areas are likely to be necessary for reasonable assurance of persistence, as indicated by one or more of the following:
  — A higher number of likely extant sites/records does not indicate rarity of the species.
  — Low-to-high number of individuals per site.
  — Less restricted distribution pattern relative to range or potential habitat.
  — Moderate-to-broad ecological amplitude.
  — Moderate-to-high likelihood of sites in reserves.
- Pre-disturbance surveys are practical.

Management Direction:

Manage High-Priority Sites. High-priority sites will be managed according to Management Recommendations. The size of the area to be managed depends on the habitat and the requirements for the species. Management may range from maintaining one or more habitat components (such as down logs or canopy cover) to complete exclusion from disturbance for many acres, and may allow loss of some individuals, areas, or elements not affecting continued site occupancy. Until a Management Recommendation is written addressing high-priority sites, all known sites will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the Regional Ecosystem Office. Professional judgement, Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations.

Survey Prior to Habitat-Disturbing Activities. Surveys will be conducted at the project level prior to implementing habitat-disturbing activities and in accordance with Management Recommendations or Survey Protocols. Management Recommendations may identify habitats or conditions where it is no longer necessary to continue surveys. High-priority sites found as a result of these surveys will be managed as known sites.

Strategic Surveys. The objective of strategic surveys in this category is to narrow habitat descriptions or to define geographic range for future surveys. Strategic surveys could find additional new sites and also provide important information on population status, life history, and habitat use to improve site management and selection of high-priority sites for management. Species sites found as a result of these surveys will be managed as known sites.

Strategic Surveys may address one or more of the following:

- What is the quality of the known sites (such as habitat characteristics, longevity and continuity of habitat, and the status and characteristics of the population)?
- What is the geographic distribution of sites and extent of the range of species within the area of the Northwest Forest Plan (such as distribution of sites in the Northwest Forest Plan reserve allocations and the connectivity of known sites, both spatially and temporally)?
- Where does the species occur? Find new sites.

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- Obtain information on habitat requirements to help manage known sites (examples: developing Management Recommendations and identifying high-priority sites).

Category 1D (Uncommon; Pre-Disturbance Surveys Not Practical or Not Necessary)

Objective: Identify and manage high-priority sites to provide for a reasonable assurance of species persistence. Until high-priority sites can be determined, manage all known sites.

Criteria for assigning a species to Category 1D:

- Same as Category 1C, except that pre-disturbance surveys are not practical or are not necessary to meet objectives for species persistence because inadvertent loss of some undiscovered sites would not change level of rarity.

Management Direction:

Manage High-Priority Sites. High-priority sites will be managed according to Management Recommendations. The size of the area to be managed depends on the habitat and the requirements for the species. Management may range from maintaining one or more habitat components (such as down logs or canopy cover) to complete exclusion from disturbance for many acres, and may allow loss of some individuals, areas, or elements not affecting continued site occupancy.

Until a Management Recommendation is written addressing high-priority sites, all known sites (including Del Norte salamander sites documented as presumed occupied) will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the Regional Ecosystem Office. Professional judgement, Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations.

Strategic Surveys. The objective of strategic surveys in this category is to gather information to either develop or revise Management Recommendations, which will include identifying high-priority sites for management and how to manage to provide for a reasonable assurance of species persistence.

Incorporate information from past and ongoing survey efforts. Start surveys for all remaining species within 10 years. Species sites found as a result of these surveys will be managed as known sites.

Strategic Surveys may address one or more of the following:

- What is the quality of known sites (such as habitat characteristics, longevity and continuity of habitat, status and characteristics of population)?
- What is the geographic distribution of sites and extent of the species' range within the area of the Northwest Forest Plan (such as distribution of sites in the Northwest Forest Plan's reserve allocations and the connectivity of known sites, both spatially and temporally)?
- Where does the species occur? Find new sites.
- Obtain information on habitat requirements to help manage known sites (such as developing Management Recommendations and identifying high-priority sites).

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Category 1E (Rare; Status Undetermined)

Objective: Manage all known sites while determining if the species meets the basic criteria for Survey and Manage and, if so, to which category it should be assigned.

Criteria for assigning a species to Category 1E:

- The number of likely extant sites/records and survey information on federal lands indicate possible rarity of the species; and
- Information is insufficient to determine whether Survey and Manage basic criteria are met, or to determine what management is needed for a reasonable assurance of species persistence.

Management Direction:

Manage All Known Sites. Current and future known sites will be managed according to Management Recommendations. The size of the area to be managed depends on the habitat and the requirements for the species. Management may range from maintaining one or more habitat components (such as down logs or canopy cover) to complete exclusion from disturbance for many acres, and may allow loss of some individuals, areas, or elements not affecting continued site occupancy. All known sites will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the Regional Ecosystem Office. Professional judgement, Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations.

Strategic Surveys. The objective of strategic surveys in this category is to collect enough information to determine if the species meets the basic criteria for Survey and Manage, and to either place the species into the appropriate Survey and Manage category or remove the species from the list.

Give these species a high priority. Incorporate information from past and ongoing survey efforts. Start surveys for all remaining species within 5 years. Species sites found as a result of these surveys will be managed as known sites. In cases where the strategic survey indicates that a species is potentially still rare, but the species is not closely associated with late-successional or old-growth forests, the species will be considered for the special status species programs of the Agencies.

Strategic Surveys may address one or more of the following:

- Is the species closely associated with late-successional/old-growth forests?
  — Revisit known sites, characterize the species habitat, and find new sites.
- Does the species occur within the Northwest Forest Plan area?
  — Survey potential habitat near known sites.
- What is the appropriate management for the species"?
  — Does the species meet the basic criteria for Survey and Manage?
  — What is the appropriate Survey and Manage category?

Category 1F (Uncommon or Rarity Unknown; Status Undetermined)

Objective: Determine if the species meets the basic criteria for Survey and Manage and, if so, to which category it should be assigned.

Criteria for assigning a species to Category 1F:

- The species is uncommon, and the number of likely extant sites/records and survey information does not indicate rarity; and

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- Information is insufficient to determine whether Survey and Manage basic criteria are met, or to determine what management is needed for reasonable assurance of species persistence.

Management Direction:

Manage Known Sites is NOT required for this category because species are uncommon, not rare. Therefore, inadvertent loss of some sites is not likely to change the level of rarity. Other management direction is yet to be determined.

Strategic Surveys. The objective of strategic surveys in this category is to collect enough information to determine if the species meets the basic criteria for Survey and Manage, and to either place the species into the appropriate Survey and Manage category or remove the species from the list. In cases where the strategic survey indicates that a species is potentially still rare, but the species is not closely associated with late-successional or old-growth forests, consider the species for the special status species programs of the Agencies. Incorporate information from past and ongoing survey efforts. Start surveys for all remaining species within 10 years.

Strategic Surveys may address one or more of the following:

- Is the species closely associated with late-successional/old-growth forests?
- Does the species occur within the Northwest Forest Plan area?
- What is the appropriate management for the species?
  — Does the species meet the basic criteria for Survey and Manage?
  — What is the appropriate Survey and Manage category?
- What is the level of rarity?

Protection Buffers

Under Alternative 1, all Protection Buffer species except those listed below are moved to Survey and Manage categories as shown in Table 2-6, Placement of Protection Buffer Species, which is located at the end of this chapter. Protection Buffer land allocations (Late-Successional Reserves [LSRs] and Managed Late-Successional Areas [MLSAs]) are returned to their underlying or appropriate surrounding allocation. Until and unless a Management Recommendation is written for these species, use the Northwest Forest Plan Protection Buffer direction (except for the LSR and MLSA land allocations) as the interim Management Recommendation.

The following Protection Buffer species are removed from this standard and guideline or are changed as explained below:

- *Ulota meglospora* is removed from this standard and guideline, because it is not late-successional/old-growth related, and there is not a concern for its persistence.

- *Sarcosoma mexicana* is removed from this standard and guideline for the Oregon Coast Range and Oregon Willamette Valley provinces. Because numerous sites of this species exist in these two provinces, this species is not at risk for persistence in those areas.

- *Ptilidium californicum* is removed from this standard and guideline north of the Lane-Douglas County line (Oregon), because it is common there and was not a concern in the original FEMAT screens.

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- The White-headed Woodpecker, Black-backed Woodpecker, Pygmy Nuthatch, and Flammulated Owl Standard and Guideline (USDA, USDI 1994b, pp. C-45 through C-47) is moved to "Standards and Guidelines Common to all Land Allocations" and amended to read as follows:
  — According to the USDA, USDI 1994b (pp. C-45 through C-47), these species will not be sufficiently aided by applying mitigation measures for riparian habitat protection or other elements of the Northwest Forest Plan. These four species occur on the periphery of the range of the northern spotted owl on the east slope of the Cascade Range in Washington and Oregon. Additionally, the white-headed woodpecker and flammulated owl occur in the Klamath Province in northwestern California and southwestern Oregon.

  — Apply the following mitigation standard and guideline to ensure that the distribution and numbers of all four species do not severely decline on National Forests and BLM Districts within the range of the northern spotted owl: Maintain adequate numbers of large snags and green-tree replacements for future snags in appropriate forest types in sufficient numbers to maintain 100 percent of potential population levels of these four species.

  The Northwest Forest Plan Protection Buffer direction for the white-headed woodpecker, black-backed woodpecker, pygmy nuthatch, and flammulated owl (USDA, USDI 1994b, pp. C-45 through C-47), with the following two changes, becomes the interim Management Recommendation for these species until or unless a Management Recommendation is completed. Management Recommendations may be prepared for these four bird species using the same process described in the standard and guideline for preparing and approving Management Recommendations for Survey and Manage species.
  — The sentence reading "Specifically, the Scientific Analysis Team recommends that no snags over 20 inches dbh be marked for cutting" is changed to read "Specifically, snags over 20 inches dbh are particularly valuable for these species. Snags over 20 inches dbh may be marked for cutting only after retaining the best available snags (considering size, longevity, etc.) in sufficient numbers to meet 100 percent of potential population levels of these four species."
  — After the sentence "If snag requirements cannot be met, the harvest must not take place," insert the following statement: "This limitation does not apply to intermediate harvests (thinning) in even-aged young stands that currently lack an adequate number of large trees."

- The Canada lynx standard and guideline (USDA, USDI 1994b, pp. C-47 through C-48) is replaced as follows, and also moved to "Standards and Guidelines Common to All Land Allocations":
  - Canada lynx is rare within the range of the northern spotted owl. Historical records indicate lynx was distributed primarily east of the Cascade Mountains in Washington, but occurrences on the west side of the Cascades in Washington and Oregon have been documented. Surveys are currently underway to further refine our understanding of lynx distribution. The lynx has been proposed for listing as a threatened species by the U.S. Fish and Wildlife Service (63 FR 36994). The U.S. Fish and Wildlife Service concluded that the population in the conterminous United States is threatened by human alteration of forests, low numbers as a result of past over exploitation, expansion of the range of competitors, and elevated levels of human access into lynx habitat. Concurrently with the listing process, a national interagency Canada lynx Assessment and Conservation Strategy is being developed to provide a consistent and effective approach to conservation of Canada lynx on federal lands in the conterminous United States. The Forest Service, BLM, U.S. Fish and Wildlife Service, and National Park Service are all participants.

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Primary lynx habitats in Washington and Oregon are dominated by Engelman spruce, subalpine fir and lodgepole pine. Secondary habitats contain western larch, Douglas-fir, Pacific silver fir, western red cedar/mountain hemlock, and the upper elevations of ponderosa pine forests. Lynx appears to have a preference for gentle terrain when available. Landscape connectivity is likely a major factor in lynx distribution. Three primary habitat components for lynx are: (1) foraging habitat (habitat that supports snowshoe hare or alternative prey species such as red squirrel), (2) denning habitat that contains large woody debris, either down logs or root wads (stand structure appears to be of more importance than forest cover type), and (3) dispersal cover (variable in vegetation composition and structure). Abundance of snowshoe hare is limited by the availability of winter habitat. Excessive trapping of lynx in the past and incidental mortality of lynx from hunting of other species have depressed populations and may have been detrimental to local lynx populations. Roads provide access to hunters and trappers and, therefore, road density may be related to lynx mortality.

The reserve areas in the Northwest Forest Plan area will provide denning habitat within protected forest stands in juxtaposition with early-successional vegetation in the forest matrix. Connectivity between many of the denning patches will be provided by a network of buffers along streams under the Riparian Reserves.

In addition, the Scientific Analysis Team proposed development of site-specific timber harvest, road, and fire management plans in known lynx range (Thomas et al. 1993). These plans should be developed in consultation with state wildlife agencies and should address: (1) minimizing road construction, closing unused roads, and maintaining roads to the minimum standard possible; (2) using prescribed fire to maintain forage for snowshoe hare in juxtaposition with hunting cover; (3) designating areas as closed to kill trapping of any furbearer to avoid incidental lynx mortality and to maintain population refugia for lynx in key areas; (4) planning for kill trapping closure on a wider basis if data indicate a declining lynx population as a result of incidental trapping mortality; and (5) developing and implementing a credible survey and monitoring strategy to determine the distribution of lynx throughout its potential range.

The above language is the interim Management Recommendation for this species until or unless a Management Recommendation is completed, or a national interagency Canada lynx Assessment and Conservation Strategy is developed. Management Recommendations may be prepared for the lynx using the same process described in the standard and guideline for preparing and approving Management Recommendations for Survey and Manage species.

Manage Recreation Areas to Minimize Disturbance to Species

The standard and guideline for Managing Recreation Areas to Minimize Disturbance to Species (USDA, USDI 1994b, p. C-6) is deleted because it is not necessary for species persistence, and no species are assigned to this standard and guideline. The reason that large numbers of reported Survey and Manage species sites are associated with recreation areas appears to be due to many of these areas being examined more frequently than other areas by Agency staff and other experts. A large number of Survey and Manage species in a recreation area should not suggest a higher priority for protection of these areas. Management Recommendations for Survey and Manage species provide duplicate coverage.

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Protect Sites From Grazing

Species and species groups associated with Protect Sites From Grazing (USDA, USDI 1994b, p. C-6) are moved to Survey and Manage (see Table 2-7, Placement of Protect Sites From Grazing Species, located at the end of this chapter), except for *Pedicularis howellii*, which is removed from the standards and guidelines because it is not closely associated with late-successional/old-growth forests. *Pedicularis howellii* is being considered for addition to the special status species programs of the Agencies.

Until Management Recommendations are written, current direction stating that "[k]nown and newly discovered sites of these species will be protected from grazing by all practical steps to ensure that the local population of the species will not be impacted" will be used as the Management Recommendation for those species assigned to categories requiring management of known sites.

Provide Additional Protection for Caves, Mines, and Abandoned Wooden Bridges and Buildings that are Used as Roost Sites for Bats

This standard and guideline (USDA, USDI 1994b, p. C-43) is moved to "Standards and Guidelines Common to all Land Allocations" and amended to read as follows:

> **Provide Additional Protection For Some Bat Roosts**
>
> Bat species occurring in the Pacific Northwest roost and hibernate in crevices or caverns in protected sites. Suitable roost sites and hibernacula fall within a specific range of temperature and moisture conditions. Sites commonly used by bats include caves, mines, snags and decadent trees, bridges, and buildings. Provisions for retention of large snags and decadent trees are included in the standard and guideline for green tree patches in the Matrix. Caves, mines, and bridges and buildings, however, are extremely important roost and hibernation sites that require additional protection to ensure their value as habitat is maintained. This provision applies to all land allocations.
>
> In all land allocations, protect caves, mines, bridges, and buildings used by bats from destruction, vandalism, and disturbance from road construction or blasting, or other activities that could change microclimate conditions or drainage patterns possibly affecting use by bats. Retention of abandoned bridges or buildings must be contingent on safety concerns.

The Northwest Forest Plan's Protection Buffer direction to "Provide additional protection for caves, mines, and abandoned wooden bridges and buildings that are used as roost sites for bats" (USDA, USDI 1994b, pp. C-43 and 44) is the interim Management Recommendation for these species until or unless Management Recommendations are completed. Management Recommendations may be prepared for bats using the same process described in the standard and guidelines for preparing and approving Management Recommendations for Survey and Manage species. Approved Management Recommendations may provide a guideline that is more specific than the generic direction in this standard and guideline. The Management Recommendations may include guidelines for conducting searches, identifying likely bat use, identifying appropriate circumstances for species identification, establishing conditions under which specific mitigation measures will be applied to project activity plans, describing various no-harvest buffer widths to fit specific habitat conditions, or other guidelines to help determine site-specific management needs.

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Adaptive Management

The Agencies have encountered complexities in applying the present adaptive management process to the Survey and Manage Standards and Guidelines due to the absence of specific steps and criteria in the Northwest Forest Plan Record of Decision for such changes or refinements. The following adaptive management detail is designed to make the standards and guidelines more efficient for the Agencies to implement while maintaining benefits to species.

The adaptive management process for the Survey and Manage Standards and Guidelines is refined by adding a specific process and criteria for making future adaptive management changes. The specific criteria for refining or changing species management are based on the strategies and objectives for a specific category.

Acquiring and Evaluating New Information

The Adaptive Management Process

The adaptive management process for Survey and Manage Standards and Guidelines includes three steps:

- Acquiring new information.
- Evaluating new information pertaining to species and arthropod guilds.
- Implementing changes or refinements to Survey and Manage Standards and Guidelines.

These three process steps are described individually below.

Acquiring New Information Relative to Survey and Manage

New knowledge may arise from various sources. New information concerning the efficiency of the standards and guidelines will be generated mostly through implementation experience as done in the past. Sources of new information may include taxa experts, resource specialists, scientists, data from Agency surveys, research, and members of the public. The Regional Ecosystem Office will coordinate compilation of new information.

When new information indicates a need for change, a regional-level interagency group including taxa experts will weigh new information against the criteria below to determine if additions or deletions of species from Survey and Manage, or changes of species among categories, are warranted. Information addressing the appropriate criteria (Survey and Manage basic criteria, level of rarity, and category criteria) must be submitted with the proposed change to the Regional Ecosystem Office. Proposed changes to species categories within Survey and Manage will not obligate the Agencies to gather additional information. This process is explained in the evaluation process section below.

Evaluating New Information Pertaining to Species and Arthropod Guilds

New information presented for evaluation in considering changes to Survey and Manage Standards and Guidelines should address the criteria described in the following section, as appropriate.

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Criteria for Adding, Removing or Changing a Species in Survey and Manage

The basic criteria for Survey and Manage are key to the evaluation process.

Three Basic Criteria for Survey and Manage

- The species must occur within the Northwest Forest Plan area, or occur close to the NFP area and have potentially suitable habitat within the NFP area.
- The species must meet the criteria for being closely associated with late-successional or old-growth forest (see Appendix E).
- The reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence.

Criteria for Adding Species to Survey and Manage

Species proposed for addition to the Survey and Manage Standards and Guidelines must be published taxonomic entities and must meet all of the basic criteria for Survey and Manage.

The new information to support addition of a species to Survey and Manage must address the three basic criteria, including the specific factors used as a basis for determining concern for persistence. *The factors must apply to at least an identified portion of the species range within the Northwest Forest Plan area.*

One or more of the following factors may indicate that persistence is a concern. These factors must be considered in the context of other standards and guidelines (other than Survey and Manage) in the Northwest Forest Plan.

— Low-to-moderate number of likely extant known sites/records in all or part of species range.
— Low-to-moderate number of individuals.
— Low-to-moderate number of individuals at most sites or in most populations.
— Very-limited to somewhat-limited range.
— Very-limited to somewhat-limited habitat.
— The distribution of the species within habitat is spotty or unpredictable in at least part of its range within the Northwest Forest Plan area.

Information to add species to the Survey and Manage Standards and Guidelines must meet a standard of clear or reasonable evidence. New species will not be added to Categories 1E and 1F.

Criteria for Removing Species from Survey and Manage

When new information indicates that a species no longer meets the Survey and Manage basic criteria, the species will be proposed for removal from Survey and Manage Standards and Guidelines.

New information to support removing a species from the Survey and Manage Standards and Guidelines may address any one of the three Survey and Manage basic criteria. If a species is proposed for removal from Survey and Manage Standards and Guidelines because there is not a concern for its persistence, the new information must address specific factors indicating that persistence is not a concern as listed below. *The factors must apply to at least an identified portion of the species range within the Northwest Forest Plan area.*

Usually, most of the following factors must be true to indicate that persistence is not a concern:

- Moderate-to-large number of likely extant sites/records.
- High proportion of sites and habitat are in reserve land-use allocations.
- Sites are well distributed within the species range.
- Matrix prescriptions or other elements of the Northwest Forest Plan provide for reasonable assurance of species persistence.

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- Limited number of sites within reserves, but proportion or amount of potential habitat within reserves is high, and there is high probability that the habitat is occupied.

Species removed from the Survey and Manage Standards and Guidelines because they are not closely associated with late-successional or old-growth forests, but are still of concern for persistence, will be considered for the special status species programs of the Agencies.

Criteria for Changing a Category Assigned to Species in Survey And Manage

New information to support changing a species from one Survey and Manage category to another must address the specific criteria for the categories involved in the change. The new information must support the proposed change by showing how the species no longer meets the criteria of the present category and better meets the criteria for the proposed category.

The criteria for determining if a species should be placed under specific categories are as follows:

Category 1A (Rare; Pre-Disturbance Surveys Practical). Criteria for a species to be assigned to Category 1A are:

- The species is rare, and all known sites or population areas are likely to be necessary for a reasonable assurance of persistence, as indicated by one or more of the following:
  - Low number of likely extant sites/records on federal lands indicates rarity.
  - Not well distributed within species range or habitat.
  - Limited number of individuals per site.
  - Highly specialized habitat requirements (narrow ecological amplitude).
  - Dispersal capability limited relative to federal habitat.
  - Microsite habitat limited.
  - Reproduction or survival not sufficient.
  - Low number of sites in reserves or low likelihood of sites or habitat in reserves.
  - Habitat fragmentation that causes genetic isolation.
  - Factors beyond management under the Northwest Forest Plan affect persistence, but special management under the NFP will help persistence.
  - Declining habitat trend.
- Pre-disturbance surveys are practical.

Category 1B (Rare: Pre-Disturbance Surveys Not Practical). Criteria for a species to be assigned to Category 1B:

- Same criteria as Category 1A, except that pre-disturbance surveys are not practical.

Category 1C (Uncommon; Pre-Disturbance Surveys Practical). Criteria for a species to be assigned to Category 1C are:

- The species is uncommon, and not all known sites or population areas are likely to be necessary for a reasonable assurance of species persistence, as indicated by one or more of the following:
  - A higher number of likely extant sites/records does not indicate rarity of the species.
  - May have low-to-high number of individuals per site.
  - Less restricted distribution pattern relative to range or potential habitat.
  - Moderate-to-broad ecological amplitude.
  - Moderate-to-high likelihood of sites in reserves.
- Pre-disturbance surveys are practical.

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Category 1D (Uncommon; Pre-Disturbance Surveys Not Practical). Criteria for a species to be assigned to Category 1D:

- Same criteria as Category 1C, except that pre-disturbance surveys are not practical or are not necessary to meet a reasonable assurance of persistence.

Category 1E (Rare; Status Undetermined). Criteria for a species to be assigned to Category 1E are:

- The number of likely extant sites/records and survey information on federal lands indicates rarity of the species; and
- Information is insufficient to determine that Survey and Manage basic criteria are met, or to determine what management is needed for a reasonable assurance of persistence.

Category 1F (Uncommon or Rarity Unknown; Status Undetermined). Criteria for a species to be assigned to Category 1F are:

- The species is uncommon, and the number of likely extant sites/records and survey information on federal lands does not indicate rarity, and:
- The information is not sufficient to determine that Survey and Manage basic criteria are met, or to determine which management is needed for a reasonable assurance of persistence.

Analysis Process for New Information

The Regional Ecosystem Office will coordinate the compilation of new information from taxa experts for annual evaluation. The process for analyzing or evaluating new information pertaining to species will involve a panel of agency taxonomic experts, resource specialists, and managers similar to the process used to evaluate new information in this SEIS (see Appendix F). The panel of experts will convene at least once a year to evaluate and respond to new accumulated information and to propose changes to appropriate management of species under the Survey and Manage Standards and Guidelines and recommend changes to the Regional Interagency Executive Committee.

The panel will use the specific criteria and factors defined for making determinations regarding whether there is a concern for persistence and placement of species within individual categories of Survey and Manage. The number and combination of criteria and factors used in making a judgement about concern for persistence or appropriate placement of species within individual categories will vary, depending on the species and the type and quality of information available.

Because no clear formula exists for reaching a conclusion, the analysis process relies on the professional judgement of the experts to weigh the various factors and criteria. To avoid being arbitrary, and to have the process and conclusions be approximately repeatable, it is important to provide the assumptions, criteria, factors, and logic used as a basis for the professional judgement. For purposes of these evaluations, the factors and criteria listed for use in these evaluations will constitute the foundation of the assumptions, criteria, factors, and logic to support the conclusions.

The process proposed for future adaptive management changes under Survey and Manage Standards and Guidelines was developed and used for species analysis in this SEIS. Changes to Survey and Manage and Protection Buffer species management resulting from the analysis in this SEIS are included on Table 2-2 and summarized on Tables 2-8 through 2-10 at the end of this Chapter. These changes are attributable to new information since 1994 and to a clarification and refinement of the criteria for assigning species to individual categories as described in this section and under the descriptions of the individual categories.

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Implementing Changes or Refinements to Survey and Manage

The criteria and evaluation process for species that is presented in this SEIS and proposed for use in future adaptive management changes are designed to continue approximately the same level of assurance of persistence. The process and results are repeatable because the assumptions, criteria, and logic used in reaching determinations relating to species disposition under the Survey and Manage Standards and Guidelines will remain constant. Proposed changes to management of species under the Survey and Manage Standards and Guidelines resulting from the periodic evaluations of new information will be forwarded to the Regional Ecosystem Office. The Regional Ecosystem Office will facilitate review and approval by the Regional Interagency Executive Committee (RIEC). The purpose of the RIEC review is to ensure that current information about the species has been appropriately considered and weighed against the stated criteria, and that the resultant proposal continues to provide for the level of protection intended by the standards and guidelines. The RIEC may delegate approval authority to the REO Executive Director. Approved adaptive management changes to the Survey and Manage Standards and Guidelines and changes to associated species will be published in an annual report. This process is adequately described, and its expected results regarding effects on species are sufficiently predictable, that this process is considered in the effects discussion in this SEIS. No additional NEPA-related documentation is anticipated when applying this process in future years.

Evaluating New Information for Management Recommendations and Survey Protocols

Management Recommendations are developed in cooperation with taxa experts and specialists for use at field offices of the BLM and Forest Service. Management Recommendations are reviewed by the Regional Ecosystem Office and jointly transmitted to the field offices, along with their effective date, by the BLM and Forest Service. Changes proposed to Management Recommendations, Survey Protocols and Strategic Survey Plans as a result of new information pertaining to species, or as a result of new information resulting from implementation experience, will be subjected to the same process used to develop the original Recommendations and Protocols. Changes to Management Recommendations, Survey Protocols, and Strategic Survey Plans constitute administrative changes to the technical details of specific site management and surveys.

Alternative 2

Introduction

Alternative 2 is identical to Alternative 1 for the "rare" species. Alternative 2 assumes that the 53 "uncommon" species are the most likely species to be removed from Survey and Manage in the near future, and seeks to expedite that decision by concentrating efforts on completing strategic surveys within 5 years. Building on the classification system used in Alternative 1, Alternative 2 redefines Survey and Manage into four categories (2A-2D) based on relative rarity, the ability to reasonably and consistently locate sites during surveys prior to implementing habitat-disturbing activities, and the level of information known about the species or group of species as shown below.

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Alternative 2 - Remove or Reassign Uncommon Species Within 5 Years

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 2A** - 49 species •Manage All Known Sites •Pre-Disturbance Surveys •Strategic Surveys	**Category 2B** - 197 species •Manage All Known Sites •N/A •Strategic Surveys (5 yrs.)	**Category 2C** - 44 species •Manage All Known Sites •N/A •Strategic Surveys
Uncommon	**Category 2D** - 53 species •Manage All Sites Known as of 9/30/99----------> •No Pre-Disturbance Surveys ----------> •Strategic Surveys Completed in 5 years ---------->		

The four categories make it easier to clarify species objectives and apply specific management direction, compared to the No-Action Alternative, partly because Alternative 2 assigns each species to only one category. The standards and guidelines of Alternative 2 describe the objective, assignment criteria, and management direction for each category.

Like Alternatives 1 and 3, this alternative combines most standards and guidelines for Protection Buffer and Protect Sites From Grazing into Survey and Manage, and edits and moves the remaining standards and guidelines for Protection Buffers and those for Additional Protection for Bats to "Standards and Guidelines Common to All Land Allocations." A list of the Protection Buffers or Protect Sites From Grazing species proposed to be included in Survey and Manage is on Table 2-2 (Species to be Protected Through Survey and Manage for All Alternatives) at the end of this chapter. Alternative 2 proposes removing 64 species from Survey and Manage and related standards and guidelines (see Table 2-4), and removing 7 species for part of their range (see Table 2-5). The reason for proposing these species removals is that new information or reexamination of existing information indicates the species do not meet the Survey and Manage basic criteria for this alternative. Changes in the level of management between Alternative 2 and No-Action are summarized by taxa group on Table 2-10.

Similar to Alternatives 1 and 3, Alternative 2 includes an adaptive management section defining how, when there is new information in the future, to change species among the three high-concern categories and how to add or remove species from Survey and Manage.

The section in this chapter entitled "Provisions Common to Alternatives 1, 2 and 3" is incorporated as part of the standards and guidelines for Alternative 2.

Survey and Manage

These standards and guidelines apply within all land allocations; however, the Survey and Manage provision for each species will be directed to the range, or portion of range, of that species and to the particular habitats where there are concerns for persistence. The Survey and Manage Standards and Guidelines will benefit species closely associated with late-successional and old-growth forests including certain amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropod groups.

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Information concerning these species that is acquired through implementing these standards and guidelines should facilitate project planning, adaptive management changes, and adjustments to these provisions.

Table 2-2 (Species to be Protected Through Survey and Manage), located at the end of this chapter, shows which species are addressed in the Survey and Manage provision and their assignment into the four categories (2A, 2B, 2C, and 2D, described below).

Description of Categories

The following text describes the four categories (2A-2D) in Alternative 2. In text discussions these alternatives are referenced as 2A, 2B, etc., to link the category to Alternative 2. The category discussions include additional information clarifying the linkage between objectives and management actions of each category and describing the criteria for assigning species to the various categories. A taxon, or range-defined portion of a taxon, can be assigned to only one category. Categories 2A, 2B, and 2C are exactly the same in every respect as Categories 1A, 1B, and 1E, respectively, in Alternative 1.

Category 2A (Rare; Pre-Disturbance Surveys Practical)

The objective, criteria, management direction, and species assigned to this category are the same as for Category 1A in Alternative 1.

Objective: Manage all known sites and minimize inadvertent loss of undiscovered sites.

Criteria for assigning a species to Category 2A are:

- The species is rare, and all known sites or population areas are likely to be necessary to provide reasonable assurance of persistence, as indicated by one or more of the following:
  - Low number of likely extant sites/records on federal lands indicates rarity.
  - Not well distributed within species range or habitat.
  - Limited number of individuals per site.
  - Highly specialized habitat requirements (narrow ecological amplitude).
  - Dispersal capability limited relative to federal habitat.
  - Microsite habitat limited.
  - Reproduction or survival not sufficient.
  - Low number of sites in reserves or low likelihood of sites or habitat in reserves.
  - Habitat fragmentation that causes genetic isolation.
  - Factors beyond management under the Northwest Forest Plan affect persistence, but special management under the NFP will help persistence.
  - Declining habitat trend.
- Pre-disturbance surveys are practical.

Management Direction:

Manage All Known Sites. Current and future known sites will be managed according to Management Recommendations. The size of the area to be managed depends on the habitat and requirements for the species. Management may range from maintenance of one or more habitat components (such as down logs or canopy cover) to complete exclusion from disturbance for many acres, and may allow loss of some individuals, areas, or elements not affecting continued site occupancy. All known sites will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. (See glossary for definition of "known site.") These exceptions will be reviewed by the Regional Ecosystem Office. Professional judgement,

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Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations.

For one fungus species, *Bridgeoporous nobilissimus*, there are few known sites. Management areas of all useable habitat up to 600 acres are to be established around these sites to protect those populations until the sites can be thoroughly surveyed and site-specific measures prescribed.

Survey Prior to Habitat-Disturbing Activities. Surveys will be conducted at the project level prior to implementing habitat-disturbing activities, and in accordance with Management Recommendations or Survey Protocols, so as to avoid loss of undiscovered sites by habitat-disturbing activities. Species sites found as a result of these surveys will be managed as known sites. These surveys are designed so that a reasonable effort is likely to determine the presence of a species on a specific area. Such surveys are specified when losing undiscovered sites of a species could increase the risk to persistence.

Strategic Surveys. The objective of strategic surveys in this category is to narrow habitat descriptions or to define geographic range for future surveys. Strategic surveys could find additional new sites and also provide important information on population status, life history, and habitat use to improve site. Species sites found as a result of these strategic surveys will be managed as known sites.

Strategic Surveys may address one or more of the following:

- Are known sites still extant?
- What is the habitat of the species?
- Identify high-probability habitat for survey to find new sites.
- Where else does the species occur? Find new sites.
- Collect habitat information to assist with managing the species.
- What is the status of the population (such as number of individuals and population size)?

Category 2B (Rare; Pre-Disturbance Surveys Not Practical)

The objective, criteria, management direction, and species assigned to this category are the same as for Category 1B in Alternative 1.

Objective: Manage all known sites and minimize inadvertent loss of undiscovered sites.

Criteria for assigning a species to Category 2B:

- Same as Category 2A, except that pre-disturbance surveys are not practical.

Management Direction:

Manage All Known Sites. Current and future known sites will be managed according to Management Recommendations. The size of the area to be managed depends on the habitat and the requirements for the species. Management may range from maintenance of one or more habitat components (such as down logs or canopy cover) to complete exclusion from disturbance for many acres, and may allow loss of some individuals, areas, or elements not affecting continued site occupancy. All known sites will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the Regional Ecosystem Office. Professional judgement, Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a), and appropriate literature will be used to guide

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individual site management for those species that do not have Management Recommendations.

Strategic Surveys: The objective of strategic surveys in this category is to find additional new sites and characterize the habitat to improve the Agencies' ability to know where to survey and how to manage the species. To minimize inadvertent loss of undiscovered sites, the areas with highest risk to loss of potential habitat are given highest priority. For this reason, do not implement habitat-disturbing activities in old growth (as defined in the glossary) in fiscal year 2006 (fiscal year 2011 for fungi) and beyond, unless strategic surveys have been completed for the general geographic area following the Strategic Survey Plan. Sampling intensity, repetitions, or design will not be adjusted to include specific stands or proposed activity units.

Incorporate information from past and ongoing survey efforts. Species sites found as a result of strategic surveys will be managed as known sites.

Strategic Surveys may address one or more of the following:

- Are known sites still extant?
- What is the habitat of the species?
- Identify high-probability habitat for surveys to find new sites.
- Where else does the species occur? Survey high-probability habitat at highest risk to find new sites.
- What is the distribution of the species relative to land-use allocations established in the Northwest Forest Plan?
- Collect habitat information to assist with managing the species.
- What is the status of the population (such as number of individuals, size)?

Category 2C (Rare; Status Undetermined)

The objective, criteria, management direction, and species assigned to this category are the same as for Category 1E in Alternative 1.

Objective: Manage all known sites while determining if the species meets the basic criteria for Survey and Manage and, if so, to which category it should be assigned.

Criteria for assigning a species to Category 2C:

- The species is rare, and the number of likely extant sites/records and survey information on federal lands indicate possible rarity of the species; and
- Information is insufficient to determine whether Survey and Manage basic criteria are met, or to determine what management is needed for a reasonable assurance of species persistence.

Management Direction:

Manage All Known Sites: Current and future known sites will be managed according to Management Recommendations. The size of the area to be managed depends on the habitat and the requirements for the species. Management may range from maintenance of one or more habitat components (such as down logs or canopy cover) to complete exclusion from disturbance for many acres, and may allow loss of some individuals, areas, or elements not affecting continued site occupancy. All known sites will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the Regional Ecosystem Office. Professional judgement, Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations.

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Strategic Surveys. The objective of strategic surveys in this category is to collect enough information to determine if the species meets the basic criteria for Survey and Manage, and to either place the species into the appropriate Survey and Manage category or remove it from the list.

Give these species a high priority. Incorporate information from past and ongoing survey efforts. Start surveys for all remaining species within 5 years. Species sites found as a result of these surveys will be managed as known sites. In cases where the strategic survey indicates that a species is potentially still rare, but the species is not closely associated with late-successional or old-growth forests, the species will be considered for the special status species programs of the Agencies.

Strategic Surveys may address one or more of the following:

- Is the species closely associated with late-successional/old-growth forests?
- Revisit known sites, characterize the species habitat, and find new sites.
- Does the species occur within the Northwest Forest Plan area?
- Survey potential habitat near known sites.
- What is the appropriate management for the species?
- Does the species meet the basic criteria for Survey and Manage?
- What is the appropriate Survey and Manage category?

Category 2D (Uncommon)

The 53 species assigned to this category are those assigned to Categories 1C, 1D, and 1F in Alternative 1. The objectives and management direction, however, are different in this alternative.

Objective: Provide for a reasonable assurance of species persistence by: manage all sites (except those for arthropods) known as of September 30, 1999. Also, complete strategic surveys for all species within 5 years to determine whether to drop special protection for these species, to assign individual species to the existing special status species programs of the Agencies, or to consider the species for listing under the Endangered Species Act. This category (Uncommon) expires in 5 years when a determination is made regarding future management for each of the 53 species in this category. Category 2D species will not be moved to other Survey and Manage categories.

Criteria for assigning a species to Category 2D are:

- The species is uncommon, and not all known sites or population areas are likely to be necessary for reasonable assurance of persistence, as indicated by one or more of the following:
  - A higher number of likely extant sites/records does not indicate rarity of the species.
  - May have low-to-high number of individuals per site.
  - Less restricted distribution pattern relative to range or potential habitat.
  - Moderate-to-broad ecological amplitude.
  - Moderate-to-high likelihood of sites in reserves.

Or

- The species is uncommon, and the number of likely extant sites/records and survey information does not indicate rarity, and
- There is not sufficient information to determine whether Survey and Manage basic criteria are met, or to determine what management is needed for species persistence.

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Management Direction:

Manage All Known Sites. Current sites known as of September 30, 1999, will be managed according to Management Recommendations. No newly discovered sites will be added. The size of the area to be managed will depend on the habitat and requirements for the species. Management may range from maintenance of one or more habitat components (such as down logs or canopy cover) to complete exclusion from disturbance for many acres, and may allow loss of some individuals, areas, or elements not affecting continued site occupancy. All known sites (including Del Norte and Siskiyou Mountain salamander sites documented as presumed occupied) will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the Regional Ecosystem Office. Professional judgement, Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations

This direction expires in 5 years when the results of required strategic surveys are evaluated to determine whether the species should be assigned to special status species programs of the Agencies, the species should be proposed for listing under the Endangered Species Act, or the evaluation indicates no additional species-specific provisions are needed. If the species is listed under the Endangered Species Act or a special status species program of the Agencies, all or a portion of the above sites and others may continue being managed under the receiving program direction.

Strategic Surveys. The objective of strategic surveys in this category is to gather information to determine if reserves and other elements of the Northwest Forest Plan provide for a reasonable assurance of species persistence, or if the species should be recommended for management under some other special status species program of the Agencies or proposed for listing under the Endangered Species Act.

Incorporate information from past and ongoing survey efforts. Complete surveys for all species within 5 years.

Strategic Surveys may address one or more of the following:

- What is the quality of known sites (such as habitat characteristics, longevity and continuity of habitat, and status and characteristics of population), particularly within reserves?
- What is the geographic distribution of sites and extent of the range of species within the area of the Northwest Forest Plan (such as the distribution of sites in the Northwest Forest Plan reserve allocations and the connectivity of known sites, both spatially and temporally)?
- Where does the species occur?
- Obtain information on habitat requirements to correlate with habitat availability to help in determining a likelihood of assuring persistence.
- Is there still a concern that reserves and other elements of the Northwest Forest Plan will not provide a reasonable assurance of persistence?

Protection Buffers

The management direction for Protection Buffers is the same as described for Alternative 1.

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Manage Recreation Areas to Minimize Disturbance to Species

The management direction for Recreation Areas is the same as described for Alternative 1.

Protect Sites From Grazing

The management direction for Grazing is the same as described for Alternative 1.

Provide Additional Protection for Caves, Mines, and Abandoned Wooden Bridges and Buildings That are Used as Roost Sites for Bats

The management direction for Bats is the same as described for Alternative 1.

Adaptive Management

The Agencies have encountered complexities in applying the present adaptive management process to the Survey and Manage Standards and Guidelines due to the absence of specific steps and criteria in the Northwest Forest Plan Record of Decision for such changes or refinements. The following adaptive management detail is designed to make the standards and guidelines more efficient for the Agencies to implement while maintaining benefits to species.

The adaptive management process for the Survey and Manage Standards and Guidelines is refined by adding a specific process and criteria for making future adaptive management changes. The specific criteria for refining or changing species management are based on the strategies and objectives of the specific categories.

Acquiring and Evaluating New Information

The Adaptive Management Process

The adaptive management process for Survey and Manage Standards and Guidelines includes three steps:

- Acquiring new information.
- Evaluating new information pertaining to species and arthropod guilds.
- Implementing changes or refinements to Survey and Manage Standards and Guidelines.

These three process steps are described individually below.

Acquiring New Information Relative to Survey and Manage

New knowledge may arise from various sources. New information concerning the efficiency of the standards and guidelines will be generated mostly through implementation experience as done in the past. Sources of new information may include taxa experts, resource specialists, scientists, data from Agency surveys, research, and members of the public. The Regional Ecosystem Office will coordinate compilation of new information.

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When new information indicates a need for change, a regional-level interagency group including taxa experts will weigh new information against the criteria below to determine if additions or deletions of species from Survey and Manage, or changes of species among high categories, are warranted. Information addressing the appropriate criteria (Survey and Manage basic criteria, level or rarity, and category criteria) must be submitted with the proposed change to the Regional Ecosystem Office. Proposals for changes to species within Survey and Manage will not obligate the Agencies to gather additional information. This process is discussed in more detail in the Evaluation Process section below.

The process and criteria for reassigning Category 2D species in 5 years is described separately below. If Alternative 2 is selected, no species will be added to Category 2D during the 5 years following the effective date of the Record of Decision for this SEIS, and species in Category 2D will not be moved to another Survey and Manage category. At the end of 5 years, the 53 uncommon species will be dropped or placed in other management programs, and there will not be a category of uncommon species in Survey and Manage.

Evaluating New Information Pertaining to Species

New information presented for evaluation in considering changes to Survey and Manage Standards and Guidelines should address the following criteria, as appropriate.

Criteria for Adding, Removing, or Changing a Species in Survey and Manage

The basic criteria for Survey and Manage are key to the evaluation process.

Criteria for Adding Species to Survey and Manage

Species proposed for addition to the Survey and Manage Standards and Guidelines must be published taxonomic entities and must meet the basic criteria for Survey and Manage.

Three Basic Criteria for Survey and Manage

- The species must occur within the Northwest Forest Plan area, or occur close to the NFP area and have potentially suitable habitat within the NFP area.
- The species must meet the criteria for being closely associated with late-successional or old-growth forest (see Appendix E).
- The reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence.

The new information to support the addition of a species to Survey and Manage must address the three basic criteria, including specific factors used as a basis for determining concern for persistence. *The factors must apply to at least an identified portion of the species range within the Northwest Forest Plan area.*

One or more of the factors listed below may indicate that persistence is a concern. These factors must be considered in the context of other standards and guidelines (other than Survey and Manage) in the Northwest Forest Plan.

- Low number of likely extant sites/records on federal lands indicates rarity.
- Not well distributed within species range or habitat.
- Limited number of individuals per site.
- Highly specialized habitat requirements (narrow ecological amplitude).
- Dispersal capability limited relative to federal habitat.
- Microsite habitat limited.
- Reproduction or survival not sufficient.
- Low number of sites in reserves or low likelihood of sites or habitat in reserves.
- Habitat fragmentation that causes genetic isolation

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- Factors beyond management under the Northwest Forest Plan affect persistence, but special management under the NFP will help persistence.
- Declining habitat trend.

The information to add species to the Survey and Manage Standards and Guidelines must meet a standard of clear or reasonable evidence. New species will not be added to Category 2C. New species will not be added to Category 2D since this is an interim category that will expire when longer-term management direction for those species is determined.

Criteria for Removing Species from Survey and Manage

When new information indicates that a species no longer meets the Survey and Manage basic criteria, the species will be proposed for removal from the Survey and Manage Standards and Guidelines. These criteria apply to Categories 2A, 2B, and 2C.

New information to support removing a species from the Survey and Manage Standards and Guidelines may address any one of its three basic criteria. If the species is proposed for removal because there is not a concern for persistence, the new information must address the specific factors indicating that persistence is not a concern as listed below. *The factors must apply to at least an identified portion of the species range within the Northwest Forest Plan area.*

Usually, most of the following factors must be true to indicate that persistence is not a concern:

- Moderate-to-large number of likely extant sites/records.
- Moderate-to-high proportion of sites and habitat are in reserve land-use allocations.
- Sites are well distributed or only partially restricted within the species range.
- Matrix prescriptions or other elements of the Northwest Forest Plan provide for reasonable assurance of persistence.
- Limited number of sites within reserves, but proportion or amount of potential habitat within reserves is moderate-to-high, and there is moderate-to-high probability that the habitat is occupied.

Species removed from the Survey and Manage Standards and Guidelines because they are not closely associated with late-successional or old-growth forests, but are still of concern for persistence will be considered for special status species programs of the Agencies.

The above criteria apply only to Categories 2A, 2B, and 2C. Category 2D expires in 5 years, and the results of required strategic surveys are evaluated to determine whether the species should be assigned to special status species programs of the Agencies or proposed for listing under the Endangered Species Act, or whether the evaluation indicates no additional species-specific provisions are needed. Determinations may be made sooner than 5 years if sufficient information is available.

The Forest Service Sensitive Species and BLM Special Status Species programs are designed to provide for the health and well being of species on federal lands, sufficient to preclude the need to list the species under the Endangered Species Act or otherwise conserve the species. For the Forest Service, for example, objectives include "maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitat distributed throughout their geographic range" (FSM 2670.22, WO Amendment 2600-95-7). Both agencies have broad latitude to write appropriate conservation direction up to, and including, requiring surveys prior to habitat-disturbing activities and managing known sites, as needed for conservation of the species.

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Criteria for Changing a Category Assigned to Species in Survey And Manage

New information to support changing a species from one Survey and Manage category to another must address the specific criteria for the categories involved in the change. The new information needs to support the proposed change by showing how the species no longer meets the criteria of the present category and better meets the criteria for the proposed category.

The criteria for determining if a species should be protected under specific categories are as follows:

Category 2A (Rare; Pre-Disturbance Surveys Practical). Criteria for a species to be assigned to Category 2A are:

- The species is rare, and all known sites or population areas are likely to be necessary for a reasonable assurance of species persistence, as indicated by one or more of the following:
  - Low number of likely extant sites/records on federal lands indicates rarity.
  - Not well distributed within species range or habitat.
  - Limited number of individuals per site.
  - Highly specialized habitat requirements (narrow ecological amplitude).
  - Dispersal capability limited relative to federal habitat.
  - Microsite habitat limited.
  - Reproduction or survival not sufficient.
  - Low number of sites in reserves or low likelihood of sites or habitat in reserves.
  - Habitat fragmentation that causes genetic isolation
  - Factors beyond management under the Northwest Forest Plan affect persistence, but special management under the NFP will help persistence.
  - Declining habitat trend.
- Pre-disturbance surveys are practical.

Category 2B (Rare; Pre-Disturbance Surveys Not Practical). Criteria for a species to be assigned to Category 2B:

- Same criteria as Category 2A, except that pre-disturbance surveys are not practical.

Category 2C (Rare; Status Undetermined). Criteria for a species to be assigned to Category 2C are:

- The number of likely extant sites/records and survey information on federal lands indicates rarity of the species, and:
  - There is not sufficient information to determine that Survey and Manage basic criteria are met, or;
  - There is not sufficient information to determine which management is needed for a reasonable assurance of species persistence.

Category 2D (Uncommon). (Note: No additional species will be assigned to this category in the future.) Criteria for assigning the 53 species to Category 2D in this SEIS are as follows:

- The species is uncommon, and not all known sites or population areas are likely to be necessary for a reasonable assurance of persistence of the species, as indicated by one or more of the following:
  - A higher number of likely extant sites/records does not indicate rarity of the species.
  - May have low to high number of individuals per site.
  - Less restricted distribution pattern relative to range or potential habitat.
  - Moderate-to-broad ecological amplitude.
  - Moderate-to-high likelihood of sites in reserves.

Or:

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- The number of likely extant sites/records and survey information on federal lands does not indicate rarity; and there is not sufficient information to determine that Survey and Manage basic criteria are met, or to determine what management is needed for a reasonable assurance of persistence.

Analysis Process

The process for analyzing or evaluating new information pertaining to species will involve a panel of agency taxonomic experts, resource specialists, and resource specialists similar to the process used to evaluate new information in this SEIS. The panel of experts will convene at least once a year to evaluate and respond to new accumulated information and to propose changes to appropriate management of species under the Survey and Manage Standards and Guidelines.

The panel will use the specific criteria and factors defined for making determinations regarding whether there is a concern for persistence, and placement of species within individual categories of Survey and Manage. The number and combination of criteria and factors used in making a judgement about concern for persistence or appropriate placement of species within individual categories will vary, depending on the species and the type and quality of information available.

Because no clear formula exists for reaching a conclusion, the analysis process relies on the professional judgement of the experts to weigh the various factors and criteria. To avoid being arbitrary, and to have the process and conclusions be approximately repeatable, it is important to provide the assumptions, criteria, factors, and logic used as a basis for the professional judgement. For purposes of these evaluations, the factors and criteria listed for use in these evaluations will constitute the foundation of the assumptions, criteria, factors, and logic to support the conclusions.

The process proposed for future adaptive management changes under Survey and Manage Standards and Guidelines was developed and used for species analysis in this SEIS. Changes to Survey and Manage and Protection Buffer species management resulting from the analysis in this SEIS are included on Table 2-2 and summarized by taxa group on Table 2-10, at the end of this chapter. These changes are attributable to new information since 1994 and to a clarification and refinement of the criteria for assigning species to individual categories, as described in this section and under the descriptions of the individual categories.

Implementing Changes or Refinements to Survey and Manage

The criteria and evaluation process for species that are presented in this SEIS and proposed for use in future adaptive management changes are designed to continue approximately the same level of assurance of persistence. The process and results are repeatable because the assumptions, criteria, and logic used in reaching determinations relating to species disposition under the Survey and Manage Standards and Guidelines will remain constant. Proposed changes to management of species under the Survey and Manage Standards and Guidelines resulting from the periodic evaluations of new information will be forwarded to the Regional Ecosystem Office. The REO will facilitate review and approval by the Regional Interagency Executive Committee (RIEC). The purpose of the RIEC review is to ensure that current information about the species has been appropriately considered and weighed against the stated criteria, and that the resultant proposal continues to provide for the level of protection intended by the standards and guidelines. The RIEC may delegate approval authority to the REO Executive Director. Approved adaptive management changes to the Survey and Manage Standards and Guidelines and changes to associated species will be published in an annual report. This process is adequately described, and its expected results regarding effects on species are sufficiently predictable, that this process is considered in

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the effects discussion in this SEIS. No additional NEPA-related documentation is anticipated when applying this process in future years.

Evaluating New Information Pertaining to Management Recommendations and Survey Protocols

Management Recommendations are developed in cooperation with taxa experts and specialists for use at field offices of the BLM and Forest Service. Management Recommendations are reviewed by the Regional Ecosystem Office and jointly transmitted, along with their effective date, by the BLM and Forest Service. Changes proposed to Management Recommendations, Survey Protocols, and Strategic Survey Plans (as a result of new information pertaining to species, or as a result of new information resulting from implementation experience) will be subjected to the same process used to develop the original Recommendations and Protocols. Changes to Management Recommendations, Survey Protocols and Strategic Survey Plans constitute administrative changes to the technical details of specific site management and surveys.

Alternative 3

Introduction

Alternative 3 builds on Alternative 1 by adding 250-meter buffers around occupied sites of rare species (minimum 48.5 acres), adds equivalent-effort surveys for species where pre-disturbance surveys are not considered practical, and adds known site protection for uncommon, status undetermined species. Building on the species classifications of Alternative 1, Alternative 3 redefines Survey and Manage into three categories (3A, 3B, and 3C), based on relative rarity and the level of information known about the species or group of species as shown below.

Alternative 3 - Add Equivalent-Effort Surveys and 250-Meter Rare Site Buffers

Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	**Category 3A** - 290 species •Manage All Known Sites with 250-Meter Buffers----------> •Pre-Disturbance Surveys ------> Equivalent-Effort Surveys---------->•Strategic Surveys---------->		
Uncommon	**Category 3B** - 28 species •Manage High-Priority Sites---------->•Pre-Disturbance Surveys---> Equivalent-Effort Surveys-->•Strategic Surveys---------->		**Category 3C** - 25 species •Manage all Known Sites •N/A •Strategic Surveys

The three categories make it easier to clarify species objectives and apply specific management direction, as compared to the No-Action Alternative, partly because Alternative 3 assigns each species to only one category. The standards and guidelines of Alternative 3 describe the objective, assignment criteria, and management direction for each category.

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Like Alternatives 1 and 2, this alternative combines most standards and guidelines for Protection Buffer and Protect Sites From Grazing into Survey and Manage, and edits and moves the remaining standards and guidelines for Protection Buffers and those for Additional Protection for Bats to "Standards and Guidelines Common to All Land Allocations." Protection Buffers or Protect Sites From Grazing species proposed for inclusion in Survey and Manage are included on Table 2-2 (Species to be Protected Through Survey and Manage for All Alternatives) located at the end of this chapter. Alternative 3 proposes removing 64 species from Survey and Manage and related standards and guidelines (see Table 2-4), and removing 7 species for part of their range (see Table 2-5). The reason for proposing these species removals is that new information or reexamination of existing information indicates the species do not meet the Survey and Manage basic criteria. Changes in the level of management between Alternative 3 and No-Action are summarized by taxa group on Table 2-10.

Similar to Alternatives 1 and 2, Alternative 3 includes an adaptive management section defining how, when there is new information in the future, to change species among the three categories and how to add or remove species from Survey and Manage.

The section in this chapter entitled "Provisions Common to Alternatives 1, 2 and 3" is incorporated as part of the standards and guidelines for Alternative 3.

Survey and Manage

These standards and guidelines apply within all land allocations; however, the Survey and Manage provision for each species will be directed to the range (or portion of range) of that species and to the particular habitats where concerns exist for its persistence. The Survey and Manage standard and guidelines will benefit species closely associated with late-successional and old-growth forests including certain amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropod groups. Information concerning these species that is acquired through implementing these standards and guidelines should facilitate project planning, adaptive management changes, and adjustments to these provisions.

Table 2-2 (Species to be Protected Through Survey and Manage for All Alternatives), located at the end of this chapter, shows which species are addressed in the Survey and Manage provision and the assignment of these species into categories A, B, and C of Alternative 3, as described below.

Description of Categories

The following text describes the three categories in Alternative 3. In text discussions these alternatives are referenced as 3A, 3B, and 3C, to link the categories to Alternative 3. The category discussions include additional information clarifying the linkage between objectives and management actions of each category and describing the criteria for assigning species to the various categories. A taxon, or range-defined portion of a taxon, can be assigned to only one category.

Category 3A (Rare)

The species assigned to this category are those assigned to Categories 1A, 1B, and 1E in Alternative 1. The objectives and management direction, however, are different in this alternative.

Objective: Manage all known sites, minimize inadvertent loss of undiscovered sites, and learn more about the species to better determine how it should be managed and to which category it should be assigned.

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Criteria for assigning a species to Category 3A are:

- The species is rare, and all known sites or population areas are likely to be necessary to provide reasonable assurance of species persistence, as indicated by one or more of the following:
  - Low number of likely extant sites/records on federal lands indicates rarity.
  - Not well distributed within species range or habitat.
  - Limited number of individuals per site.
  - Highly specialized habitat requirements (narrow ecological amplitude).
  - Dispersal capability limited relative to federal habitat.
  - Microsite habitat limited.
  - Reproduction or survival not sufficient.
  - Low number of sites in reserves or low likelihood of sites or habitat in reserves.
  - Habitat fragmentation that causes genetic isolation
  - Factors beyond management under the Northwest Forest Plan affect persistence, but special management under the NFP will help persistence.
  - Declining habitat trend.

Or

- The species is rare, and the number of likely extant sites/records and survey information on federal lands indicate possible rarity of the species; and
- Information is insufficient to determine whether Survey and Manage basic criteria are met, or to determine what management is needed for a reasonable assurance of species persistence.

Management Direction:

Manage All Known Sites. The size of the area to be managed will include the known site and all stands within 250 meters, regardless of age. Management Recommendations, when prepared, will identify the appropriate management of the site, but will not reduce the size. All known sites will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the Regional Ecosystem Office.

Professional judgement, Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations. For one fungus species, *Bridgeoporous nobilissimus*, there are few known sites. Management areas of all useable habitat up to 600 acres are to be established around these sites to protect those populations until the sites can be thoroughly surveyed and site-specific measures prescribed.

Survey Prior to Habitat-Disturbing Activities. Surveys will be conducted at the project level, prior to implementing habitat-disturbing activities, and in accordance with Management Recommendations or Survey Protocols. Species sites found as a result of these surveys will be managed as known sites. Such surveys are specified for species for which the loss of undiscovered sites could increase the risk to persistence. For species for which pre-disturbance surveys are not practical or information status is undetermined, "equivalent-effort" surveys are designed to find as many occupied sites as reasonably possible. For some species, such surveys will likely only locate a portion of occupied sites. Such surveys are only designed to locate the species if it occurs in an identifiable condition during a reasonable survey time period (no more than two seasons). Equivalent-effort surveys are conducted similar to "practical" surveys, prior to implementing habitat-disturbing activities, and to the same intensity and effort (usually one season and no more than two) during the seasons when the likelihood of detection is highest.

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Strategic Surveys. The objective of strategic surveys in this category is to find the most important habitat for the species and to determine the ability of reserves to provide for a reasonable assurance of species persistence. Priority focus is in reserves for species that are widely distributed, and in highest-likelihood habitat for more endemic species.

Strategic Surveys may address one or more of the following:

- What is the distribution of the species relative to land-use allocations established in the Northwest Forest Plan?
- Identify high-probability habitat for survey to find new sites.
- What is the status of the population (such as number of individuals and size)?
- Where else does the species occur? Survey high-probability habitat at highest risk to find new sites.
- Collect habitat information to assist with managing the species.

Incorporate information from past and ongoing survey efforts. Start surveys for all remaining species within 10 years. Species sites found as a result of these surveys will be managed as known sites.

Category 3B (Uncommon)

The species assigned to this category are those assigned to Categories 1C and 1D in Alternative 1. The objectives and management direction, however, are different in this alternative.

Objective: Identify and manage high-priority sites to provide for reasonable assurance of species persistence. Until high-priority sites can be determined, manage all known sites. Learn more about the species to better determine how it should be managed and to which category it should be assigned.

Criteria for assigning a species to Category 3B are:

- The species is uncommon, and not all known sites or population areas are likely to be necessary for reasonable assurance of persistence of the species as indicated by one or more of the following:
  - A higher number of likely extant sites/records does not indicate rarity of the species.
  - May have low-to-high number of individuals per site.
  - Less restricted distribution pattern relative to range or potential habitat.
  - Moderate-to-broad ecological amplitude.
  - Moderate-to-high likelihood of sites in reserves.

Management Direction:

Manage High-Priority Sites. High-priority sites will be managed according to Management Recommendations. The size of the area to be managed depends on the habitat and the requirements for the species. Management may range from maintaining one or more habitat components (such as down logs or canopy cover) to complete exclusion from disturbance for many acres, and may allow loss of some individuals, areas, or elements not affecting continued site occupancy. Until a Management Recommendation is written addressing high-priority sites, all known sites will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the Regional Ecosystem Office. Professional judgement, Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations.

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Survey Prior to Habitat-Disturbing Activities. Surveys will be conducted at the project level, prior to implementing habitat-disturbing activities, and in accordance with Management Recommendations or Survey Protocols. Sites found as a result of these surveys will be managed as known sites. For species for which pre-disturbance surveys are not practical, "equivalent-effort" surveys are designed to find as many occupied sites as reasonably possible. For some species, such surveys will likely locate only a portion of occupied sites. Such surveys are only designed to locate the species if it occurs in an identifiable condition during a reasonable survey time period (no more than two seasons.) Equivalent-effort surveys are conducted similar to "practical" surveys, prior to implementing habitat-disturbing activities and to the same intensity and effort (usually one season and no more than two) during the seasons when likelihood of detection is highest. Management Recommendations or Survey Protocols may identify habitats or conditions where it is no longer necessary to continue surveys.

Strategic Surveys. The objective of strategic surveys in this category is to find the most important habitat for the species and to determine the ability of reserves to provide for a reasonable assurance of species persistence. Priority focus is in reserves for species widely distributed, and in highest-likelihood habitat for more endemic species.

Strategic Surveys may address one or more of the following:

- What is the distribution of the species relative to land-use allocations established in the Northwest Forest Plan?
- Identify high-probability habitat for survey to find new sites.
- What is the status of the population (such as number of individuals and size)?
- Where else does the species occur? Survey high-probability habitat at highest risk to find new sites.
- Collect habitat information to assist with managing the species.

Incorporate information from past and ongoing survey efforts. Start surveys for all remaining species within 10 years. Species sites found as a result of these surveys will be managed as known sites.

Category 3C (Uncommon or Rarity Unknown; Status Undetermined)

The objective, criteria, and species assigned to this category are the same as for Category 1F in Alternative 1. The management criteria, however, are different.

Objective: Determine if the species meets the basic criteria for Survey and Manage and, if so, to which category it should be assigned.

Criteria for assigning a species to Category 3C are:

- The species is uncommon, and the number of likely extant sites/records and survey information does not indicate rarity, and:
- Information is insufficient to determine whether Survey and Manage basic criteria are met, or to determine which management is needed for species persistence.

Management Direction:

Manage All Known Sites. Current and future known sites (except arthropods) will be managed according to Management Recommendations. The size of the area to be managed depends on the habitat and the requirements for the species. Management may range from maintaining one or more habitat components (such as down logs or canopy cover) to complete exclusion from disturbance for many acres, and may allow loss of some individuals, areas, or elements not affecting continued site occupancy. All known sites will be managed, *except* that professional judgement, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed

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by the Regional Ecosystem Office. Professional judgement, Appendix J2 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations.

Strategic Surveys. The objective of strategic surveys in this category is to collect enough information to determine if the species meets the basic criteria for Survey and Manage, and to either place the species into the appropriate Survey and Manage category or to remove it from the list. In cases where the strategic survey indicates that a species is potentially still rare, but the species is not closely associated with late-successional or old-growth forests, the species will be considered for the special status species programs of the Agencies.

Give these species high priority. Incorporate information from past and ongoing survey efforts. Start surveys for all remaining species within 10 years. Species sites found as a result of these surveys will be managed as known sites.

Strategic Surveys may address one or more of the following:

- *Is the species closely associated with late-successional/old-growth forests?*
- Does the species occur within the Northwest Forest Plan area?
- What is the appropriate management for the species?
  - — Does the species meet the basic criteria for Survey and Manage?
  - — What is the appropriate Survey and Manage category?
- What is the level of concern for persistence?

Protection Buffers

The management direction for Protection Buffers is the same as for Alternative 1.

Manage Recreation Areas to Minimize Disturbance to Species

The management direction for Recreation Areas is the same as described for Alternative 1.

Protect Sites From Grazing

The management direction for Grazing is the same as described for Alternative 1.

Provide Additional Protection for Caves, Mines, and Abandoned Wooden Bridges and Buildings That are Used as Roost Sites for Bats

The management direction for Bats is the same as described for Alternative 1.

Adaptive Management

The following direction for Adaptive Management is the same as in Alternative 1, except that some categories and their criteria have been combined and relabeled.

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The Agencies have encountered complexities in applying the present adaptive management process to the Survey and Manage Standards and Guidelines due to the absence of specific steps and criteria in the Northwest Forest Plan Record of Decision for such changes or refinements. The following adaptive management detail is designed to make the standards and guidelines more efficient for the Agencies to implement while maintaining benefits to species.

The adaptive management process for the Survey and Manage Standards and Guidelines is refined by adding a specific process and criteria for making future adaptive management changes. The specific criteria for refining or changing species management are based on the strategies and objectives of the specific categories.

Acquiring and Evaluating New Information

The Adaptive Management Process

The adaptive management process for Survey and Manage Standards and Guidelines includes three steps:

- Acquiring new information.
- Evaluating new information pertaining to species and arthropod guilds..
- Implementing changes or refinements to Survey and Manage Standards and Guidelines.

These process steps are described individually below.

Acquiring New Information Relative to Survey and Manage

New knowledge may arise from various sources. New information concerning the efficiency of the standards and guidelines will be generated mostly through implementation experience as done in the past. Sources of new information may include taxa experts, resource specialists, scientists, data from Agency surveys, research, and members of the public. The Regional Ecosystem Office will coordinate compilation of new information.

When new information indicates a need for change, a regional-level interagency group including taxa experts will weigh new information against the criteria below to determine if additions or deletions to Survey and Manage, or changes of species among categories are warranted. Information addressing the appropriate criteria (Survey and Manage basic criteria, level of rarity, and category criteria) must be submitted with the proposed change to the Regional Ecosystem Office. Proposals for changes to species within Survey and Manage will not obligate the Agencies to gather additional information. This process is discussed in more detail in the evaluation process section below.

Evaluating New Information Pertaining to Species

New information presented for evaluation when considering changes to Survey and Manage Standards and Guidelines should address the following criteria, as appropriate.

Criteria for Adding, Removing, or Changing a Species in Survey and Manage

The basic criteria for Survey and Manage are key to the evaluation process.

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Three Basic Criteria for Survey and Manage

- The species must occur within the Northwest Forest Plan area, or occur close to the NFP area and have potentially suitable habitat within the NFP area.
- The species must meet the criteria for being closely associated with late-successional or old-growth forest (see Appendix E).
- The reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence.

Criteria for Adding Species to Survey and Manage

Species proposed for addition to the Survey and Manage Standards and Guidelines must be published taxonomic entities and must meet the basic criteria for Survey and Manage.

The new information to support addition of a species to Survey and Manage must address these three basic criteria, including the specific factors used as a basis for determining concern for persistence. *The factors must apply to at least an identified portion of the species range within the Northwest Forest Plan area.*

One or more of the following factors may indicate that persistence is a concern. These factors must be considered in the context of other standards and guidelines (other than Survey and Manage) in the Northwest Forest Plan.

—Low-to-moderate number of likely extant known sites/ records in all or part of species range.
—Low-to-moderate number of individuals.
—Low-to-moderate number of individuals at most sites or in most populations.
—Very-limited to somewhat-limited range
—Very-limited to somewhat-limited habitat.
—The distribution of the species within habitat is spotty or unpredictable in at least part of its range within theNorthwest Forest Plan area.

The information to add species to the Survey and Manage Standards and Guidelines must meet a standard of clear or reasonable evidence. New species will not be added to Category 3C.

Criteria for Removing Species from Survey and Manage

When new information indicates that a species no longer meets the basic criteria for Survey and Manage, removal of the species will be proposed.

New information to support removing a species from the Survey and Manage Standards and Guidelines may address any one of these three criteria. If the species is proposed for removal because there is not a concern for its persistence, the new information must address the specific factors indicating that persistence is not a concern as listed below. *The factors must apply to at least an identified portion of the species range within the Northwest Forest Plan area.*

Usually, most of the following factors must be true to indicate that persistence is not a concern:

- Moderate-to-large number of likely extant sites/records.
- High proportion of sites and habitat are in reserve land-use allocations.
- Sites are well distributed within the species range.
- Matrix prescriptions or other elements of the Northwest Forest Plan provide for reasonable assurance of species persistence.
- Limited number of sites within reserves, but proportion or amount of potential habitat within reserves is high, and there is high probability that the habitat is occupied.

Species removed from the Survey and Manage Standards and Guidelines because they are not closely associated with late-successional or old-growth forests, but are still of

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concern for persistence will be considered for inclusion in special status species programs of the Agencies.

Criteria for Changing a Category Assigned to Species in Survey And Manage

New information to support changing a species from one Survey and Manage category to another must address the specific criteria for the categories involved in the change. The new information needs to support the proposed change by showing how the species no longer meets the criteria of the present category and better meets the criteria for the proposed category.

Criteria for placing a species under specific categories are as follows:

Category 3A (Rare) Criteria for a species to be assigned to Category 3A are:

- The species is rare, and all known sites or population areas are likely to be necessary for a reasonable assurance of persistence, as indicated by one or more of the following:
  — Low number of likely extant sites/records on federal lands indicates rarity.
  — Not well distributed within species range or habitat.
  — Limited number of individuals per site.
  — Highly specialized habitat requirements (narrow ecological amplitude).
  — Dispersal capability limited relative to federal habitat.
  — Microsite habitat limited.
  — Reproduction or survival not sufficient.
  — Low number of sites in reserves or low likelihood of sites or habitat in reserves.
  — Habitat fragmentation that causes genetic isolation
  — Factors beyond management under the Northwest Forest Plan affect persistence, but special management under the NFP will help persistence.
  — Declining habitat trend.

Or

- The species is rare, and the number of likely extant sites/records and survey information on federal lands indicate rarity of the species, and:
  — Information is insufficient to determine that Survey and Manage basic criteria are met, or to determine what management is needed for a reasonable assurance of persistence.

Category 3B (Uncommon). Criteria for a species to be assigned to Category 3B are:

- The species is uncommon, and not all known sites or population areas are likely to be necessary for a reasonable assurance of persistence of the species, as indicated by one or more of the following:
  — A higher number of likely extant sites/records does not indicate rarity of the species.
  — May have low to high number of individuals per site.
  — Less restricted distribution pattern relative to range or potential habitat.
  — Moderate-to-broad ecological amplitude.
  — Moderate-to-high likelihood of sites in reserves.

Category 3C (Uncommon or Rarity Unknown; Status Undetermined). Criteria for a species to be assigned to Category 3C are:

- The species is uncommon, and the number of likely extant sites/records and survey information on federal lands does not indicate rarity, and:
- There is not sufficient information to determine whether Survey and Manage basic criteria are met, or to determine which management is needed for a reasonable assurance of persistence.

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Analysis Process

The process for analyzing or evaluating new information pertaining to species will involve a panel of agency taxonomic experts, resource specialists, and resource specialists similar to the process used to evaluate new information in this SEIS. The panel of experts will convene at least once a year to evaluate and respond to new accumulated information and to propose changes to appropriate management of species under the Survey and Manage Standards and Guidelines.

The panel will use the specific criteria and factors defined for making determinations regarding whether there is a concern for persistence and placement of species within individual categories of Survey and Manage. The number and combination of criteria and factors used in making a judgement about concern for persistence or appropriate placement of species within individual categories will vary, depending on the species and the type and quality of information available.

Because no clear formula exists for reaching a conclusion, the analysis process relies on the professional judgement of the experts to weigh the various factors and criteria. To avoid being arbitrary, and to have the process and conclusions be approximately repeatable, it is important to provide the assumptions, criteria, factors, and logic used as a basis for the professional judgement. For purposes of these evaluation, the factors and criteria listed for use in these evaluations will constitute the foundation of the assumptions, criteria, factors, and logic to support the conclusions.

The process proposed for future adaptive management changes under Survey and Manage Standards and Guidelines was developed and used for species analysis in this SEIS. Changes to Survey and Manage and Protection Buffer species management resulting from the analysis in this SEIS are included on Table 2-2 and summarized by taxa group in Table 2-10, at the end of this chapter. These changes are attributable to new information since 1994 and to a clarification and refinement of the criteria for assigning species to individual categories as described in this section and under the descriptions of the individual categories.

Implementing Changes or Refinements to Survey and Manage

The criteria and evaluation process for species that is presented in this SEIS and proposed for use in future adaptive management changes is designed to continue approximately the same level of assurance of persistence. The process and results are repeatable because the assumptions, criteria, and logic used in reaching determinations relating to species disposition under the Survey and Manage Standards and Guidelines will remain constant. Proposed changes to management of species under the Survey and Manage Standards and Guidelines resulting from the periodic evaluations of new information will be forwarded to the Regional Ecosystem Office. The REO will facilitate review and approval by the Regional Interagency Executive Committee (RIEC). The purpose of the RIEC review is to ensure that current information about the species has been appropriately considered and weighed against the stated criteria, and that the resultant proposal continues to provide for the level of protection intended by the standards and guidelines. The RIEC may delegate approval authority to the REO Executive Director. Approved adaptive management changes to the Survey and Manage Standards and Guidelines and changes to associated species will be published in an annual report. This process is adequately described, and its expected results regarding effects on species are sufficiently predictable, that this process is considered in the effects discussion in this SEIS. No additional NEPA-related documentation is anticipated when applying this process in future years.

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Evaluating New Information Pertaining to Management Recommendations and Survey Protocols

Management Recommendations are developed in cooperation with taxa experts and specialists for use at field offices of the BLM and Forest Service. Management Recommendations are reviewed by the Regional Ecosystem Office and jointly transmitted to the field offices, along with their effective date, by the BLM and Forest Service. Changes proposed to Management Recommendations, Survey Protocols, and Strategic Survey Plans as a result of new information about a species, or as a result of new information from implementation experience, will be made through the same process used to develop the original Recommendations and Protocols. Changes to Management Recommendations, Survey Protocols, and Strategic Survey Plans constitute administrative changes to the technical details of specific site management and surveys.

Alternatives Considered But Eliminated From Detailed Study

An environmental impact statement must rigorously explore and objectively evaluate all reasonable alternatives. The range of alternatives is limited by the requirement to fulfill the Purpose and Need to which the Agencies are responding in proposing the alternatives.

Many of the alternatives considered by the interdisciplinary team were eliminated from detailed study in attempts to find reasonable alternatives that would fulfill the Underlying Need for the Proposed Action and the Purpose of this SEIS (sometimes referred to simply as the Purpose and Need.) The Purpose and Need, as described in Chapter 1, is to better identify protections needed, clarify language, eliminate inconsistent and redundant direction and establish a process responsive to new information for the Survey and Manage and related mitigation measures, while continuing to meet the underlying needs of the Northwest Forest Plan of providing a balance between species protection and the production of goods and services including timber sales. The Purpose and Need substantially limited the range of reasonable alternatives available for analysis and provided a relatively narrow scope for this action. It was not the objective nor intent of this action to re-examine the overall strategy of the Northwest Forest Plan.

Among potential alternatives considered were various strategies proposed by the public during the scoping process, as well as some strategies proposed by Agency staff. Some proposals reflected a desire to make fundamental changes in the Northwest Forest Plan; some proposals were very technical in nature; and others were based on broad generalizations. Overall, the interdisciplinary team discovered that few strategies were available that would meet the goal of improving Agency and resource program efficiency while continuing to meet the underlying needs of the Northwest Forest Plan. Additional alternatives would have been possible if a broader revision of the Northwest Forest Plan had been the objective of this action; however, no such broad revision was deemed necessary to meet the purpose and need.

Alternatives considered but eliminated from detailed study are summarized below:

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Alternative With Focus on Gathering Information About Species and Their Habitat Needs

This alternative would emphasize gathering information through surveys for species and other means, while eliminating the requirement to protect known sites of species. Information gathering would be for the purpose of determining necessary protections under existing programs or federal laws. This alternative would not fulfill the Purpose and Underlying Need, because it would not adequately provide for species protection in the short term (by protecting known sites), therefore increasing the risk to persistence. This strategy was analyzed in Appendix J2 of the Northwest Forest Plan FSEIS (pp. J2-58 through J2-79), and that analysis was used in reaching the conclusion regarding this alternative. The main element of this strategy, strategic surveys, is included in all action alternatives for all species.

Alternative Focusing on Protection of Known Sites of Species

This alternative would protect all known sites of species, while eliminating the requirement to conduct species surveys. No additional information would be required to be gathered under this alternative. This alternative would not fulfill the Purpose, because the concern for persistence for many of these species, related to uncertainty based on lack of information, would not be addressed. This strategy was analyzed in Appendix J2 of the Northwest Forest Plan FSEIS (pp. J2-58 through J2-79), and that analysis was used to reach the conclusion regarding this alternative.

Alternative Maintaining Currently Known Sites While Conducting Strategic Surveys to Determine Best Future Management

This alternative would defer pre-disturbance surveys and rely on strategic surveys done within a limited time frame to determine which species need additional protections. This approach would expedite the time frame for the Agencies in gathering general knowledge about species, and could result in some species being removed from Survey and Manage while improving management of others based on better information. Under this alternative, undiscovered sites of rare species could be at risk in the short term. Alternative 2 in this SEIS examines such a strategy for species in the uncommon category, and such an emphasis could be considered for other species in the future if that strategy worked well. This strategy was not considered for species placed in the rare category under the action alternatives, because activities might inadvertently create a risk to viability for species occupying only a few sites.

Alternative Proposing Changes in Distribution and Strategy of Reserves

This alternative would eliminate the standards and guidelines for Survey and Manage and the Protection Buffers, and in lieu redesign the reserve system giving greater protection for small, isolated stands of old-growth forests and providing greater distribution of reserves. Because of the extent that this proposal intends to alter the reserve system, it was assumed for this analysis that the large blocks of reserves would be made smaller so that the reserves could be more evenly distributed across the landscape. Such a strategy does not meet the Purpose because it would no longer be a mitigation measure for Alternative 9 of the Northwest Forest Plan FSEIS, but a new alternative.

Alternative Prohibiting Harvest of Old-Growth Forests

This alternative would eliminate the standards and guidelines for Survey and Manage and for Protection Buffers and also prohibit harvest of old-growth forests on federal lands. Prohibiting the harvest of old-growth forests would not fulfill the Underlying Need, because the balance of effects anticipated in the Northwest Forest Plan concerning development, extraction, and use of other forest resources would not be met. In addition, Survey and Manage is a mitigation measure, and such an alternative would, in effect, mitigate Alternative 9 to look like Alternative 1 in the Northwest Forest Plan FSEIS. The Needs that compelled this SEIS were

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not so much that these species were not sufficiently protected, but were primarily that the measures were far more costly, inefficient, and inflexible than anticipated.

Alternative Providing Additional Mitigation in the Matrix Land-use Allocation

This alternative would eliminate the standards and guidelines for Survey and Manage and for Protection Buffers and, in lieu, have a strategy based on maintaining habitat elements. This strategy would increase the requirements for retaining green trees, coarse woody debris, and snags in the Matrix land-use allocation. This alternative would not fulfill the Need or Underlying Purpose, because it would not adequately provide short-term protection of known sites for species, thereby increasing risk to persistence. In addition, this alternative would not address the risk or concern for persistence for many species related to lack of information. The analysis in Appendix J2 of the Northwest Forest Plan FSEIS (Appendix J2 in USDA, USDI 1994a, pp. J2-19, and J2-58 through J2-79) already considered increases in green tree and coarse wood, and these measures were adopted as mitigation measures in the Northwest Forest Plan. There is no information in that analysis or elsewhere that indicates these elements are insufficient or limiting for most Survey and Manage species.

Alternative Strengthening the Late-Successional Elements and Connectivity in the Matrix Land-use Allocation

This alternative would eliminate the standards and guidelines for Survey and Manage and for Protection Buffers. In lieu, this alternative proposed a strategy that would focus on strengthening biological connectivity among reserves by prohibiting harvest of late-successional forest in the Matrix land-use allocation, significantly increasing the level of green tree retention in harvest units, and lengthening harvest rotations. This strategy increases emphasis on biological connectivity to protect the genetic diversity of species. Prohibiting harvest of late-successional forests would not fulfill the Underlying Need because the balance of effects anticipated in the Northwest Forest Plan concerning development, extraction, and use of other forest resources would not be met.

Further, Alternative 1 in the Northwest Forest Plan FSEIS (USDA, USDI 1994a) examined the strategy of prohibiting harvest of late-successional forest. In addition, this alternative would not fulfill the Purpose and Need, because it would not address the lack of information related to risk or concern for persistence for many isolated species. The analyses in Appendix J2 of the Northwest Forest Plan FSEIS (USDA, USDI 1994a, p. J2-15 and others) were reviewed in reaching these conclusions.

Alternative Protecting Species Only Through Agency Sensitive Species Lists or Through the Endangered Species Act

This alternative would eliminate the standards and guidelines for Survey and Manage and for Protection Buffers in lieu of a strategy that would protect species known to be at risk through current Agency regulations regarding sensitive species and through the existing Endangered Species Act requirements.

The existing requirements for sensitive species and the Endangered Species Act were considered in the Northwest Forest Plan FSEIS when adopting the mitigation measures for Survey and Manage and for Protection Buffers to provide for species persistence. There were concerns that such a strategy would not address risks or concerns for persistence that are based on incomplete information. A considerable degree of uncertainty exists regarding these species based on incomplete information, and this proposal was determined not address the need to gain additional information through strategic surveys. Additionally, it is the policy of the BLM and Forest Service to manage for species to avoid the need for their listing under the Endangered Species Act.

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This strategy is an important component of Alternative 2. For the 53 uncommon species, strategic surveys will be completed within 5 years; species for which there is still a concern for persistence will be included in the special status species programs of the Agencies. If successful, this strategy could be considered for other Survey and Manage species in the future.

Alternative Relying on the National Forest Management Act "Viability" Regulations to Protect Species

This alternative would remove all but vertebrate species from the Survey and Manage and the Protection Buffer Standards and Guidelines. In addition, this alternative would not apply these standards and guidelines to BLM-administered lands. The National Forest Management Act regulations provide that *"Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area"* (36 CFR 219.19).

This strategy would attempt to maintain stable well-distributed populations only of vertebrate species, and only on lands administered by the Forest Service. This alternative would not meet an underlying need of the Northwest Forest Plan for "...habitat that will support populations of native species...," because it would eliminate the Survey and Manage mitigation measure for species located on BLM-administered lands, and eliminate the measure for all but vertebrates on National Forest System lands. Questions about application of the National Forest Management Act regulation concerning viability were addressed in the Northwest Forest Plan FSEIS in response to public comments and addressed by the court decision on the Northwest Forest Plan (Seattle Audubon Society v. Lyons 871 F. Supp. 1291 [W.D. Wash. 1994]).

Alternative That Would Vary Individual Management of the Hundreds of Survey and Manage Species

This strategy would attempt to create individualized management of the hundreds of Survey and Manage species to minimize impact to other programs and to maximize benefits to species. Hundreds of variations of management strategies would be possible. This strategy could also create many combinations of various strategies for groups of species. If this alternative were approached by writing standards and guidelines tailored to each species, it would likely be so complex as to fail to meet the Underlying Need for the Proposed Action by not reducing conflicts and overlap in management strategy, not adding clarity to management direction, and not reducing unreasonably high costs. It would also be more difficult for such a strategy to respond to new information about species. The objectives of such a strategy are met in the action alternatives, which provide for individual Management Recommendations written by taxa experts and manager and reviewed by the Regional Ecosystem Office.

Alternative That Would Maintain the PSQ Levels in the Current Forest and District Land and Resource Management Plans

This strategy would limit Survey and Manage known site acreage to the level identified in the 1994 Northwest Forest Plan FSEIS, to help maintain the "balance" of commodities and habitat protection in the Northwest Forest Plan Purpose and Need. This alternative would not meet the Purpose and Need of providing for the viability of vertebrate species, and non-vertebrates to the extent practicable. The PSQ uncertainties related to implementation of the Survey and Manage mitigation measure were acknowledged in the FSEIS (USDA, USDI 1994a, p. 3&4-267.)

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Comparison of the Effects of the Alternatives

Chapter 3&4 describes environmental consequences of the alternatives. The action alternatives modify and clarify Survey and Manage related standards and guidelines and propose a detailed process for using new information concerning rare and uncommon species in the future (adaptive management). The environmental consequences of the three alternatives vary as a result of differences in the management of sites and surveys for these species. The environmental effects described in the Northwest Forest Plan FSEIS (USDA, USDI 1994a) that are not associated with the proposed action of this SEIS are considered to remain valid and are incorporated by reference. The following discussion summarizes the impacts identified in detail in Chapter 3& 4.

Effects - Forest Ecosystems

The Northwest Forest Plan is an ecosystem approach to land management that focuses on habitat for late-successional and old-growth forest related species. It features a functional interconnected, late-successional and old-growth network to provide dispersal (short term) and movement between reserves (long term), and essential processes for selection, adaptation, and evolution. The major focus, as such, is on function, rather than structure or composition; this is a relatively "coarse" approach. The processes of succession and disturbance are expected to create a diversity of landscape pattern across the regional network.

In the long term, no significant cumulative change is anticipated in the overall functioning of succession or disturbance as a result of differences among alternatives. The Northwest Forest Plan FSEIS (USDA, USDI 1994a) concluded that the acres associated with Survey and Manage and related mitigation would have a relatively minor effect on the maintenance of a functional and interconnected, late-successional forest ecosystem. Although the number of acres associated with Survey and Manage Standards and Guidelines is greater than was anticipated (tens of thousands of acres), it is not significant in relation to the approximately 20 million acres of reserves.

The overall strategy for the Northwest Forest Plan is restoring and maintaining functional late-successional forest and old-growth forest ecosystems. The species-specific strategy of the Survey and Manage Standards and Guidelines may sometimes conflict with the management associated with the overall strategy of the Northwest Forest Plan. One example of this potential conflict is the use of prescribed burning or allowing natural burning to restore ecological functions to fire-associated forests in southern Oregon or northern California. There may be situations where species under Survey and Manage Standards and Guidelines depend on habitat that is a result of fire exclusion from the ecosystem. Information concerning ecology at both the watershed and landscape scale, as well as the local scale, is important in resolving these conflicts.

Effects - Aquatic Ecosystems

The Northwest Forest Plan was designed to protect streams, lakes, and wetlands within the range of the northern spotted owl (Figure 1-1). The Aquatic Conservation Strategy is a habitat-based approach developed to restore and maintain ecological health of watersheds and aquatic ecosystems contained within them on public lands. The four major components of the Aquatic Conservation Strategy (Riparian Reserves, Key Watersheds, Watershed Analysis and Watershed Restoration) provide the basis for protecting flora and fauna that is aquatic dependent or is either fully or partly riparian dependent.

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The protection provided to aquatic-dependent flora and fauna with the Aquatic Conservation Strategy should result in stable well-distributed populations regardless of the alternative selected. This is due to the Riparian Reserve network and the other components and framework of the Aquatic Conservation Strategy. Riparian Reserves protect and restore functions and process of an interconnected network of aquatic systems.

The degree of protection provided by the four alternatives is in addition to the protection provided by the Aquatic Conservation Strategy. The three action alternatives require strategic surveys to collect additional information to develop and refine Management Recommendations. This provision allows management of species in isolated habitats that will supplement the protection provided for by the Aquatic Conservation Strategy.

Effects - Air and Water Quality, Soil Productivity, and Fire Management

The Northwest Forest Plan standards and guidelines for air and water quality, and also soil productivity, have started to improve the general ecosystem health as well as management of habitat for late-successional and old-growth forest related species. Soil quality is protected through Agency standards, following "Best Management Practices" as prescribed by the Clean Water Act, and implementing the Northwest Forest Plan and Aquatic Conservation Strategy. Watershed conditions and functions are protected or restored, based on priorities, through activities identified in watershed analysis, Water Quality Recovery Plans (Clean Water Act), and/or consultation with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

There have been changes in air quality since 1994. Smoke generated from burning slash in forest management activities has declined commensurately with the decline of timber harvesting. Conversely, there has been an increase in prescribed burning for ecological health and to reintroduce fire into fire-dependent ecosystems. Slash from forest management activities tends to include heavier fuel loadings and, therefore, generates greater volumes of smoke than does burning of natural fuels for ecological reasons. The overall impact to airsheds has been a decline in smoke generated from prescribed burning by the Agencies.

In the short term, the requirements for surveys and management of known sites under all alternatives would have the potential to delay or eliminate some management activities that would otherwise benefit air, water or soil resources. Those actions that could be affected include subsoiling, fuel treatment, upland watershed restoration and riparian restoration treatments. However, in the long term under all alternatives, these conflicts are expected to be reduced or resolved through the adaptive management use of increased knowledge. The effects of the potential conflicts of Survey and Manage Standards and Guidelines with management activities that would benefit air, water or soil resources would be minor in the short term and inconsequential in the long term; this effect is based on the relatively small amount of acres (tens of thousands) associated with Survey and Manage, compared to the total of 24.4 million acres of federally managed lands within the Northwest Forest Plan area.

Effects - Bryophytes

Bryophytes include hornworts, liverworts and mosses. The habitat components important to bryophytes include live, old-growth trees, decaying wood, riparian zones, and generally the habitat characteristics achieved by more extensive and interconnected late-successional and old-growth forest conditions. The No-Action Alternative applied the Survey and Manage Standard and Guideline to 25 bryophyte species, and the

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Protection Buffer Standard and Guideline to 9 bryophytes. There are a total of 29 bryophytes considered under these standards and guidelines, with some species under both Survey and Manage and Protection Buffer Standards and Guidelines.

Eleven species of bryophtes would be removed from Survey and Manage and Protection Buffer Standards and Guidelines under the action alternatives, either in all or portions of their range, because they no longer meet the Survey and Manage basic criteria.

For the remaining species, the four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the Agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

Compared to the No-Action Alternative, species would receive different management under the action alternatives as a result of applying new information and the slightly different emphasis of the alternatives. Under Alternatives 1 and 2: pre-disturbance surveys would be added for 1 bryophyte and removed for 8 bryophytes; strategic surveys would be added for 9 bryophytes; management of known sites would be removed for 1 bryophyte; and 11 bryophytes would be removed from the Survey and Manage Standards and Guidelines.

Under Alternative 3: pre-disturbance surveys would be added for 7 bryophytes and removed for 1 bryophyte; strategic surveys would be added for 9 bryophtyes; and 11 bryophytes would be removed from the Survey and Manage Standards and Guidelines.

Most of the bryophytes would have an equal or greater likelihood of a stable, well-distributed population under the action alternatives when compared to the No-Action Alternative.

For the 11 bryophytes that would be removed from the Survey and Manage Standards and Guidelines, 7 would be expected to have stable, well-distributed populations. Four species at risk for not maintaining a stable, well-distributed population do not meet the basic criteria for the Survey and Manage Standard and Guideline and could be considered for protection under the sensitive species programs of the Agencies or for listing under the Endangered Species Act.

Eighteen bryophytes species would remain on the Survey and Manage Standards and Guidelines. Stable, well-distributed populations would be expected under the alternatives as follows: 3 bryophytes under No-Action; 6 bryophytes under Alternative 1; 4 bryophytes under Alternative 2; and 7 bryophytes under Alternative 3.

For some species, the alternatives provide mitigation to the extent practical or appropriate, but the species may not have a stable, well-distributed population for reasons outside the control of the Northwest Forest Plan. This situation would exist for 7 bryophytes under No-Action; 10 bryophytes under Alternatives 1 and 2; and 11 bryophytes under Alternative 3.

For some species, some alternatives would not provide enough mitigation to maintain or achieve a stable, well-distributed population. This situation would exist for 8

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bryophytes under No-Action; 2 bryophytes under Alternative 1; 4 bryophytes under Alternative 2; and zero bryophytes under Alternative 3.

Effects - Fungi

Fungi, which are neither plants nor animals, are recognized as a separate kingdom of organisms, both in structure and function. Fungi are essential to the functioning of forest ecosystems. There are 225 fungi included in the Survey and Manage Standards and Guidelines in the No-Action Alternative.

Under all action alternatives, because they do not meet the basic criteria for Survey and Manage, 16 species are proposed to be removed from Survey and Manage Standards and Guidelines, and 1 species is proposed to be removed from part of its range. Of these 17 species, two species do not meet the basic criteria of Survey and Manage, but are at risk for a stable, well-distributed population and would be considered for sensitive species programs of the Agencies or for listing under the Endangered Species Act. One species does not occur in the Northwest Forest Plan area, five are synonyms of other species, and nine are expected to have stable, well-distributed populations.

There are 196 species of fungi under Alternative 1,and 202 species of fungi under Alternative 2, that would be either unchanged or receive greater protection compared to the No-Action Alternative. Under Alternative 3, 209 species of fungi would either be unchanged or receive greater protection compared to the No-Action Alternative. On an overall basis, the action alternatives would provide for stable well-distributed populations of fungi.

Effects - Lichens

Lichens are a conspicuous component of old-growth forest ecosystems where they play an important ecological role. The habitat components important to lichens include live, old-growth trees, decaying wood, riparian zones, and extensive and interconnected late-successional and old-growth forest conditions. Under the No-Action Alternative, the Survey and Manage Standard and Guideline was applied to 84 lichen species.

Thirty-seven species of lichens are proposed to be removed from Survey and Manage and Protection Buffer Standards and Guidelines under the action alternatives, either in all or portions of their range because they no longer meet the Survey and Manage basic criteria.

For the remaining species, the four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the Agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

Compared to the No-Action Alternative, species would receive different management under the action alternatives as a result of applying new information and the slightly different emphasis of the alternatives. Under Alternative 1, pre-disturbance surveys are added for 2 lichens; known site management is increased for 13 lichens; known site

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protection is removed for 1 lichen; and 37 lichens are removed from the Survey and Manage Standards and Guidelines.

Under Alternative 2, 23 lichens receive increased known site protection (for sites known as of September 30, 1999); pre-disturbance surveys are added for 1 lichen; and 37 lichens are removed from the Survey and Manage Standards and Guidelines.

Under Alternative 3, 23 lichens would receive increased known site protection; pre-disturbance surveys would be added for 33 lichens; and 37 lichens would be removed from the Survey and Manage Standards and Guidelines.

Most of the lichens would have an equal or greater likelihood of a stable, well-distributed population under the action alternatives when compared to the No-Action Alternative.

For the 37 lichens proposed to be removed from the Survey and Manage Standards and Guidelines, 34 are expected to have stable, well-distributed populations. Three species at risk for not maintaining a stable, well-distributed population do not meet the basic criteria for the Survey and Manage Standard and Guideline and may be considered for protection under the sensitive species program of the Agencies or for listing under the Endangered Species Act.

Forty-seven lichen species would remain on the Survey and Manage Standards and Guidelines. Stable, well-distributed populations of lichens are expected under the alternatives as follows: 10 lichens under No-Action; 13 lichens under Alternative 1; 11 lichens under Alternative 2; and 13 lichens under Alternative 3.

For some species, the alternatives would provide mitigation to the extent practical or appropriate, but the species may not have a stable, well-distributed population for reasons outside the control of the Northwest Forest Plan. This situation would exist for 24 lichens under No-Action; 34 lichens under Alternatives 1; 29 lichens under Alternative 2; and 34 lichens under Alternative 3.

For some species, some alternatives would not provide enough mitigation to maintain or achieve a stable, well-distributed population of lichens. This situation would exist for 13 lichens under No-Action; zero lichens under Alternative 1; 7 lichens under Alternative 2; and zero lichens under Alternative 3.

Effects - Vascular Plants

Vascular plants are defined as those that contain conducting or vascular tissue. The Survey and Manage Standard and Guideline is applied to 18 vascular plant species under the No-Action Alternative.

Under the action alternatives, four species of vascular plants are proposed to be removed from Survey and Manage Standards and Guidelines, and two species are to be removed in part of their range. These species have been found to no longer meet all basic criteria for Survey and Manage Standards and Guidelines.

For the remaining species, the four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

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The three action alternatives have similar provisions for adaptive management to allow the Agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

Compared to the No-Action Alternative, species would receive different management under the action alternatives as a result of applying new information and the slightly different emphasis of the alternatives. Under Alternative 1, 2 and 3, strategic surveys would be added for 11 vascular plants, and 6 vascular plants would be removed from the Survey and Manage Standards and Guidelines in all or part of their range.

Under Alternative 2, one vascular plant would receive increased known site protection, and pre-disturbance surveys would be removed for four vascular plants.

Under Alternative 3, one vascular plant would receive increased known site protection.

All six of the vascular plants to be removed from the Survey and Manage Standards and Guidelines are expected to have stable, well-distributed populations.

All 12 of the vascular plant species that would remain on the Survey and Manage Standards and Guidelines are expected to have stable, well-distributed populations. The likelihood of stable, well-distributed populations for these species would be greater under Alternatives 1 and 3 compared to the No-Action Alternative, and would be greater under the No-Action Alternative compared to Alternative 2.

Effects - Arthropods

Arthropods are invertebrates with jointed legs, a segmented body, and an exoskeleton (an external supporting covering). They include insects, crustaceans, arachnids, and myriapods. Collectively, arthropods constitute over 85 percent of the biological diversity in late-successional and old-growth forests in the Pacific Northwest.

Arthropods are treated as functional groups with many taxa represented in each group, instead of individual species. The only difference for arthropods being treated as a group, instead of individually, is that among the alternatives the three action alternatives include specific provisions for adaptive management. The conclusion of the Northwest Forest Plan FSEIS that arthropods will have a high likelihood of being stable and well distributed with gaps in their distribution would basically be unchanged by the action alternatives.

Effects - Mollusks

Mollusk species inhabiting Northwest coniferous forests include land snails, slugs, aquatic snails, and clams. As a group, mollusks are diverse in number and function and many have restricted geographic ranges and narrow ecological requirements.

There are 47 species of mollusks under the Survey and Manage Standards and Guidelines under all alternatives. Much new information has been learned from surveys concerning the range, distribution, and population numbers of many species of mollusks. New known sites have been identified for 31 species, and for 11 of these species the number of known sites has increased by at least 100 percent. These new records have resulted in an increase in the known ranges for 14 species.

Under all four alternatives, there would be 47 mollusk species under the Survey and Manage Standards and Guidelines. No mollusks would be removed from Survey and Manage Standards and Guidelines under the alternatives.

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The four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the Agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

Compared to the No-Action Alternative, species would receive different management under the action alternatives as a result of applying new information and the slightly different emphasis of the alternatives. Under Alternatives 1, 2 and 3, strategic surveys would be added for 47 mollusk species.

Alternative 1 would remove pre-disturbance surveys for 11 mollusk species and remove known site protection from 2 mollusk species. Alternative 2 would remove pre-disturbance surveys from 13 mollusk species. Alternative 3 would add pre-disturbance surveys for one mollusk species.

Under the action alternatives, 42 mollusks would be expected to have the outcome of a stable, well-distributed population. For the remaining five mollusk species that have some risk to a stable, well-distributed population, Alternative 3 would provide the best opportunity for stable, well-distributed population. Compared to the other alternatives, Alternative 1 would present a greater risk to two species of mollusks, while Alternative 2 would present a greater risk to five mollusk species. The No-Action Alternative would present the greater risk to all but two of these species compared to the action alternatives.

Effects - Amphibians

The amphibian fauna of the Pacific Northwest includes 13 species that are endemic to the Northwest Forest Plan area. Cool, moist, shady conditions found in old-growth forests, and cool, clear streams are important to amphibians. Five salamanders (Del Norte, Larch Mountain, Shasta, Siskiyou Mountains, and Van Dyke's) would be included in the Survey and Manage Standards and Guidelines under all alternatives. No salamanders would be removed from Survey and Manage Standards and Guidelines under the alternatives.

The four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

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Compared to the No-Action Alternative, species would receive different management under the action alternatives as a result of applying new information and because of the slightly different emphasis of the alternatives. Under Alternatives 1, 2 and 3, strategic surveys would be added for all five salamander species.

Alternative 1 would remove pre-disturbance surveys for the Del Norte salamander. Alternative 2 would remove pre-disturbance surveys for the Del Norte, Larch Mountain, and Siskiyou Mountains salamanders.

Under Alternatives 1 and 3, all five salamanders (Del Norte, Larch Mountain, Siskiyou Mountains, Shasta and Van Dyke's) would be expected to have stable, well-distributed populations.

Under Alternative 2, the Shasta and Van Dyke's salamanders would be expected to have a stable, well-distributed population. The Del Norte and Larch Mountain salamanders would be expected to have stable, well-distributed populations, although with somewhat greater risk for this outcome. Under Alternative 2, the Siskiyou Mountains salamander could be at a substantial risk to its population and range.

Effects - Birds

The Northwest Forest Plan Protection Buffer Standards and Guidelines address five species of birds: black-backed woodpecker, white-headed woodpecker, pygmy nuthatch, flammulated owl, and great gray owl.

The four alternatives considered in this SEIS would have nearly equal effect on late-successional birds across the broad landscape of the Northwest Forest Plan area.

For black-backed woodpecker, white-headed woodpecker, pygmy nuthatch and flammulated owl, a difference between the No-Action and action alternatives is that the action alternatives would move these four bird species from Protection Buffers applied only in the Matrix and Adaptive Management Areas, to standards and guidelines applied to all land allocations, and also would make three other changes in the written descriptions.

Unlike the No-Action Alternative, Alternatives 1, 2 and 3 would apply this standard and guideline to all land allocations, broadening the area where management attention would be given to these species. The effect in reserved land allocations should be minimal, since most of these allocations are managed for maximum potential for snag dependent species. The effect on Matrix and Adaptive Management Area land allocations would be the same as current snag levels because this standard and guideline already applies to those lands.

A change for these species in the action alternatives, compared to the No-Action Alternative, would be incorporation of specific adaptive management language; this language would allow new scientific and management information to be more readily acted on.

For great gray owl, a difference between the No-Action Alternative and the action alternatives is that the action alternatives propose to move great gray owl from Protection Buffer to Survey and Manage. This change is expected to have no difference in how the habitat for this species is identified, delineated or managed; however, it would affect the land allocation assigned to that habitat. In the No-Action Alternative, the acreage would become a Late-Successional Reserve with associated standards and guidelines applied to it. In the action alternatives, the great gray owl would be a Survey and Manage species, which would be afforded appropriate management analogous to

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that it receives currently; the acreage, however, would not be given a particular land allocation designation. The net effect to the owl and its habitat would be nearly the same. The No-Action Alternative would require a Late-Successional Reserve assessment, subject to review by the Regional Ecosystem Office for the owl site, while assessments under Alternatives 1, 2 and 3 would be managed under a Management Recommendation subject to review by the Regional Ecosystem Office.

In summary, it is expected that these species would have stable, well-distributed population under all alternatives.

Effects - Mammals

The Northwest Forest Plan FSEIS analysis of alternatives stated that the land management factors that are most important for the 15 mammal species assessed in the FEMAT report, including the four species that were part of the additional species analysis, are: presence of dead and dying trees and the logs they produce; presence of large areas of late-successional forest (Late-Successional Reserves), and protection of riparian zones.

Bats

The three action alternatives incorporate essentially the same management direction for bats and, therefore, would have an identical effect on bats. Under the action alternatives, Management Recommendations could modify the survey and identification requirements to avoid adverse effects to bats in contrast to the No-Action Alternative.

Canada Lynx

The No-Action Alternative would retain the lynx Protection Buffer Standard and Guidelines in the Matrix and Adaptive Management Area land-use allocations. The action alternatives would apply that language to all land allocations. The interagency Lynx Conservation Assessment and Strategy currently under development will include direction for land management agencies to develop the plans to provide the needed management of lynx habitat, regardless of the Survey and Manage alternative selected.

Red Tree Vole

The Oregon red tree vole is an arboreal mammal endemic to western Oregon and extreme northwest California. Its distribution is limited to the moist coniferous forest west of the crest of the Cascade Mountains. The red tree vole depends on conifer tree canopies for nesting sites, foraging, travel routes, escape cover, and moisture. Tree voles are closely associated with old-growth forest habitat and appear very sensitive to habitat disturbance.

The No-Action Alternative, Alternative 1, and Alternative 3 provide for stable, well-distributed populations of red tree vole. Under Alternative 2, known sites would be managed as of September 30, 1999. Because of the low number of sites for the red tree vole and their poor distribution, the potential loss of sites under Alternative 2 could increase the risk that Oregon red tree vole populations may decline throughout large portions of its range and that the remaining populations could become more isolated.

Other Mammals

The four alternatives considered in this SEIS would have nearly equal effect on late-successional mammals across the broad landscape of the Northwest Forest Plan area.

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The most discernible effect of the action alternatives relates to removal of 64 Survey and Manage species, which is expected to have a relatively minor effect on mammals because these species depend on the system of large reserves provided under the Northwest Forest Plan.

Effects - Early Seral Species

The Northwest Forest Plan was developed to address the federal land management issues related to late-successional associated species.

With overall timber harvest levels below that anticipated in the Northwest Forest Plan FSEIS, there is a trend of slightly less early-seral habitat on federal lands than was expected. However, the acreage of even the expected timber harvest is a very minor component of the total federal acreage.

The effects of the four alternatives in this SEIS would have a negligible effect on the abundance and distribution of early-seral habitat across the Northwest Forest Plan area and, therefore, would have little effect on the populations of early-seral associated species in the planning area. The negligible effect is the result of the relatively large extent of early-seral habitat currently, and the expectation that nonfederal lands will continue to be harvested and natural disturbances will continue throughout the Northwest Forest Plan area. This will provide an adequate acreage and distribution of early-seral habitat across the area to sustain adequate populations of species dependent upon young forest habitat.

Effects - Threatened and Endangered Species

Northern Spotted Owl

Northern spotted owl habitat and population management under the Northwest Forest Plan depends on management of large reserves with provisions for owl dispersal among the reserves. After five years of implementing the Northwest Forest Plan, experience has shown fewer impacts to the spotted owl population in the Matrix and Adaptive Management Areas than was originally expected due to lower than expected levels of timber harvest and more acreage in Riparian Reserves than originally modeled (see Introduction to Chapter 3&4).

A difference between the alternatives for the northern spotted owl is the effect on the red tree vole (*Arborimus longicaudus*). The red tree vole is an important prey for the spotted owl. Use of red tree voles as prey varies in different portions of the range of the northern spotted owl, from a low of 1 percent of its diet, to a high of 6 percent by volume. However, red tree voles may represent a higher proportion of the diet of individual owls. In coastal southwestern Oregon, the vole made up 50 percent of the prey items consumed by two owl pairs, although due to their small size, red tree voles provided 16 percent of the total diet (Forsman et al. 1984).

Alternative 2 would increase the risk that Oregon red tree vole populations may decline throughout large portions of its range and that the remaining populations could become more isolated compared to Alternatives 1, 3 and No-Action. However, because red tree voles do not represent a large portion of the diet of most spotted owls, any effect to spotted owls from reductions of red tree vole populations is likely to be low.

The four alternatives would have an equal effect on spotted owl habitat management across the broad landscape of the Northwest Forest Plan area, which is the meaningful scale for consideration of owl populations. None of the alternatives would have an effect on the basic land management strategies for spotted owl habitat in the Northwest

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Forest Plan. Large reserves and habitat conditions for owl dispersal would continue to be managed appropriately in all of the alternatives. The acreage of protected habitat for Survey and Manage species, although significant for the species it is designed for, occurs as scattered, relatively small patches that have little contribution to the spotted owl population.

Marbled Murrelet

Marbled murrelet habitat and population management under the Northwest Forest Plan depends on management of large reserves, and also protection of murrelet nests wherever they occur on federal lands. The four alternatives would have an equal effect on marbled murrelet habitat management. Survey and Manage strategy is not relevant to the protection of currently occupied marbled murrelet habitat, since murrelet surveys and habitat protection measures will remain in place regardless of Survey and Manage species locations.

Other Terrestrial Threatened and Endangered Species

The Northwest Forest Plan FSEIS addressed all of the Endangered Species Act listed species in the planning area at the time it was prepared. The alternatives considered in this SEIS would have no effect on the conclusions in the Northwest Forest Plan FSEIS for listed species, as the Agencies will continue to comply with the requirements of the Endangered Species Act and also will appropriately manage habitat for the listed species.

Costs of Management

Costs of management related to implementation of Survey and Manage Standards and Guidelines are as follows (in millions of dollars per year):

No-Action Alternative:	$132 million/year
Alternative 1:	$28 million/year
Alternative 2:	$19 million/year
Alternative 3:	$44 million/year

Socioeconomic

The number of jobs that would be supported through timber harvest under the alternatives are as follows:

No-Action Alternative:	6,170 jobs
Alternative 1:	6,310 jobs
Alternative 2:	6,990 jobs
Alternative 3:	4,590 jobs

Timber

The Probable Sale Quantity under each alternative would be as follows (million board feet per year):

Alternative	PSQ (million board feet annually)
Current Declared	811
No-Action Alternative	680
Alternative 1	695
Alternative 2	770
Alternative 3	505

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Summary of Effects

	No-Action	Alt. 1	Alt. 2	Alt. 3	Comments
Species not Mitigated to the Extent Practical	80	2 (with risk un-known)	13 (Includes 2 vertebrates)	0	Species at risk of not maintaining stable, well-distributed populations.
Probable Sale Quantity[1] (Million Board Feet) (Current declared: 811 MMBF)	680 MMBF	695 MMBF	770 MMBF	505 MMBF	Analysis assumed removal of 64 species from Survey and Manage under the No-Action Alternative through other NEPA decisions within 5 years.
Acres Managed as Known Sites	205,000 acres	185,000 acres	64,000 acres	482,000 acres	Projected for 25 years of implementation.
Annual Costs: Survey and Manage Implementation (Current budget $8 million)[3]	$132 million[2]	$28 million	$19 million	$44 million	Pre-disturbance field survey costs are 75-99% of costs.
Employment (Wood Products)	6,170 (790 for 1st 5 yrs)	6,310	6,990	4,590	
Employment (Survey Related)	2,400	500	350	800	Full-time Equivalent @ $15.88/hr

[1] The NFP FSEIS used only 6 MMBF as the effect of Survey and Manage. The PSQ effects for the alternatives are based on projecting current estimated acres of known sites for 25 years, with eventual limits on 14 species. Actual PSQ will be affected by future adaptive management decisions and identification of high-priority sites in Management Recommendations.

[2] Includes $110 million for surveying fungi that requires a 5-year, multi-visit sampling protocol considered "impractical" in the other alternatives.

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Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives

Notes: For taxa having two names, first name is current accepted name and one in parenthesis is one used in the Northwest Forest Plan (Table C-3). Abbreviations: syn. = synonym or species name used in the past. PB= Protection Buffer species; PG = Protect From Grazing species

Taxa	Categories by Alternative			
	No Action	Alt. 1	Alt. 2	Alt. 3
FUNGI				
Acanthophysium farlowii (Aleurodiscus farlowii)	1, 3	1B	2B	3A
Albatrellus avellaneus	1, 3	1B	2B	3A
Albatrellus caeruleoporus	1, 3	1B	2B	3A
Albatrellus ellislii	3	1B	2B	3A
Albatrellus flettii	3	1B	2B	3A
Alpova alexsmithii	1, 3	1B	2B	3A
Alpova aurantiacus (Alpova sp. nov. # Trappe 1966)(syn. *Fevansia aurantiaca*)	1, 3	1B	2B	3A
Alpova olivaceotinctus	1, 3	1B	2B	3A
Arcangeliella camphorata (*Arcangeliella* sp. nov. #Trappe 12382; *Arcangeliella* sp. nov. #Trappe 12359)	1, 3	1B	2B	3A
Arcangeliella crassa	1, 3	1B	2B	3A
Arcangeliella lactarioides	1, 3	1B	2B	3A
Asterophora lycoperdoides	3	1B	2B	3A
Asterophora parasitica	3	1B	2B	3A
Baeospora myriadophylla	3	1B	2B	3A
Balsamia nigrens (Balsamia nigra)	1, 3	1B	2B	3A
Boletus haematinus	1, 3	1B	2B	3A
Boletus pulcherrimus	1, 3	1B	2B	3A
Bondarzewia mesenterica (Bondarzewia montana)	1, 2, 3	1B	2B	3A
Bridgeoporus nobilissimus (Oxyporus nobilissimus)	1, 2, 3	1A	2A	3A
Bryoglossum gracile	1, 3	Off	Off	Off
Cantharellus cibarius	3, 4	Off	Off	Off
Cantharellus subalbidus	3, 4	1D	2D	3B
Cantharellus tubaeformis	3, 4	1D	2D	3B
Cantharellus formosus	1, 3	Off	Off	Off
Catathelasma ventricosa	3	1B	2B	3A
Chalciporus piperatus (*Boletus piperatus*)	3	1D	2D	3B
Chamonixia caespitosa (*Chamonixia pacifica* sp. nov. #Trappe #12768)	1, 3	1B	2B	3A
Choiromyces alveolatus	1, 3	1B	2B	3A
Choiromyces venosus	1, 3	1B	2B	3A
Chromosera cyanophylla (Mycena lilacifolia)	3	1B	2B	3A
Chroogomphus loculatus	1, 3	1B	2B	3A

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Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives (Continued)				
Taxa	**Categories by Alternative**			
	No Action	**Alt. 1**	**Alt. 2**	**Alt. 3**
FUNGI (continued)				
Chrysomphalina grossula	3	1B	2B	3A
Clavariadelphus borealis	3, 4	Off	Off	Off
Clavariadelphus ligula	3, 4	1B	2B	3A
Clavariadelphus lovejoyae	3, 4	Off	Off	Off
Clavariadelphus pistilaris	3, 4	1B	2B	3A
Clavariadelphus sachalinensis	3, 4	1B	2B	3A
Clavariadelphus subfastigatus	3, 4	1B	2B	3A
Clavariadelphus truncatus	3, 4	1B	2B	3A
Clavicorona avellanea	3	Off	Off	Off
Clavulina cinerea	3, 4	Off	Off	Off
Clavulina cristata	3, 4	Off	Off	Off
Clavulina ornatipes	3, 4	1B	2B	3A
Clitocybe senilis	1, 3	1B	2B	3A
Clitocybe subditopoda	1, 3	1B	2B	3A
Collybia bakerensis	1, 3	1B	2B	3A
Collybia racemosa	3	1B	2B	3A
Cordyceps capitata	3	1B	2B	3A
Cordyceps ophioglossoides	3	1B	2B	3A
Cortinarius azureus	3	1B	2B	3A
Cortinarius boulderensis	1, 3	1B	2B	3A
Cortinarius cyanites	3	1B	2B	3A
Cortinarius magnivelatus	1, 3	1B	2B	3A
Cortinarius olympianus	1, 3	1B	2B	3A
Cortinarius speciosissimus (Cortinarius rainierensis)	1, 3	1B	2B	3A
Cortinarius spilomius	3	1B	2B	3A
Cortinarius tabularis	3	1B	2B	3A
Cortinarius umidicola (Cortinarius canabarba)	1, 3	1B	2B	3A
Cortinarius valgus	3	1B	2B	3A
Cortinarius variipes	1, 3	1B	2B	3A
Cortinarius verrucisporus	1, 3	1B	2B	3A
Cortinarius wiebeae	1, 3	1B	2B	3A
Cudonia monticola	3	1B	2B	3A
Cyphellostereum laeve	3	1E	2C	3A
Dermocybe humboldtensis	1, 3	1B	2B	3A
Destuntzia fusca	1, 3	1B	2B	3A
Destuntzia rubra	1, 3	1B	2B	3A
Dichostereum boreale (Dichostereum granulosum)	1, 3	1B	2B	3A

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Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives (Continued)				
Taxa	**Categories by Alternative**			
	No Action	**Alt. 1**	**Alt. 2**	**Alt. 3**
FUNGI (continued)				
Elaphomyces anthracinus	1, 3	1B	2B	3A
Elaphomyces subviscidus	1, 3	1B	2B	3A
Endogone acrogena	1, 3	1B	2B	3A
Endogone oregonensis	1, 3	1B	2B	3A
Entoloma nitidum (Rhodocybe nitida)	1, 3	1B	2B	3A
Fayodia gracilipes	3	1B	2B	3A
Galerina atkinsoniana	3	1E	2C	3A
Galerina cerina	3	1E	2C	3A
Galerina heterocystis	3	1E	2C	3A
Galerina sphagnicola	3	1E	2C	3A
Galerina vittaeformis	3	1E	2C	3A
Gastroboletus imbellus	1, 3	1B	2B	3A
Gastroboletus ruber	1, 3	1B	2B	3A
Gastroboletus subalpinus	1, 3	1B	2B	3A
Gastroboletus turbinatus	3	1B	2B	3A
Gastroboletus vividus (*Gastroboletus* sp. nov. #Trappe 2897; *Gastroboletus* sp. nov. #Trappe 7515)	1, 3	1B	2B	3A
Gastrosuillus amaranthii (*Gastrosuillus* sp. nov. #Trappe 9608)	1, 3	1F	2D	3C
Gastrosuillus umbrinus (*Gastroboletus* sp. nov. #Trappes 7516)	1, 3	1B	2B	3A
Gautieria magnicellaris	1, 3	1B	2B	3A
Gautieria otthii	1, 3	1B	2B	3A
Gelatinodiscus flavidus	1, 3	1B	2B	3A
Glomus radiatum	1, 3	1B	2B	3A
Gomphus bonarii	3	1B	2B	3A
Gomphus clavatus	3	1F	2D	3C
Gomphus floccosus	3	1D	2D	3B
Gomphus kauffmanii	3	1B	2B	3A
Gymnomyces abietis sp. nov. (*Gymnomyces* sp. nov. #Trappe 1690, 1706, 1710; *Gymnomyces* sp. nov. #Trappe 4703, 5576; *Gymnomyces* sp. nov. #Trappe 5052; *Gymnomyces* sp. nov. #Trappe 7545; *Martellia monticola*; *Martellia* sp. nov. #Trappe 1700; *Martellia* sp. nov. #Trappe 311; *Martellia* sp. nov. #Trappe 5903)	1, 3	1B	2B	3A
Gymnopilus punctifolius	1, 3	1B	2B	3A
Gyromitra californica	3, 4	1E	2C	3A
Gyromitra esculenta	3, 4	1F	2D	3C
Gyromitra gigas (Gyromitra montana)	3, 4	1E	2C	3A
Gyromitra infula	3, 4	1E	2C	3A
Gyromitra melaleucoides	3, 4	1E	2C	3A

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Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives (Continued)				
Taxa	**Categories by Alternative**			
	No Action	**Alt. 1**	**Alt. 2**	**Alt. 3**
FUNGI (continued)				
Hebeloma olympianum (Hebeloma olympiana)	1, 3	1B	2B	3A
Helvella compressa	1, 3	Off	Off	Off
Helvella crassitunicata	1, 3	1B	2B	3A
Helvella elastica	1, 3	1B	2B	3A
Helvella maculata	1, 3	1B	2B	3A
Hydnotrya inordinata sp. nov. (*Hydnotrya* sp. nov. #Trappe 787, 792)	1, 3	1B	2B	3A
Hydnotrya subnix sp. nov. (*Hydnotrya subnix* sp. nov. #Trappes #1861)	1, 3	1B	2B	3A
Hydnum repandum	3	Off	Off	Off
Hydnum umbilicatum	3	1B	2B	3A
Hydropus marginellus (Mycena marginella)	3	1B	2B	3A
Hygrophorus caeruleus	1, 3	1B	2B	3A
Hygrophorus karstenii	3	1B	2B	3A
Hygrophorus vernalis	1, 3	1B	2B	3A
Hypomyces luteovirens	3	1B	2B	3A
Leucogaster citrinus	1, 3	1B	2B	3A
Leucogaster microsporus	1, 3	1B	2B	3A
Macowanites chlorinosmus	1, 3	1B	2B	3A
Macowanites lymanensis	1, 3	1B	2B	3A
Macowanites mollis	1, 3	1B	2B	3A
Marasmius applanatipes	1, 3	1B	2B	3A
Martellia fragrans	1, 3	1B	2B	3A
Martellia idahoensis	1, 3	1B	2B	3A
Martellia maculata (*Elaphomyces* sp. nov. #Trappe 1038)	1, 3	Off	Off	Off
Martellia nondistincta sp. nov. (*Martellia* sp. nov. #Trappe 649)	1, 3	1B	2B	3A
Mycena hudsoniana	1, 3	1B	2B	3A
Mycena monticola	1, 3	1B	2B	3A
Mycena overholtsii	1, 3	1B	2B	3A
Mycena quinaultensis	1, 3	1B	2B	3A
Mycena tenax	3	1B	2B	3A
Mythicomyces corneipes	3	1B	2B	3A
Neolentinus adhaerens	1, 3	1B	2B	3A
Neolentinus kauffmanii	1, 3	1B	2B	3A
Neournula pouchetii	1, 3	1B	2B	3A
Nivatogastrium nubigenum	1, 3	1B	2B	3A
Octavianina cyanescens (*Octavianina* sp. nov. #Trappe 7502)	1, 3	1B	2B	3A
Octavianina macrospora	1, 3	1B	2B	3A
Octavianina papyracea	1, 3	1B	2B	3A

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Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives (Continued)				
Taxa	Categories by Alternative			
	No Action	Alt. 1	Alt. 2	Alt. 3
FUNGI (continued)				
Omphilina ericetorum (Phytoconis ericetorum)	3, 4	Off	Off	Off
Otidea leporina	3, PB	1B	2B	3A
Otidea onotica	3, PB	1E	2C	3A
Otidea smithii	1,3, PB	1B	2B	3A
Phaeocollybia attenuata	3	1D	2D	3B
Phaeocollybia californica (Phaeocollybia scatesiae)	1, 3	1B	2B	3A
Phaeocollybia carmanahensis	1, 3	Off	Off	Off
Phaeocollybia dissiliens	1, 3	1B	2B	3A
Phaeocollybia fallax	3	1D	2D	3B
Phaeocollybia gregaria	1, 3	1B	2B	3A
Phaeocollybia kauffmanii	1, 3	1D	2D	3B
Phaeocollybia olivacea	3	1B	2B	3A
Phaeocollybia oregonensis	1, 3	1B	2B	3A
Phaeocollybia piceae	1, 3	1B	2B	3A
Phaeocollybia pseudofestiva	3	1B	2B	3A
Phaeocollybia scatesiae	1, 3	1B	2B	3A
Phaeocollybia sipei	1, 3	1B	2B	3A
Phaeocollybia spadicea	3	1B	2B	3A
Phellodon atratus (Phellodon atratum)	3	1B	2B	3A
Pholiota albivelata	1, 3	1B	2B	3A
Pithya vulgaris	1, 3	1B	2B	3A
Plectania melastoma	3	1F	2D	3C
Plectania milleri	1, 3	1B	2B	3A
Podostroma alutaceum	3	1B	2B	3A
Polyozellus multiplex	1,3, PB	1B	2B	3A
Pseudaleuria quinaultiana	1, 3	1B	2B	3A
Ramaria abietina	3	1B	2B	3A
Ramaria amyloidea	1, 3	1B	2B	3A
Ramaria araiospora	1, 3	1B	2B	3A
Ramaria aurantiisiccescens	1, 3	1B	2B	3A
Ramaria botryis var. *aurantiiramosa*	1, 3	1B	2B	3A
Ramaria celerivirescens	1, 3	1B	2B	3A
Ramaria claviramulata	1, 3	1B	2B	3A
Ramaria concolor f. marrii	1, 3	1B	2B	3A
Ramaria concolor f. tsugina	3	1B	2B	3A
Ramaria coulterae	3	Off	Off	Off
Ramaria cyaneigranosa	1, 3	1B	2B	3A

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Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives (Continued)				
Taxa	**Categories by Alternative**			
	No Action	**Alt. 1**	**Alt. 2**	**Alt. 3**
FUNGI (continued)				
Ramaria fasciculata var. *sparsiramosa*	1, 3	1B	2B	3A
Ramaria gelatiniaurantia	1, 3	1B	2B	3A
Ramaria gracilis	1, 3	1B	2B	3A
Ramaria hilaris var. *olympiana*	1, 3	1B	2B	3A
Ramaria largentii	1, 3	1B	2B	3A
Ramaria lorithamnus	1, 3	1B	2B	3A
Ramaria maculatipes	1, 3	1B	2B	3A
Ramaria rainierensis	1, 3	1B	2B	3A
Ramaria rubella var. *blanda*	1, 3	1B	2B	3A
Ramaria rubribrunnescens	1, 3	1B	2B	3A
Ramaria rubrievansecens	1, 3	1B	2B	3A
Ramaria rubripermanens	1, 3	1B	2B	3A
Ramaria spinulosa var. *diminutiva* (*Ramaria spinulosa*)	1, 3	1B	2B	3A
Ramaria stuntzii	1, 3	1B	2B	3A
Ramaria suecica	3	1B	2B	3A
Ramaria thiersii	1, 3	1B	2B	3A
Ramaria verlotensis	1, 3	1B	2B	3A
Rhizopogon abietis	3	1B	2B	3A
Rhizopogon atroviolaceus	3	1B	2B	3A
Rhizopogon brunneiniger	1, 3	1B	2B	3A
Rhizopogon chamaleontinus (*Rhizopogon* sp. nov. #Trappe 9432)	1, 3	1B	2B	3A
Rhizopogon ellipsosporus (*Alpova* sp. nov. # Trappe 9730)	1, 3	1B	2B	3A
Rhizopogon evadens var. *subalpinus*	1, 3	1B	2B	3A
Rhizopogon exiguus	1, 3	1B	2B	3A
Rhizopogon flavofibrillosus	1, 3	1B	2B	3A
Rhizopogon inquinatus	1, 3	1B	2B	3A
Rhizopogon parksii (*Rhizopogon* sp. nov. #Trappe1692; *Rhizopogon* sp. nov. #Trappe 1698)	1, 3	Off	Off	Off
Rhizopogon truncatus	3	1D	2D	3B
Rhodocybe speciosa	1, 3	1B	2B	3A
Rickenella swartzii (Rickenella setipes)	3	1B	2B	3A
Russula mustelina	3	1E	2C	3A
Sarcodon fuscoindicum	3	1B	2B	3A
Sarcodon imbricatus	3	1B	2B	3A
Sarcosoma latahense (Plectania latahensis)	1, 3	1B	2B	3A
Sarcosoma mexicana, Oregon Coast Range and Oregon Willamette Valley provinces.	3, PB	Off	Off	Off

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives (Continued)				
Taxa	**Categories by Alternative**			
	No Action	**Alt. 1**	**Alt. 2**	**Alt. 3**
FUNGI (continued)				
Sarcosoma mexicana, outside Oregon Coast Range and Oregon Willamette Valley provinces.	3, PB	1E	2C	3A
Sarcosphaera eximia	3	1F	2D	3C
Sedecula pulvinata	1, 3	1B	2B	3A
Sowerbyella rhenana (Aleuria rhenana)	1,3, PB	1B	2B	3A
Sparassis crispa	3	1D	2D	3B
Spathularia flavida	3	1F	2D	3C
Stagnicola perplexa	3	1B	2B	3A
Thaxterogaster pavelekii sp. nov. (*Thaxterogaster* sp. nov. #Trappe 4867, 6242, 7427, 7962, 8520)	1, 3	1B	2B	3A
Thaxterogaster pingue	3	Off	Off	Off
Tremiscus helvelloides (Phlogoitis helvelloides)	3, 4	1B	2B	3A
Tricholoma venenatum	1, 3	1B	2B	3A
Tricholomopsis fulvescens	1, 3	1B	2B	3A
Tuber asa (*Tuber* sp. nov. #Trappe 2302)	1, 3	1B	2B	3A
Tuber pacificum sp. nov. (*Tuber* sp. nov. #Trappe 12493)	1, 3	1B	2B	3A
Tylopilus porphyrosporus (Tylopilus pseudoscaber)	1 ,3	1D	2D	3B
LICHENS				
Bryoria pseudocapillaris	1, 3	1E	2C	3A
Bryoria spiralifera	1, 3	1E	2C	3A
Bryoria subcana (syn. *Alectoria subcana*)	1, 3	1B	2B	3A
Bryoria tortuosa, East of crest of the Cascades	1, 3	Off	Off	Off
Bryoria tortuosa,West of crest of the Cascades	1, 3	1B	2B	3A
Buellia oidalea	1, 3	1E	2C	3A
Calicium abietinum	4	1B	2B	3A
Calicium adaequatum	4	Off	Off	Off
Calicium adspersum	4	1F	2D	3C
Calicium glaucellum	4	Off	Off	Off
Calicium viride	4	Off	Off	Off
Cetrelia cetrarioides	4	1F	2D	3C
Chaenotheca brunneola	4	Off	Off	Off
Chaenotheca chrysocephala	4	Off	Off	Off
Chaenotheca ferruginea	4	Off	Off	Off
Chaenotheca furfuracea	4	Off	Off	Off
Chaenotheca subroscida	4	1F	2D	3C
Chaenothecopsis pusilla (syn. *Chaenothecopsis subpusilla*, *Calcium asikkalense*, *Calcium floerkei, Calcium pusillum, Calcium subpusillum)*	4	1F	2D	3C
Cladonia norvegica	3	1E	2C	3A

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Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives (Continued)				
Taxa	**Categories by Alternative**			
	No Action	**Alt. 1**	**Alt. 2**	**Alt. 3**
LICHENS (continued)				
Collema nigrescens in OR Klamath, CA Klamath, and CA Coast provinces	4	Off	Off	Off
Collema nigrescens, remainder of range	4	1F	2D	3C
Cyphelium inquinans	4	Off	Off	Off
Dendriscocaulon intricatulum	1, 3	1B	2B	3A
Dermatocarpon luridum	1, 3	1E	2C	3A
Erioderma sorediatum	1, 3	1E	2C	3A
Heterodermia leucomelos (syn. *Anaptychia leucomelaena, Heterodermia leucomelaena*)	1, 3	1E	2C	3A
Heterodermia sitchensis	3	1E	2C	3A
Hydrothyria venosa	1, 3	Off	Off	Off
Hypogymnia duplicata (syn. *Hypogymnia elongata*)	1, 2, 3	1A	2A	3A
Hypogymnia oceanica	1, 3	Off	Off	Off
Hypogymnia vittata (Hygomnia vittiata)	3	1E	2C	3A
Hypotrachyna revoluta (syn. *Parmelia revoluta*)	3	1E	2C	3A
Kaernefeltia californica (Cetraria californica)	1, 3	1F	2D	3C
Leioderma sorediatum	1, 3	1E	2C	3A
Leptogium brebissonii	1, 3	1E	2C	3A
Leptogium burnetiae var. *hirsutum* (syn. *Leptogium hirsutum*)	4	1E	2C	3A
Leptogium cyanescens	4	1E	2C	3A
Leptogium rivale	1, 3	1E	2C	3A
Leptogium saturninum	4	1F	2D	3C
Leptogium teretiusculum	4	1E	2C	3A
Lobaria hallii	1, 3	Off	Off	Off
Lobaria linita	1, 2, 3	1A	2A	3A
Lobaria oregana	4	Off	Off	Off
Lobaria pulmonaria	4	Off	Off	Off
Lobaria scrobiculata	4	Off	Off	Off
Loxosporopsis corallifera (*Loxospora* sp. nov. "*corallifera*")	1, 3	Off	Off	Off
Microcalicium arenarium	4	1F	2D	3C
Mycocalicium subtile	4	Off	Off	Off
Nephroma bellum	4	Off	Off	Off
Nephroma helveticum	4	Off	Off	Off
Nephroma isidiosum	3	1E	2C	3A
Nephroma laevigatum	4	Off	Off	Off
Nephroma occultum	1, 3	1B	2B	3A
Nephroma parile	4	Off	Off	Off
Nephroma resupinatum	4	Off	Off	Off

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Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives (Continued)				
Taxa	**Categories by Alternative**			
	No Action	**Alt. 1**	**Alt. 2**	**Alt. 3**
LICHENS (continued)				
Niebla cephalota (syn. *Desmazieria cephaolta, Ramalina cephalota*)	1, 3	1E	2C	3A
Pannaria leucostictoides	4	Off	Off	Off
Pannaria mediterranea	4	Off	Off	Off
Pannaria rubiginosa	1, 3	1E	2C	3A
Pannaria saubinetii	4	Off	Off	Off
Peltigera collina	4	Off	Off	Off
Peltigera neckeri	4	1F	2D	3C
Peltigera pacifica	4	1F	2D	3C
Pilophorus nigricaulis	1, 3	Off	Off	Off
Platismatia lacunosa	4	1C	2D	3B
Pseudocyphellaria anomala	4	Off	Off	Off
Pseudocyphellaria anthraspis	4	Off	Off	Off
Pseudocyphellaria crocata	4	Off	Off	Off
Pseudocyphellaria sp. 1 (Pseudocyphellaria mougeotiana)	1, 3	1B	2B	3A
Pseudocyphellaria rainierensis	1, 2, 3	1A	2A	3A
Pyrrhospora quernea (syn. *Lecidea quernea, Protoblastenia quernea*)	1, 3	1E	2C	3A
Ramalina pollinaria	3	1E	2C	3A
Ramalina thrausta	4	1D	2D	3B
Stenocybe clavata	4	1B	2B	3A
Stenocybe major	4	Off	Off	Off
Sticta arctica	1, 3	Off	Off	Off
Sticta beauvoisii	4	1F	2D	3C
Sticta fuliginosa	4	Off	Off	Off
Sticta limbata	4	Off	Off	Off
Teloschistes flavicans	1, 3	1A	2A	3A
Tholurna dissimilis, south of Columbia River	1, 3	1B	2B	3A
Tholurna dissimilis, north of Columbia River	1, 3	Off	Off	Off
Usnea hesperina	1, 3	1E	2C	3A
Usnea longissima	4	Off	Off	Off
BRYOPHYTES				
Antitrichia curtipendula	4	Off	Off	Off
Bartramiopsis lescurii	1, 3	Off	Off	Off
Brotherella roellii	1,3, PB	1E	2C	3A
Buxbaumia viridis	PB	1D	2D	3B
Diplophyllum albicans	1, 3	1D	2D	3B
Diplophyllum plicatum	1, 2	1B	2B	3A
Douinia ovata	4	Off	Off	Off
Encalypta brevicolla v. crumiana	1, 3	1B	2B	3A

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Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives (Continued)				
Taxa	**Categories by Alternative**			
	No Action	**Alt. 1**	**Alt. 2**	**Alt. 3**
Herbertus aduncus	1, 3	1B	2B	3A
Herbertus sakuraii	1, 3	Off	Off	Off
Iwatsukiella leucotricha	1, 3	1B	2B	3A
Kurzia makinoana	1, 2	1B	2B	3A
Marsupella emarginata v. aquatica	1, 2	1B	2B	3A
Orthodontium gracile	1, 3	1A	2A	3A
Plagiochila satoi	1, 3	Off	Off	Off
Plagiochila semidecurrens	1, 3	Off	Off	Off
Pleuroziopsis ruthenica	1, 3	Off	Off	Off
Ptilidium californicum, California only	1,2, PB	1A	2A	3A
Ptilidium californicum, Oregon, South of Lane-Douglas County line extended east to boundary of Northwest Forest Plan.	1,2, PB	1F	2D	3C
Ptilidium californicum, Washington and Oregon, north of Lane-Douglas County line extended east to boundary of Northwest Forest Plan.	1,2, PB	Off	Off	Off
Racomitrium aquaticum	1, 3	1B	2B	3A
Radula brunnea	1, 3	Off	Off	Off
Rhizomnium nudum	PB	1B	2B	3A
Schistostega pennata	PB	1A	2A	3A
Scouleria marginata	4	Off	Off	Off
Tetraphis geniculata	1,3, PB	1A	2A	3A
Tritomaria exsectiformis	1, 2	1B	2B	3A
Tritomaria quinquedentata	1, 3	1B	2B	3A
Ulota megalospora	PB	Off	Off	Off
VERTEBRATES				
Del Norte salamander *Plethodon elongatus*	2, PB	1D	2D	3B
Great Gray Owl *Strix nebulosa*	PB	1C	2D	3B
Larch Mountain salamander *Plethodon larselli*	2, PB	1C	2D	3B
Oregon Red Tree Vole *Arborimus longicaudus*	2	1C	2D	3B
Shasta salamander *Hydromantes shastae*	1,2, PB	1A	2A	3A
Siskiyou Mountains salamander *Plethodon stormi*	1,2, PB	1C	2D	3B
Van Dyke's salamander *Plethodon vandykei* (Cascade population only)	2	1A	2A	3A
MOLLUSKS				
Ancotrema voyanum	PG	1F	2D	3C
Cryptomastix devia	1, 2	1A	2A	3A
Cryptomastix hendersoni	1, 2	1A	2A	3A
Deroceras hesperium	1, 2	1E	2C	3A
Fluminicola n. sp. 1	1,2, PG	1A	2A	3A
Fluminicola n. sp. 2	1, 2	1E	2C	3A
Fluminicola n. sp. 3	1,2, PG	1A	2A	3A
Fluminicola n. sp. 11	1,2, PG	1A	2A	3A

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Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives (Continued)				
Taxa	**Categories by Alternative**			
	No Action	**Alt. 1**	**Alt. 2**	**Alt. 3**
Fluminicola n. sp. 14	1, 2	1A	2A	3A
MOLLUSKS				
Fluminicola n. sp. 15	1, 2	1A	2A	3A
Fluminicola n. sp. 16	1, 2	1A	2A	3A
Fluminicola n. sp. 17	1, 2	1A	2A	3A
Fluminicola n. sp. 18	1, 2	1A	2A	3A
Fluminicola n. sp. 19	1,2, PG	1E	2C	3A
Fluminicola n. sp. 20	1,2, PG	1E	2C	3A
Fluminicola seminalis	1,2, PG	1A	2A	3A
Helminthoglypta hertleini	1, 2	1A	2A	3A
Helminthoglypta talmadgei	1, 2	1A	2A	3A
Hemphillia burringtoni (Hemphillia barringtoni)	1, 2	1A	2A	3A
Hemphillia glandulosa	1, 2	1A	2A	3A
Hemphillia malonei	1, 2	1C	2D	3B
Hemphillia pantherina	1, 2	1E	2C	3A
Juga (O) n. sp. 2	1, 2	1A	2A	3A
Juga (O) n. sp. 3	1, 2	1A	2A	3A
Lyogyrus n. sp. 1	1, 2	1A	2A	3A
Lyogyrus n. sp. 2	1, 2	1A	2A	3A
Lyogyrus n. sp. 3	1, 2	1A	2A	3A
Megomphix hemphilli	1, 2	1D	2D	3B
Monadenia chaceana	1, 2	1A	2A	3A
Monadenia churchi	1, 2	1C	2D	3B
Monadenia fidelis klamathica	PG	1E	2C	3A
Monadenia fidelis minor	1, 2	1A	2A	3A
Monadenia fidelis ochromphalus	PG	1F	2D	3C
Monadenia troglodytes troglodytes	1, 2	1A	2A	3A
Monadenia troglodytes wintu	1, 2	1A	2A	3A
Oreohelix n. sp.	1, 2	1A	2A	3A
Pristoloma articum crateris	1,2, PG	1B	2B	3A
Prophysaon coeruleum , north of Oregon Highway 22	1, 2	1A	2A	3A
Prophysaon coeruleum , south of Oregon Highway 22	1, 2	1D	2D	3B
Prophysaon dubium	1, 2	1D	2D	3B
Trilobopsis roperi	1, 2	1A	2A	3A
Trilobopsis tehamana	1, 2	1A	2A	3A
Vertigo n. sp.	1, 2	1A	2A	3A
Vespericola pressleyi	1, 2	1A	2A	3A
Vespericola shasta	1, 2	1A	2A	3A
Vorticifex klamathensis sinitsini	1, 2	1E	2C	3A
Vorticifex n. sp. 1	1, 2	1E	2C	3A
VASCULAR PLANTS				
Allotropa virgata	1, 2	Off	Off	Off
Arceuthobium tsugense mertensianae (Washington only)	4	1F	2D	3C
Bensoniella oregana (California only)	1, 2	1A	2A	3A

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Table 2-2. Species to be Protected Through Survey and Manage, All Alternatives (Continued)				
Taxa	**Categories by Alternative**			
	No Action	**Alt. 1**	**Alt. 2**	**Alt. 3**
Botrychium minganense - Oregon/California	1, 2	1A	2A	3A
VASCULAR PLANTS				
Botrychium minganense -Washington	1, 2	Off	Off	Off
Botrychium montanum	1, 2	1A	2A	3A
Clintonia andrewsiana	1, 2	Off	Off	Off
Coptis asplenifolia	1, 2	1A	2A	3A
Coptis trifolia	1, 2	1A	2A	3A
Corydalis aquae-gelidae	1, 2	1C	2D	3B
Cypripedium fasciculatum (entire range)	1, 2	1C	2D	3B
Cypripedium montanum (entire range)	1, 2	1C	2D	3B
Eucephalus vialis (Aster vialis)	1, 2	1A	2A	3A
Galium kamtschaticum - Olympic Peninsula, eastern Washington Cascades, western Cascades -south of Snoqualmie Pass	1, 2	1A	2A	3A
Galium kamtschaticum - western Cascades - north of Snoqualmie Pass	1, 2	Off	Off	Off
Pedicularis howellii	1,2, PG	Off	Off	Off
Platanthera orbiculata var. orbiculata (Habenaria orbiculata)	1, 2	1C	2D	3B
Scoliopus bigelovii	1, 2	Off	Off	Off
ARTHROPODS				
Canopy herbivores (south range)	4	1F	2D	3C
Coarse wood chewers (south range)	4	1F	2D	3C
Litter and soil dwelling species (south range)	4	1F	2D	3C
Understory and forest gap herbivores (south range)	4	1F	2D	3C

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Table 2-4. Species Proposed To Be Removed From Survey and Manage/Protection Buffer/Protect From Grazing in Alternatives 1 , 2, and 3

Taxa	Categories (Current Situation & No-Action Alternative)	Factors For Proposing Species Be Removed From Survey And Manage
FUNGI		
Bryoglossum gracile	1, 3	Not LS/OG associated.
Cantharellus cibarius	3, 4	Step 2 Panel indicated that this was the common variety; not at risk.
Cantharellus formosus	1, 3	Not LS/OG associated; common.
Clavariadelphus borealis	3, 4	Not distinct taxonomic entity.
Clavariadelphus lovejoyae	3, 4	Not in Northwest Forest Plan area.
Clavicorona avellanea	3	Only known from eastern North America
Clavulina cinerea	3, 4	Synonymous with *Clavulina cristata*.
Clavulina cristata	3, 4	Common; not LS/OG associated.
Helvella compressa	1, 3	Not LS/OG associated; not rare, frequently found in young stands.
Hydnum repandum	3	Moderate number of records; widely distributed; found in protected sites and habitats in reserve system.
Martellia maculata (*Elaphomyces* sp. nov. #Trappe 1038)	1, 3	Now common; combined w/*Elaphomyces* sp. Nov. #Trappe 1038. Provided for by reserve allocations.
Omphilina ericetorum (Phytoconis ericetorum)	3, 4	More common than thought; no concern for persistence.
Phaeocollybia carmanahensis	1, 3	No longer considered separate species. Synonymous with *Phaeocollybia californica*
Ramaria coulterae	3	Not in Northwest Forest Plan area.
Rhizopogon parksii (*Rhizopogon* sp. nov. #Trappe1692; *Rhizopogon* sp. nov. #Trappe 1698)	1, 3	Not LS/OG associated. Found frequently in early seral stands.
Thaxterogaster pingue	3	Widespread; protected by reserve allocations and other standards and guidelines of NFP; less rare than thought; not at risk.
LICHENS		
Calicium adaequatum	4	Not LS/OG associated.
Calicium glaucellum	4	Not LS/OG associated; provided for by reserve allocations and other S&G's of NFP
Calicium viride	4	Moderate number of records, but under-reported; common; provided for by reserve allocations and other standards and guidelines of NFP.

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Table 2-4. Species Proposed To Be Removed From Survey and Manage/Protection Buffer/Protect From Grazing in Alternatives 1, 2, and 3		
Taxa	**Categories (Current Situation & No-Action Alternative)**	**Factors For Proposing Species Be Removed From Survey And Manage**
LICHENS (continued)		
Chaenotheca brunneola	4	Not LS/OG associated; provided for by reserve allocations and other standards and guidelines of NFP; common; widespread.
Chaenotheca chrysocephala	4	Not LS/OG associated; provided for by reserve allocations and other standards and guidelines of NFP.
Chaenotheca ferruginea	4	Not LS/OG associated; widespread.
Chaenotheca furfuracea	4	Moderate/low number, but under-reported. Widespread and common; provided for by reserve allocations and other standards and guidelines of NFP.
Cyphelium inquinans	4	Not LS/OG associated; many new sites despite limited survey effort and cryptic/small size.
Hydrothyria venosa	1, 3	Moderate number of records in NFP area; provided for by reserve allocations and other standards and guidelines of NFP, including riparian reserves and Aquatic Conservation Strategy objectives.
Hypogymnia oceanica	1, 3	Moderate number of records in NFP area; provided for by reserve allocations and other standards and guidelines of NFP; large increase in records since FEMAT; more common than previously known; widely distributed.
Lobaria hallii	1, 3	High number of records in NFP area; not at risk. Air quality concerns beyond purview of NFP (managed under other laws).
Lobaria oregana	4	High number of records; not at risk. Air quality concerns beyond purview of NFP (managed under other laws).
Lobaria pulmonaria	4	High number of records; not at risk. Air quality concerns beyond purview of NFP (managed under other laws).
Lobaria scrobiculata	4	Not LS/OG associated. Common and widespread.
Loxosporopsis corallifera (*Loxospora* sp. nov. "*corallifera*")	1, 3	Not LS/OG associated; habitat protected; widespread.

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Table 2-4. Species Proposed To Be Removed From Survey and Manage/Protection Buffer/Protect From Grazing in Alternatives 1, 2, and 3		
Taxa	**Categories (Current Situation & No-Action Alternative)**	**Factors For Proposing Species Be Removed From Survey And Manage**
LICHENS (continued)		
Mycocalicium subtile	4	Not LS/OG associated; many new sites despite limited survey effort and cryptic/small size. Provided for by reserve allocations and other standards and guidelines of NFP.
Nephroma bellum	4	Moderate number of records; wide distribution and habitat; Provided for by reserve allocations and other standards and guidelines of NFP. Air quality concerns beyond purview of NFP (managed under other laws).
Nephroma helveticum	4	Moderate/high number of records; Provided for by reserve allocations and other standards and guidelines of NFP. Wide distribution. Air quality concerns beyond purview of NFP (managed under other laws).
Nephroma laevigatum	4	Moderate number of records; Provided for by reserve allocations and other standards and guidelines of NFP. Wide distribution. Air quality concerns beyond purview of NFP (managed under other laws).
Nephroma parile	4	Not LS/OG associated; Provided for by reserve allocations and other standards and guidelines of NFP. Wide distribution. Air quality concerns beyond purview of NFP (managed under other laws).
Nephroma resupinatum	4	Not LS/OG associated; Provided for by reserve allocations and other standards and guidelines of NFP. Wide distribution. Air quality concerns beyond purview of NFP (managed under other laws).
Pannaria leucostictoides	4	Not LS/OG associated; Provided for by reserve allocations and other standards and guidelines of NFP. Widespread. Air quality concerns beyond purview of NFP (managed under other laws).
Pannaria mediterranea	4	Not LS/OG associated; Provided for by reserve allocations and other standards and guidelines of NFP. Air quality concerns beyond purview of NFP (managed under other laws).

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Table 2-4. Species Proposed To Be Removed From Survey and Manage/Protection Buffer/Protect From Grazing in Alternatives 1, 2, and 3

Taxa	Categories (Current Situation & No-Action Alternative)	Factors For Proposing Species Be Removed From Survey And Manage
LICHENS (continued)		
Pannaria saubinetii	4	Many records, most since 1993; broad habitat and widespread. Air quality concerns beyond purview of NFP (managed under other laws).
Peltigera collina	4	Not LS/OG associated. Widespread. Air quality concerns beyond purview of NFP (managed under other laws).
Pilophorus nigricaulis	1, 3	Not LS/OG associated.
Pseudocyphellaria anomala	4	Very high number of records; Common and widesprad; Provided for by reserve allocations and other standards and guidelines of NFP. Air quality concerns beyond purview of NFP (managed under other laws).
Pseudocyphellaria anthraspis	4	High number of records; Common and widespread. Provided for by reserve allocations and other standards and guidelines of NFP. Air quality concerns beyond purview of NFP (managed under other laws).
Pseudocyphellaria crocata	4	Moderate/high number of records; Common and widespread. Provided for by reserve allocations and other standards and guidelines of NFP Air quality concerns beyond purview of NFP (managed under other laws).
Stenocybe major	4	Not LS/OG associated.
Sticta arctica	1, 3	Not LS/OG associated.
Sticta fuliginosa	4	Moderate/high number of records; Common and widespread. Provided for by reserve allocations and other standards and guidelines of NFP; broad habitat. Air quality concerns beyond purview of NFP (managed under other laws).
Sticta limbata	4	Moderate/high number of records; Common and widespread. Provided for by reserve allocations and other standards and guidelines of NFP; broad habitat. Air quality concerns beyond purview of NFP (managed under other laws).

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Table 2-4. Species Proposed To Be Removed From Survey and Manage/Protection Buffer/Protect From Grazing in Alternatives 1, 2, and 3		
Taxa	**Categories (Current Situation & No-Action Alternative)**	**Factors For Proposing Species Be Removed From Survey And Manage**
LICHENS (continued)		
Usnea longissima	4	Moderate/high number of records in NFP area; LS/OG forest association questionable; Riparian reserves may protect.
BRYOPHYTES		
Antitrichia curtipendula	4	Moderate/high number of records in NFP area; under-reported; fairly well protected under NFP; protection of reserves adequate; common; well distributed; broad range of habitats.
Bartramiopsis lescurii	1, 3	Not LS/OG associated.
Douinia ovata	4	Low number of records in NFP area, but FEMAT rating of Outcomes A & B = 100%. Widespread. Was on Survey and Manage standard and guideline based on air pollution concerns and cumulative effects. Air pollution no longer a concern.
Herbertus sakuraii	1, 3	Not LS/OG associated. Saddle Mountain species; North Pacific disjunct; cliff associate.
Plagiochila satoi	1, 3	Now considered part of common species *Plagiochila asplenioides*, which is considered protected by FEMAT.
Plagiochila semidecurrens	1, 3	Not LS/OG associated; Saddle Mountain species; North Pacific disjunct; cliff associate.
Pleuroziopsis ruthenica	1, 3	Highly likely not in NFP area.
Radula brunnea	1, 3	Not LS/OG associated; Saddle Mountain species; North Pacific disjunct; cliff associate.
Scouleria marginata	4	Not LS/OG associated.
Ulota megalospora	PB	Not LS/OG associated. Common.
VASCULAR PLANTS		
Allotropa virgata	1, 2	High number of records; increase in elevational distribution; protected by NFP due to extensive potential habitat in reserve allocations.
Clintonia andrewsiana	1, 2	Not LS/OG associated; high potential for habitat protection under NFP; 97% probability of Outcomes A and B in FEMAT.
Pedicularis howellii	1,2, PG	Not LS/OG associated.

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Table 2-4. Species Proposed To Be Removed From Survey and Manage/Protection Buffer/Protect From Grazing in Alternatives 1, 2, and 3		
Taxa	**Categories (Current Situation & No-Action Alternative)**	**Factors For Proposing Species Be Removed From Survey And Manage**
VASCULAR PLANTS (continued)		
Scoliopus bigelovii	1, 2	Low number of records in NFP area, but considered too common to survey for so very under-reported; not LS/OG associated; persistence not at risk; protected in Redwood National Park.
Note: Where taxa has two names, first name is current accepted name and second one in parenthesis is name used in Northwest Forest Plan (Table 3-C). *Abbreviations*: LS/OG = Late-Successional/Old-Growth PB = Protection Buffer S&G = Standard and Guideline PG = Protect From Grazing NFP = Northwest Forest Plan		

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Table 2-5. Species Proposed to be Removed From Survey and Manage/Protection Buffer in Part of Their Ranges in Alternatives 1, 2, and 3.

Taxa	Current Categories & No Action Alternative	Factors For Proposing Reduced Ranges Within Survey And Manage
FUNGI		
Sarcosoma mexicana, Oregon Coast Range and Oregon Willamette Valley provinces	3, PB	Moderate/high number of records in Northwest Forest Plan area; many new records; most locations not in late-successional/old-growth forests; not at risk.
LICHENS		
Bryoria tortuosa, east of crest of the Cascades	1, 3	Moderate number of records; many new sites; provided for by reserve allocations and other standards and guidelines of NFP; not at risk.
Collema nigrescens in Oregon Klamath, California Klamath, and California Coast provinces	4	Moderate/high number of records in NFP area; well distributed; many new records.
Tholurna dissimilis, north of Columbia River	1, 3	Low number of records, but protected habitat and sites; high elevation species.
BRYOPHYTES		
Ptilidium californicum, Washington and Oregon, north of Lane-Douglas County line extended east to boundary of Northwest Forest Plan.	1,2, PB	Not indicated of concern by FEMAT process; common; under-reported.
VASCULAR PLANTS		
Botrychium minganense- Washington	1, 2	High number of sites in protected land allocations; not LS/OG associated west of Cascade crest; secure under Northwest Forest Plan east of Cascade crest.
Galium kamtschaticum - western Cascades, north of Snoqualmie Pass	1, 2	Moderate number of records; many sites in reserve allocations; lots of potential habitat in protected allocations.

Abbreviations: LS/OG = Late-Successional/Old-Growth PB = Protection Buffer NFP = Northwest Forest Plan FEMAT = Forest Ecosystem Management Assessment Team

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Table 2-6. Proposed Placement of "Protection Buffer" Species, All Alternatives[1]

Protection Buffer Species	No-Action (Current Situation) Type of Protection Buffer[2]/Applicable Survey & Manage Categories As Noted Below	Alternative 1 Move to Survey & Manage Category or Off List As Noted Below	Alternative 2 Move to Survey & Manage Category or Off List As Noted Below	Alternative 3 Move to Survey & Manage Category or Off List As Noted Below
Fungi				
▸ *Otidea leporina*	LSR/3	1B	2B	3A
▸ *Otidea onotica*	LSR/3	1E	2C	3A
▸ *Otidea smithii*	LSR/1 and 3	1B	2B	3A
▸ *Polyozellus multiplex*	MLSA/1 and 3	1B	2B	3A
▸ *Sarcosoma mexicana*	MLSA/3	Off list (Oregon Coast Range and Oregon Willamette Valley provinces); 1E (outside Oregon Coast Range and Oregon Willamette Valley provinces).	Off list (Oregon Coast Range and Oregon Willamette Valley provinces); 2C (outside Oregon Coast Range and Oregon Willamette Valley provinces).	Off list (Oregon Coast Range and Oregon Willamette Valley provinces); 3A (outside Oregon Coast Range and Oregon Willamette Valley provinces).
▸ *Sowerbyella rhenana (Aleuria rhenana)*[3]	LSR/1 and 3	1B	2B	3A
Bryophytes				
▸ *Brotherella roellii*	MLSA/1 and 3	1E	2C	3A
▸ *Buxbaumia viridis*	MLSA/(n/a)	1D	2D	3B
▸ *Ptilidium californicum*	LSR/1 and 2	1A (California) 1F (southern Oregon) Off list (rest of range)	2A (California) 2D (southern Oregon) Off list (rest of range)	3A (California) 3C (southern Oregon) Off list (rest of range)
▸ *Rhizomnium nudum*	MLSA/(n/a)	1B	2B	3A
▸ *Shistostega pennata*	MLSA/(n/a)	1A	2A	3A
▸ *Tetraphis geniculata*	MLSA/1 and 3	1A	2A	3A
▸ *Ulota meglospora*	LSR/(n/a)	Off list	Off list	Off list

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Table 2-6. Proposed Placement of "Protection Buffer" Species, All Alternatives[1] (continued)

Protection Buffer Species	No-Action (Current Situation) Type of Protection Buffer[2]/Applicable Survey & Manage Categories As Noted Below	Alternative 1 Move to Survey & Manage Category Noted Below	Alternative 2 Move to Survey & Manage Category Noted Below	Alternative 3 Move to Survey & Manage Category Noted Below
Vertebrates				
▸ Canada Lynx	3	Move to own standard and guideline, and incorporate adaptive management for potential future changes.	Move to own standard and guideline, and incorporate adaptive management for potential future changes.	Move to own standard and guideline, and incorporate adaptive management for potential future changes.
▸ Del Norte Salamander	MLSA/2	1D	2D	3B
▸ Great Gray Owl	LSR/(n/a)	1C	2D	3B
▸ Larch Mountain Salamander	MLSA/2	1C	2D	3B
▸ Shasta Salamander	LSR/1 and 2	1A	2A	3A
▸ Siskiyou Mountain Salamander	MLSA/1 and 2	1C	2D	3B
▸ White-headed Woodpecker, Black-Backed Woodpecker, Pygmy Nuthatch, and Flammulated Owl	Manage snags at 100% biological potential.	Move to own standard and guideline, and incorporate adaptive management for potential future changes.	Move to own standard and guideline, and incorporate adaptive management for potential future changes.	Move to own standard and guideline, and incorporate adaptive management for potential future changes.

[1] See Chapter 2 for rationale about changing and assigning categories.
[2] *Abbreviations*: LSR= Late-Successional Reserve; MLSA= Managed Late-Successional Area; NFP = Northwest Forest Plan.

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Table 2-7. Proposed Placement of "Protect Sites From Grazing" Species, All Alternatives.				
Protect From Grazing Species (Current Situation and No-Action Alternative)	**No-Action (Current Situation) Also in Survey & Manage Categories Noted Below**	**Alternative 1 Move to Survey & Manage Category Noted Below**	**Alternative 2 Move to Survey & Manage Category Noted Below**	**Alternative 3 Move to Survey & Manage Category Noted Below**
Mollusks (NFP ROD, p. C-6)				
▸ *Ancotrema voyanum*	n/a	1F	2D	3C
▸ *Fluminicola* n. sp. *1*	1 and 2	1A	2A	3A
▸ *Fluminicola* n. sp. *3*	1 and 2	1A	2A	3A
▸ *Fluminicola* n. sp. 11	1 and 2	1A	2A	3A
▸ *Fluminicola* n. sp. *19*	1 and 2	1E	2C	3A
▸ *Fluminicola* n. sp. *20*	1 and 2	1E	2C	3A
▸ *Fluminicola seminalis*	1 and 2	1A	2A	3A
▸ *Monodenia fidelis klamathica*	n/a	1E	2C	3A
▸ *Monodenia fidelis ochromphalus*	n/a	1F	2D	3C
▸ *Pristiloma articum crateris*	1 and 2	1B	2B	3A
Vascular Plants (NFP ROD, p. C-6)				
▸ *Pedicularis howellii*	1 and 2	Remove from list.	Remove from list.	Remove from list.

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Table 2-8. Species with Increased Levels of Protection and Management

Notes: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3). Abbreviations: syn. = synonym or species name used in the past. PB= Protection Buffer species; PG = Protect From Grazing species

TAXA	Categories by Alternative	
	No Action	Alt. 1
SPECIES GAINING SITE PROTECTION		
FUNGI		
Albatrellus ellislii	3	1B
Albatrellus flettii	3	1B
Asterophora lycoperdoides	3	1B
Asterophora parasitica	3	1B
Baeospora myriadophylla	3	1B
Catathelasma ventricosa	3	1B
Chromosera cyanophylla (Mycena lilacifolia)	3	1B
Chrysomphalina grossula	3	1B
Clavariadelphus ligula	3, 4	1B
Clavariadelphus pistilaris	3, 4	1B
Clavariadelphus sachalinensis	3, 4	1B
Clavariadelphus subfastigatus	3, 4	1B
Clavariadelphus truncatus	3, 4	1B
Clavulina ornatipes	3, 4	1B
Collybia racemosa	3	1B
Cordyceps capitata	3	1B
Cordyceps ophioglossoides	3	1B
Cortinarius azureus	3	1B
Cortinarius cyanites	3	1B
Cortinarius spilomius	3	1B
Cortinarius tabularis	3	1B
Cortinarius valgus	3	1B
Cudonia monticola	3	1B
Cyphellostereum laeve	3	1E
Fayodia gracilipes	3	1B
Galerina atkinsoniana	3	1E
Galerina cerina	3	1E
Galerina heterocystis	3	1E

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Table 2-8. Species with Increased Levels of Protection and Management		
Notes: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3). Abbreviations: syn. = synonym or species name used in the past. PB= Protection Buffer species; PG = Protect From Grazing species		
TAXA	**Categories by Alternative**	
	No Action	**Alt. 1**
SPECIES GAINING SITE PROTECTION (Continued)		
FUNGI (Continued)		
Galerina vittaeformis	3	1E
Gastroboletus turbinatus	3	1B
Galerina sphagnicola	3	1E
Gomphus bonarii	3	1B
Gomphus kauffmanii	3	1B
Gyromitra californica	3, 4	1E
Gyromitra gigas (Gyromitra montana)	3, 4	1E
Gyromitra infula	3, 4	1E
Gyromitra melaleucoides	3, 4	1E
Hydnum umbilicatum	3	1B
Hydropus marginellus (Mycena marginella)	3	1B
Hygrophorus karstenii	3	1B
Hypomyces luteovirens	3	1B
Mycena tenax	3	1B
Mythicomyces corneipes	3	1B
Phaeocollybia olivacea	3	1B
Phaeocollybia pseudofestiva	3	1B
Phaeocollybia spadicea	3	1B
Phellodon atratus (Phellodon atratum)	3	1B
Podostroma alutaceum	3	1B
Ramaria abietina	3	1B
Ramaria concolor f. tsugina	3	1B
Ramaria suecica	3	1B
Rhizopogon abietis	3	1B
Rhizopogon atroviolaceus	3	1B
Rickenella swartzii (Rickenella setipes)	3	1B
Sarcodon fuscoindicum	3	1B
Sarcodon imbricatus	3	1B

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Table 2-8. Species with Increased Levels of Protection and Management

Notes: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3). Abbreviations: syn. = synonym or species name used in the past. PB= Protection Buffer species; PG = Protect From Grazing species

TAXA	Categories by Alternative	
	No Action	Alt. 1
SPECIES GAINING SITE PROTECTION (Continued)		
FUNGI (Continued)		
Stagnicola perplexa	3	1B
Tremiscus helvelloides (Phlogoitis helvelloides)	3, 4	1B
LICHENS		
Calicium abietinum	4	1B
Cladonia norvegica	3	1E
Heterodermia sitchensis	3	1E
Hypogymnia vittata (Hygomnia vittiata)	3	1E
Hypotrachyna revoluta (syn. *Parmelia revoluta*)	3	1E
Leptogium burnetiae var. *hirsutum* (syn. *Leptogium hirsutum*)	4	1E
Leptogium cyanescens	4	1E
Leptogium teretiusculum	4	1E
Nephroma isidiosum	3	1E
Platismatia lacunosa	4	1C
Ramalina pollinaria	3	1E
Ramalina thrausta	4	1D
Stenocybe clavata	4	1B
VERTEBRATES		
Van Dyke's salamander *Plethodon vandykei* (Cascade population only)	2	1A
SPECIES GAINING PRE-DISTURBANCE SURVEYS		
LICHENS		
Platismatia lacunosa	4	1C
Teloschistes flavicans	1, 3	1A
BRYOPHYTES		
Orthodontium gracile	1, 3	1A

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Table 2-8. Species with Increased Levels of Protection and Management

Notes: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3). Abbreviations: syn. = synonym or species name used in the past. PB= Protection Buffer species; PG = Protect From Grazing species

TAXA	Categories by Alternative	
	No Action	Alt. 1
SPECIES GAINING STRATEGIC SURVEYS		
BRYOPHYTES		
Buxbaumia viridis	PB	1D
Diplophyllum plicatum	1, 2	1B
Kurzia makinoana	1, 2	1B
Marsupella emarginata v. aquatica	1, 2	1B
Ptilidium californicum, California only	1, 2, PB	1A
Ptilidium californicum, Oregon, South of Lane-Douglas County line extended east to boundary of Northwest Forest Plan.	1, 2, PB	1F
Rhizomnium nudum	PB	1B
Schistostega pennata	PB	1A
Tritomaria exsectiformis	1, 2	1B
VERTEBRATES		
Del Norte salamander *Plethodon elongatus*	2, PB	1D
Larch Mountain salamander *Plethodon larselli*	2, PB	1C
Shasta salamander *Hydromantes shastae*	1,2, PB	1A
Siskiyou Mountains salamander *Plethodon stormi*	1,2, PB	1C
Van Dyke's salamander *Plethodon vandykei* (Cascade population only)	2	1A
Oregon Red Tree Vole *Arborimus longicaudus*	2	1C
Great Gray Owl *Strix nebulosa*	PB	1C
MOLLUSKS		
Ancotrema voyanum	PG	1F
Cryptomastix devia	1, 2	1A
Cryptomastix hendersoni	1, 2	1A
Deroceras hesperium	1, 2	1E
Fluminicola n. sp. 17	1, 2	1A
Fluminicola n. sp. 14	1, 2	1A
Fluminicola n. sp. 2	1, 2	1E
Fluminicola n. sp. 11	1, 2, PG	1A
Fluminicola n. sp. 15	1, 2	1A

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Table 2-8. Species with Increased Levels of Protection and Management

Notes: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3). Abbreviations: syn. = synonym or species name used in the past. PB= Protection Buffer species; PG = Protect From Grazing species

TAXA	Categories by Alternative	
	No Action	Alt. 1
SPECIES GAINING STRATEGIC SURVEYS (Continued)		
MOLLUSKS (Continued)		
Fluminicola n. sp. 16	1, 2	1A
Fluminicola n. sp. 20	1, 2, PG	1E
Fluminicola n. sp. 1	1, 2, PG	1A
Fluminicola n. sp. 3	1, 2, PG	1A
Fluminicola n. sp. 19	1, 2, PG	1E
Fluminicola n. sp. 18	1, 2	1A
Fluminicola seminalis	1, 2, PG	1A
Helminthoglypta hertleini	1, 2	1A
Helminthoglypta talmadgei	1, 2	1A
Hemphillia burringtoni (Hemphillia barringtoni)	1, 2	1A
Hemphillia glandulosa	1, 2	1A
Hemphillia malonei	1, 2	1C
Hemphillia pantherina	1, 2	1E
Juga (O) n. sp. 2	1, 2	1A
Juga (O) n. sp. 3	1, 2	1A
Lyogyrus n. sp. 1	1, 2	1A
Lyogyrus n. sp. 2	1, 2	1A
Lyogyrus n. sp. 3	1, 2	1A
Megomphix hemphilli	1, 2	1D
Monadenia chaceana	1, 2	1A
Monadenia churchi	1, 2	1C
Monadenia fidelis klamathica	PG	1E
Monadenia fidelis minor	1, 2	1A
Monadenia fidelis ochromphalus	PG	1F
Monadenia troglodytes troglodytes	1, 2	1A
Monadenia troglodytes wintu	1, 2	1A
Oreohelix n. sp.	1, 2	1A
Pristoloma articum crateris	1, 2, PG	1B
Prophysaon coeruleum , south of Oregon Highway 22	1, 2	1D
Prophysaon coeruleum , north of Oregon Highway 22	1, 2	1A
Prophysaon dubium	1, 2	1D

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Table 2-8. Species with Increased Levels of Protection and Management		
Notes: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3). Abbreviations: syn. = synonym or species name used in the past. PB= Protection Buffer species; PG = Protect From Grazing species		
TAXA	**Categories by Alternative**	
	No Action	**Alt. 1**
SPECIES GAINING STRATEGIC SURVEYS (Continued)		
MOLLUSKS (Continued)		
Trilobopsis roperi	1, 2	1A
Trilobopsis tehamana	1, 2	1A
Vertigo n. sp.	1, 2	1A
Vespericola pressleyi	1, 2	1A
Vespericola shasta	1, 2	1A
Vorticifex klamathensis sinitsini	1, 2	1E
Vorticifex n. sp. 1	1, 2	1E
VASCULAR PLANTS		
Bensoniella oregana (California only)	1, 2	1A
Botrychium minganense - Oregon/California	1, 2	1A
Botrychium montanum	1, 2	1A
Coptis asplenifolia	1, 2	1A
Coptis trifolia	1, 2	1A
Corydalis aquae-gelidae	1, 2	1C
Cypripedium fasciculatum (entire range)	1, 2	1C
Cypripedium montanum (entire range)	1, 2	1C
Eucephalus vialis (Aster vialis)	1, 2	1A
Galium kamtschaticum - Olympic Peninsula, eastern Washington Cascades, western Cascades -south of Snoqualmie Pass	1, 2	1A
Platanthera orbiculata var. orbiculata (Habenaria orbiculata)	1, 2	1C

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Table 2-9. Species with Decreased Levels of Protection and Management

Notes: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3). Abbreviations: syn. = synonym or species name used in the past. PB= Protection Buffer species; PG = Protect From Grazing species

TAXA	Categories by Alternative	
	No Action	Alt. 1
SPECIES LOSING PRE-DISTURBANCE SURVEYS		
FUNGI		
Bondarzewia mesenterica (Bondarzewia montana)	1, 2, 3	1B
Otidea leporina	3, PB	1B
Otidea onotica	3, PB	1E
Otidea smithii	1,3, PB	1B
Polyozellus multiplex	1,3, PB	1B
Sarcosoma mexicana, outside Oregon Coast Range & Oregon Willamette Valley provinces.	3, PB	1E
Sowerbyella rhenana (Aleuria rhenana)	1,3, PB	1B
BRYOPHYTES		
Brotherella roellii	1, 3, PB	1E
Buxbaumia viridis	PB	1D
Diplophyllum plicatum	1, 2	1B
Kurzia makinoana	1, 2	1B
Marsupella emarginata v. aquatica	1, 2	1B
Ptilidium californicum, Oregon, South of Lane-Douglas County line extended east to boundary of Northwest Forest Plan.	1, 2, PB	1F
Rhizomnium nudum	PB	1B
Tritomaria exsectiformis	1, 2	1B
VERTEBRATES		
Del Norte salamander *Plethodon elongatus*	2, PB	1D
MOLLUSKS		
Deroceras hesperium	1, 2	1E
Fluminicola n. sp. 2	1, 2	1E
Fluminicola n. sp. 19	1, 2, PG	1E
Fluminicola n. sp. 20	1, 2, PG	1E

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Table 2-9. Species with Decreased Levels of Protection and Management

Notes: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3). Abbreviations: syn. = synonym or species name used in the past. PB= Protection Buffer species; PG = Protect From Grazing species

TAXA	Categories by Alternative	
	No Action	Alt. 1
MOLLUSKS (Continued)		
Hemphillia pantherina	1, 2	1E
Megomphix hemphilli	1, 2	1D
Pristoloma articum crateris	1, 2, PG	1B
Prophysaon coeruleum , south of Oregon Highway 22	1, 2	1D
Prophysaon dubium	1, 2	1D
Vorticifex klamathensis sinitsini	1, 2	1E
Vorticifex n. sp. 1	1, 2	1E
SPECIES LOSING SITE PROTECTION		
FUNGI		
Gastrosuillus amaranthii (*Gastrosuillus* sp. nov. #Trappe 9608)	1, 3	1F
Gomphus clavatus	3	1F
Gyromitra esculenta	3, 4	1F
Plectania melastoma	3	1F
Sarcosphaera eximia	3	1F
Spathularia flavida	3	1F
LICHENS		
Kaernefeltia californica (Cetraria californica)	1, 3	1F
BRYOPHYTES		
Ptilidium californicum, Oregon, South of Lane-Douglas County line extended east to boundary of Northwest Forest Plan.	1, 2, PB	1F
MOLLUSKS		
Ancotrema voyanum	PG	1F
Monadenia fidelis ochromphalus	PG	1F

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Table 2-10. Summary of Proposed Changes to Levels of Management by Taxa Group and Alternative, Compared to the No-Action Alternative[1].

Taxa Group	Increased Management			Decreased Management		
	Increased Known Site Protection	Added Pre-disturbance Surveys	Added Strategic Surveys	Removed Pre-disturbance Surveys	Removed Known Site Protection	Removed from Management
Alternative 1						
Fungi	59	--	--	7	6	17
Lichens	13	2	--	--	1	37
Bryophytes	--	1	9	8	1	11
Mollusks	--	--	47	11	2	--
Vascular Plants	--	--	11	--	--	6
Vertebrates[2]	1	--	7	1	--	--
Total	73	3	74	27	10	71
Alternative 2						
Fungi	59	--	--	7	--	17
Lichens	23	1	--	--	--	37
Bryophytes	--	1	9	8	--	11
Mollusks	--	--	47	13	--	--
Vascular Plants	1	--	11	4	--	6
Vertebrates[2]	1	--	7	5	--	--
Total	84	2	74	37	--	71
Alternative 3						
Fungi	64	194	--	--	--	17
Lichens	23	33	--	--	--	37
Bryophytes	--	7	9	1	--	11
Mollusks	--	1	47	--	--	--
Vascular Plants	1	--	11	--	--	6
Vertebrates[2]	1	--	7	--	--	--
Total	89	235	74	1	--	71

[1] Includes changes to management in all or a portion of the species range within the Northwest Forest Plan area.
[2] Vertebrates include salamanders, red tree vole, and great gray owl.

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Chapter 3 & 4
Affected Environment and Environmental Consequences

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Introduction

Chapter 3 (Affected Environment) and Chapter 4 (Environmental Consequences) are combined in this document, as was done in the Northwest Forest Plan FSEIS (USDA, USDI 1994a) to more clearly present information to the readers. The text is ordered by first describing a resource or environmental component, then describing the environmental consequences to that resource or component.

This chapter describes aspects of the environment likely to be most directly affected by the proposed management. Also described are the direct and indirect effects (or impacts) of management under the alternatives, which constitutes presentation of cumulative impacts. Together, these form the scientific and analytic basis for the Comparison of Effects of the Alternatives section in Chapter 2.

Relationship of this Supplemental Environmental Impact Statement to the Northwest Forest Plan FSEIS

To eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision, this supplemental environmental impact statement (SEIS) is tiered to the Northwest Forest Plan FSEIS. Whenever a broad environmental impact statement has been prepared (such as the Northwest Forest Plan FSEIS and a subsequent environmental impact statement is then prepared on an action within the entire program (such as the Survey and Manage Standards and Guidelines), the subsequent environmental impact statement need only summarize the issues discussed in the broader environmental impact statement and incorporate by reference the discussions from the broader statement (40 CFR 1502.20).

This SEIS incorporates by reference the discussions in Chapter 3&4 of the Northwest Forest Plan FSEIS that concern affected environment and background information relating to ecosystems, species, communities and the economy**.** This SEIS builds on those discussions and adds additional discussions that address relevant changed circumstances and new information since publication of Northwest Forest Plan FSEIS in February 1994. The analysis of environmental consequences in this SEIS is limited to those that would possibly result from the actions described in the alternatives. The environmental consequences described in the Northwest Forest Plan FSEIS relating to other aspects and elements of the Northwest Forest Plan and that are unchanged by the alternatives in this SEIS, are assumed to remain valid.

Incomplete or Unavailable Information

There is less than complete knowledge for many of the relationships and conditions of wildlife species, forests, the economy, and communities. The ecology, inventory, and management of large forests is a complex and developing discipline. The biology of specific species prompts questions about population dynamics and habitat relationships. The interaction among resource supply, the economy, and rural communities is also the subject of an inexact science.

The SEIS interdisciplinary team examined the data and relationships used to estimate the effects of the alternatives. There is a substantial amount of credible information about the topics of this environmental impact statement; the central relationships and basic data are well established. The best available information was used to evaluate the alternatives. However, for certain species analyzed in this SEIS, there is very little known about their range, distribution, habitat, and abundance.

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When encountering a gap in information, the question implicit in the Council on Environmental Quality regulations on incomplete or unavailable information was posed: Is this information "essential to a reasoned choice among alternatives"? (40 CFR 1502.22[a]). While additional information would often add precision to estimates or better specify a relationship, the basic data and central relationships are sufficiently well established that any new information would not likely reverse or nullify understood relationships. Although new information would be welcome, no missing information was determined as essential to making a reasoned choice among the alternatives as they are constituted.

Nonetheless, the precise relationships between the amount and quality of habitat and the future populations of species are far from certain; there is a certain level of risk inherent in managing forest lands, even to standards based on conservative application of those relationships. The greater the uncertainty, the more difficult it is to manage risk. The alternatives analyzed in this SEIS propose specific strategies designed to address management of species for which much information is incomplete. The gaps in knowledge concerning species that are relevant to environmental consequences and a reasoned choice among alternatives are discussed in subsequent sections of this chapter.

Although the Northwest Forest Plan was based on current science, the plan acknowledged circumstances of uncertainty and incorporated the adaptive management process to provide the flexibility to respond to new information. The analysis of alternatives that refine or modify the Survey and Manage Standards and Guidelines in this SEIS is part of the adaptive management process, which is used by the Forest Service and the Bureau of Land Management to respond to new information concerning species and new information resulting from over five years of experience in implementing the Northwest Forest Plan. Although the overall concept of adaptive management is straightforward, responding to new information relating to the Survey and Manage Standards and Guidelines is complex. One aspect that has added complexity to applying adaptive management to the Survey and Manage Standards and Guidelines is that the Northwest Forest Plan Record of Decision did not identify specific steps and criteria for making changes or refinements to them.

The action alternatives in this SEIS provide a specific process and specific criteria for making changes through the adaptive management process. The process and criteria for making these changes are similar to the process and criteria used to assess new information concerning species in this SEIS. The process includes periodic review of new information by a panel of scientists and experts using specified criteria to make determinations whether to add or remove species from Survey and Manage Standards and Guidelines, or move a species to another Survey and Manage category. This defined process and criteria should facilitate the adaptive management response to future new information in a scientifically sound and credible manner.

Cumulative Impacts

Cumulative impacts to the environment are those that result from the incremental effects of a proposal added to other past, present, and reasonably foreseeable future actions regardless of which agency or person undertakes them (see 40 CFR 1508.7). Most of the environmental consequences disclosed in this environmental impact statement are cumulative, because they are the environmental and management impacts of an accumulation of management actions that will happen locally throughout the area of the Northwest Forest Plan.

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Background

Relationship of Survey and Manage to the Northwest Forest Plan

Effects Assumptions Relating to Survey and Manage Standards and Guidelines

The Survey and Manage Standards and Guidelines were a mitigation measure added to the preferred alternative in the Northwest Forest Plan FSEIS and adopted in its Record of Decision. This mitigation measure was included to increase the likelihood of stable, well-distributed populations of certain species across federally managed lands, and/or to decrease the likelihood of extirpation of these species from federally managed lands in the area of the Northwest Forest Plan. The analysis of environmental consequences of the alternatives in this SEIS must be understood in the context of the overall Northwest Forest Plan. Species persistence (see Chapter 2 and glossary) is provided for in the Northwest Forest Plan by a combination of seven different land-use allocations (or designated areas) and many different standards and guidelines. The Survey and Manage Standards and Guidelines, similar to the other standards and guidelines in the Northwest Forest Plan, do not work independently but rather work together to provide for persistence. Persistence cannot be attributed to any single standard and guideline. The relationship and relative acres of benefit to Survey and Manage species to the other parts of the Northwest Forest Plan is shown in Figure 3&4-1.

Although overall persistence cannot be attributed to a single standard and guideline, the specific benefits to species of a given land-use allocation or a given standard and guideline can be identified. However, since this SEIS is analyzing alternatives that would refine or modify only the Survey and Manage Standards and Guidelines, it is important to understand in the effects analysis that the Survey and Manage Standards and Guidelines were a mitigation measure that increased the confidence of persistence, but were not the sole factor in providing persistence.

The Northwest Forest Plan FSEIS (USDA, USDI 1994a, p. 3&4-122) acknowledged this difficulty:

> *"The assessment was meant to help determine when the cumulative effects of such incremental losses of habitat might result in risk to the species' survival. As discussed above, this determination is problematic. Background information about exact habitat requirements of many organisms does not exist, nor is it possible to accurately predict the exact consequences of each potential land management activity for all species."*

Among the assumptions in the effects analysis in this SEIS is that the definition of "implementation" of projects since adoption of the Northwest Forest Plan was consistent with the letter of direction dated September 11, 1998 (1736-PFP(BLM-OR931)P/1950(FS), 9/1/98). Using this assumption, the habitat modifications expected to take place as the result of projects that met this definition of implementation were assumed, for analysis purposes, to have already taken place.

Persistence, Likelihood of Various Distributions of Species Populations, and Viability

Persistence, as used in this SEIS, is defined and discussed in detail in Chapter 2. Briefly, persistence for this analysis means to support a species well distributed across its

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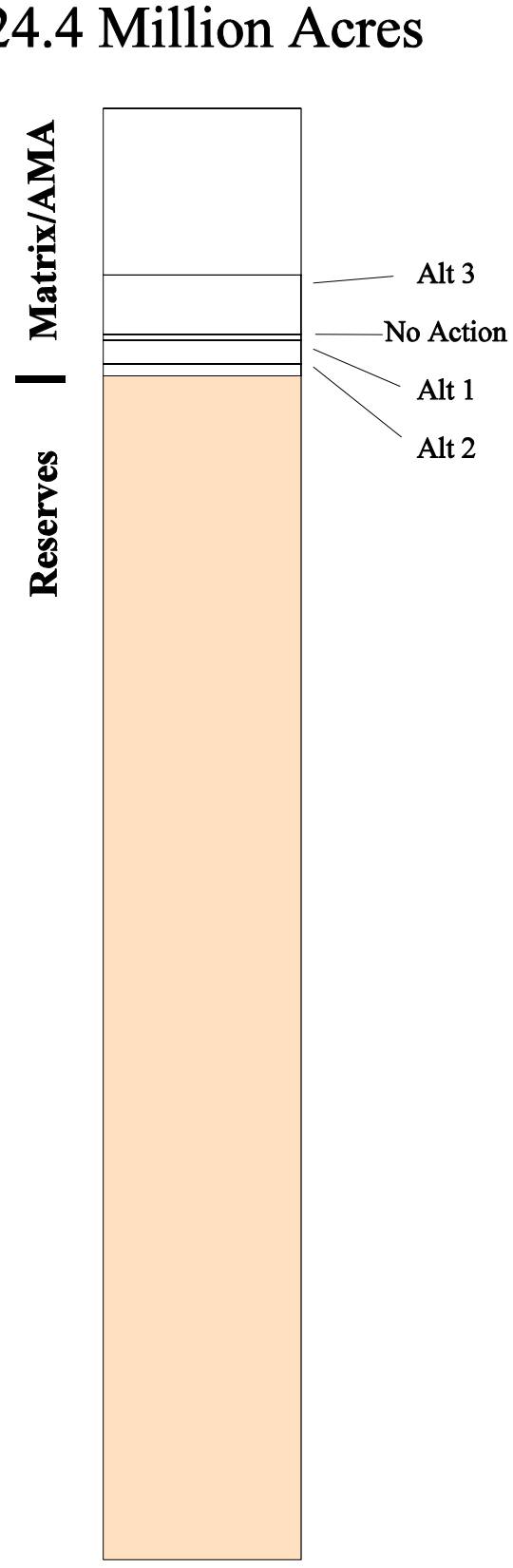
Figure 3&4-1.



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historic range on federally managed lands for 100 years. The action alternatives in this SEIS, along with the other elements of the Northwest Forest Plan, are designed to provide persistence of late-successional and old-growth forest related species. In this manner, the alternatives and analysis in this document are related to the work of the Forest Ecosystem Management Assessment Team.

The Forest Ecosystem Management Assessment Team was instructed to "include alternatives that range from a medium to a very high probability of ensuring the viability of species." The term "viability" in this context refers to a Forest Service planning regulation issued under the National Forest Management Act stating that "fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired nonnative vertebrate species within the planning area" (36 CFR 219.19).

The Forest Ecosystem Management Assessment Team conducted assessments of the likelihood that each option presented in the FEMAT Report would provide sufficient habitat on federally managed lands for various distributions of species populations over 100 years. The team's assessments rated four outcomes ranging from species populations that were stable, well-distributed across federally managed lands (Outcome A) to extirpation from federal land (Outcome D). The team compared options by assessing the likelihood of a species (or group) of attaining the four outcomes. A specific likelihood of achieving Outcome A was used as a point of comparison only and was not intended as establishing a standard for satisfying the viability regulation. The FEMAT Report stated that the team's evaluations should not be viewed as precise analysis of likelihood of persistence.

Ultimately, the FEMAT Report's Option 9 was brought forward as Alternative 9 in the Northwest Forest Plan Draft SEIS. Between the release of the Draft SEIS and the Final SEIS, the Additional Species Analysis Team reviewed the status of the species originally assessed by FEMAT. As a result of this team's work, the Survey and Manage Standards and Guidelines were added as mitigation measures in the Northwest Forest Plan FSEIS. The goal was to improve the likelihood of achieving well-distributed species populations across their historic ranges on federally managed lands.

Although the Additional Species Analysis Team did not redo the species assessments originally conducted by FEMAT, and no precise measure of viability appears in the Northwest Forest Plan FSEIS, adding the Survey and Manage Standards and Guidelines to the Option 9/Alternative 9 management direction strengthened or increased the protection for these species. Therefore, environmental consequences resulting from management under the Survey and Manage Standards and Guidelines are either equal to, or of less impact than, those environmental consequences described by FEMAT and the Northwest Forest Plan Draft SEIS. This increase is described more in qualitative terms related to the additional analysis and resultant added mitigation.

Although there is a relationship among (1) the concepts of persistence as used in this document, (2) the likelihoods of various distributions of species populations used in FEMAT and the Northwest Forest Plan FSEIS, and (3) the "viability" regulation of the National Forest Management Act, the three are clearly not synonymous. Therefore, it is important in understanding the alternatives and effects analysis of this SEIS to note that persistence is meant to be a relative term related to the assumptions of the Northwest Forest Plan FSEIS.

Current Conditions, New Information, and Changed Circumstances Since 1994

The analysis in this document is tiered to the Northwest Forest Plan FSEIS and incorporates that analysis by reference. The management of natural resources and the

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analysis in the Northwest Forest Plan FSEIS were surrounded by public and scientific controversy. The Northwest Forest Plan FSEIS acknowledged this controversy and uncertainty. The public and scientific controversy concerning natural resource management in the Northwest has continued to the present time. However, the key question in the use of the Northwest Forest Plan FSEIS analysis is whether there is new information or changed circumstances since 1994, relevant to the environmental concerns and bearing on the actions or their impacts that would substantially alter the conclusions in the Northwest Forest Plan FSEIS.

Although the effects analysis is incorporated by reference, this document repeats (for the benefit of the reader) various background information, analysis and conclusions from the Northwest Forest Plan FSEIS. The issue of significant new information or changed circumstances is addressed for each resource in either general or specific terms, as appropriate. The adaptive management changes to the Survey and Manage and other mitigation measures proposed in the alternatives are based on new information. However, the new information related to these mitigation measures does not significantly alter the basic and overall conclusions of the Northwest Forest Plan FSEIS such that the fundamental analysis would be invalid.

The finding in this SEIS, which is based on a review of current information, is that there is no significant new information or changed circumstances that would alter the overall impact analysis or conclusions of the Northwest Forest Plan FSEIS. Implementation during the first five years indicates that accomplishments and progress are generally consistent with the underlying assumptions of the Northwest Forest Plan. The following overview addresses some of the basis for this conclusion.

Overview of Aspects of Northwest Forest Plan Implementation

Late-Successional Reserve Assessments are required in the future prior to Agency actions in Late-Successional Reserves. Late-Successional Reserve Assessments have been developed for nearly 6 million acres (more than 75 percent of Late-Successional Reserve acres).

Watershed analysis is required in Key Watersheds and Riparian Reserves prior to determining how proposed management actions meet the Aquatic Conservation Strategy. Approximately 80 percent of the Northwest Forest Plan area is currently covered by watershed analysis. Watershed restoration accomplishments include a net reduction of approximately 900 miles of roads in Key Watersheds. In addition, over $150 million (consisting of 2,380 projects) has been invested in ecosystem restoration through the Jobs-In-The-Woods program. Watershed restoration is an active and productive part of the Northwest Forest Plan.

The area assumed available for timber harvest in the Northwest Forest Plan FSEIS has declined approximately 13 percent as a result of corrections that more accurately reflect the extent of riparian reserves and other reserves. The probable sale quantity has declined 15 percent as a result of these corrections (see section on Timber later in this chapter). These adjustments were consistent with the Northwest Forest Plan FSEIS assumption that "Sustainable sale estimates will be revised using more refined data and procedures when Draft Forest and District plans are completed or current plans are revised." (USDA, USDI 1994a, p. 3&4-263).

All 10 Adaptive Management Areas, which encompass 1.5 million acres, have active research projects. Most of the ten Adaptive Management Areas also have scheduled projects for timber harvest, forest health maintenance and improvement, and habitat and watershed restoration, and have formed local citizen/scientist/manager partnerships. Plans have been completed for nine of the ten Adaptive Management Areas.

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Regional implementation monitoring shows a high rate of success in implementing the Northwest Forest Plan Record of Decision. Over 95 percent compliance with the Northwest Forest Plan Record of Decision requirements has been found through monitoring of timber sales, roads, and restoration projects (USDA, USDI 1999c).

Although the area covered by the Northwest Forest Plan has experienced some wild fires, floods and windstorms, none of these stochastic events are beyond the normal range of variability that was assumed in the Northwest Forest Plan FSEIS.

The Northwest Forest Plan includes many long-term (100 years or longer) goals and objectives. Conclusions based on a brief assessment of the overall plan (five years of implementation) must be limited. However, based on monitoring information and the implementation experience described above, it is possible to conclude that the FSEIS assumptions relating to existing environment and effects of implementing the Northwest Forest Plan remain valid. Therefore, the Northwest Forest Plan FSEIS assumptions and conclusions are used as a basis for the effects analysis in this Supplemental Environmental Impact Statement.

Forest Ecosystem

Background and Affected Environment

The Northwest Forest Plan is an ecosystem approach to land management that focuses on habitat for late-successional and old-growth forest related species. The planning area is limited to the federally administered lands within the range of the northern spotted owl.

Although the scale of the Northwest Forest Plan is regional, the Plan uses watershed scale analysis for site-specific actions. The Plan brings consistency to analysis, yet recognizes that some local, site-specific projects may have short-term adverse effects. Traditional temporal planning scales have been expanded from decades to centuries (100-200 years) in recognition that ecosystems are adapted to absorb and respond to extreme fluctuations in climate and changes in habitat. Although these natural extremes have short-term adverse effects, these extremes foster the resilience of species and ecosystems in the long term. The period since adoption of the Northwest Forest Plan in 1994 represents approximately three percent of the projected natural cycle of 100 to 200 years.

The Northwest Forest Plan features a functional interconnected, late-successional forest ecosystem to provide dispersal (short term) and movement between reserves (long term) of species, both of which are essential processes for selection, adaptation, and evolution. As such, the major focus is on function, rather than structure or composition, giving a relatively "coarse" approach. The processes of succession and disturbance are expected to create a diversity of landscape patterns across the region. However, certain standards and guidelines, parts of the Aquatic Conservation Strategy, and some mitigation measures focus on providing stand-scale structures—such as clumps of green trees, snags, and woody habitat across the landscape. Since managing habitat alone does not ensure persistence of all species, Survey and Manage mitigation measures were incorporated into the Northwest Forest Plan. These mitigation measures are a "fine filter" approach, focusing on individual species habitat needs.

The Northwest Forest Plan and this SEIS assumed a continuation of succession, and the disturbance processes that interrupt succession. Other assumptions used in this SEIS

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include the natural variability in successional process rates and successional directions. Since climate drives successional rates, there is an expected variability in rate and direction associated with normal climatic variability. Like the weather, succession is expected to be imprecisely predicted. Although disturbance regimes (high rates of change) are often described precisely in terms of frequency, intensity, duration, and extent, such regimes are also chaotic. For example, the average fire return intervals in the temperate forests of Oregon vary from less than 10 years between fires at the low elevations, to over 100 years between fires at the high elevations. (Variability throughout the overall region is greater.) These frequencies seem precise, but standard deviations (variability associated with the average) are often greater than the average. This means that average conditions and average rates of change can only be poorly described. Given that natural variability is wide, chaotic, and takes at least several decades to establish patterns and trends, it is premature to effectively evaluate anthropomorphic effects and trends. Therefore, any analysis of the validity of the Northwest Forest Plan based on only the first five years of its implementation must be limited in the ability to draw definite conclusions.

Late-Successional and Old-Growth Forests

Within the context of the Northwest Forest Plan, late-seral stage stands (such as late-successional and old-growth forests) are generally those at or over 80 years old. The Northwest Forest Plan anticipated and planned for increases in late-seral acres in the long term, as well as harvest of late-successional stands in the Matrix. Increases in late-seral acres would be insignificant since adoption of the Northwest Forest Plan due to the short time period involved. Since 1994, harvest levels have been 20 percent lower than anticipated in the Northwest Forest Plan FSEIS. Probable sale quantity has been adjusted downward by approximately 15 percent to more accurately reflect the extent of reserves.

A total of approximately 8 million acres of late-successional forest is within the area of the Northwest Forest Plan. Reserve land-use allocations constitute 86 percent of this late-successional forest. The remaining 14 percent is in the Matrix and Adaptive Management Areas, and available for harvest that contributes to the Probable Sale Quantity (PSQ). It is anticipated that management actions of partial cut harvests, regeneration harvests, and prescribed fires in the Matrix and Adaptive Management Areas will modify 2.5 percent to 4 percent of the total 8 million acres of late-successional forest (or 20 percent of the Matrix and Adaptive Management Areas) in the next 10 years (see Figures 3&4-1 and 3&4-2).

In relation to the long-term and regional ecological objectives, these changes are not expected to be significant because of the large extent of reserves and the large range of natural variability. Although late-successional and old-growth forests will not be replaced in the Matrix land-use allocation, across the entire Northwest Forest Plan area and in the long term, late-successional and old-growth forest will be replaced at a rate four times greater than the rate at which it is harvested. As a result, in the long term, there will be many more acres of late-successional and old-growth forests in the Northwest Forest Plan area than currently exists. This late-successional and old-growth forest will exist in the reserve and withdrawn land-use allocations.

Species Population Numbers and Composition

Much new information has been derived from the surveys conducted prior to ground-disturbing activities as required by the Survey and Manage Standards and Guidelines. This new information includes increased knowledge of population numbers and the extent of species range (see Tables 3&4-2 for fungi and 3&4-4 for mollusks, located at the

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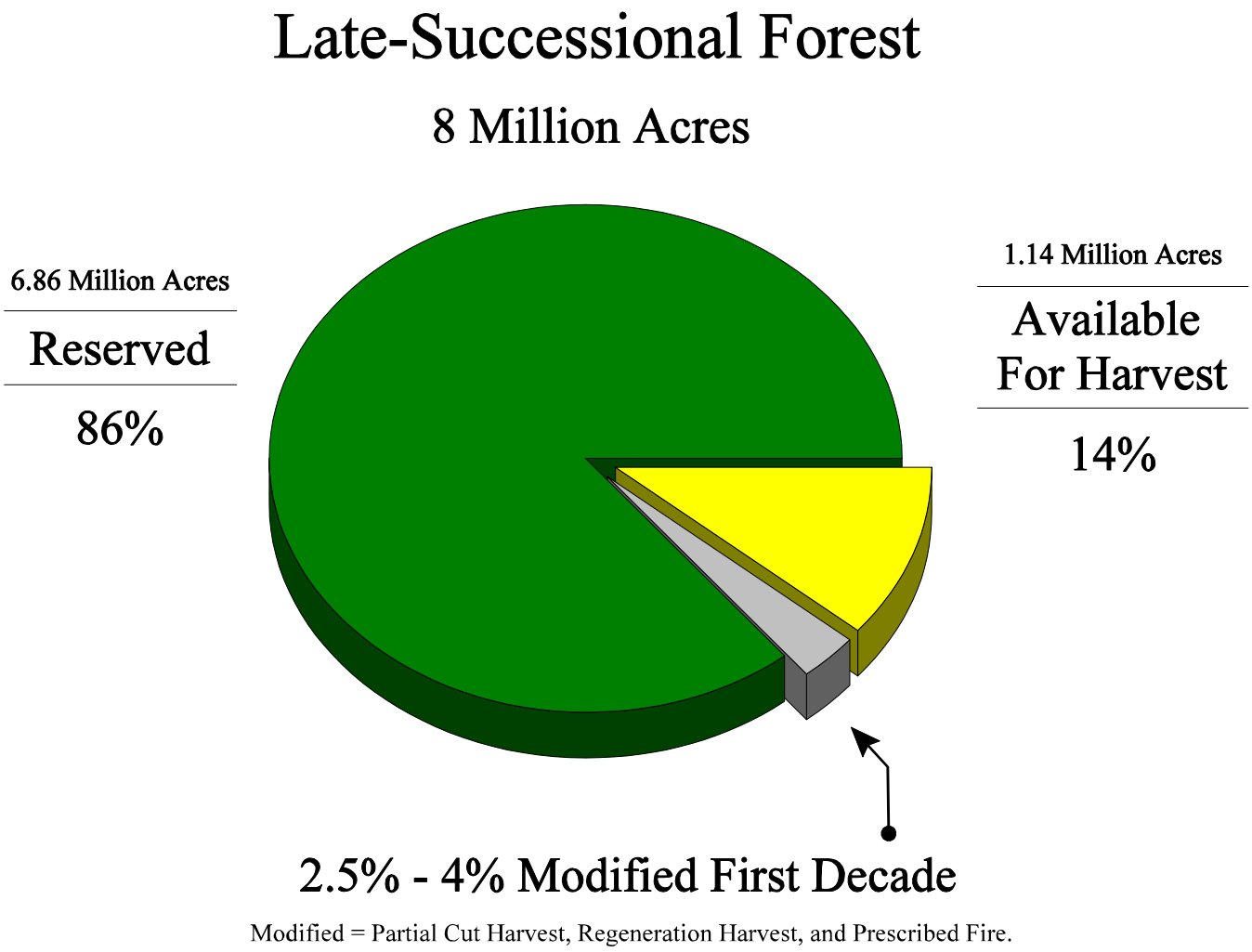
Figure 3&4-2. Late-Succestional Forest.



end of Chapter 3). Although range-wide data on the status of many species is scarce, some of the new information does indicate that certain species occur in greater numbers and in different areas than was previously known. Although new information concerning individual species is the basis for the adaptive management changes proposed for managing species in the action alternatives, this new information concerning species numbers and composition does not change the overall and basic conclusions of the Northwest Forest Plan FSEIS.

Global Climate

The effects of the Northwest Forest Plan on global climate were analyzed in the Northwest Forest Plan FSEIS. Global warming is anticipated as a result primarily of increases in atmospheric carbon dioxide, methane, nitrous oxide and other trace gases attributed to human activities. Land management activities under the Northwest Forest Plan, such as timber harvest or burning, would primarily affect the quantity of carbon dioxide released into the atmosphere. The Northwest Forest Plan FSEIS analysis concluded that the impacts of the Northwest Forest Plan on global atmospheric carbon

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dioxide balance would be much less than 0.01 percent of the total. Under all alternatives presented in this SEIS, the impact on atmospheric carbon dioxide would be less than anticipated in the Northwest Forest Plan FSEIS because of lower harvest levels than originally expected under the Northwest Forest Plan.

Natural Disturbance Processes

There was no estimate made in the Northwest Forest Plan FSEIS of the amount of natural disturbances for short intervals such as 1994 to 1999. Because of the short-term nature of the information in those five years and because of the high variability of natural disturbances, an examination of data from this period would not lend itself to valid comparison of the analysis in the FSEIS. There is no new information since 1994 concerning natural disturbances that would alter the assumptions, impact analysis, or conclusions of the Northwest Forest Plan FSEIS concerning natural disturbance processes.

Human Activity

The annual harvest rate has declined approximately 15 percent to 811 million board feet compared to the harvest rate of 958 million board feet anticipated in the FSEIS. The amount of prescription fires were not quantified in the Northwest Forest Plan FSEIS; however, this activity has occurred at the approximate level normally associated with the harvest and restoration activities that have occurred in the past five years. The rate of road and stream restoration was also not quantified in the Northwest Forest Plan FSEIS; however, these activities have also occurred at a level that is reasonable to expect. All of these activities in the initial five-year period of the implementation of the Northwest Forest Plan have been consistent with the assumptions, impact analysis, and conclusions of the Plan.

Overall, changes since 1994 were anticipated. The most significant change is the trend towards managing for individual species, rather than functional processes. Attempting to maintain stable populations on a site-by-site basis will continue to spotlight conflicts in species needs and the natural ebb and flow in numbers. Late-seral related species have different habitat needs and have survived various types and intensities of disturbance. Disturbance and change enhance long-term resilience. Species diversity may be best served by restoring the focus to maintaining functional groups and processes.

Assessing Ecological or Species Risk

The four essential elements of risk are: value, susceptibility, hazard, and exposure. Removing any of the four elements results in eliminating risk. Altering any element (risk management) alters the risk landscape (USDA, USDI 1997a). Although values cannot always be expressed economically, they still exist. Hazard is considered to have a negative effect on the valued resource, yet nature depends on hazards to keep it healthy. Examples may be extreme, and include acute climatic events, fires, floods, or insect outbreaks.

Succession (which consists of slow chronic change) and disturbance (which consists of acute change) produce ”winners” and “losers,” resulting in landscape diversity through their differing rates of change. In many instances, susceptibility may be related to intensity of exposure to one or more hazards over time and space. However, if the resource is not susceptible to the hazard, there is no risk. The probability of exposure to a specified hazard is commonly considered risk.

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Information about the exact habitat requirements of many organisms does not exist, nor is it possible to accurately predict the exact consequences of each potential land management activity for all species (USDA, USDI 1994a, p. 3&4-122). The greater the uncertainty, the more difficult it is to manage risk. However, through acquisition and application of knowledge about ecosystems or species, and their probable exposure and susceptibility to known hazards, it is possible to devise strategies to manage the risk or probability of an outcome.

The challenge is to manage the elements of risk to provide a reasonable assurance of persistence (see Chapter 2). Each species has its value, and value within a watershed or site can be additive to a certain point. The hazards may be the lack of measurable elements of habitat. Each species has its own specific requirements (unless functional groups are considered). Also, each species susceptibility associated with the hazard is unique. The Northwest Forest Plan standards and guidelines attempt to manage the components of late-successional and old growth condition, or maintain late-successional and old growth habitat to reduce exposure to the lack of late-successional and old growth structure. Management under the Northwest Forest Plan (including the Survey and Manage Standards and Guidelines) has provided specific habitat components or habitat areas (land allocations) to meet those needs.

In considering effects of the alternatives, it is important to be aware of some principles of ecosystem management. Among those principles important to an overall understanding of the effects analysis are the following:

- Management of forest ecosystems does not control climatic or other ecosystem processes to a great degree.
- The population extent and density of species will vary without an understanding of the cause.
- Reduction in exposure is not linearly related to effort or resource input. Usually, initial efforts result in greater reduction in risk. Later efforts tend to be more expensive, but less productive. Information gathering aimed at managing risk must be focused specifically at management questions regarding species needs. To achieve the objectives of persistence, information must provide the answer to questions of susceptibility, hazard, or exposure.
- Management aimed at dampening extreme ecological variations caused by natural disturbance, such as fire, tends to lead to eventual magnification of the effects associated with disturbance.

Environmental Consequences and Comparison of Alternatives

The overall strategy for the Northwest Forest Plan is restoring and maintaining functional late-successional old-growth forest ecosystems. The species-specific direction of the Survey and Manage Standards and Guidelines may sometimes conflict with management associated with the core strategy of the Plan. An example of this potential conflict would be the use of prescribed burning, or allowing natural fire, to restore ecological functions to fire-associated forests in southern Oregon or northern California. There may be situations where Survey and Manage species depend on habitat that results from exclusion of fire from the ecosystem. These potential conflicts between the species-specific approach of Survey and Manage and the management of broad ecological functions important for maintaining late-successional forest ecosystems may lead to at least short-term management that varies with that needed to maintain natural

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disturbance.

Implementing Survey and Manage Standards and Guidelines during the initial five years of the Northwest Forest Plan has generated a very large amount of new information concerning species. Additional new information (concerning species, ecology, and the species ability to persist in the presence of natural disturbance that is expected to be developed through Survey and Manage strategic surveys) would be expected to resolve these potential management conflicts in the long term. Therefore, because these conflicts would be short term and within the expected variability of natural disturbance, there would be no significant ecological effects.

In the long term, no significant cumulative change is anticipated in the overall functioning of succession or disturbance as a result of differences between alternatives. Each alternative provides specific instructions for Survey and Manage species; however, from an overall ecosystem perspective, the acres associated with Survey and Manage Standards and Guidelines do not vary significantly under all four alternatives. The Northwest Forest Plan FSEIS concluded that the acres associated with the Survey and Manage mitigation measures would have a relatively minor effect on maintenance of a functional and interconnected, late-successional forest ecosystem (USDA, USDI 1994a, p.3&4-39). Although the number of acres associated with Survey and Manage under all alternatives is greater than was anticipated (tens of thousands of acres), these acres are not significant in relation to the approximately 20 million acres of reserves under the Northwest Forest Plan, and therefore would not alter the conclusion of the Northwest Forest Plan FSEIS.

Aquatic Ecosystem

Background and Affected Environment

The Northwest Forest Plan protects all streams, lakes, and wetlands within the range of the northern spotted owl/Northwest Forest Plan planning area. The Aquatic Conservation Strategy is a habitat-based approach developed to restore and maintain ecological health of watersheds and aquatic ecosystems contained within them on public lands (USDA, USDI 1994a, b). The assumption of the Northwest Forest Plan was that species-specific strategies would be insufficient to maintain and recover the populations of aquatic-dependent species. The Northwest Forest Plan Record of Decision emphasized this concept by stating:

> *"Any species-specific strategy aimed at defining explicit standards for habitat elements would be insufficient for protecting even the targeted species. The Aquatic Conservation Strategy must strive to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats". (USDA,USDI 1994b, p. B-9)*

The four major components of the Aquatic Conservation Strategy (Riparian Reserves, Key Watersheds, Watershed Analysis and Watershed Restoration) provide the basis for protection of aquatic-dependent and full-time and part-time riparian dependent flora and fauna. Species that spend their entire life histories in water receive the highest degree of protection as they are all contained within Riparian Reserves. Managing Riparian Reserves under the specific standards and guidelines, combined with the other components of the Aquatic Conservation Strategy, should meet the habitat/life history needs of the water-dependent flora and fauna throughout the range of the northern spotted owl. Riparian Reserves also benefit species that spend considerable portions of

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their life histories within the water or within riparian areas.

The assumptions of the Aquatic Conservation Strategy, the analysis contained in the Northwest Forest Plan FSEIS, and the Northwest Forest Plan 1994 Record of Decision remain sound after five years of implementation. The analysis in the Northwest Forest Plan FSEIS underestimated the potential landscape level of protection provided by the Aquatic Conservation Strategy. For example, the probable sale quantity has decreased 15 percent compared to that anticipated in the Northwest Forest Plan FSEIS, the acreage of Riparian Reserves is higher than originally analyzed, and the amount of land within Reserves has increased from a 6:1 ratio of reserve to non-reserve lands in the Northwest Forest Plan FSEIS to a 7:1 ratio. The absolute increase in reserves is additional to the increase in prescribed Riparian Reserve widths implemented through the Northwest Forest Plan Record of Decision. Alternative 9 in the Northwest Forest Plan FSEIS incorporated Riparian Reserve Scenario 1, which increased the width from one-half site potential tree height or 50 feet, to one-site potential tree height or 100 feet, whichever is greatest on each side of intermittent streams. This change was due to the additional species analysis in the Northwest Forest Plan FSEIS.

All forests within the range of the northern spotted owl were subjected to intense floods in 1996 and again in 1997. The most intense storms (estimated to exceed 100-year events) occurred on National Forests on the west side of the Cascade Range (B. McCammon, pers.com.). The floods affected many streams and watersheds within the range of the northern spotted owl. Within a flood-affected watershed, the effects were dispersed and occurred in clumps. For example, some subwatersheds received extensive flood damage, whereas a neighboring subwatershed may have experienced little to no effect, some of which could have benefitted the aquatic system (B. McCammon, pers.com.).

For example, the Clackamas River basin on the Mt. Hood National Forest had significantly different responses to the floods depending on the watershed. The upper Clackamas Watershed had less than 10 identified landslides, whereas the Fish Creek watershed had more than 250 landslides. These two watersheds are less than 20 miles apart. Although the flood affected many streams across the planning area, many streams and watersheds remained intact. The pattern of flood effects affirms the integrity of the landscape-level approach and assumptions of the Aquatic Conservation Strategy and the Northwest Forest Plan FSEIS.

Sixteen species of fish occurring within the Northwest Forest Plan analysis area received protection under the Endangered Species Act since the NFP Record of Decision, and two additional fish species have been proposed for listing (Table 3&4-1). Fourteen of the 16 species are anadromous fish; the two bull trout Distinct Population Segments are resident species. These listings do not reflect the integrity of the Aquatic Conservation Strategy. The life history of the fish species along with the short time implementing the Aquatic Conservation Strategy potentially affected the listings. Anadromous fish spend the majority of their life histories in areas outside of the federal lands covered by the Northwest Forest Plan. Other mortality factors (commercial and recreational fish harvest, ocean conditions, etc.) contributed to the listing of the fish. The relative contribution of each mortality factor was not identified in the listing announcements. The Northwest Forest Plan FSEIS states that:

> *".....the [Aquatic Conservation] strategy can succeed at maintaining and restoring the aquatic and riparian habitats regardless of what happens on nonfederal lands, but that would not ensure population viability of many of the fish stocks evaluated in this SEIS. …For these reasons, it is not possible to determine whether any of the alternatives in this SEIS would preclude listing of fish species under the Endangered Species Act."* (USDA,USDI 1994a, p. 3&4-202).

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The Aquatic Conservation Strategy has been in place for approximately 5 years, since the Northwest Forest Plan Record of Decision was signed in 1994. The time frame implementing the Aquatic Conservation Strategy has been too short to improve habitat conditions and have the fish populations respond to the improved conditions. This, too, is consistent with the analysis contained in the Northwest Forest Plan FSEIS and FEMAT Report. The authors of the Aquatic Conservation Strategy (USDA et al.1993) stated that:

> *"We emphasize, however, that it will require time for this strategy to work. Because it is based on natural disturbance processes, it may take decades to over a century to accomplish all of its objectives."*

Implementing the Aquatic Conservation Strategy for five years has not affected the listings of water quality impaired stream segments under Section 303(d) of the Clean Water Act. For example, the number of stream miles added to the 303(d) list in Oregon increased from approximately 12,000 miles from the time period of 1994-1996, to approximately 13,700 miles in 1998 (Oregon Department of Environmental Quality 1999). Not all of these streams occur within the Northwest Forest Plan planning area. The increase in stream miles is due in part to more information being available and a greater emphasis on water quality matters in recent years. For example, Oregon Governor Kitzhaber initiated a statewide effort aimed at recovering declining fish stocks. The Governor's effort involves identifying water quality impaired water bodies and developing Water Quality Recovery Plans to address factors that contributed to the listing of the water body.

Environmental Consequences and Comparison of Alternatives

The Aquatic Conservation Strategy emphasizes restoring watersheds, ecosystem functions, and aquatic systems, which results in a high degree of protection for aquatic-dependent flora and fauna regardless of the alternative selected. This is due to the Riparian Reserve network that is designed to protect and restore functions and processes of an interconnected network of aquatic systems (USDA, USDI 1994b). The Northwest Forest Plan Record of Decision requires Riparian Reserve widths that maintain the functions and processes that support the particular aquatic community and associated riparian area. The assumption here is that the Riparian Reserve width implemented through a project level NEPA decision document is based on a Watershed Analysis. Watershed Analyses address the factors that affect the protection and restoration of the habitat type affected (such as a lake or wetland) and recommend Riparian Reserves designed to protect and restore the functions and processes necessary to support the habitat type.

Regardless of the understanding of the ecological needs of aquatic dependent flora and fauna or their existing distribution, the Aquatic Conservation Strategy provides a high degree of protection of their habitat. The risk to the persistence of a particular species depends on its distribution and life history characteristics. There is a higher risk to species that have very limited distribution throughout their known range and/or occur in rare and isolated habitats (wetlands, lakes, geothermal springs, isolated seeps, etc.) (Figure 3&4-3). For example, species A is found only in warm geothermal seeps on specific landform types. These seeps are locally isolated and there are few of them. Species B lives along margins of permanently flowing cold water streams in the west slope of the Cascades. Species B also has few individuals at the locations where it has been observed. Species B, although locally rare when found, occurs in a common habitat type and, therefore, has a low risk to its persistence because of the landscape level protection required under the Aquatic Conservation Strategy. Species A has a

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higher risk to its long-term persistence because of the isolated nature and limited occurrence of the warm geothermal seeps.

The degree of dependence on water also is a risk factor**.** Species that spend their entire lives within water have the lowest risk of long-term negative effects due to ground disturbing activities. Species that spend greater proportions of their life histories out of water and within Riparian Reserves have a higher risk to their persistence than 100 percent aquatic species but they have a lower risk to their persistence than species that commonly use areas outside of Riparian Reserves. The other components of the Northwest Forest Plan such as Late-Successional Reserves, Administratively Withdrawn areas, etc., provide other levels of protection for those species that spend more time outside Riparian Reserves (refer to other sections that address terrestrial species).

Alternatives 1, 2, and 3 provide additional measures to reduce the risk to aquatic-dependent flora and fauna similarly. The degree of protection provided by the three alternatives is in addition to the "universal protection" provided by the Aquatic Conservation Strategy. The Survey and Manage direction in the alternatives provides mechanisms to collect additional information (such as through strategic surveys) to develop and refine Management Recommendations.

For isolated populations only known to occur in a few locales, the action alternatives provide for refining Management Recommendations that specifically address the habitat needs of the species. This provision serves to emphasize the importance of some isolated habitats. Refining the species-specific Management Recommendations would help prioritize restoration efforts. For those species that may be locally rare but have a wide distribution, the cumulative effect of the Aquatic Conservation Strategy would be that the risks to persistence would be significantly reduced at a regional or subbasin scale.

None of the alternatives affect the analysis or outcomes developed in the Northwest Forest Plan FSEIS and implemented through its Record of Decision (USDA, USDI 1994b).

Air and Water Quality, Soil Productivity, and Fire Management

Background and Affected Environment

Implementation of the Northwest Forest Plan standards and guidelines for air and water quality and soil productivity have started to improve the general ecosystem health, as well as the management of habitat for late-successional and old-growth forest related species. Five years, however, is a short time for significant change. Additional time and, in some cases, increased management activities are necessary to fully reach the intended goals of the Northwest Forest Plan.

The reduction of timber harvest levels in the lands covered by the Northwest Forest Plan, along with alterations in timber harvest methods, have reduced management activity impacts to water quality and soil productivity since 1994 when the Northwest Forest Plan Record of Decision was signed. Road closures and road obliteration activities are increasing in the lands covered by the Northwest Forest Plan. In Key Watersheds, for instance, there has been a net reduction of approximately 900 miles. Other activities designed to enhance long-term air quality, water quality, and soil productivity have also been accomplished including: subsoiling, fuel treatment, upland

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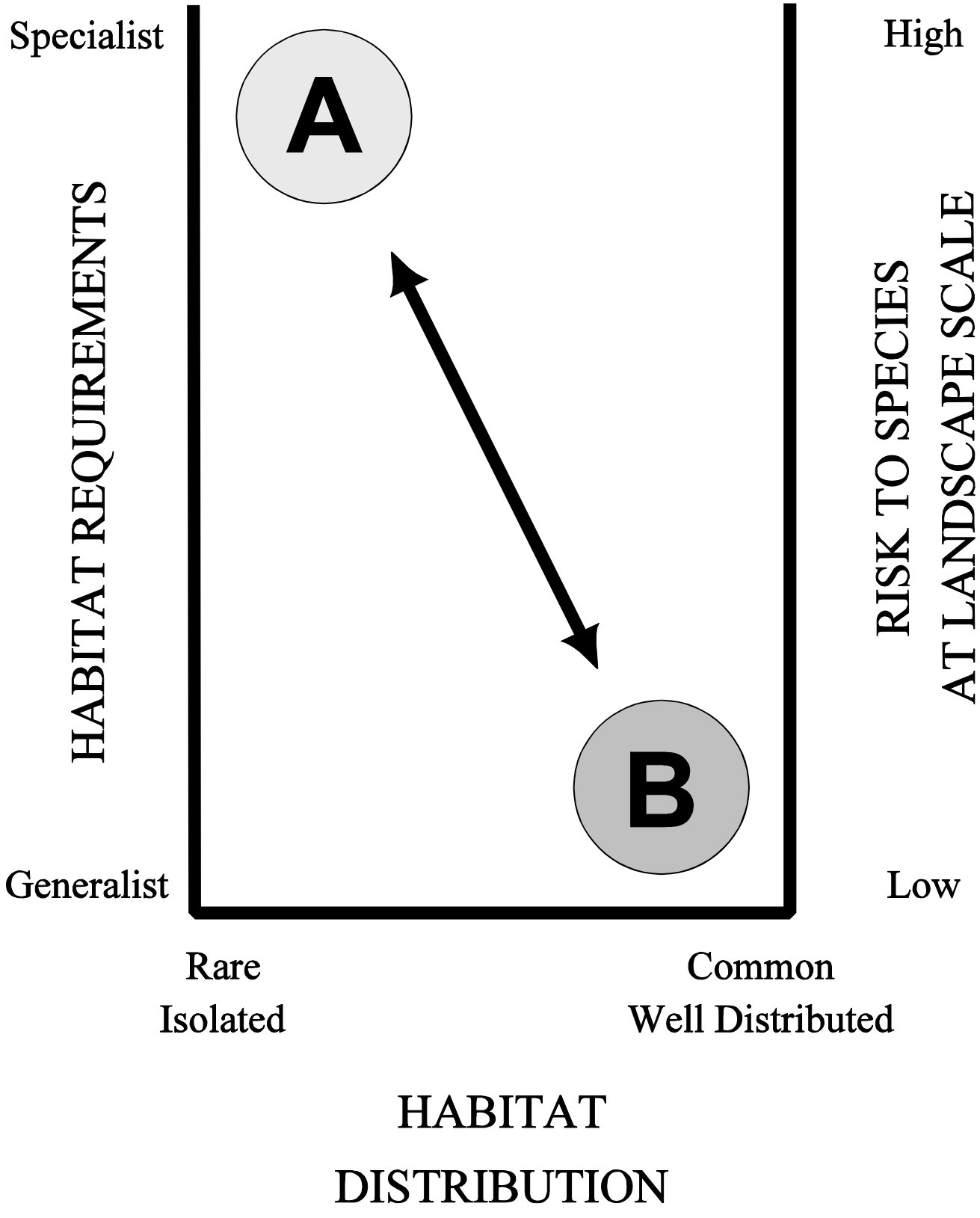

Figure 3&4-3. Relationship between habitat requirements, habitat distribution and relative risk for a species persistence at the landscape scale for aquatic-dependent flora and fauna.

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watershed restoration, riparian restoration, and a vigorous program of converting culverts to 100-year design as required in the standards and guidelines. Some 2,380 projects and over $150 million have been invested in ecosystem restoration through the Jobs-In-The-Woods program.

Other laws, regulations and guidelines adopted since 1994 have helped to improve management of air, water and soil within the area of the Northwest Forest Plan. New listings under the Endangered Species Act, Clean Air Act amendments, Clean Water Act supplements, and updated State requirements for water and air quality all complement the tenets of the Northwest Forest Plan. In addition to new mandatory requirements, other voluntary actions have been applied to improve ecosystem health. An example is in southwest Oregon where a voluntary arrangement has been established with the Oregon Department of Environmental Quality to monitor air quality and restrict prescribed burning when air quality thresholds are exceeded.

Flooding occurred in western Washington and Oregon in 1996 and 1997 resulting in a mix of conditions. Some hydrologic systems were enhanced through introduction of wood and debris, and floodplain alteration; other systems were degraded due to loss of channel structure. These flood events have been followed by an active program of stream restoration to repair damage.

The Northwest Forest Plan and Aquatic Conservation Strategy provide an unprecedented level of protection for aquatic systems and water quality. Based on the results of implementation monitoring, there has been good to excellent implementation of the Aquatic Conservation Strategy throughout the lands covered by the Northwest Forest Plan (USDA, USDI 1999c).

Water Quality Recovery Plans are being developed to respond to degraded water quality conditions as part of conformance with section 303(d) of the Clean Water Act. Soil quality is protected through agency standards, implementation of Best Management Practices as prescribed by the Clean Water Act, as well as the Northwest Forest Plan and its Aquatic Conservation Strategy's objectives and guidelines. Watershed conditions and functions are protected or restored based on priority, activities identified through watershed analysis, water quality recovery plans (Clean Water Act), and/or consultation with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

There have been changes in air quality since 1994 in the area covered by the Northwest Forest Plan. Smoke generated from burning slash in forest management activities has declined commensurately with the decline of timber harvesting. Conversely, there has been an increase in prescribed burning for ecological health and to reintroduce fire into fire-dependent ecosystems. Slash from forest management activities tends to include heavier fuel loadings, and therefore, generates greater volumes of smoke than natural slash burned for ecological reasons. However, the overall impact to airsheds has been a decline in smoke generated from prescribed burning by the Agencies.

There has been an increase in prescribed burning of slash from forest management activities on private lands adjacent to federally managed lands covered by the Northwest Forest Plan. Population increases, with their associated transportation and infrastructure needs, have also significantly increased emissions (particularly nitrogen and ozone). Sulfur emissions, on the other hand, have decreased and are expected to continue decreasing due to technological advances in emission control systems and the gradual switch to natural gas as a fuel of choice.

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The Northwest Forest Plan and Fire Management

There has been a general increase in management activities to restore the ecological role of fire and reduce hazardous fuel loadings (USDA, USDI 1994b, pp. B-7, C-12, and C-23). Extreme wildfire conditions produced corresponding increases in acres burned in 1994 and 1996. Conversely, very few wildfire acres burned in 1997 and 1998 when moderate-to-low wildfire conditions existed.

Using prescribed fire and other fuel reduction methods to restore ecosystem health can potentially conflict with the management of known sites under the Survey and Manage Standards and Guidelines. Without the reduction of hazardous fuels that have built up as a result of fire exclusion, the same populations may be inadvertently lost to wildfires if hazardous fuels remain untreated. The following excerpts from the Northwest Forest Plan FSEIS address hazardous fuels:

> *"Interruption of natural fire regimes has a direct effect on ecosystem species composition, and sometimes on species persistence. The near exclusion of natural, low to-moderate intensity wildfire has resulted in a proliferation of fire-intolerant and shade-tolerant species (i.e., true fir species and hardwoods), which are replacing ponderosa pine and Douglas-fir forest types within the dry provinces. Changes in long term soil productivity, stand structure and function, forest health, and biological diversity are also occurring due to the exclusion of fire. The mortality of trees due to insects and disease makes forest more susceptible to high-intensity, stand-replacing fires. "* (USDA, USDI 1994a, p. 3&4-83)

> *"Silvicultural practices to enhance stand development may reduce the risk of high severity wildfires. Underburning reduces the amount of fuel, also known as fuel loadings. Wildfires in underbumed stands are generally less severe, consequently less intrusive fire suppression methods may be effective. Underburning should be reintroduced across large areas over a period of time to create a mosaic of stand conditions. Silvicultural treatments to reduce wildfire risk may include thinning, underburning, and establishing fuelbreaks."* (USDA, USDI 1994a, p. 3&4-84)

> *"The goal of wildfire hazard reduction is to modify fuel profiles in order to lower the potential of fire ignition and the rate of spread. Hazard reduction will also protect and support land allocation objectives by lowering the risk of high intensity, stand-replacing wildfires..... Hazard reduction activities will include, but not be limited to: prescribed burning, mechanical or manual manipulation of forest vegetation and debris; removal of forest vegetation and debris; as well as combinations of these methods. While fuelbreak construction and underburning are both valid hazard reduction techniques, prescribed burning is generally more effective in reducing wildfire hazard. "* (USDA, USDI 1994a, Appendix B, p. B-135)

Environmental Consequences and Comparison of Alternatives

All alternatives have the potential, in the short term, to delay or eliminate some management activities that would otherwise benefit air, water or soil resources due to conflicts caused by requirements for surveys and management of known sites. Those actions that could be affected include subsoiling, fuel treatment, upland watershed restoration, and riparian restoration treatments. The potential for short-term conflicts with these management activities would be greater under the No-Action Alternative and Alternative 3, than under Alternatives 1 and 2 because of the larger number of species protected under the No-Action Alternative and the requirement for larger number of surveys and the management of larger known sites under Alternative 3.

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Under all alternatives, in the long term, these conflicts are expected to be reduced or resolved through the adaptive management use of increased knowledge gained through strategic surveys. The action alternatives, through the use of strategic surveys, would generate increased knowledge more quickly than the No-Action Alternative. Under all alternatives, the effects of potential conflicts of Survey and Manage Standards and Guidelines with management activities that would benefit air, water or soil resources would be minor in the short term and inconsequential in the long term; this analysis is based on the relatively small amount of acres (tens of thousands) associated with Survey and Manage direction compared to the 24.4 million acres of federally managed lands within the Northwest Forest Plan area (Figure 3&4-2)

Bryophytes

Mosses, liverworts, and hornworts (collectively referred to as bryophytes) are small, green, nonvascular, spore-bearing plants that have evolved a wide array of species well adapted to nearly every habitat on earth. About 170 species of liverworts and 450 species of mosses occur within the range of the northern spotted owl. About 20 percent of these species are endemic to western North America or to the Pacific Northwest (Lawton 1971)

Old-growth forests may be essential to the continued existence of some bryophytes. Most species of bryophytes do not become established in stands before these stands attain 100 years of age, and they are best developed in stands 400 years or older. Epiphytic mosses and lichens can total up to 2.6 metric tons per hectare in old-growth Douglas-fir forests of western Oregon (McCune 1993). In the understory, mosses often comprise 20 percent of the biomass and 95 percent of the photosynthetic tissue biomass (Binkley and Graham 1981).

Bryophytes provide food and habitat for a host of invertebrates (Russell 1979, Gerson 1982, Varga 1992) and vertebrates. They are a perennial source of organic material and function as efficient filters for trapping sediments. Marbled murrelet nest in moss mats in old-growth trees. Flying squirrels, birds, and mammals commonly use mosses to build their nests. Bryophytes also intercept, absorb, and buffer nutrients and water in the canopy and understory (Brown and Bates 1990). They play an important role in the dynamics of understory vegetation, as well as soil structure, soil stability, and interception and retention of water. Bryophytes are also a major component of the forest stream ecosystem, providing year-round habitat for a wide array of algal species, aquatic invertebrates, and amphibians.

General Background for Bryophytes

The Survey and Manage Standards and Guidelines were originally applied to 25 bryophyte species, including both mosses and liverworts. Eight of these bryophyte species were included because they did not pass the screens of the additional species analysis in the Northwest Forest Plan FSEIS, and it was thought that additional mitigation was needed to provide for species persistence. An additional 15 species that were not rated during the FEMAT viability panels because of insufficient information were included in the Survey and Manage Standards and Guidelines requiring management of known sites while acquiring information necessary to address concerns for species persistence.

The Protection Buffer Standards and Guidelines were applied to nine bryophytes. Three of these species were also listed under the Survey and Manage Standards and

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Guidelines: *Ptilidium californicum*, *Brotherella roellii*, and *Tetraphis geniculata*.

Since 1994, considerable new information has been acquired on the occurrence and distribution of the bryophyte species assigned to the Survey and Manage Standards and Guidelines, as well as those assigned to the Protection Buffer Standards and Guidelines. Information has been acquired from field surveys, herbaria, literature, field units and taxonomic experts. This information was evaluated when determining the appropriate level of mitigation for the bryophyte species covered by these standards and guidelines (Appendix F).

The basis for species inclusion in the Survey and Manage Standards and Guidelines under the action alternatives were that they met all three of the following criteria: occurrence in the geographic area of the Northwest Forest Plan; close association with late-successional old-growth forests; and the ability of the Northwest Forest Plan to provide for species persistence. There are ten species and a portion of one other species range that are proposed for removal from Survey and Manage and Protection Buffer Standards and Guidelines under the three action alternatives because they no longer meet one or more of these criteria.

The three action alternatives are similar in the provision for adaptive management. This would allow the Agencies to respond to changing information and to provide appropriate management for species.

Summary of Effects for Bryophytes

Because of the large number of bryophyte species discussed and the length of this section, a brief summary is provided here, prior to the detailed discussion.

Eleven species would be removed from Survey and Manage and Protection Buffer Standards and Guidelines under the action alternatives, either in all or portions of their range, because they no longer meet the Survey and Manage Basic Criteria.

For the remaining species, the four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the Agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

Compared to the No- Action Alternative, species receive different management under the action alternatives as a result of the application of new information and the slightly different emphasis of the alternatives. Under Alternative 1 and 2, pre-disturbance surveys would be added for 1 bryophyte and removed for 8 bryophytes; strategic surveys would be added for 9 bryophytes; management of known sites would be removed for 1 bryophyte; and 11 bryophytes would be removed from the Survey and Manage Standards and Guidelines.

Under Alternative 3, pre-disturbance surveys would be added for 7 bryophytes and removed for 1 bryophyte; strategic surveys are added for 9 bryophtyes; and 11 bryophytes are removed from the Survey and Manage Standards and Guidelines.

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Most of the bryophytes have an equal or greater likelihood of a stable, well-distributed population under the action alternatives when compared to the No- Action Alternative.

For the 11 bryophytes that would be removed from the Survey and Manage Standards and Guidelines, 7 would be expected to have stable, well-distributed populations. Four species at risk for not maintaining a stable, well-distributed population do not meet the basic criteria for the Survey and Manage Standard and Guideline and may be considered for protection under the sensitive species program of the Agencies or for listing under the Endangered Species Act.

Eighteen bryophytes species would remain on the Survey and Manage Standards and Guidelines. Stable, well-distributed populations would be expected for 3 bryophytes under No-Action; 6 bryophytes under Alternative 1; 4 bryophytes under Alternative 2; and 7 bryophytes under Alternative 3.

For some species, the alternatives would provide mitigation to the extent practical or appropriate but the species may not have a stable, well-distributed population for reasons outside the control of the Northwest Forest Plan. This situation would exist for 7 bryophytes under No-Action; 10 bryophytes under Alternatives 1 and 2; and 11 bryophytes under Alternative 3.

For some species, some alternatives would not provide enough mitigation to maintain or achieve a stable, well-distributed population. This situation would exist for 8 bryophytes under No-Action; 2 bryophytes under Alternative 1; 4 bryophytes under Alternative 2; and 0 bryophytes under Alternative 3.

Background and Affected Environment - *Bartramiopsis lescurii, Herbertus sakuraii, Plagiochila semidecurrens, Radula brunnea*

Four species would be removed from the Survey and Manage Standards and Guidelines, and from the Protection Buffer Standards and Guidelines, under the three action alternatives (*Bartramiopsis lescurii*, *Herbertus sakuraii*, *Plagiochila semidecurrens*, *Radula brunnea*) because they do not meet the criteria for being closely associated with late-successional old-growth forests. However, these species are thought to be quite rare within the area of the Northwest Forest Plan.

Bartramiopsis lescurii is a northern species that reaches the southern extent of its range in northern Washington. The only known site for this species in the area of the Northwest Forest Plan is on the Mt. Baker-Snoqualmie National Forest, where it occurs in a non-forest community on talus. This species is thought to be quite rare in Washington (Christy and Wagner 1996; USDA, USDI Species Review Panel 1999b).

Herbertus sakuraii, *Plagiochila semidecurrens* and *Radula brunnea* reach the southern extent of their range for North America in northwestern Oregon. These species are known only from one site in the area of the Northwest Forest Plan, on Saddle Mountain in the Oregon Coast Range, which is nonfederal land (Christy and Wagner 1996). The habitat at the known site is a non-forest community on a north-facing basalt cliff (USDA, USDI 1996; USDA, USDI 1998f; USDA, USDI Species Review Panel 1999b). These species appear to be quite rare in the Pacific Northwest.

Environmental Consequences and Comparison of Alternatives - *Bartramiopsis lescurii, Herbertus sakuraii, Plagiochila semidecurrens, Radula brunnea*

Bartramiopsis lescurii, *Herbertus sakuraii*, *Plagiochila semidecurrens*, and *Radula brunnea* are in Categories 1 and 3 under the No-Action alternative, where all current and future known sites would be managed, and extensive surveys would be required for these species. However, the only site under federal management for these four species is a

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single site for *Bartramiopsis lescurii* on the Mt. Baker-Snoqualmie National Forest. The other known sites for these species are on nonfederal land outside of the jurisdiction of the Northwest Forest Plan. Because of the very limited distribution, low number of known sites, and lack of federal sites for three of these species, the Survey and Manage Standards and Guidelines does not increase the likelihood of stable well-distributed populations for these species on federally managed lands in the Northwest Forest Plan area.

Under the three action alternatives, these four species would be removed from the Survey and Manage Standards and Guidelines because they do not meet the criterion of being closely associated with late-successional old-growth forests. However, these species remain at risk because they are thought to be very rare: there is only one known site for each species in the area of the Northwest Forest Plan, and only one species has a known site on federally managed land. Since these species would not be protected under the Northwest Forest Plan in the action alternatives because they are not late-successional old-growth associated, they would be evaluated for inclusion in the sensitive species program of the Agencies.

Background and Affected Environment - *Scouleria marginata and Ulota megalospora*

Scouleria marginata is endemic to the Pacific Northwest, but has a wide distribution within this area. This species is not closely associated with late-successional old-growth forests, as it occurs in both exposed or shaded conditions (Christy and Wagner 1996), and does not require the canopy of a late-successional forest. Under the FEMAT process, *Scouleria marginata* was rated having a high likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands.

Ulota megalospora is a widespread and common species within the area of the Northwest Forest Plan. This species does not meet the criterion of close association with late-successional old-growth forests because it occurs on a wide variety of substrates in a broad range of habitats and stand ages, from low elevation to montane areas (Christy and Wagner 1996; USDA, USDI Species Review Panel 1999b). *Ulota megalospora* was one of two species in the Canopy Twigs-Exterior group that was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands. *Ulota megalospora* was included as a Protection Buffer species in the Northwest Forest Plan Record of Decision, where it was stated that it is locally abundant in northern California and southwestern Oregon, but is generally scarce throughout its range, as well as being poorly known ecologically (USDA, USDI 1994b). Information acquired since that time shows that the species is well distributed throughout the Northwest Forest Plan area, with well over 100 new sites since 1993 (USDA, USDI Species Review Panel 1999b), and that it is not closely associated with late-successional old-growth forests. This species is probably more widespread or common than the data represents. Known site reports are steadily increasing as field personnel survey for this species.

Environmental Consequences and Comparison of Alternatives - *Scouleria marginata and Ulota megalospora*

The No-Action Alternative requires management of known sites and pre-disturbance surveys for *Ulota megalospora* and general regional surveys for *Scouleria marginata*. *Scouleria marginata* and *Ulota megalospora* would receive greater protection under the No-Action alternative than the action alternatives with direction to manage known sites and conduct pre-project surveys for *Ulota megalospora*; general regional surveys would be required for *Scouleria marginata*. The three action alternatives remove *Scouleria marginata*

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and *Ulota megalospora* from the Survey and Manage Standards and Guidelines because they do not meet the criteria for being closely associated with late-successional and old-growth forests.

These two species are widespread, common (*Ulota megalospora*), and provided for by the Northwest Forest Plan without the Survey and Manage Standards and Guidelines (USDA, USDI Species Review Panel 1999b). *Scouleria marginata* is a riparian species, and the Aquatic Conservation Strategy provides protection for populations throughout the Northwest Forest Plan area. *Ulota megalospora* is very widespread, and occurs in a broad range of habitat conditions and stand ages. The reserve land allocations, riparian reserves, and other standards and guidelines such as green tree retention would likely provide habitat for *Ulota megalospora*, well distributed throughout its range, in the area of the Northwest Forest Plan.

Background and Affected Environment - *Pleuroziopsis ruthenica*

The global distribution of *Pleuroziopsis ruthenica* includes Japan, the Russian Far East, Alaska and British Columbia. In Alaska and British Columbia, *Pleuroziopsis ruthenica* occurs along creek banks and hummocks, and in low-elevation shrub thickets (USDA, USDI 1998f). Reports on its abundance vary from very rare in northern British Columbia (Schofield 1976), rare throughout its Pacific range (Schofield 1990), and common in the north (Pojar and MacKinnon 1994; USDA, USDI 1998f).

Pleuroziopsis ruthenica is reported from only one historical collection in the area of the Northwest Forest Plan. The historical collection of *Pleuroziopsis ruthenica* was made by N.L.Gardner in about 1898 "in marsh, Seattle" (USDA, USDI 1998f).

Despite extensive bryological collection in Washington state over the last century, no additional collections of this species have been made. Because there are no documented sites of this species that can be verified, this species is currently assumed to not occur in the area of the Northwest Forest Plan (USDA, USDI Species Review Panel 1999b).

Environmental Consequences and Comparison of Alternatives - *Pleuroziopsis ruthenica*

Pleuroziopsis ruthenica is in Categories 1 and 3 under the No-Action Alternative, where all current and future known sites would be managed, and extensive surveys would be required. Under the three action alternatives, this species would be removed from Survey and Manage because it does not meet the criterion of occurring in the area of the Northwest Forest Plan. Therefore, because *Pleuroziopsis ruthenica* is no longer considered to be extant within the area of the Northwest Forest Plan, no adverse effects to this species would be expected from land management activities prescribed under the Northwest Forest Plan.

Background and Affected Environment - *Antitrichia curtipendula and Douinia ovata*

Antitrichia curtipendula is a widespread and common species throughout the area of the Northwest Forest Plan (Christy and Wagner 1996) and occurs in a broad range of habitats from low elevation to mid-montane forests.

Douinia ovata is a widespread species at low elevations in habitats with cool, moist sites. *Douinia ovata* is not restricted to forest habitats. It may occur in stands of various ages as well as on rock or soil in cool, moist sites (Christy and Wagner 1996; USDA, USDI Species Review Panel 1999b). It is generally not abundant where it occurs.

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Antitrichia curtipendula and *Douinia ovata* were rated as the Canopy Interior group in the FEMAT analysis. They were rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands, though with some possibility of significant gaps in the historic distribution. *Douinia ovata* was originally included in Survey and Manage Category 4 because of concerns of threats from air pollution (Appendix J2 in USDA, USDI 1994a).

Environmental Consequences and Comparison of Alternatives - *Antitrichia curtipendula and Douinia ovata*

Antitrichia curtipendula and *Douinia ovata* would be removed from the Survey and Manage Standard and Guideline under the three action alternatives. Taxa experts and the species review panel determined that there were not concerns for these species persistence because they are widespread and common (*Antitrichia curtipendula*) (USDA, USDI Species Review Panel 1999b). In addition, the reserve land allocations and other standards and guidelines of the Northwest Forest Plan provide habitat well distributed throughout the species ranges. Under the No-Action Alternative, general regional surveys would be required for both species. These regional surveys would provide additional information on the distribution of these species, however, it is already documented these species have well-distributed populations within the area of the Northwest Forest Plan (USDA, USDI Species Review Panel 1999b). The original concerns for these species were based on cumulative effects on nonfederal land (Appendix J2 in USDA, USDI 1994a). The mitigation under the No-Action Alternative would not address these concerns, which are beyond the scope of the Northwest Forest Plan.

Background and Affected Environment - *Ptilidium californicum*

Ptilidium californicum occurs on the west coast of North America from southeastern Alaska to northern California (Christy and Wagner 1996). *Ptilidium californicum* is a common and widespread species in the Pacific Silver Fir and Mountain Hemlock vegetation zones of the Olympics (Henderson et al. 1988) and Cascades of Washington (Mt. Baker-Snoqualmie National Forest Ecology Program data files) and northern Oregon (Christy and Wagner 1996). It is unknown at this time where the species becomes more restricted in its distribution to the south in Oregon.

Ptilidium californicum reaches the southern limit of its range in northern California. In this area, the species becomes restricted to mid-elevation old-growth true fir forests between 4,500 and 5,000 feet elevation (Appendix J2 in USDA,USDI 1994a; USDA, USDI 1998f; USDA, USDI Species Review Panel 1999b). There are currently three known sites in northern California—on the Lassen, Shasta-Trinity and Rogue River National Forests (USDA, USDI 1998f).

Previous analyses reported different concerns for persistence of *Ptilidium californicum* depending on the geographic area (Thomas et al. 1993; USDA et al. 1993; Appendix J2 in USDA,USDI 1994a). The FEMAT bryophyte viability panel rated *Ptilidium californicum* in two different groups based on its geographic distribution. *Ptilidium californicum* in Oregon and Washington was included in the Tree Boles/Understory group and was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands, though with some possibility of significant gaps in the historic distribution. *Ptilidium californicum* in California was included in the "rare" species group and rated separately as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands. Between the draft and final Northwest Forest Plan FSEIS, the 180-year rotation was dropped for California, elevating the

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concern for this rare species in California (Appendix J2 in USDA,USDI 1994a). *Ptilidium californicum* was added to the Survey and Manage Standards and Guidelines, but the geographic designation of California was inadvertently omitted from Table C-3 (USDA, USDI 1994b). In addition, *Ptilidium californicum* was included as a Protection Buffer species (Thomas et al. 1993; USDA, USDI 1994b). Here, too, the geographic designation of California was inadvertently omitted in Table C-3 (Appendix 5-H in Thomas et al. 1993). The viability concerns expressed for *Ptilidium californicum* by the taxonomic experts in both panels had been for the California populations only (Thomas et al.1993; USDA et al. 1993; Appendix J2 in USDA,USDI 1994a). *Ptilidium californicum* would benefit from the requirement in the Northwest Forest Plan to retain old-growth fragments in watersheds where little remains. However, if the oldest stands are not selected for protection in landscape areas where little late-successional forest exists (USDA, USDI 1994b, p. C-44), the Survey and Manage mitigation would become more important for this species.

Current information indicates that portions of the range of *Ptilidium californicum* warrant different management direction based on different levels of concern. Concerns for maintaining stable, well-distributed populations are highest for *Ptilidium californicum* in California, where the species reaches the southern extent of its range, has a very limited distribution, and is quite rare. There is uncertainty about maintaining stable, well-distributed populations of this species in southern Oregon, from Douglas County south to the California border, because there is insufficient information on distribution, habitat and populations at this time to reach a conclusion. *Ptilidium californicum* would likely exist in stable, well-distributed populations from Lane County, Oregon, and north through Washington to the Canadian border because in those areas the species is widespread and common within suitable habitat.

Environmental Consequences and Comparison of Alternatives - *Ptilidium californicum*

Under the No-Action Alternative, *Ptilidium californicum* throughout its range is in Categories 1 and 2, and is a Protection Buffer species. Under these categories, all current and future known sites would be managed, and pre-disturbance surveys would be required. The No-Action Alternative did not distinguish geographic differences in the concern for maintaining stable, well-distributed populations within this species range. In areas where there is little concern, the Survey and Manage mitigation is not necessary because the species is well distributed, and there is abundant suitable habitat that is occupied within the reserve land allocations.

In the three action alternatives, management for *Ptilidium californicum* has been divided into three geographic areas.

- California
- Oregon, south of Lane-Douglas County line extended east to the boundary of the Northwest Forest Plan (referred to as southern Oregon in subsequent discussion)
- Washington and Oregon, north of Lane-Douglas County line extended east to boundary of the Northwest Forest Plan (referred to as Washington and northern Oregon in subsequent discussion)

Ptilidium californicum - California

California populations of *Ptilidium californicum* would be in Categories 1A, 2A, and 3A under the three action alternatives. All current and future known sites would be managed and pre-disturbance surveys and strategic surveys would be required.

Management of all known sites for *Ptilidium californicum* in California would occur under all alternatives. However, there would be some differences in site management among the alternatives. Alternative 3 may provide larger protected areas around

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known sites if the Management Recommendations for *Ptilidium californicum* under Alternatives 1 and 2 do not specify interior microclimate as a necessary habitat condition in this portion of its range. This would provide larger habitat areas for recruitment and expansion of the population and could result in larger or more stable populations over time under Alternative 3. However, if the species is thought to require interior microclimate, there would be little difference between site management under the action alternatives. The area necessary to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer).

All alternatives would require pre-disturbance surveys for *Ptilidium californicum* in California. These surveys would result in minimizing inadvertent loss of undiscovered sites of *Ptilidium californicum* in California. Strategic surveys would be required for *Ptilidium californicum* in California under all three action alternatives, and would not be required under the No-Action Alternative. Strategic surveys could provide the information necessary for managing the species, such as finding additional sites, determining if known sites are still extant, characterizing habitat at known sites, improving distribution and population information, provide information to determine the management needs of *Ptilidium californicum,* and narrow the habitat where pre-disturbance surveys would be required. Since these surveys do not occur under the No-Action Alternative, it would be difficult to gather information necessary to determine management needs of the species, address the question of whether the reserve system provides for the persistence of the species in California, and find additional populations if they occur outside of project areas. Strategic surveys should provide the information necessary to determine the appropriate mitigation to reduce concerns for *Ptilidium californicum* in California.

Ptilidium californicum - southern Oregon

There is uncertainty about maintaining stable, well-distributed populations of *Ptilidium californicum* in southern Oregon (Christy and Wagner 1996; USDA, USDI Species Review Panel 1999c; USDA, USDI Species Review Panel 1999b). There is currently insufficient information to determine if populations are stable and well distributed in this portion of its range. Under the No-Action Alternative, *Ptilidium californicum* throughout its range is in Categories 1 and 2, and is a Protection Buffer species. Under these categories, all current and future known sites would be managed, and pre-disturbance surveys would be required. Under Alternative 1, this portion of the species range is placed in Category 1F, where strategic surveys would be conducted to determine if the species meets the basic criteria for inclusion in Survey and Manage. Under Alternative 2, this portion of the species range is placed in Category 2D, where all sites known as of September 30, 1999, would be managed, and strategic surveys would be conducted for five years. Based on strategic survey information, the species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed. Under Alternative 3, *Ptilidium californicum* in southern Oregon is in Category 3C. Under this category, all current and future known sites would be managed, and strategic surveys would be conducted to determine if the species meets the basic criteria for inclusion in the Survey and Manage Standard and Guideline.

Known site management varies for *Ptilidium californicum* in southern Oregon under the different alternatives. The No-Action Alternative and Alternative 3 provide the greatest site protection as all current and new known sites would be managed. There is no management of known sites under Alternative 1, so known sites could be lost before strategic surveys determine what management is necessary for *Ptilidium californicum* in this portion of its range. Risk to the species could increase in this area, if it is later determined that these sites were important to maintain stable, well-distributed

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populations of the species across federally managed lands. However, due to the habitat protected in the reserves, the risk of losing important sites would be low-to-moderate and localized to geographic areas where suitable habitat is limited. Under Alternative 2, the sites known as of September 30, 1999 would be managed, whereas no future sites would be protected. This could result in increased risk to the species in this area if it is later determined that these sites were important to maintain stable, well-distributed populations of the species across federally managed lands. However, due to the habitat protected in the reserves, the risk of losing important sites is likely to be low-to-moderate and localized to geographic areas where suitable habitat is very limited.

There would be different requirements for pre-disturbance surveys for *Ptilidium californicum* in southern Oregon under the different alternatives. The No-Action Alternative requires surveys prior to habitat-disturbing activities. These surveys may locate new known sites that would be managed to provide for species persistence. Since pre-disturbance surveys would not be required in the three action alternatives, there could be inadvertent loss of undiscovered sites. This could result in the loss of sites that may be important to maintaining stable well-distributed populations of *Ptilidium californicum* in southern Oregon, should it later be determined that there are concerns for *Ptilidium californicum* in southern Oregon. However, due to the habitat protected in the reserves, the risk of losing important sites is likely to be moderate and localized to geographic areas where suitable habitat is limited.

Strategic surveys would be required for *Ptilidium californicum* in southern Oregon under the three action alternatives. These surveys could provide information regarding the distribution, habitat requirements and expected population of *Ptilidium californicum* in southern Oregon. Information from these surveys would help determine if the reserve land allocations provide for *Ptilidium californicum*, and what the appropriate management is for the species in this part of its range in order to maintain stable, well-distributed populations. Strategic surveys could be effective in gathering information about the species, as they can focus in areas with a high likelihood of locating the species, and provide information that can assist in management of the species. Since these surveys do not occur under the No-Action Alternative, it could be difficult to gather information necessary to determine the management needs of the species, address the question of whether the reserve system provides for the persistence of *Ptilidium californicum* in southern Oregon, and find additional populations if they occur outside of project areas. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for *Ptilidium californicum* in southern Oregon.

Ptilidium californicum - Washington and northern Oregon

The No-Action Alternative is the only alternative that provides management for *Ptilidium californicum* in Washington and northern Oregon. Under the No-Action Alternative, *Ptilidium californicum* throughout its range is in Categories 1 and 2, and is a Protection Buffer species. Under these categories, all current and future known sites would be managed, and pre-disturbance surveys would be required. This provides mitigation for *Ptilidium californicum* throughout this portion of its range where there are no concerns for persistence given its widespread distribution and abundance (Thomas et al. 1993; USDA et al. 1993; Appendix J2 in USDA, USDI 1994a; UDSA, USDI 1994b; USDA, USDI Species Review Panel 1999b; USDA, USDI Species Review Panel 1999c).

There would be no adverse effects to *Ptilidium californicum* due to removal from the Survey and Manage and Protection Buffer Standards and Guidelines in Washington and northern Oregon under the three action alternatives because the populations would be stable and well distributed, and there is sufficient potential habitat within the reserve land allocations (Thomas et al. 1993; USDA et al. 1993; Appendix J2 in USDA, USDI 1994a; UDSA, USDI 1994b; USDA, USDI Species Review Panel 1999b; USDA, USDI Species Review Panel 1999c).

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Background and Affected Environment - *Plagiochila satoi*

Based on current information, *Plagiochila satoi* is now considered part of the P. *asplenioides* complex ;USDA, USDI Species Review Panel 1999b, Harpel pers. comm.). *Plagiochila asplenioides* is a widespread and common species (USDA, USDI Species Review Panel 1999b). The FEMAT bryophyte panel placed the *Plagiochila asplenioides* complex in the Wet Shaded Humic Soil group, which was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands, though with some possibility of significant gaps in the historic distribution.

Environmental Consequences and Comparison of Alternatives - *Plagiochila satoi*

Plagiochila satoi is removed from the Survey and Manage Standard and Guideline under the three action alternatives. Taxonomic studies realigned *Plagiochila satoi* within another species complex (*Plagiochila asplenioides*), which is common and widespread within the area of the Northwest Forest Plan, and there are not concerns for persistence of this species complex under the Northwest Forest Plan (USDA, USDI Species Review Panel 1999b). Under the No-Action Alternative, all known sites would be managed and extensive surveys would be required for *Plagiochila satoi*.

Alternatives 1, 2 and 3 would not adversely affect *Plagiochila asplenioides* because this species is widespread and common throughout the area of the Northwest Forest Plan. The reserve land allocations would provide the habitat necessary to maintain stable well-distributed populations (USDA, USDI Species Review Panel 1999b).

Background and Affected Environment - *Brotherella roellii*

Brotherella roellii is known only from historical collections within the range of the Northwest Forest Plan (USDA, USDI Species Review Panel 1999b; USDA, USDI 1999d). It is unknown if *Brotherella roellii* is still extant at these sites. *Brotherella roellii* is endemic to the Pacific Northwest, known from southern British Columbia, and historically from Washington (Christy and Wagner 1996; USDA, USDI 1999d).

In addition, *Brotherella roellii* may not meet the criteria for close association with late-successional old-growth forests (USDA, USDI Species Review Panel 1999b; USDA, UDSI 1999d). Christy and Wagner (1996) note it occurs at low elevation on slopes, stream terraces and swampy floodplains; red alder and bigleaf maple are the preferred hardwood habitat. Recent habitat data from British Columbia populations indicate this species occurs in second-growth mixed conifer/deciduous forests, mostly on rotten logs of bigleaf maple (Denton and Cadwell 1999; USDA, USDI 1999d). Little is known about *Brotherella roellii* in the area of the Northwest Forest Plan.

Environmental Consequences and Comparison of Alternatives - *Brotherella roellii*

In the No-Action Alternative, *Brotherella roellii* is a Protection Buffer species, and in Survey and Manage Categories 1 and 3. Under Categories 1 and 3, all current and future known sites would be managed, extensive surveys would be required for the species, and high-priority sites would be selected for management. In addition, as a Protection Buffer species, surveys would be required before ground-disturbing activities.

Brotherella roellii is placed in Category 1E of Alternative 1, and Category 2C of Alternative 2 because of uncertainties with this species status. Under these categories, strategic surveys would be conducted to determined if *Brotherella roellii* meets the

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criteria for close association with late-successional and old-growth forests, and if the species is still extant within the area of the Northwest Forest Plan. All current and future known sites would be managed until strategic surveys can determine if the species meets the basic criteria for Survey and Manage.

In Alternative 3, *Brotherella roellii* is in Category 3A. Under this category, all current and future known sites would be managed with a 250-meter buffer. Equivalent-effort surveys would be conducted before habitat-disturbing activities, with the objective to find occupied sites and minimize the inadvertent loss of undiscovered sites. Strategic surveys would be conducted to address species information and management needs.

Management of known sites for *Brotherella roellii* would be required under all alternatives. Management recommendations would direct management of known sites and, under the No-Action Alternative and Alternatives 1 and 2, management would be the identical (that is, management would be to maintain the species persistence at the site). If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for the species, then more area would be protected around known sites under Alternative 3, which prescribes a 250-meter buffer for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger or more stable populations over time. However, if the species is thought to require interior microclimate, there would be little difference in site management under the action alternatives. The area necessary to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer).

Because all five sites of *Brotherella roellii* in the Northwest Forest Plan area were documented a long time ago, and it is not known if this species is still extant at these sites, management of currently known sites alone would not increase the likelihood that *Brotherella roellii* would maintain stable, well-distributed populations in the Northwest Forest Plan area, regardless of management applied to sites.

Surveys prior to habitat-disturbing activities would be required under the No-Action Alternative and Alternative 3. There may be additional known sites discovered because of these pre-disturbance surveys. There may be inadvertent loss of sites under Alternatives 1 and 2 because these surveys prior to habitat-disturbing activities would not be conducted. This could result in the loss of sites that may be important to maintaining stable well-distributed populations of *Brotherella roellii* in the area of the Northwest Forest Plan. However, because this species is thought to be extremely rare and may be easily confused with a common species, only a few new sites would likely be found with pre-disturbance surveys. Given the uncertainty about whether this species is extant in the Northwest Forest Plan area, the impact of the potential loss of undiscovered sites is unknown.

Strategic surveys would be required under all action alternatives and extensive surveys would be required under the No-Action Alternative. These surveys could focus on likely sites where the species may occur, and address questions necessary for the management of *Brotherella roellii*, such as whether *Brotherella roellii* is still extant in the area of the Northwest Forest Plan, whether the species is closely associated with late-successional old-growth forests, and what management is necessary to maintain stable well-distributed populations of *Brotherella roellii* in the area of the Northwest Forest Plan. In addition, any site found with these surveys would be managed to maintain the species persistence at the site. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for *Brotherella roellii*.

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Background and Affected Environment - *Diplophyllum plicatum, Kurzia makinoana, Marsupella emarginata var. aquatica, Tritomaria exsectiformis, Rhizomnium nudum*

Diplophyllum plicatum has a North Pacific distribution from northeastern Asia around coastal Alaska and British Columbia south to Oregon (Christy and Wagner 1996). There are about 20 collections from the Northwest Forest Plan area, and only one new site has been reported since 1993 (USDA, USDI Species Review Panel 1999b). Most of the collections prior to 1993 are from the Olympic Peninsula and northern Cascades of Washington (USDA, USDI Species Review Panel 1999b). It is not known if the species still occurs at these sites. Little is known about the habitat and ecological requirements of *Diplophyllum plicatum* (Christy and Wagner 1996).

The FEMAT bryophyte panel included *Diplophyllum plicatum* in the Rare species group and rated it as having a low likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands (USDA et al. 1993). *Diplophyllum plicatum* is described as rare with a spotty distribution, and over half of the known sites in Oregon occur on nonfederal land (Appendix J2 in USDA, USDI 1994b). It was also noted that mitigation may not be effective because of the species rarity (Appendix J2 in USDA, USDI 1994b).

Kurzia makinoana is an extremely small liverwort that is thought to be rare (USDA, USDI Species Review Panel 1999b; Christy and Wagner 1996). Little is known about its abundance, distribution, and ecology (Appendix J2 in USDA, USDI 1994b). It has a North Pacific distribution and occurs from Asia to California, but has not yet been reported from Oregon, and is known from very few sites in Washington (Christy and Wagner 1996; USDA, USDI Species Review Panel 1999b). It is reported from old-growth forests in Washington, and from bogs in California (Appendix J2 in USDA, USDI 1994b). *Kurzia makinoana* was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands, though with a small possibility of significant gaps in the historic distribution, restriction to refugia, or extirpation. Herbaria searches have only found five collections of this species in the area of the Northwest Forest Plan (USDA, USDI Species Review Panel 1999b).

Marsupella emarginata var. aquatica is an aquatic species that grows attached to rocks in streams. It is only known from one site within the area of the Northwest Forest Plan (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b; Christy and Wagner 1996). For the FEMAT analysis, it was included in the Rare Species group, and was rated as having a low likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands, and a high likelihood of being confined to refugia (USDA et al. 1993).

Tritomaria exsectiformis is known from fewer than 10 populations in the area of the Northwest Forest Plan. It occurs on the eastside of the Cascades, near perennial seeps and springs. There were three sites known as of 1993; four new sites have been discovered on the Deschutes National Forest since that time (USDA, USDI Species Review Panel 1999b).

Tritomaria exsectiformis was included in the Rare Species group, was rated as having a low likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands; and was given a high likelihood of being confined to refugia or extirpated (Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b).

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Rhizomnium nudum has a North Pacific distribution; it occurs from Kamchatka and Japan east to the northwest coast of North America, and south from Alaska to northern Oregon (USDA, USDI 1998f). Most of the sites reported for this species are in the Olympic Mountains and northern Washington Cascades, although the majority of collections (56) date prior to 1980 (USDA, USDI Species Review Panel 1999b). There is no information on whether the species is extant at these historic sites.

Environmental Consequences and Comparison of Alternatives - *Diplophyllum plicatum, Kurzia makinoana, Marsupella emarginata var. aquatica, Tritomaria exsectiformis, Rhizomnium nudum*

Management is similar for these five species under the No-Action Alternative. *Diplophyllum plicatum*, *Kurzia makinoana*, *Marsupella emarginata* var. *aquatica* and *Tritomaria exsectiformis* are in Categories 1 and 2; *Rhizomnium nudum* is a Protection Buffer species. Under the No-Action Alternative, all current and future known sites would be managed and surveys would be conducted prior to ground-disturbing activities. There is no substantial new information that would change the assumptions or conclusions for these species (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b).

Under Alternative 1, these species would be in Category 1B, and under Alternative 2 these species would be in Category 2B. Management direction for these categories would be identical. All current and future known sites would be managed. Pre-disturbance surveys are considered not practical for these species (USDA, USDI Species Review Panel 1999b), given their cryptic nature (such as their tendency to conceal or camouflage themselves) and/or the difficulty with locating and identifying them in the field. Strategic surveys would be required and would be conducted to minimize the inadvertent loss of undiscovered sites. Strategic surveys would also be conducted to address species information and management needs.

Under Alternative 3, these species would be in Category 3A. In this category, all current and future known sites would be managed with a 250-meter buffer. Equivalent-effort surveys would be conducted before habitat-disturbing activities, with the objective to find occupied sites and minimize the inadvertent loss of undiscovered sites. Strategic surveys would be conducted to address species information and management needs.

Management of known sites for these five species is required under all alternatives. Management recommendations would direct the management of known sites and, under the No-Action Alternative and Alternatives 1 and 2, management would be the same (i.e., management would be to maintain the persistence of the species at the site). If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for the species, then more area would be protected around known sites under Alternative 3 because a 250-meter buffer is prescribed for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger, or more stable populations over time. However, if the species is thought to require interior microclimate, there would be little difference between site management under the action alternatives. The area necessary to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer).

Management of known sites would help maintain the current distribution of these species. However, because these species have limited distributions, management of known sites alone may not be able to provide for stable, well-distributed populations of these species throughout the Northwest Forest Plan area.

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Surveys prior to habitat-disturbing activities would be required for these species under Alternative 3. However, because these surveys would be conducted relative to project locations and not in the most likely habitat, and because of the difficulty in finding or identifying these species, these surveys would likely provide only very limited additional information for management. Sites that would be discovered as a result of pre-disturbance surveys would be managed and would contribute to maintaining the current distribution of populations of the species. Because the current known sites of these species are limited in distribution with significant gaps, any new sites located could be important to maintenance of these species in stable well-distributed populations across their range in the Northwest Forest Plan area. There would be some risk of loss of sites under Alternatives 1 and 2 because surveys prior to habitat-disturbing activities would not be conducted. However, given that pre-disturbance surveys are not considered practical for these species due to their cryptic nature and/or the difficulty with locating and identifying them in the field, only a few new sites would likely be found with such surveys.

Strategic surveys would be conducted under all three action alternatives. These surveys could address questions for managing these five species and help focus on likely sites where the species may occur. Strategic surveys could be conducted to minimize inadvertent loss of undiscovered sites. Strategic surveys would provide the information necessary to determine the appropriate mitigation to reduce concerns for these species.

Strategic surveys would not be conducted for these five species in the No-Action Alternative. This would limit the amount of information collected on these species to the type of information collected during pre-disturbance surveys only. Discovery of known sites would be limited primarily to those areas where projects occur. It would be difficult to address the fundamental question of the Survey and Manage mitigation, that is, whether reserve land allocations and other standards and guidelines of the Northwest Forest Plan provide for these species. It would also be difficult to gather the information necessary to determine the appropriate management to provide for stable, well-distributed populations. This is because information on these species would be acquired only through pre-disturbance surveys which would be limited in geographic extent, and the kinds of information collected would be insufficient to address these questions.

Background and Affected Environment - *Orthodontium gracile*

Orthodontium gracile has a broad global distribution, occurring in England, France, Australia, and the west coast of North America. In North America, it is known only from the coastal redwood forests in southern Oregon and northwestern California where it may have been introduced from Australia (Christy and Wagner 1996). The Management Recommendation for this species lists 19 historical records, with only two reported from federally managed land. The Oregon population may have been extirpated by logging (USDA, USDI 1996).

Environmental Consequences and Comparison of Alternatives - *Orthodontium gracile*

Under the No-Action Alternative, *Orthodontium gracile* is in Categories 1 and 3. Under these categories, all current and future known sites would be managed and extensive surveys would be required for this species. Surveys required prior to ground-disturbing activities would not be required.

Orthodontium gracile is in Category 1A under Alternative 1, and Category 2A under Alternative 2. The management direction for these categories would be identical. All current and future known sites would be managed and pre-disturbance surveys would be conducted. Strategic surveys would be conducted to address species information and management needs.

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Under Alternative 3, *Orthodontium gracile* is in Category 3A. Under this category, all current and future known sites would be managed with a 250-meter buffer, pre-disturbance surveys would be conducted and strategic surveys would be required.

Management of all known sites for *Orthodontium gracile* occurs under all Alternatives, although there may be some differences in site management between alternatives. Management recommendations would direct the management of known sites and, under the No-Action Alternative and Alternatives 1 and 2, management would be the same (i.e., management would be to maintain the persistence of the species at the site). If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for the species, then more area would be protected around known sites under Alternative 3 because a 250-meter buffer is prescribed for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger, or more stable populations over time. If the species is thought to require interior microclimate, there would be little difference between site management under all alternatives. The area necessary to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer). However, because this species has a limited number of known sites and limited amount of potential habitat on federal land, management of known sites alone may not be able to provide for stable, well-distributed populations of these species throughout the Northwest Forest Plan area.

Some differences exist in the survey requirements for *Orthodontium gracile* under the different alternatives. The three action alternatives require pre-disturbance surveys, which would be likely to discover additional populations of *Orthodontium gracile* if it occurs in the project areas. Under the No-Action Alternative, there is no requirement to conduct surveys prior to habitat-disturbing activities, so there may be inadvertent loss of undiscovered sites of this species. This could result in a loss of sites that may be important to maintaining stable well-distributed populations of *Orthodontium gracile* across its range under the No-Action Alternative. However, given the limited suitable habitat available on lands managed by the Forest Service and BLM, pre-disturbance surveys would be unlikely to locate many new sites.

Strategic surveys would be required in all alternatives to gather the information needed to manage this species to maintain stable, well-distributed populations across its range in the Northwest Forest Plan area. Strategic surveys would be effective in providing for species persistence as they can be conducted in areas with high likelihood of locating the species, provide information that can assist in management of the species, and narrow the habitat where pre-disturbance surveys would be required. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for *Orthodontium gracile*.

Background and Affected Environment - *Encalypta brevicolla* var. *crumiana*, *Herbertus aduncus*, *Iwatsukiella leucotricha*, *Racomitrium aquaticum*, *Tritomaria quinquedentata*

Encalypta brevicolla var. *crumiana* is endemic to the Pacific Northwest where it is known only from two historical collections in the area of the Northwest Forest Plan (Christy and Wagner 1996; USDA, USDI Species Review Panel 1999b). This taxon may not meet the criterion for close association with late-successional old-growth forests (USDA, USDI Species Review Panel 1999b). The genus is very difficult to identify in the field by experts if the sporophyte is not present. Detailed and intensive microscopic examination is essential to identify the taxon (Christy and Wagner 1996), and requires electron microscopy (USDA, USDI Species Review Panel 1999b).

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Herbertus aduncus is circumboreal (occurs at northern latitudes), and is known in western North America from Alaska south to Oregon. The species is abundant in British Columbia, becomes rare in Washington, and is very scarce in Oregon (Christy and Wagner 1996; USDA, USDI 1996). It is reported from five localities in the area of the Northwest Forest Plan, three of which occur on federally managed land (USDA, USDI 1996). Habitat data is limited (USDA, USDI Species Review Panel 1999b).

Iwatsukiella leucotricha occurs in Asia and the Pacific Northwest. There are only two known sites in the area of the Northwest Forest Plan. These sites are in northwestern Oregon and are not on federally managed land (USDA, USDI Species Review Panel 1999b).

Racomitrium aquaticum has a broad global distribution (Christy and Wagner 1996). In the Pacific Northwest it is known from the Coast and Cascade Ranges, and from the Siskiyou and Klamath Mountains, ranging from northern California to Alaska (USDA, USDI 1996). It was known from 16 sites at the time of the FEMAT analysis, with six collections reported since then (USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). Habitat information is limited (Christy and Wagner 1996).

Tritomaria quinquedentata, a circumboreal species, is known in the Pacific Northwest from northwestern Washington and northwestern Oregon (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). It is known from four sites within the area of the Northwest Forest Plan (USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). Habitat data is limited (Christy and Wagner 1996). The association of this species with late-successional old-growth forests is uncertain (USDA, USDI Species Review Panel 1999b).

Environmental Consequences and Comparison of Alternatives - *Encalypta brevicolla* var. *crumiana*, *Herbertus aduncus*, *Iwatsukiella leucotricha*, *Racomitrium aquaticum*, *Tritomaria quinquedentata*

Management is similar for these five species under the No-Action Alternative. *Encalypta brevicolla* var. *crumiana*, *Herbertus aduncus*, *Iwatsukiella leucotricha*, *Racomitrium aquaticum*, and *Tritomaria quinquedentata* are in Categories 1 and 3. Under the No-Action Alternative, all current and future known sites would be managed, extensive surveys would be required, and high-priority sites would be identified for management. There is no substantial new information that would change the assumptions and effects analysis of the Northwest Forest Plan (USDA, USDI Species Review Panel 1999b).

These species would be in Category 1B under Alternative 1, and Category 2B under Alternative 2. The management direction for these categories would be identical. All current and future known sites would be managed. Pre-disturbance surveys are considered not practical for these species (USDA, USDI Species Review Panel 1999b), given the cryptic nature of these species and/or the difficulty with locating and identifying them in the field, and the potential difficulty in accurately identifying specimens, even by skilled taxonomists. Strategic surveys would be required. These surveys would be conducted to minimize the inadvertent loss of undiscovered sites. Strategic surveys would also be conducted to address species information and management needs.

Under Alternative 3 these species would be in Category 3A. In this category, all current and future known sites would be managed with a 250-meter buffer. Pre-disturbance surveys would be conducted with the objective to find occupied sites and minimize the inadvertent loss of undiscovered sites. Strategic surveys would be conducted to address species information and management needs.

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Management of known sites for these five species is required under all alternatives. Management recommendations would direct the management of known sites and, under the No-Action Alternative and Alternatives 1 and 2, management would be the same (i.e., management would be to maintain the persistence of the species at the site). If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for the species, then more area would be protected around known sites under Alternative 3 because a 250-meter buffer is prescribed for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger, or more stable populations over time. However, if the species is thought to require interior microclimate, there would be little difference between site management under the action alternatives. The area necessary to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer).

Management of known sites would help maintain the current distribution of populations. However, because these species have limited distributions and few sites on federally managed land, management of known sites alone may not be able to provide for stable, well-distributed populations of these species throughout the Northwest Forest Plan area.

Equivalent-effort surveys prior to habitat-disturbing activities would be required for these five species under Alternative 3. However, these surveys would be conducted relative to project locations and not in the most likely habitat, and because of the difficulty in finding or identifying these species, these surveys would likely provide only very limited additional information for management. Sites discovered as a result of pre-disturbance surveys would be managed and would contribute to maintaining the current distribution of populations of the species. There is some risk of loss of sites under Alternatives 1 and 2 because surveys prior to habitat-disturbing activities would not be conducted. However, given that pre-disturbance surveys are not considered practical for these species due to their cryptic nature and/or the difficulty with locating and identifying them in the field, only a few new sites would likely be found with such surveys.

Strategic surveys would be conducted under all three action alternatives, and extensive surveys under the No-Action Alternative. These surveys would address the questions for the management of these five species, and would focus on likely sites where the species may occur. Strategic surveys would be conducted to minimize the inadvertent loss of undiscovered sites. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for these species.

Background and Affected Environment - *Tetraphis geniculata*

Tetraphis geniculata occurs in the Russian Far East, Japan, the Pacific Northwest, New England and the Canadian Maritime Provinces (Christy and Wagner 1996). In the area of the Northwest Forest Plan, it is known from 11 sites in Washington and Oregon (USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b; Harpel pers. comm.). Eight of these sites have been reported since 1993 (USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b; Harpel pers. comm.). It has been reported from late-successional old-growth forests, but also from younger stands in cool, moist sites, on large logs that were derived from older forests (USDA, USDI 1999d). It has a spotty distribution, and where it occurs, it is often associated with a closely related species, *Tetraphis pellucida* (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b). *Tetraphis geniculata* was not rated by the FEMAT bryophyte panel, because it was poorly known (USDA et al. 1993).

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Environmental Consequences and Comparison of Alternatives - *Tetraphis geniculata*

In the No-Action Alternative, *Tetraphis geniculata* is a Protection Buffer species, and in Survey and Manage Categories 1 and 3. Under Categories 1 and 3, all current and future known sites would be managed, extensive surveys would be required for the species, and high-priority sites would be selected for management. In addition, as a Protection Buffer species, surveys are required before ground-disturbing activities. There is not substantial new information that would change the assumptions and effect analysis of the Northwest Forest (USDA, USDI Species Review Panel 1999b). This species is still considered to be rare and with a limited distribution within the Northwest Forest Plan area.

Tetraphis geniculata is in Category 1A under Alternative 1, and 2A under Alternative 2. The management direction for these categories would be identical. All current and future known sites would be managed and pre-disturbance surveys would be conducted. Strategic surveys would be conducted to address species information and management needs. Under Alternative 3, *Tetraphis geniculata* is in Category 3A. Under this category, all current and future known sites would be managed with a 250-meter buffer, pre-disturbance surveys would be conducted, and strategic surveys would be required.

Management of all known sites for *Tetraphis geniculata* occurs under all alternatives. Management recommendations would direct the management of known sites and, under the No-Action Alternative and Alternatives 1 and 2, management would be the same (i.e., management would be to maintain the persistence of the species at the site). If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for the species, then more area would be protected around known sites under Alternative 3 because a 250-meter buffer is prescribed for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger, or more stable populations over time. If the species is thought to require interior microclimate, there would be little difference between site management under the action alternatives. The area necessary to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer). However, because this species has a limited distribution in the Northwest Forest Plan range, management of known sites alone may not be able to provide for stable, well-distributed populations of this species throughout the Northwest Forest Plan area.

Subtle differences exist in the survey requirements for *Tetraphis geniculata* under the different alternatives. All alternatives require pre-disturbance surveys, which would be likely to discover additional populations of *Tetraphis geniculata* if it occurs in the project areas. In the absence of sporophytes, *Tetraphis geniculata* cannot be distinguished from a closely related, common and widespread species *Tetraphis pellucida*. Because these surveys would be conducted relative to project locations and not in the most likely habitat, and because of the difficulty in finding or identifying these species, these surveys would likely provide only limited additional information for management. Sites that would be discovered by these surveys would be managed, and would contribute to providing an improved distribution of populations across its range in the Northwest Forest Plan area.

Strategic surveys would be required in all alternatives to gather the information needed to manage this species to maintain stable, well-distributed populations across its range in the Northwest Forest Plan area. Strategic surveys would be effective in providing for species persistence as they can be conducted in areas with high likelihood of locating the species, provide information that can assist in management of the species, and narrow the habitat where pre-disturbance surveys would be required. Strategic surveys could

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provide the information necessary to determine the appropriate mitigation to reduce concerns for *Tetraphis geniculata*.

Background and Affected Environment - *Schistostega pennata*

Schistostega pennata is a circumboreal species (occurs at northern latitudes), known in this region from British Columbia, Alberta, Montana, Washington and Oregon (Christy and Wagner 1996; USDA, USDI 1999d). It is reported from 12 sites in the area of the Northwest Forest Plan (USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b; Harpel pers. comm.). The majority of the known sites are from collections prior to 1980, although several collections have been made in recent years. During the FEMAT analysis, it was only known from Washington. It was reported in 1998 from Douglas and Lincoln counties in Oregon, which extended the known range of the species (USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b).

Schistostega pennata is considered a rare species in the area of the Northwest Forest Plan (USDA et al. 1993; Christy and Wagner 1996; USDA, USDI 1996). S*chistostega pennata* was included in the Rare Species group by the FEMAT bryophyte panel, and was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands. This rating reflected a high level of confidence the species would be well distributed due to prescriptions for riparian areas. Knowledge of the distribution and habitat of the species has increased since FEMAT, although there are still very few known sites in the region (USDA, USDI Species Review Panel 1999b; USDA, USDI 1999d; Harpel pers. comm.;)

Environmental Consequences and Comparison of Alternatives - *Schistostega pennata*

In the No-Action Alternative, *Schistostega pennata* is a Protection Buffer species. All current and future known sites would be managed and surveys would be required before ground-disturbing activities. There is not substantial new information that would change the assumptions and effects analyses of the Northwest Forest Plan (USDA, USDI Species Review Panel 1999b).

Schistostega pennata is in Category 1A under Alternative 1, and Category 2A under Alternative 2. The management direction for these categories would be identical. All current and future known sites would be managed and pre-disturbance surveys would be conducted. Strategic surveys would be conducted to address species information and management needs.

Under Alternative 3, *Schistostega pennata* is in Category 3A. Under this category, all current and future known sites would be managed with a 250-meter buffer, pre-disturbance surveys would be conducted, and strategic surveys would be required.

Management of all known sites for *Schistostega pennata* occurs under all alternatives. Management recommendations would direct the management of known sites and, under the No-Action Alternative and Alternatives 1 and 2, management would be the same (i.e., management would be to maintain the persistence of the species at the site). If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for the species, then more area would be protected around known sites under Alternative 3 because a 250-meter buffer is prescribed for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger, or more stable populations over time. If the species is thought to require interior microclimate, there would be little difference between site management under the action alternatives. The area necessary to provide for interior microclimate conditions would

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be very similar to the area provided under Alternative 3 (250-meter buffer). Because this species has a limited distribution, management of known sites alone may not be able to provide for stable, well-distributed populations of this species throughout the Northwest Forest Plan area.

All alternatives require pre-disturbance surveys, which would be likely to discover additional populations of the species if they occur in these project areas. However, because these surveys would be conducted relative to project locations and not in the most likely habitat, and because of the difficulty in finding this species, these surveys would likely provide only limited additional information for management. Sites that would be discovered by these surveys would be managed, and would contribute to providing an improved distribution of populations across its range in the Northwest Forest Plan area.

Strategic surveys would be conducted for *Schistostega pennata* under all three action alternatives. These surveys would address the questions for the management of this species, and would focus on likely sites where the species may occur. They would gather information needed to manage this species to maintain stable, well-distributed populations across its range in the Northwest Forest Plan area. Strategic surveys would be effective in providing for species persistence as they can be conducted in areas with high likelihood of locating the species, provide information that can assist in management of the species, and narrow the habitat where pre-disturbance surveys would be required. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for *Schistostega pennata*.

Strategic surveys would not be conducted for *Schistostega pennata* in the No-Action Alternative. This would limit the amount of information collected on this species to pre-disturbance surveys only. Discovery of known sites would be limited primarily to those areas where projects occur, and would not find additional populations if they occur outside of project areas. It would be difficult to address the fundamental question of the Survey and Manage mitigation, that is do the reserve land allocations and other standards and guidelines of the Northwest Forest Plan provide for this species. It would also be difficult to gather the information necessary to determine what the concerns would be for species persistence and what management is needed to provide for stable, well-distributed populations across its range in the Northwest Forest Plan area.

Background and Affected Environment - *Diplophyllum albicans*

Diplophyllum albicans has a circumboreal (occurs at northern latitudes) distribution (Christy and Wagner 1996). Within the area of the Northwest Forest Plan, it occurs along the coast and west of the Cascade crest (USDA, USDI Species Review Panel 1999b). The majority of known sites are reported from herbaria collections made prior to 1993. The species review panel notes 78 known sites with only 3 reported since 1993 (USDA, USDI Species Review Panel 1999b). The species is widespread, but patchy in its distribution (Christy and Wagner 1996; USDA, USDI 1996). This species may not be closely associated with late-successional old-growth forests (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). This species is reported as abundant in forested regions, but its ability to occur on a variety of substrates indicates it is not tied to old-growth forests (Christy and Wagner 1996).

It was described as most common in the Coast Range in the Sitka Spruce Zone and infrequent outside of the coastal strip (USDA et al. 1993; USDA, USDI 1996). Additional information now indicates that it may be sufficiently common to not require site-specific protection (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI Species Review Panel 1999b).

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Environmental Consequences and Comparison of Alternatives - *Diplophyllum albicans*

Under the No-Action Alternative, *Diplophyllum albicans* is in Survey and Manage Categories 1 and 3. Under Categories 1 and 3, all current and future known sites would be managed, extensive surveys would be required for the species, and high-priority sites would be selected for management. The number and distribution of known sites, and its occurrence outside of the Sitka Spruce Zone, as well as questions regarding its association with late-successional old-growth forests, may change some of the assumptions in previous analyses. This information would indicate that it may be sufficiently common to not require management of all known sites to provide for stable, well-distributed populations on federally managed lands in the Northwest Forest Plan area (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI Species Review Panel 1999b,).

Under Alternative 1, *Diplophyllum albicans* is in Category 1D. This category requires management of high-priority sites. Strategic surveys would be conducted to address species information and management needs. Under Alternative 2, *Diplophyllum albicans* is in Category 2D, where all sites known as of September 30, 1999, would be managed, and strategic surveys would be conducted for five years. Based on strategic survey information, the species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions are needed. Under Alternative 3, *Diplophyllum albicans* is in Category 3B. This category requires management of high-priority sites, equivalent-effort surveys and strategic surveys.

Known site management varies for *Diplophyllum albicans* in the different alternatives. The No-Action Alternative provides the greatest site protection as all current and future known sites would be managed. Under Alternatives 1 and 3, only the high-priority sites would be managed. The Management Recommendation for *Diplophyllum albicans* would identify the high-priority sites, but until this document is approved, all known sites would be managed. Sites that would not be considered necessary for maintaining stable, well-distributed populations on federally managed lands would not be managed under Alternatives 1 and 3. The least amount of site protection occurs under Alternative 2, where only the sites known as of September 30, 1999, would be managed. This could result in loss of known sites that may be necessary for maintaining this species well distributed throughout its range in the Northwest Forest Plan area. After five years, the species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed.

Pre-disturbance surveys only occur for *Diplophyllum albicans* under Alternative 3. These surveys would be conducted relative to project locations and not in the most likely habitat. However, sites that would be discovered would be managed to provide for species persistence if they were identified as high-priority sites. The absence of pre-disturbance surveys in the other three alternatives may result in a low to moderate increase in the risk of not providing for stable, well-distributed populations of *Diplophyllum albicans* if the potential lost sites occur within a portion of its range where additional populations would be important to provide for its distribution and abundance.

Strategic surveys would be required for *Diplophyllum albicans* under all alternatives, although these surveys would only occur for five years in Alternative 2. Strategic surveys would determine what the level of concern is for the *Diplophyllum albicans* throughout its range, determine if the reserve land allocations provide for the species,

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identify high-priority sites for management and determine what the appropriate management is for *Diplophyllum albicans* in order to maintain well-distributed populations throughout its range in the Northwest Forest Plan area. Strategic surveys would provide the information necessary to determine the appropriate mitigation to reduce concerns for the species.

Background and Affected Environment - *Buxbaumia viridis*

Buxbaumia viridis has a broad global distribution and is reported from North America, Europe, Russia, China, Japan, North Asia, New Zealand (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b). In North America, it occurs in British Columbia, Alberta, Montana, Idaho, Colorado, Washington and Oregon (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b). It is documented from northern Washington into southern Oregon, and on both sides of the Cascades (USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b). The distribution is somewhat patchy, although this may reflect levels of survey and difficulty with locating the species in the field due to its cryptic and ephemeral nature (USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). The species has a broad ecological distribution, occurring from sea level to subalpine elevations (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI 1999d).

Buxbaumia viridis was included in the Decaying Wood-Less Common group and was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands, though with some possibility of significant gaps in the historic distribution. This species appears to be dependent on a continuous supply of large, well decayed logs for persistence (Christy and Wagner 1996; USDA, USDI 1996).

The number of known sites has increased for *Buxbaumia viridis* since the initial analyses in 1993. The Management Recommendation lists 10 known sites as of 1996 (USDA, USDI 1996). *Buxbaumia viridis* is now reported from over 100 collections in the area of the Northwest Forest Plan. The majority of reports are recent collections since 1997. However, many of these recent sites are in project areas (USDA, USDI Species Review Panel 1999b), as they were detected during implementation of pre-disturbance surveys.

Environmental Consequences and Comparison of Alternatives - *Buxbaumia viridis*

Buxbaumia viridis is a Protection Buffer species in the No-Action Alternative. Under the No-Action Alternative, all current and future known sites would be managed and surveys would be conducted prior to ground-disturbing activities. The increase in the number of known sites since 1993 may reduce the level of concern for this species, and it may not be as rare as previously thought (USDA, USDI Species Review Panel 1999b; USDA, USDI Species Review Panel 1999c).

Under Alternative 1, *Buxbaumia viridis* is in Category 1D. This category requires management of high-priority sites and strategic surveys. Strategic surveys would be conducted to address species information and management needs. Under Alternative 2, *Buxbaumia viridis* is in Category 2D, where all sites known as of September 30, 1999, would be managed, and strategic surveys would be conducted for five years. Based on strategic survey information, the species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed. Under Alternative 3, *Buxbaumia viridis* is in Category 3B. This category requires management of high-priority sites, equivalent-effort surveys and strategic surveys.

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Known site management varies for *Buxbaumia viridis* in the different alternatives. The No-Action Alternative provides the greatest site protection as all current and future known sites would be managed. Under Alternatives 1 and 3, only the high-priority sites would be managed. The Management Recommendation for *Buxbaumia viridis* would identify the high-priority sites, but until this document is approved, all known sites would be managed. Sites that would not be considered necessary for maintaining stable, well-distributed populations on federally managed lands would not be managed under Alternatives 1 and 3. The least amount of site protection occurs under Alternative 2, where only the sites known as of September 30, 1999, would be managed. This could result in loss of known sites that may be necessary for maintaining this species well distributed throughout its range in the Northwest Forest Plan area. After five years, the species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed.

Pre-disturbance surveys would occur for *Buxbaumia viridis* under the No-Action Alternative and Alternative 3. However, these surveys would be conducted relative to project locations and may not occur in the most likely habitat. And because the species is cryptic and ephemeral in nature, locating or identifying this species is difficult and these surveys would likely not provide the information needed for management of this species. Sites that would be discovered would be managed to provide for species persistence if they were identified as high-priority sites. The absence of pre-disturbance surveys in Alternatives 1 and 2 would only slightly increase the risk of not providing for stable, well-distributed populations of *Buxbaumia viridis* given the wide geographic and ecological distribution of this species. This would only increase the risk if the loss of sites occurs within a portion of its range where additional populations would be necessary to provide for its distribution and abundance.

Strategic surveys would be required for *Buxbaumia viridis* under all three action alternatives, but would not be required in the No-Action Alternative. However, these surveys would only occur for five years in Alternative 2. Strategic surveys would determine what the level of concern is for *Buxbaumia viridis* throughout its range, determine if the reserve land allocations provide for the species, identify high-priority sites for management, and determine what the appropriate management is for *Buxbaumia viridis* in order to maintain well-distributed populations throughout its range in the Northwest Forest Plan area. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for the species.

Under Alternative 2, strategic surveys would also address whether the species should be recommended for management under a sensitive species program. The physical features necessary to identify *Buxbaumia viridis* are ephemeral and unpredictable, and therefore would be easily missed during surveys. It may take multiple years at an individual site to locate the species in the correct state of development. It is unlikely that all information would be available after 5 years given the survey difficulties and the need to gather information on the level of concern for *Buxbaumia viridis* throughout its wide range and the need to determine if the reserve land allocations provide for the species. This would make it difficult to determine the appropriate mitigation measures that would be necessary to provide for well-distributed populations of *Buxbaumia viridis*.

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Fungi

Background and Affected Environment

Fungi are neither plants nor animals but are recognized as a separate kingdom of organisms, both in structure and function. The large number of macrofungi (a fungi with sporocarps large enough to be seen without a hand lens) in late-successional and old-growth forests, especially in uneven-age stand structure, reflects the complexity of the late-successional and old-growth ecosystems as well as, or better than, many other groups of organisms. Estimates indicate there are at least six species of fungi for every vascular plant species in a given temperate ecosystem (Hawksworth 1991).

The fungal flora of the Pacific Northwest is extremely diverse. Of the 527 species of fungi that were evaluated as being closely associated with late-successional forests, 109 (21 percent) are known to be endemic to the Pacific Northwest. This list of species represents only a small percentage of the macrofungi that occur in late-successional forests. If microfungi (fungi with small sporocarps that are seen only with a hand lens) were included, the list would be greatly expanded. For every group of fungi, there are many species, perhaps hundreds, in addition to those on the original list (see Table IV-A-1, p. IV-213, in USDA et al. 1993).

Fungi are essential to the functioning of forest ecosystems. Many of the forest fungi that produce large fruiting bodies (such as mushrooms, boletes, and coral fungi) have symbiotic relationships with vascular plants. The survival of most conifers and many flowering plants depends on associations with these mycorrhizal fungi for the uptake of nutrients and water (Trappe and Luoma 1992). Hypogeous fungi (fungi that fruit below ground) and certain mushrooms are important food for small mammals that, in turn, aid in spore dispersal. Saprobic fungi (fungi that live on dead or decaying organic matter) are a major component of all forest ecosystems, growing on recently fallen trees, well-decayed logs, litter, dung, etc. They play an important role in decomposition and nutrient recycling.

Most macrofungi (mushrooms, truffles and allies) produce fruiting structures or sporocarps that are short-lived and ephemeral, seasonal in occurrence, and annually variable. Sporocarps for many species are produced only during a brief portion of the season, and may not be present at all in any given year. Richardson (1970) estimated that bi-weekly sampling would fail to detect about 50 percent of macrofungal species fruiting in a season. The year-to-year variation in detecting a species at sites is very high for fungi. On the average, less than ten percent of species were detected in each of two consecutive years at any one of eight sites (O'Dell et al., in press). In another study, about 50 percent of the species at a site were observed only during a single year, the fourth year (out of five) of sampling (O'Dell, unpublished data on file, Corvallis Forestry Sciences Lab). Because of this annual variability in sporocarp occurrence, five or more years of surveying at a site are necessary to reach a high probability of determining whether or not a species occurs at a site. The reason for the annual and seasonal variation are not fully understood, and predicting when, or under what conditions a species would fruit is not possible at present.

Another poorly understood facet of fungi is their population biology. Connectivity of populations is key to species persistence across a landscape because this allows for the exchange of genetic material between subpopulations, reduces inbreeding and prevents the accumulation of deleterious alleles in isolated subpopulations. Dispersal, reproduction, and connectivity are not understood for any of the fungi considered herein. All of these species produce sporocarps that can in turn produce spores. It is

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often assumed that spores are the main unit of dispersal and reproduction in macrofungi, however, vegetative reproduction is probably an alternative for many species (Peterson and Hughes 1999). Spores can be aerial dispersed or moved by animals, with obvious differences in implications for population connectivity. If spores are moved by air currents over large distances, then isolation of subpopulations is less likely than if an animal vector is required. Unfortunately, there is little specific data on dispersal mechanisms for macrofungi, although it is generally assumed that truffle fungi are dispersed by animals. Because of these factors, population isolation and connectivity cannot be specifically addressed in this analysis.

Table 3&4-2 summarizes the number of records/sites of fungi located for two periods of time: the period prior to 1994 (which was prior to the Northwest Forest Plan Record of Decision) and for the period 1994 and later.

Summary of Effects for Fungi

Because of the large number of fungi species discussed and the length of this discussion, a brief summary is provided here, prior to the detailed discussion.

Under all action alternatives, 16 species are removed from Survey and Manage Standards and Guidelines and one species is removed from part of its range because they do not meet the basic criteria for Survey and Manage Standards and Guidelines. Of these 17 species, two species do not meet the basic criteria of Survey and Manage Standards and Guidelines but are at risk for a stable, well-distributed population and will be considered for inclusion in the sensitive species program of the Agencies or for listing under the Endangered Species Act. One species does not occur in the Northwest Forest Plan area, five species have been found to be synonyms of other species, and nine species are expected to have stable, well-distributed populations.

Alternatives 1 would have 196 species of fungi, and Alternative 2 would have 202 species of fungi, that are either unchanged or receive greater protection compared to the No-Action Alternative. Alternative 3 would have 209 species of fungi that would be unchanged or would receive greater protection compared to the No-Action Alternative. On an overall basis, the action alternatives provide for stable well-distributed populations of these fungi species.

Environmental Consequences and Comparison of Alternatives

The status of most fungi is either unchanged, or changed in such a way as to clearly provide greater protection, under Alternatives 1, 2 and 3 compared to the No-Action Alternative. Because all categories for all action alternatives, except Alternative 1 (Category 1F) require management of at least selected "high-priority" sites, while Category 4 under the No-Action Alternative does not, this change is clearly an increase in the level of protection for those species to which it applies. Under the No-Action Alternative, Category 3 requires management of selected, high-priority sites.

Species whose management under Alternatives 1, 2 and 3, when compared to the No-Action Alternative, is unchanged, or for which protection is increased are not specifically addressed below. Species in Category 1 under the No-Action Alternative, that would be placed in Category 1B under Alternative 1, Category 2B under Alternative 2 or Category 3A under Alternative 3 are considered to have equal or greater protection under those action alternatives compared to the No-Action Alternative. There is no additional new information that alters the assumptions or conclusions of the Northwest Forest Plan FSEIS regarding threats to range, distribution, and abundance for these

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species. There is a high degree of uncertainty regarding the expected future condition of these species within the Northwest Forest Plan area. Some species, such as *Cortinarius speciosissimus* (= *C. rainierensis*), have not been collected in the region for more than 40 years despite significant efforts to locate them (Ammirati et al. 1994). Others are known from so few sites that they are highly vulnerable to stochastic events such as catastrophic wildfire. At least 79 species are known from only one or two sites (3&4-2). All species remaining in the Survey and Manage program would benefit from strategic surveys, and management of known sites; some would have additional benefits from pre-disturbance or "equivalent-effort" surveys. Through these efforts, additional sites would be located and managed for the benefit of the species. Therefore, more of the populations of these rare species are likely to persist than would otherwise be the case.

Efforts have been made to gather additional information about all species of fungi listed under the Survey and Manage Standards and Guidelines. These include literature reviews, searches of herbaria to gather distribution information, and surveys (prior to ground-disturbing and extensive). For species listed under Categories 1 and 2 in Table C-3 of the Northwest Forest Plan Record of Decision, this information was summarized as of December 1996 in the Management Recommendations for Fungi (USDA, USDI 1997b). Additional information has come from research projects by mycologists in the region. The efforts have resulted in proposals to change the status of some species. For 16 species of fungi, new information is available regarding rarity, distribution, or association with late-successional and old-growth forest habitat, which greatly reduces concern about threats to their range, distribution, and abundance. These species are discussed below.

See Table 3&4-3 for comparison of categories and management elements for fungi that are in Protection Buffer and Category 2. .

Species Not Known or Suspected to Occur in the Northwest Forest Plan Area

The following species is proposed for removal from the Survey and Manage mitigation under the action alternatives.

Clavariadelphus lovejoyae is only known to occur in Wyoming. (R. Peterson [n.d.]). Because *Clavariadelphus lovejoyae* does not occur in the Northwest Forest Plan area, it is not affected by management activities therein. Therefore, *C. lovejoyae* does not meet the criterion that "The species must occur within the Northwest Forest Plan area, or occur close to the NFP area and have potentially suitable habitat within the NFP area."

Species Not Associated With Late-Successional and Old-Growth Habitat

The following four species are proposed for removal from the Survey and Manage Mitigation.

<u>*Bryoglossum gracile*</u>
Bryoglossum gracile is associated with mosses in subalpine meadows and boulder fields. It is not a forest species (unpublished report by N.S. Weber, on file Corvallis Forestry Sciences Lab). Management activities are extremely limited in such habitats, and much of this extensively distributed habitat is in protective (Congressionally or Administratively Withdrawn) allocations. This species is does not have threats to its range, distribution or abundance because extensive areas of potential habitat occur in protective allocations under the Northwest Forest Plan because of the low level of management activity in its habitat. Therefore *B. gracile* does not meet the criteria for inclusion in the Survey and Manage mitigation that "the species must [be] closely associated with late-successional or old-growth forest," and "the reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence." There is a high degree of uncertainty

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regarding the expected future condition of *Bryoglossum gracile* within the Northwest Forest Plan area. It is only known from about three sites, two of which are historic, so it is vulnerable to stochastic disturbance. However, millions of acres of potential habitat for the species have not been surveyed. It is likely that additional populations would be located with a modest amount of effort. *Bryoglossum gracile* should be considered for inclusion in the sensitive species programs by the Agencies.

Cantharellus formosus

This species is most abundant in younger forest types. A recent study found that it is ten times more likely to be found in 40-year-old stands than in adjacent 400+ year-old stands (Dunham, O'Dell, and Molina 1999). This species was so frequently encountered during surveys that it is rarely vouchered. Even so, over 60 new occurrences are documented. It is also much more abundant and broadly distributed across a wide range of habitats than thought at the time the Northwest Forest Plan was written (USDA, USDI Species Review Panel 1999b). The expected future condition for *Cantharellus formosus* is numerous populations throughout its range in the Northwest Forest Plan area. Therefore, *Cantharellus formosus* does not meet the criterion for inclusion in the Survey and Manage mitigation that "the species must be closely associated with late-successional or old-growth forest". The expected future condition for this species is numerous, well-distributed populations throughout its range in the Northwest Forest Plan area. Since then, it has been determined that this is the commonly harvested yellow chanterelle in the Northwest Forest Plan region (Redhead et al. 1997). It was formerly assumed that the common yellow chanterelle was *C. cibarius*, a European species (Appendix J2, p. 159-160 in USDA, USDI 1994a).

Clavulina cristata

This species has been found in more than 50 sites just during recent surveys, mostly in other than late-successional or old-growth habitat, and is also known from hundreds of additional sites from herbarium records. New sites include all 10 of the 30- to 50- year old stands selected for a study of the association of Survey and Manage fungi (Cazares et al. unpub). The occurrence of this species at all ten, essentially randomly selected, sites demonstrates its high frequency. In fact, it is the most frequently encountered mushroom in this study of early-seral stands. This species is frequently collected in early-seral stands; it is not a late-successonal and old-growth forest associated species and does not need any mitigation under the Northwest Forest Plan (USDA, USDI Species Review Panel 1999b). The expected future condition for *Clavulina cristata* is numerous populations throughout its range in the Northwest Forest Plan area. Therefore, *Clavulina cristata* does not meet the criterion for inclusion in the Survey and Manage mitigation that "the species must [be] closely associated with late-successional or old-growth forest."

Helvella compressa

This species occurs frequently in young stands, and has been collected from such extremely disturbed habitats as suburban lawns and cultivated gardens (N.S. Weber, unpublished report on file CFSL and additional data). It is not associated with late-successional and old growth forests, although it can occur in late-seral stands; it is no longer thought to be at risk because it is frequently encountered in early-seral and disturbed habitats and is broadly distributed across a wide range of habitats. There have been over 100 new occurrences of this species found since 1995, and these are mostly in habitats other than late-successional or old-growth forest. Taxa expert panels concluded that there are no threats to the range, distribution and abundance of this species (USDA, USDI Species Review Panel 1999b). The expected future condition for *Helvella compressa* is numerous populations throughout its range in the Northwest Forest Plan area. Therefore, *Helvella compressa* does not meet the criterion for inclusion in the Survey and Manage mitigation that "the species must be closely associated with late-successional or old-growth forest."

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Species That Are More Abundant and Broadly Distributed Than Thought When the Northwest Forest Plan Was Prepared

The following six species are proposed for removal from the Survey and Manage mitigation under the action alternatives (*Sarcosoma mexicana* is only proposed for removal in the Oregon Willamette Valley and Oregon Coast Range Provinces).

Hydnum repandum is now known to occur at more than 90 sites that are well distributed throughout its range (northern Washington to northern California) in the Northwest Forest Plan area. Over 70 percent of these sites are in protected allocations. Undoubtedly, many more sites could easily be found, because this species has broad habitat requirements within late-successional and old growth forests, and extensive areas of potential habitat have not yet been surveyed. The abundance of this species is further evidenced by the fact that it is a major commercially harvested species; Arora (1986) describes it as "sometimes outrageously abundant." Apparently, commercial picking was considered the major threat to the species by the FEMAT panelists (p. 175-6 in Appendix J2 of USDA, USDI 1994a). New information does not evidence a threat to fungi from removing sporocarps (Egli et al. 1990, Norvell 1995). Because this species is frequently encountered, it does not have threats to its range, distribution and abundance (USDA, USDI Species Review Panel 1999b). The expected future condition for *Hydnum repandum* is numerous populations throughout its range in the Northwest Forest Plan area. Therefore, *Hydnum repandum* does not meet the criterion for inclusion in the Survey and Manage mitigation that "the reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence."

Martellia maculata is the correct name for what was thought to be an undescribed species (*Elaphomyces sp. Nov*. # Trappe 1038) (J.M. Trappe [n.d.]). The putative collection tentatively identified as a new species was only known from one site, however *M. maculata* is known from about 30 sites, well-distributed through its range, and over 70 percent of known sites are in protected allocations. Furthermore, this species was not considered by the FEMAT panelists to have any threats to its range abundance and distribution, nor does any new information indicate that to be the case. Because it occurs in a wide range of habitats (coastal hemlock, douglas-fir, and montane true fir forests) ranging from early to late seral, it does not have risks threats to its range, distribution and abundance (USDA, USDI Species Review Panel 1999b). The expected future condition for *Martellia maculata* is numerous populations throughout its range in the Northwest Forest Plan area. Therefore *Martellia maculata* does not meet the criterion for inclusion in the Survey and Manage mitigation that "the reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence."

Omphalina ericetorum was not indicated to have threats to viability at the time of the Northwest Forest Plan FSEIS. There are over 100 recently discovered sites for this species in the Northwest Forest Plan area. These sites cover most of the Northwest Forest Plan area from northern Washington to northern California. Recent surveys have found over thirty sites in the past three years. Because *Omphalina ericetorum* is frequently encountered and broadly distributed across a wide range of habitats (from coastal to montane, many different forest types, plant associations and seral stages) it is does not have threats to its range, distribution and abundance (USDA, USDI Species Review Panel 1999b). The expected future condition for *Omphalina ericetorum* is numerous populations throughout its range in the Northwest Forest Plan area. Therefore, *Omphalina ericetorum* does not meet the criterion for inclusion in the Survey and Manage mitigation that "the reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence."

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Rhizopogon parksii is the correct name for what was thought to be an undescribed species (*Rhizopogon sp. Nov.* # Trappe 1692 and 1698) (J.M. Trappe [n.d.]). The putative collections tentatively identified as a new species were from two sites, however *R. parksii* is known from over 200 sites, across its range in the Northwest Forest Plan area and in a wide range of habitats(mesic to dry forest types with a douglas-fir component) and seral stages. It does not have threats to its range, distribution and abundance because it is frequently encountered and broadly distributed across a wide range of habitats. The expected future condition for *Rhizopogon parksii* is numerous populations throughout its range in the Northwest Forest Plan area. This species was not considered by the FEMAT panelists to have any threats to its range abundance and distribution, nor does any new information indicate that to be the case. Furthermore, this species is frequently collected in early seral stands, it is not a late-successional and old-growth forest associated species and does not need any mitigation under the Northwest Forest Plan (USDA, USDI Species Review Panel 1999b). Therefore *Rhizopogon parksii* does not meet the criteria for inclusion in the Survey and Manage mitigation that "the species must be closely associated with late-successional or old-growth forest" and "the reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence."

Thaxterogaster pingue is locally abundant throughout its range and is known from more than 100 sites. Many new sites are being found across in the Northwest Forest Plan area. Over 70 percent of the sites are in reserve allocations. Because this species is frequently encountered, and because there are extensive areas of its preferred habitats (late-seral, high-elevation *Abies* dominated forests) in reserve allocations, it does not have threats to its range, distribution and abundance (USDA, USDI Species Review Panel 1999b). The expected future condition for *Thaxterogaster pingue* is numerous populations throughout its range in the Northwest Forest Plan area. Therefore, *Thaxterogaster pingue* does not meet the criterion for inclusion in the Survey and Manage mitigation that "the reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence."

Sarcosoma mexicana has been found on about 75 sites in the Oregon Coast Range and Willamette provinces during the past three years over a wide range of habitat, mostly other than late-successional or old-growth forest. Possibly, it was previously under-reported because it typically fruits in winter and early spring, when fungi are not usually being collected. Because this fungus is frequently encountered in a broad range of habitats, usually Douglas-fir forests under 100 years old, there is no threat to its populations in this portion of the range of the species (USDA, USDI Species Review Panel 1999b). The expected future condition for *Sarcosoma mexicana* is numerous populations throughout the Oregon Coast Range and Oregon Willamette Valley provinces. Therefore, *Sarcosoma mexicana* in the Oregon Coast Range and Oregon Willamette Valley provinces does not meet the criteria for inclusion in the Survey and Manage mitigation that "the species must be closely associated with late-successional or old-growth forest" and "the reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence."

Species That are Synonyms of Other Species on Table C-3 of the Northwest Forest Plan Record of Decision

The following species are being addressed elsewhere in the effects analysis. *Cantharellus cibarius* was thought by the taxa team to be the name for the common yellow chanterelle (Appendix J2 p. 159-160 in USDA, USDI 1994a). This species turns out to be *C. formosus* (Redhead et al. 1997; USDA, USDI Species Review Panel 1999b), a species that is extremely common and not dependent on late-succession and old-growth forests (USDA, USDI Species Review Panel 1999b). *C. formosus* is proposed for removal from the Survey and Manage mitigation (see above).

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Clavariadelphus borealis is a taxonomic synonym of *C. truncatus* (R. Peterson [n.d.]). *Clavariadelphus truncatus* would receive equal or greater protection under all action alternatives compared to the No-Action Alternative.

Clavulina cinerea is a taxonomic synonym of *C. cristata*, a frequently encountered and broadly distributed species (R. Peterson [n.d.]). *Clavulina cristata* is proposed for removal from the Survey and Manage mitigation (see above).

Phaeocollybia carmanahensis is a taxonomic synonym of *P. oregonensis* (Norvell 1998). *Phaeocollybia oregonensis* would receive equal or greater protection under all action alternatives compared to the No-Action Alternative.

Other Species Not Known From, But Suspected to Occur Within the Northwest Forest Plan Area

There is one species that is not known from, but is suspected to occur within the Northwest Forest Plan area: *Gastrosuillus amaranthii*. This species is known only from California, near the southern boundary of the Northwest Forest Plan area (Lassen Volcanic National Park). No sites for it are currently documented from the Northwest Forest Plan area, but it could occur there. The change in status from Categories 1 and 3 under the No-Action Alternative to Category 1F under Alternative 1 might reduce protection for this species because management of known sites would no longer be required. Category 2D under Alternative 2 and Category 3C under Alternative 3 both require management of all known sites, and so provide greater levels of protection than Categories 1 and 3 under the No-Action Alternative where only high-priority sites must be managed. Until it is known to occur within the planning area, however, there is no clear range, distribution and abundance threat from any action there. If the species is found in the planning area, it should be protected because it is extremely rare.

No Action Category 2 and Protection Buffer Species Fungi

(Note: This rationale is appropriate for *Bondarzewia* also.)

The Survey and Manage Category 2 and Protection Buffer mitigation in the No-Action Alternative require "surveys prior to ground-disturbing activities" (USDA, USDI 1994b, p C-5 and C-19). The Protection Buffer Standards and Guidelines further specify that "survey protocols will have a high probability of detecting occupied sites" (USDA, USDI 1994b, p. C-19). For fungi with sporocarps that are short lived and annually variable (all of the deferred species), the goal of "high probability of detecting occupied sites" is difficult to attain.

The following discussion applies to *Bondarzewia mesenterica, Otidea leporina, O. onotica, O. smithii, Polyozellus multiplex, Sowerbyella rhenana,* throughout the Northwest Forest Plan area, and *Sarcosoma mexicana* outside of the Oregon Willamette Valley and Oregon Coast Range Provinces.

Under the No-Action Alternative, all of these species require pre-disturbance surveys, management of known sites, and extensive surveys (to locate "high-priority sites for management"). Although some of these species are placed in different categories under the action alternatives, all of the species would receive identical mitigation under any particular alternative (Tables 3&4-2 and 3&4-3).

Under Alternatives 1 and 2, these species would receive management of all known sites and strategic surveys. The main change from the No-Action Alternative is that Alternatives 1 and 2 drop the requirement for pre-disturbance surveys.

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Because the pre-disturbance survey requirement is eliminated, protection for these species is reduced. Without pre-disturbance surveys, some sites for these species may be lost due to management activities. However, with strategic surveys, more of the potential habitat for the species may be scrutinized than with pre-disturbance surveys because strategic surveys are prioritized in high-probability habitat for the species, and sites can be located and additional information gained efficiently. Therefore, threats to the range, distribution and abundance of these species under Alternatives 1 and 2 are slightly greater than under the No-Action Alternative. There is a high degree of uncertainty regarding the expected future condition of these species within the Northwest Forest Plan area under these alternatives, particularly for *Otidea smithii* and *Sowerbyella rhenana* which are known from less than ten sites.

Under Alternatives 1 and 2, habitat-disturbing activities are not allowed to be initiated in old growth (as defined in the glossary) in fiscal year 2011 and beyond, unless strategic surveys for fungi have been completed for the general geographic area , per the Strategic Survey Plan. During this 10-year period, inadvertent loss of sites may occur through habitat-disturbing activities. The degree of risk to the species would be related to the amount and distribution of habitat disturbed through such activities. Currently, approximately 8 million acres of late-successional forest exist in the Northwest Forest Plan area. It is estimated during this 10- year period that approximately 2.5 to 4 percent of the total late-successional forest in the Northwest Forest Plan area will be modified through partial cut harvest, regeneration harvest, or prescribed fire in the Matrix and Adaptive Management Area land-use allocations. This level of disturbance represents approximately 20 percent of the late-successional forest located in Matrix and Adaptive Management Area land-use allocations (Cadwell and Denton 1999). The distribution of these habitat-disturbing activities is expected to be relatively uniform across, and occur mostly in, the late-successional forest in the Matrix and Adaptive Management Areas, and less uniform across and occur less in the reserve land-use allocations. This 10-year period of habitat-disturbing activities prior to completion of strategic surveys is unlikely to have a significant effect on the ability of these species to be maintained in a stable, well-distributed condition on federally managed lands because of the moderate amount of habitat loss and potential inadvertent loss of sites. In those parts of the region with very low amounts of late-successional and old-growth forest habitat, such habitat could be critical to maintaining some species in a stable, well-distributed condition. Alternatives 1 and 2 accommodate this by prioritizing such areas for strategic surveys.

Under Alternative 3, these species would receive management of all known sites with a 250-meter buffer, “equivalent-effort” pre-disturbance surveys, and strategic surveys. Fungal individuals range in size from a few centimeters across to many acres (Dahlberg and Stenlid 1990, Smith et al.1996). For most species, including all of these, the average size of individuals is unknown. So, the effect on fungi of a 250-meter buffer cannot be assessed with confidence. The main change compared to the No-Action Alternative is changing the requirement for a “high probability of detecting occupied sites” which might require five or more years, to “equivalent-effort” surveys limited to two field seasons. Some occupied sites would not be detected in the two field seasons allotted for survey under this option. Therefore, Alternative 3 would slightly increase threats to the range, distribution and abundance of these species compared to the No-Action Alternative. Compared to Alternatives 1 and 2, Alternative 3 would reduce threats to the species range, distribution, and abundance because it adds a pre-disturbance survey requirement. There is a high degree of uncertainty regarding the expected future condition of these species within the Northwest Forest Plan area under this alternative, particularly for *Otidea smithii* and *Sowerbyella rhenana*.

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Lichens

General Background for Lichens

The Survey and Manage Standard and Guideline was originally applied to 84 lichen species. Of these, 75 were included because they did not pass the screens of the additional species analysis in the Northwest Forest Plan FSEIS, and it was thought that additional mitigation was needed to provide for species persistence. An additional six species not rated during the FEMAT viability panels because of insufficient information were included in the Survey and Manage Standard and Guideline. The reason for adding these six species was to manage known sites while acquiring information necessary to address concerns for their persistence.

Since 1994, considerable new information has been acquired on the occurrence and distribution of the lichen species covered by Survey and Manage Standards and Guidelines. Information has been acquired from field surveys, herbaria, literature, field units and taxonomic experts. This information was evaluated when determining the appropriate level of mitigation for the lichen species covered by these standards and guidelines, and it was also used in developing the action alternatives.

The three action alternatives explicitly define the basic criteria necessary for a species to be listed under the Survey and Manage Standards and Guidelines. These criteria were taken from the FEMAT and Northwest Forest Plan FSEIS analyses. The basis for including certain species in the FEMAT viability analysis were their occurrence in the geographic area of the Northwest Forest Plan and their close association with late-successional old-growth forests, which are two basic criteria for Survey and Manage. The third basic criterion for Survey and Manage addresses the ability of the Northwest Forest Plan to provide for species persistence; this criterion was used for evaluation during the additional species analysis of the Northwest Forest Plan FSEIS.

The three action alternatives have similar adaptive management processes, which would allow the Agencies to respond to changing information and to provide appropriate management for species.

New information demonstrates that some species no longer meet one or more of the three basic criteria, and for this reason, they are proposed for removal from Survey and Manage under the three action alternatives. There are 34 species and the portions of three species ranges proposed for removal from Survey and Manage Standards and Guidelines under the action alternatives. The reason for proposing their removal is that these taxa do not meet the criterion for close association with late-successional old-growth forests, or because the reserve system and other standards and guidelines of the Northwest Forest Plan provide for a reasonable assurance of species persistence.

Summary of Effects for Lichens

A brief summary of effects for mollusks is provided here prior to detailed discussion, due to the large number of species discussed and the length of this section.

Thirty-seven species would be removed from Survey and Manage and Protection Buffer Standards and Guidelines under the action alternatives either in all or portions of their range because they no longer meet the Survey and Manage basic criteria.

For the remaining species, the four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and

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regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the agencies to respond to changing information and to provide appropriate management for species. Adaptive management would result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

Compared to the No-Action Alternative, species receive different management under the action alternatives as a result of the application of new information and the slightly different emphasis of the alternatives. Under Alternative 1, pre-disturbance surveys are added for two lichens, management of known sites is increased for 13 lichens, one lichen is removed from known site protection, and 37 lichens are removed from the Survey and Manage Standards and Guidelines.

Under Alternative 2, 23 lichens receive increased known site protection (for sites known as of September 30, 1999), pre-disturbance surveys are added for one lichen, and 37 lichens are removed from the Survey and Manage Standards and Guidelines.

Under Alternative 3, 23 lichens receive increased known site protection, pre-disturbance surveys are added for 33 lichens, and 37 lichens are removed from the Survey and Manage Standards and Guidelines.

Most of the lichens have an equal or greater likelihood of a stable, well-distributed population under the action alternatives when compared to the No-Action Alternative.

For the 37 lichens that are removed from the Survey and Manage Standards and Guidelines, 34 are expected to have stable, well-distributed populations. Three species at risk for not maintaining a stable, well-distributed population do not meet the basic criteria for the Survey and Manage Standards and Guidelines and may be considered for protection under the agencies' sensitive species program or for listing under the Endangered Species Act.

Forty-seven lichen species remain on the Survey and Manage Standards and Guidelines. Stable, well-distributed populations are expected for 10 lichens under No-Action, 13 lichens under Alternative 1, 11 lichens under Alternative 2 and 13 lichens under Alternative 3.

For some species, the alternatives provide mitigation to the extent practical or appropriate but the species may not have a stable, well-distributed population for reasons outside the control of the Northwest Forest Plan. This situation exists for 24 lichens under No-Action, 34 lichens under Alternatives 1, 29 lichens under Alternative 2 and 34 lichens under Alternative 3.

For some species, some alternatives do not provide enough mitigation to maintain or achieve a stable, well-distributed population. This situation exists for 13 lichens under No-Action, 0 lichens under Alternative 1, 7 lichens under Alternative 2, and 0 bryophytes under Alternative 3.

Background and Affected Environment - *Pilophorus nigricaulis and Sticta arctica*

Pilophorus nigricaulis and *Sticta arctica* are removed from Survey and Manage under the three action alternatives because they do not meet the criterion for being closely

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associated with late-successional old-growth forests. However, current information indicates these rock-dwelling species are quite rare within the area of the Northwest Forest Plan (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b).

Sticta arctica is a rare species in the Pacific Northwest. It is known to occur in western North America from Alaska to northwestern Oregon, and in Siberia and Kamchatka (USDA, USDI 1999a). Known sites for *S. arctica* in the Northwest Forest Plan area have increased from one to two since 1993. The two sites are widely disjunct, and both are on nonfederal land (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). Habitat at the known sites is reported as rock ledges and mossy soil at a non-forest site near sea level in Puget Sound, and an open site on a moss-covered basalt outcrop on a rocky mountain summit (2,950 feet) in coastal northwestern Oregon (McCune et al. 1997; USDA, USDI Species Review Panel 1999b; USDA, USDI 1999a). The population in Oregon is reported as very small (McCune et al. 1997; USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b).

Pilophorus nigricaulis is a rare rock lichen in the Pacific Northwest (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b) . It is known to occur in western North America from Alaska to Oregon, and in Japan. The number of known sites for this species in the Northwest Forest Plan area has increased from 2 to 16 since 1993, with additional unreported sites likely (Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b). Its distribution is spotty in the Northwest Forest Plan area where it has been reported in the Cascade Mountains from northern Washington to central Oregon (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). The majority of the reported sites on federally managed land are in reserve land allocations (USDA, USDI Species Review Panel 1999b). *Pilophorus nigricaulis* is found primarily in non-forest communities in cool, moist sites on talus slopes, cliffs, rock outcrops and large boulders (McCune and Geiser 1997; USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). Population size varies from small to locally abundant (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b).

Environmental Consequences and Comparison of Alternatives - *Pilophorus nigricaulis and Sticta arctica*

There are concerns for *Sticta arctica* and *Pilophorus nigricaulis* because they have limited distribution and are known from very few sites in the Northwest Forest Plan area. These species would receive greater protection under the No-Action Alternative. Under the No-Action Alternative, *Sticta arctica* and *Pilophorus nigricaulis* are in Categories 1 and 3, where all current and future known sites would be managed and extensive surveys would be required.

The two known sites for *Sticta arctica* are on nonfederal land, although additional sites may be discovered on federally managed land through future extensive survey efforts. Because all known sites of *Sticta arctica* are on nonfederal land, the requirement to protect known sites would not increase the likelihood that the species will maintain stable, well-distributed populations of this species on federally managed lands in the Northwest Forest Plan area.

In the three action alternatives, these two species would be removed from Survey and Manage because they do not meet the criterion of being closely associated with late-successional old-growth forests. However, these species remain at risk because of their limited distribution and abundance. As these species would not be protected under the Northwest Forest Plan because they are not late-successional old-growth forest species, they may be evaluated for inclusion in the agencies' sensitive species programs.

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Background and Affected Environment - *Calicium adeaquatum, Calicium glaucellum, Chaenotheca chrysocephala, Chaenotheca brunneola, Chaenotheca ferruginea, Chaenotheca furfuracea, Cyphelium inquinans, Mycocalicium subtile, Calicium viride, Stenocybe major*

Pin lichens were evaluated as a group of 16 species by the lichen panel for the FEMAT analysis (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). The pin lichens were rated as having a low likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federally managed lands. This was because they were thought to be late-successional or old-growth associated species and little was known of their distribution, ecology or abundance in the Pacific Northwest (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). Information acquired since the FEMAT analysis (USDA, USDI Species Review Panel 1999b) shows most of these species are not closely associated with late-successional old-growth forests, or the reserve land allocations and other standards and guidelines of the Northwest Forest Plan provide a reasonable assurance of their persistence. Ten species of pin lichens are proposed for removal from the Survey and Manage Standards and Guidelines under the three action alternatives, because they do not meet its basic criteria.

Most of these species of pin lichens have a broad global distribution and occur on several continents, as well as in the northern and southern hemispheres (Tibell 1975). Most of these species have a broad ecological amplitude and occur in a variety of habitats and stand ages (Tibell 1975; USDA, USDI Species Review Panel 1999b). These lichens are very small, which presents survey difficulties (Appendix J2 in USDA, USDI 1994b). However, limited survey efforts by taxa experts in the federal agencies and universities have reported many new sites since 1993 (USDA, USDI Species Review Panel 1999b).

Calicium adeaquatum, a circumboreal species, is reported from eight locations in the Northwest Forest Plan area. It occurs on both sides of the Cascades, and on federal and nonfederal land (USDA, USDI Species Review Panel 1999b). All known sites are from twigs and branches of young hardwoods such as oak, alder, ash, and apple. Reported habitat is oak forests, young to mature riparian forests, and apple orchards. Current information indicates this species is not closely associated with late-successional old-growth forests (USDA, USDI Species Review Panel 1999b).

Calicium glaucellum, Chaenotheca chrysocephala, C. brunneola, C. ferruginea, Cyphelium inquinans and *Mycocalicium subtile* are more common and widespread than originally thought (USDA et al. 1993; USDA, USDI Species Review Panel 1999b; Appendix J2 in USDA, USDI 1994b). These species have broad global distributions (Tibell 1975). They occur in a wide range of habitats and stand ages (Tibell 1975; USDA, USDI Species Review Panel 1999b). They are found on a variety of substrates including bark, lignum, both hard and soft decorticate wood, snags, and conifer and deciduous trees; some occur on lumber and fence posts (USDA, USDI Species Review Panel 1999b). *Chaenotheca furfuracea* is widespread in distribution, but appears restricted to specific microsites, though these can occur in a wide variety of habitats and stand ages (USDA, USDI Species Review Panel 1999b).

Information on the distribution of these species has increased significantly since 1993. *Calicium glaucellum* occurs on both sides of the Cascades, and the known sites have increased from 5 to over 70. *Chaenotheca chrysocephala* occurs on both sides of the Cascades, and the known sites have increased from 1 to 28. *Chaenotheca brunneola* occurs on both sides of the Cascades, and the known sites have increased from 2 to over 70. *Cyphelium inquinans* occurs on both sides of the Cascades, and the known sites have increased from 4 to 79. *Chaenotheca ferruginea* is now considered widespread. It was suspected to occur in 1993 and is now known from 17 sites. *Mycocalicium subtile* was

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only suspected to occur in the Pacific Northwest in 1993, and now there are 32 known sites (USDA, USDI Species Review Panel 1999b). This species is the most commonly encountered pin lichen in the north Maine woods (Selva 1988). The known sites for *Chaenotheca furfuracea* have increased from 4 to 31 since 1993 (USDA, USDI Species Review Panel 1999b).

Calicium viride has a broad global distribution and is widespread in the Northwest Forest Plan area (Tibell 1975; USDA, USDI Species Review Panel 1999b). This species appears to be much more common than originally thought, and is noted as the most common pin lichen in forested habitats (USDA, USDI Species Review Panel 1999b). *Calicium viride* occurs on bark, lignum, decorticate stumps, snags, and branches of various types of conifer species. It is found primarily in late-successional and old-growth forests, although there are some sites in younger forests, especially in stands with late-successional legacy.

Stenocybe major occurs in North America and Europe (Tibell 1975). Limited survey effort has increased the number of known sites for this species from two to six in the Northwest Forest Plan area since 1993. It is reported from Oregon and Washington, but the relatively few records may be a function of limited surveys and the small size of this lichen. This species occurs on the bark of *Abies*. The four recent collections are from young trees less than 80-years old (USDA, USDI Species Review Panel 1999b). This species was observed on practically every specimen of cone-bearing age *Abies balsamea* in the north Maine woods (Selva 1988). Based on current information, this species does not appear to be closely associated with late-successional or old-growth forest (USDA, USDI Species Review Panel 1999b).

Environmental Consequences and Comparison of Alternatives - *Calicium adeaquatum, Calicium glaucellum, Chaenotheca chrysocephala, Chaenotheca brunneola, Chaenotheca ferruginea, Chaenotheca furfuracea, Cyphelium inquinans, Mycocalicium subtile, Calicium viride, Stenocybe major*

These 10 species of pin lichens were poorly known at the time of the FEMAT assessment and additional species analysis for the Northwest Forest Plan FSEIS (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). Under the No-Action Alternative, these species are in Category 4, which would require general regional surveys to acquire additional information and determine the necessary levels of protection.

In the action alternatives, these 10 pin lichens are proposed for removal from the Survey and Manage mitigation. *Calicium adeaquatum*, *Calicium glaucellum*, *Chaenotheca chrysocephala*, *Chaenotheca brunneola*, *Chaenotheca ferruginea*, *Chaenotheca furfuracea*, *Cyphelium inquinans*, *Mycocalicium subtile*, and *Calicium viride* have a widespread distribution and occur in a broad range of habitats. The number of known sites of these species has increased significantly since 1993, despite limited survey effort. Of the species listed above, *Calicium viride* is the only species still considered closely associated with late-successional old-growth forests, but this species is very common and occupies a broad range of habitats that are provided in the reserve land allocations (USDA, USDI Species Review Panel 1999b). The reserve land allocations, riparian buffers, and standards and guidelines (such as green tree and snag retention, prescriptions for coarse woody debris, and 15 percent retention of late-successional forest in watersheds) would all contribute to providing habitat well distributed for these species throughout their range.

Stenocybe major remains poorly known in the area of the Northwest Forest Plan, with only six reported sites (USDA, USDI Species Review Panel 1999b). This species may not be rare in the Northwest Forest Plan area, or the limited number of sites may be a function of limited survey efforts and the difficulty of surveying due to its very small size. Under the three action alternatives, this species is removed from Survey and

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Manage because it does not meet the criterion for close association with late-successional old-growth forests (USDA, USDI Species Review Panel 1999b). *Stenocybe major* is known to occur only on *Abies*, which are widespread in Pacific Northwest forests and provide well-distributed, potential habitat for this species. Under the No-Action Alternative, there would be no management of known sites of this species, but the general regional surveys could address uncertainties about the species rarity by acquiring additional information on species distribution, abundance, and habitat requirements.

Background and Affected Environment - *Lobaria hallii, L. oregana, L. pulmonaria, L. scrobiculata, Nephroma bellum, N. helveticum, N. laevigatum, N. parile, N. resupinatum, Pannaria leucostictoides, P. mediterranea, P. saubinetii, Peltigera collina, Pseudocyphellaria anomala, P. anthrapsis, P. crocata, Sticta fuliginosa, S. limbata, Collema nigrescens* (Oregon and California Klamath, and California Coast Provinces)

Concerns were expressed in the FEMAT analysis for many lichen species because of their sensitivity to air pollution (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). Of particular concern were the nitrogen-fixing lichens known to be among the most sensitive lichens to air pollution effects (Hawksworth and Hill 1984 in USDA et al. 1993). Therefore, the main concern for this group of species was not their rarity, but potential air pollution effects over the 100 year time-frame used in the assessment (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b).

Lobaria pulmonaria has a broad global distribution (Purvis *et al*. 1992) and is common and widespread in the Northwest Forest Plan area (USDA, USDI Species Review Panel 1999b). This species occurs in a variety of habitats and stand ages, in moist hardwood and conifer forests, and in riparian areas, ranging from low to mid-elevation (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). The number of known sites in the Interagency Species Management System database has increased from 87 in 1993 to almost 2,000. There are also many unreported sites as this is a common species and not routinely collected (USDA, USDI Species Review Panel 1999b).

Lobaria scrobiculata has a broad global distribution (Purvis *et al*. 1992), and is common and widespread in the Northwest Forest Plan area (USDA, USDI Species Review Panel 1999b). This species occurs in a variety of habitats and stand ages. It is most frequent in low-elevation hardwood forests, swamps, and savannahs west of the Cascades, but is also found in low- to mid-elevation late-successional and old-growth conifer forests. East of the Cascades, it occurs on sheltered mossy outcrops areas, often near water (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). The number of known sites for this species in the Northwest Forest Plan area has increased from 32 to 205 since 1993, with many unreported sites. This species is common and widespread and does not appear to be closely associated with late-successional or old-growth forests (USDA, USDI Species Review Panel 1999b).

Nephroma bellum, N. helveticum, N. laevigatum, N. parile and *N. resupinatum* have broad global distributions (Purvis *et al*. 1992) and are well distributed west of the Cascades (USDA, USDI Species Review Panel 1999b). *Nephroma parile* is more common east of the Cascades than the other *Nephroma* species (McCune and Geiser 1997). Since 1993, the number of documented known sites in the Northwest Forest Plan area has increased significantly for these species: *Nephroma bellum* has increased from 13 to 123, *N. helveticum* from 36 to 326, *N. laevigatum* from 28 to 129, *N. parile* from 14 to 73, and *N. resupinatum* from 25 to 1,156. There are additional unreported sites for these species (USDA, USDI Species Review Panel 1999b). These species are widespread and occur in various habitats and stand ages, on trees, shrubs, and mossy rocks in moist hardwood and conifer forests, and riparian areas from low- to mid-elevation, mainly west of the Cascades (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b).

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Nephroma laevigatum, *N. parile* and *N. resupinatum* occur most frequently on hardwoods (USDA, USDI Species Review Panel 1999b). *Nephroma parile* may also occur in drier habitats than the other *Nephroma* species mentioned here.

Pannaria mediterranea, *P. saubinetii* and *Peltigera collina* have broad global distributions (Purvis *et al*. 1992). *Pannaria leucostictoides* is endemic to western North America, from Alaska to California (Noble 1982, Goward et al. 1994, McCune and Geiser 1997). These species are widespread and occur in various habitats and stand ages, on trees (mainly hardwoods), shrubs, and mossy rocks in moist hardwood and conifer forests, and riparian areas from low- to mid-elevation, mainly west of the Cascades (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). *Peltigera collina* ranges from low elevations up into the subalpine (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). Since 1993, the number of documented known sites in the Northwest Forest Plan area has increased significantly for these species: *Peltigera collina* from 42 to 564, *Pannaria saubinetii* from 12 to 84, and *Pannaria leucostictoides* from 12 to 69. *Pannaria mediterranea* is a minute and inconspicuous species, and therefore difficult to survey, and yet its known sites have increased from 2 to 16 since 1993. There are additional unreported sites for these species (USDA, USDI Species Review Panel 1999b).

Pseudocyphellaria anomala and *Pseudocyphellaria anthrapsis* are endemic to western North America (Noble 1982). These are common and widespread species, and they occur in various habitats and stand ages (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). These species occur on trees (mostly hardwoods), shrubs, and occasionally mossy rocks in low- to mid-elevation moist hardwood and conifer forests, and riparian areas, to somewhat open sites, mainly west of the Cascades (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). Since 1993, the number of documented known sites in the Northwest Forest Plan area has increased significantly for these species: *Pseudocyphellaria anomala* from 52 to 939, and *Pseudocyphellaria anthrapsis* from 68 to 1,807. There are additional unreported sites for both species (USDA, USDI Species Review Panel 1999b).

Pseudocyphellaria crocata, *Sticta fuliginosa* and *Sticta limbata* have broad global distributions (Purvis *et al*. 1992). These are common and widespread species, occurring in various habitats and stand ages. These species are found on trees (mainly hardwoods) and shrubs in low- to mid-elevation moist hardwood and conifer forests and riparian areas, to somewhat open sites, valley bottoms, ash swamps, and oak savanna, mainly west of the Cascades (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). Since 1993, the number of documented known sites in the Northwest Forest Plan area has increased significantly for these species: *Pseudocyphellaria crocata* from 26 to 192, *Sticta fuliginosa* from 39 to 255, and *Sticta limbata* from 19 to 160. There are additional unreported sites for these species (USDA, USDI Species Review Panel 1999b).

Collema nigrescens has a broad global distribution and occurs in western North America from Alaska to California (Purvis et al. 1992, McCune and Geiser 1997). Based on the current data in the Interagency Species Management System database, this species is well distributed in southern Oregon and northern California. There are relatively few reported locations farther north in Oregon and Washington. The number of documented sites in the Northwest Forest Plan area has gone from 7 to 475 since 1993, with additional unreported locations. The majority of sites are on federally managed land, and many are in reserve land allocations (USDA, USDI Species Review Panel 1999b). *Collema nigrescens* occurs primarily on deciduous trees and shrubs, and occasionally on mossy rock, mainly west of the Cascades (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). It occurs in a fairly wide range of habitat conditions and stand ages, especially in moist or riparian forests.

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Lobaria oregana is endemic to western North America (Goward et al., 1994, McCune and Geiser 1997). The number of known sites for this species in the Northwest Forest Plan area has increased from 57 to 478 since 1993, with many additional unreported sites (USDA, USDI Species Review Panel 1999b, Mt. Baker-Snoqualmie National Forest Ecology Program data files). *Lobaria oregana* is widespread on trees (mainly conifers) and shrubs in low- to mid-elevation mesic to moist hardwood and conifer forests, and riparian areas, west of the Cascade crest. It is most abundant in low to mid-elevation late-successional or old-growth forests (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b).

Lobaria hallii is known to occur in North America, Scandinavia and Eurasia (USDA, USDI 1999a). Unlike the other nitrogen-fixing lichens previously discussed, *Lobaria hallii* was one of six species included in the Rare Nitrogen-fixing group for the FEMAT analysis. (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). Current information indicates that *Lobaria hallii* is not rare like other species in this group. This species is well distributed in the Northwest Forest Plan area (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). The number of known sites has increased from 51 to 208 since 1993, with additional unreported sites (USDA, USDI Species Review Panel 1999b). *Lobaria hallii* has a broad ecological amplitude, and has been documented in a variety of habitats and on various substrates (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). It is found in a range of habitats from wetlands, swales, riparian areas, orchards, meadows, and low-elevation forests, to dry upland forests and ridgetops, oak savannahs and rocky balds. It occurs in wet to dry sites, from low elevation to over 5,000 feet elevation (USDA, USDI 1999a). This species is widespread in various stand ages and successional stages, and does not appear to be closely associated with late-successional old-growth forests (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). *Lobaria hallii* becomes more restricted on the east sides of the Cascades where it is found mainly on black cottonwood in riparian areas (McCune and Geiser 1997; USDA, USDI 1999a).

Environmental Consequences and Comparison of Alternatives - *Lobaria hallii, L. oregana, L. pulmonaria, L. scrobiculata, Nephroma bellum, N. helveticum, N. laevigatum, N. parile, N. resupinatum, Pannaria leucostictoides, P. mediterranea, P. saubinetii, Peltigera collina, Pseudocyphellaria anomala, P. anthrapsis, P. crocata, Sticta fuliginosa, S. limbata, Collema nigrescens* (Oregon and California Klamath, and California Coast Provinces)

Under the No-Action Alternative, all of these species (except *Lobaria hallii*) are in Category 4, and general regional surveys would be required. In the No-Action Alternative, *Lobaria hallii* is in Categories 1 and 3, where all current and future known sites would be managed, and extensive surveys would be required to determine high-priority sites for management.

All three action alternatives would remove these nitrogen-fixing lichens (18 species and the southern part of the range of *Collema nigrescens*) from the Survey and Manage Standards and Guidelines. These species no longer meet the basic criteria for inclusion in the Survey and Manage Standards and Guidelines because the Northwest Forest Plan provides for reasonable assurance of persistence as indicated by their widespread distribution, abundance, and the availability of potential habitat in reserve land allocations (USDA, USDI Species Review Panel 1999b). Also, several of these species do not meet the criterion of close association with late-successional old-growth forests (*Lobaria scrobiculata, Lobaria hallii, Nephroma parile, Nephroma resupinatum, Pannaria leucostictoides, Pannaria mediterranea, Peltigera collina*) (USDA, USDI Species Review Panel 1999b). The main concern for this group of species was not their rarity, but potential air pollution effects over the 100-year time-frame used in the FEMAT assessment (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b). Air quality is managed outside of the Northwest Forest Plan under the direction of other

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laws and regulations, such as the Clean Air Act.

Under the No-Action Alternative, general regional surveys (Category 4) would be required for all of these species, except *Lobaria hallii*. These regional surveys would provide additional information on the distribution of these species, although it is already documented that these species have well-distributed populations within the Northwest Forest Plan area (USDA, USDI Species Review Panel 1999b). The original concerns for these species were based on potential air pollution effects (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b). The mitigation under the No-Action Alternative would not address these concerns. The reserve land allocations provided by the Northwest Forest Plan and other standards and guidelines provide habitat for populations of these species to be stable and well distributed throughout their ranges.

Lobaria hallii would receive greater protection under the No-Action Alternative, including management of known sites. However, current information shows that *Lobaria hallii* is not as rare as indicated during previous assessments (USDA et al. 1993; USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b). This species is well distributed in the Northwest Forest Plan area (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). The increase in our knowledge of its abundance and distribution and its broad ecological amplitude, in combination with the availability of potential habitat in the reserves, has greatly reduced the level of concern for this species. The reserve land allocations in the Northwest Forest Plan (including riparian reserves, and other standards and guidelines of the Plan) provide habitat well distributed throughout this species range.

Background and Affected Environment - *Loxosporopsis corallifera*

Loxosporopsis corallifera is endemic to western North America and ranges from Alaska to California. It may be locally common in the Northwest Forest Plan area, particularly in the Oregon Coast Range and along the central Oregon Coast. The number of known sites for this species in the Northwest Forest Plan area has increased from 1 to over 30 since 1993, with numerous additional unreported sites (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). The majority of documented sites on federally managed land are in reserve areas (USDA, USDI Species Review Panel 1999b). *Loxosporopsis corallifera* is widespread and occurs in various habitats and stand ages, including riparian areas and coastal dune wetlands (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). It is found on both conifer and deciduous trees and shrubs, snags, and stumps in low- to mid-elevation moist hardwood and conifer forests and shrublands from the immediate coast to the Cascades (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b).

Information acquired since 1993 indicates *Loxosporopsis corallifera* is more widespread and common than previously thought (USDA et al. 1993; USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b). In addition, habitat data indicates this species is not closely associated with late-successional old-growth forests (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b)

Environmental Consequences and Comparison of Alternatives - *Loxosporopsis corallifera*

In the No-Action Alternative, *Loxosporopsis corallifera* is in Categories 1 and 3, which require management of all current and future known sites and extensive surveys. In the three action alternatives, *Loxosporopsis corallifera* is proposed for removal from the Survey and Manage Standards and Guidelines, because it is not closely associated with late-successional old-growth forests.

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Loxosporopsis corallifera may be locally common in the Oregon Coast Range or along the Oregon Coast. There may be persistence concerns for this species in other parts of its range, given its spotty distribution. The spotty distribution may be a function of limited surveys in suitable habitat in portions of its range outside of the Oregon Coast Range. *Loxosporopsis corallifera* would receive greater protection under the No-Action Alternative with management of known sites and extensive surveys. However, current information indicates that *Loxosporopsis corallifera* is not as rare as previously thought, since a number of sites and a more widespread distribution have been documented since 1993 (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b; USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). Removal of *Loxosporopsis corallifera* from Survey and Manage would not ensure protection of known sites if they occur outside of reserve land allocations, nor would additional known sites be discovered through extensive surveys. This loss of known sites may increase the risk of not maintaining stable, well-distributed populations. There is little concern for this species in the Oregon Coast range where it is common, widespread, and abundant. Given the lack of information on the distribution and abundance of this species outside of the Oregon Coast Range, the impact of the potential loss of sites in this area is unknown. Since this species would not protected under the Northwest Forest Plan area because it is not late-successional old-growth associated, it may be evaluated for inclusion in the Agencies sensitive species programs.

Background and Affected Environment - *Usnea longissima*

Usnea longissima was one of nine species included in the Riparian Lichens group for the FEMAT analysis (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). *Usnea longissma* is known to occur in western North America from Alaska to California, and in Europe. The number of known sites for this species in the Northwest Forest Plan area has increased from 27 to 203 since 1993, with numerous additional unreported sites (Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b). This species is found on both conifer and deciduous trees in somewhat open, moist hardwood and conifer forests, and riparian areas from low to mid-elevation, west of the Cascade crest (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). The majority of the documented sites on federally managed land are in reserve land allocations. This species is widespread and may be locally abundant. It occurs in various habitats and stand ages, especially riparian and wetland communities (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). Concern was expressed for *Usnea longissima* during the lichen viability panel of FEMAT due to declines of this species in Europe, air quality concerns, commercial harvesting of secondary forest products, and cumulative effects on nonfederal land (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b).

Environmental Consequences and Comparison of Alternatives - *Usnea longissima*

Usnea longissima is in Category 4 under the No-Action Alternative, where general regional surveys are required. It is proposed for removal from the Survey and Manage Standards and Guidelines under the three action alternatives because it is provided for by the Northwest Forest Plan reserve land allocations and Aquatic Conservation Strategy.

Usnea longissima would receive greater management under the No-Action Alternative, which provides for general regional surveys. Although these regional surveys would provide additional information on distribution of this species, the species is already documented to have well-distributed populations within the Northwest Forest Plan area (USDA, USDI Species Review Panel 1999b). The original concerns for *Usnea longissima* were based on declines of this species in Europe, air quality concerns, commercial harvesting of secondary forest products, and cumulative effects on nonfederal land

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(USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). The mitigation under the No-Action Alternative would not address these concerns, which are beyond the scope of the Northwest Forest Plan and under the direction of other laws and regulations, such as the Clean Air Act.

The Northwest Forest Plan provides a reasonable assurance that habitat would be well distributed on federally managed lands throughout the species range. While the widespread distribution of *Usnea longissima* is somewhat fragmented, partially due to naturally fragmented distribution of suitable habitat (riparian forests and wetland communities) (USDA, USDI Species Review Panel 1999b), riparian buffers, reserve land allocations, and green tree retention should provide for well-distributed populations on suitable habitat on federally managed lands throughout the Northwest Forest Plan area. The increased knowledge of its abundance and distribution, in combination with the availability of potential habitat in the reserves, has reduced the level of concern for this species on federally managed lands (USDA, USDI Species Review Panel 1999b).

Background and Affected Environment - *Bryoria tortuosa* (east of the Cascade Crest), *Tholurna dissimilis* (north of the Columbia River), *Hypogymnia oceanica*, and *Hydrothyria venosa*

Bryoria tortuosa is known to be locally abundant in the dry forest zones of eastern Oregon and Washington, especially the Ponderosa Pine and Douglas-fir Zones. It is more common and abundant in the drier climatic areas of the Pacific Northwest. It grows on trees in well-lit, open stands, most frequently on oaks and pines, although it has been collected on a large variety of trees and shrubs (Brodo and Hawksworth 1977). It occurs in forests with frequent, natural, low-intensity fires, with many known sites on the east side showing evidence of past fire events, including scarring of trees that now show large populations of the species (USDA, USDI 1999a). During the FEMAT analysis, concern was expressed for this species because it was only known from three locations in the Northwest Forest Plan area (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). More than 100 collections are reported for this species now, with the majority of sites east of the Cascade crest (USDA, USDI Species Review Panel 1999b).

Tholurna dissimilis is known from North America and Scandinavia. In the Northwest Forest Plan area, this species is known from Washington, south into Oregon where it reaches its southern extent in the central Oregon Cascades (USDA, USDI 1999a). In the Pacific Northwest, it occurs on krummholz or flag-form subalpine fir and Engelmann spruce on windswept ridges in the upper montane and subalpine zones up to timberline (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). It has also been found on the dead tops of Douglas-fir trees at the Wind River Canopy Crane site at 1,100 feet in elevation. One site (no longer extant) was on an ornamental birch tree less than 20 years old. The species ranges from near sea level to 6,700 feet. This species may not be closely associated with late-successional or old-growth forests. The number of known sites in the Northwest Forest Plan area has increased from 9 to 21 (USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b) since 1993. Eighteen of these sites are in Washington. All known sites but one are on federally managed land. The majority of known sites in Washington are in reserve land allocations (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b).

Hydrothryia venosa is known from the mountains of western North America and the Appalachians in eastern North America. *Hydrothryia venosa* is an aquatic lichen and grows on rock, and occasionally wood, in small, clear, cold streams and springs (McCune and Geiser 1997; USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). *Hydrothryia venosa* may not be closely associated with late-successional old-growth forests. It spans a broad elevational range (1,150 to 7,000 feet) in the mountains from Washington to California. The number of known sites in the Northwest Forest Plan area has increased from 21, to 92 since 1993, with additional unreported locations

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(Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b). All documented known sites on federally managed land are in Riparian Reserves, and more than 30 of these sites also occur in Congressionally Withdrawn Areas or Late-Successional Reserves (USDA, USDI Species Review Panel 1999b).

Hypogymnia oceanica is a Pacific Northwest endemic, ranging from Alaska to central Oregon. It occurs primarily in moist conifer forests, on the immediate coast on shorepine and Sitka spruce, and in low- to mid-elevation forests in the western Cascades (McCune and Geiser 1997; USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). The number of known sites for this species in the Northwest Forest Plan area has increased from 1 (Appendix J2 in USDA, USDI 1994b) to 91 since 1993, with numerous additional unreported sites (USDA, USDI Species Review Panel 1999b). About half of the documented sites are in reserve areas. *Hypogymnia oceanica* was 1 of 12 species included in the Rare Oceanic Influenced Lichens group. This species was thought to be very rare and limited in distribution to the immediate coast, with only one known site. It is now known to be more widespread geographically and with many more populations than previously thought (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b).

Environmental Consequences and Comparison of Alternatives - *Bryoria tortuosa* (east of the Cascade Crest), *Tholurna dissimilis* (north of the Columbia River), *Hypogymnia oceanica*, and *Hydrothyria venosa*

Bryoria tortuosa (east of the Cascade Crest), *Tholurna dissimilis* (north of the Columbia River), *Hypogymnia oceanica*, and *Hydrothyria venosa* are in Categories 1 and 3 in the No-Action Alternative. Under the No-Action Alternative, all current and future known sites would be managed, and extensive surveys would be required to determine high-priority sites for management. These species are proposed for removal from the Survey and Manage Standards and Guidelines under the three action alternatives because the reserve land allocations, Aquatic Conservation Strategy, and other standards and guidelines of the Northwest Forest Plan provide for a reasonable assurance of stable, well-distributed populations for *Hypogymnia oceanica* and *Hydrothyria venosa* throughout their ranges in the Northwest Forest Plan area, and for the portions of their ranges indicated above for *Bryoria tortuosa* and *Tholurna dissimilis*. These species would receive greater protection under the No-Action Alternative, with the management of known sites and extensive surveys, compared to the action alternatives. However, these species are more common or widespread than originally thought during the FEMAT viability analyses (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b).

Bryoria tortuosa would receive greater protection under the No-Action Alternative than the action alternatives. However, the increase in number of known sites for *Bryoria tortuosa* east of the Cascade Crest has greatly increased the likelihood of stable, well-distributed populations for this species in this part of the Northwest Forest Plan area. It is widespread and abundant in the dry forest types east of the Cascade crest, and occurs in open stands and in sites with periodic fire disturbance. The reserve land allocations, and standards and guidelines such as green tree retention, would likely provide habitat for *Bryoria tortuosa* well distributed throughout its range east of the Cascade Crest.

Tholurna dissimilis (north of the Columbia River) would receive greater protection under the No-Action Alternative than the action alternatives. However, the increase in the number of known sites, and the increase in our knowledge of the habitat where this species occurs has increased the likelihood that the Northwest Forest Plan will provide for well-distributed populations of this species north of the Columbia River. The habitat this species occupies at timberline is typically not subject to management that would impact populations, and the majority of this habitat is in Congressionally Withdrawn Areas in Washington. The recent discovery of a population in dead tops of old-growth Douglas-fir indicates a broader distribution than originally thought. Its position in the

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crowns of trees and on the landscape indicates that *Tholurna dissimilis* tolerates exposed habitats. The reserve land allocations, and standards and guidelines of the Northwest Forest Plan such as green tree retention and 15 percent retention of late-successional stands in watersheds, would likely provide habitat for *Tholurna dissimilis* throughout its range in Washington.

Hydrothyria venosa would receive greater protection under the No-Action Alternative than the action alternatives. However, the increase in the number of known sites, and in its known distribution, has increased the likelihood that the Northwest Forest Plan maintain the naturally patchy distribution of this species. As an aquatic species, the Aquatic Conservation Strategy, as well as other reserve land allocations and standards and guidelines of the Northwest Forest Plan should provide habitat for *Hydrothyria venosa* well distributed throughout its range.

Hypogymnia oceanica would receive greater protection under the No-Action Alternative than the action alternatives. However, the increase in the number of known sites (from one to 91 since 1993), increase in its known distribution (strictly coastal to numerous Cascade populations), and occurrence in a broader range of habitats have increased the likelihood that the Northwest Forest Plan will provide for stable, well-distributed populations. The reserve land allocations, and standards and guidelines of the Northwest Forest Plan, such as green tree retention and 15 percent retention of late-successional stands in watersheds, should provide habitat for *Hypogymnia oceanica* well distributed throughout its range in the Northwest Forest Plan area.

Background and Affected Environment - *Calicium adspersum, Cetrelia cetrarioides, Chaenotheca subroscida, Chaenothecopsis pusilla, Collema nigrescens* (range except Oregon and California Klamath and California Coast Range Provinces), *Leptogium saturninum, Microcalicium arenarium, Peltigera neckeri, Peltigera pacifica* and *Sticta beauvoisii*

There was no substantial new information to change the management for these species between the No Action and the three action alternatives. For some of these species, there is very little information available and there is uncertainty as to whether they meet the basic criteria for the Survey and Manage Standards and Guidelines (such as, does the reserve system and other standard and guidelines of the Northwest Forest Plan provide a reasonable assurance for their persistence, and are these species closely associated with late-successional old-growth forests?).

Four of these species are pin lichens and are poorly known in the Pacific Northwest. Very little is known about the distribution, habitat and abundance of *Calicium adspersum*, *Chaenotheca subroscida*, *Chaenothecopsis pusilla*, and *Microcalicium arenarium* in the area of the Northwest Forest Plan. They may not be closely associated with late-successional old-growth forests. They were included in the Pin Lichen Group for the FEMAT analysis (USDA et al. 1993). The pin lichens were rated as having a low likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well-distributed across federally managed lands, in part because so little was known about these species (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b).

Cetrelia cetrarioides, Leptogium saturninum, Peltigera neckeri, and *Peltigera pacifica* occur primarily in riparian forests and hardwood stands, but also in moist forests at low to mid-elevation (McCune and Geiser 1997), and in a range of stand ages (USDA, USDI Species Review Panel 1999b). These species are widespread in the Northwest Forest Plan area west of the Cascade crest (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). The number of known sites has increased for these species, and there are additional unreported locations (USDA, USDI Species Review Panel 1999b). These species may not be closely associated with late-successional old-growth forests.

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Sticta beauvoisii is very poorly known in the area of the Northwest Forest Plan in terms of distribution, habitat and populations. There is no new information on this species, and insufficient information was available to evaluate what management actions are necessary to provide for its persistence. It may not occur in the Northwest Forest Plan area.

There are relatively few reported locations for *Collema nigrescens* from north of the Oregon Klamath Province through Washington. *Collema nigrescens* has been found on bark and wood from mainly deciduous trees and shrubs, and occasionally on mossy rock, primarily west of the Cascades (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). It occurs in low elevation hardwood forests, mostly in riparian areas (McCune and Geiser 1997). This species may not be closely associated with late-successional old-growth forests (USDA, USDI Species Review Panel 1999b).

Environmental Consequences and Comparison of Alternatives - *Calicium adspersum, Cetrelia cetrarioides, Chaenotheca subroscida, Chaenothecopsis pusilla, Collema nigrescens* (range except Oregon and California Klamath and California Coast Range Provinces), *Leptogium saturninum, Microcalicium arenarium, Peltigera neckeri, Peltigera pacifica* and *Sticta beauvoisii*

Under the No-Action Alternative these species are in Category 4, and general regional surveys would be required. In the three action alternatives, the status of these species is undetermined, that is, there is uncertainty regarding concerns for maintaining well-distributed populations, and whether the species meet the basic criteria for Survey and Manage. Under Alternative 1, they are in Category 1F, where strategic surveys would be conducted to determine if these species meet the basic criteria for inclusion in the Survey and Manage Standards and Guidelines. Under Alternative 2, these species are in Category 2D, where all sites known as of September 30, 1999, would be managed, and strategic surveys would be conducted for 5 years. Based on strategic survey information, these species would be: (1) considered for inclusion in the sensitive species programs of the Agencies, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed. Under Alternative 3, these species are in Category 3C. Under this category, all current and future known sites would be managed, and strategic surveys would be conducted to determine if these species meet the basic criteria for inclusion in the Survey and Manage Standards and Guidelines.

In the FEMAT analysis, *Calicium adspersum, Chaenotheca subroscida, Chaenothecopsis pusilla,* and *Sticta beauvoisii* were anticipated to benefit from the protection of old-growth stands in landscape areas where little late-successional forest exists (USDA, USDI 1994b, p. C-44). If the oldest stands (greater than 200-years old) are not selected for protection in landscape areas where little late-successional forest exists, this could result in loss of undiscovered populations, and decrease the likelihood of maintaining stable, well-distributed populations in the Northwest Forest Plan area. Instructions for the implementation of the 15 percent retention are contained in the September 14, 1998, Instruction Memorandum (USDA, USDI 1998h, 16 pp.). Under these conditions, the Survey and Manage mitigation would become more important for these species.

Known site management varies for these species under the different alternatives. Alternative 3 clearly provides the greatest protection for sites of these species, as all current and new known sites would be managed. There is no site management requirement under the No-Action Alternative and Alternative 1. Under Alternative 1, known sites would receive no protection while strategic would determine what management is necessary for these species to provide for stable, well-distributed stable populations. Risk to the species may be increased if it is later determined that these sites were important for maintaining stable, well-distributed populations of these species. Due to the limited information available on this species, this risk to these species is uncertain, though probably is not high.

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Under Alternative 2, only the sites known as of September 30, 1999, would be managed. This may result in loss of known sites that may be important to maintain stable, well-distributed populations of these species throughout their range. After 5 years, these species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed.

Under all alternatives, there would be indirect protection of populations for those species that are associated primarily with riparian forests (*e.g., Cetrelia cetrarioides, Leptogium saturninum, Peltigera neckeri, Peltigera pacifica* and *Collema nigrescens*). A portion of their populations may be provided for by the reserve land allocations, particularly riparian buffers, and the Aquatic Conservation Strategy, even under alternatives where there is no protection of known sites. In addition, there would also be indirect protection for populations of all species where they occur in other reserve land allocations outside of riparian areas. However, the level of contribution of populations in the Riparian Reserves and other reserve allocations to providing for well-distributed populations of these species throughout the Northwest Forest Plan area is unknown.

Strategic surveys would be required for these species under the three action alternatives, and as general regional surveys under the No-Action Alternative. Under Alternative 2, however, these surveys would only occur for 5 years. These surveys would provide information regarding the distribution, habitat requirements, and expected populations of these species throughout the Northwest Forest Plan area. Information from these surveys would help determine if the reserve land allocations provides for these species, and what the appropriate management is to maintain stable, well-distributed populations. Strategic surveys would be effective in gathering information about these species, as they can focus in areas with a high likelihood of locating the species. Strategic surveys could provide the information necessary to determine the appropriate mitigation to address concerns for these species throughout their ranges.

Under Alternative 2, strategic surveys would also address whether the species should be considered for management under the agencies' sensitive species programs. The time limitation of 5 years on strategic surveys under Alternative 2 would limit the amount of information that can be acquired for these species, and could make it difficult to determine the appropriate mitigation measures necessary to provide for well-distributed populations of *Calicium adspersum, Chaenotheca subroscida, Chaenothecopsis pusilla, Microcalicium arenarium,* and *Sticta beauvoisii*. These species are very poorly known, with little information on habitat or range, and are extremely difficult to find due to their minute and cryptic nature. Therefore, it is unlikely that enough sites would be found in 5 years of surveys to answer questions on distribution, habitat, populations, and protection under the Northwest Forest Plan.

Background and Affected Environment - *Kaernefeltia californica*

Kaernefeltia californica (referred to as *Cetraria californica* in FEMAT, Appendix J2, USDA, USDI 1999b) is endemic to the west coast of North America, known from Alaska south to central California (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). It occurs along the immediate coast in most of its range (USDA, USDI 1999a). This species is most common in the scrubby shorepine forests in coastal dunes, and also occurs on the edges of Sitka spruce forests (McCune and Geiser 1997; USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b). It grows on bark, twigs, and cones of conifers, and on wooden fence posts and other structures (USDA, USDI 1999a). The number of known sites for this species in the Northwest Forest Plan area has increased from 17 to 56 since 1993, with about 10 known sites on federally managed land (USDA, USDI

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1999a; USDA, USDI Species Review Panel 1999b). *Kaernefeltia californica* may not be closely associated with late-successional forest/old-growth forests (USDA, USDI Species Review Panel 1999b).

Environmental Consequences and Comparison of Alternatives - *Kaernefeltia californica*

Kaernefeltia californica (syn. *Cetraria californica*) is in Categories 1 and 3 in the No-Action Alternative. Under Categories 1 and 3, all current and future known sites would be managed, extensive surveys would be required, and high-priority sites would be selected for management. Current information indicates this species is more common than previously thought (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b), although its distribution is limited to a narrow coastal band. Given its occurrence in young stands and on wooden fences, this species may not be closely associated with late-successional old-growth forests.

In the three action alternatives, the status of *Kaernefeltia californica* is undetermined, that is, there is uncertainty if the species meets the basic criteria for Survey and Manage (*i.e.*, it is closely associated with late-successional old-growth forests and are there concerns for species persistence). Under Alternative 1, it is in Category 1F, where strategic surveys would be conducted to determine if this species meets the basic criteria of Survey and Manage. Under Alternative 2, this species is in Category 2D, where all sites known as of September 30, 1999, would be managed, and strategic surveys would be conducted for 5 years. Based on strategic survey information, *Kaernefeltia californica* would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed. Under Alternative 3, *Kaernefeltia californica* is in Category 3C. Under Category 3C, all current and future known sites would be managed, and strategic surveys would be conducted to determine if this species meets the basic criteria to be included in Survey and Manage.

Kaernefeltia californica would receive the greatest protection under the No-Action Alternative and Alternative 3, where all current and future known sites would be managed, and strategic or extensive surveys would be required. However, many of the known sites occur on nonfederal land, where known site protection and survey requirements would not apply.

Alternative 1 would require strategic surveys for this species to determine its status and whether the Northwest Forest Plan provides for species persistence, but would not require management of known sites. There were moderate concerns for persistence of this species with a total of 56 known sites (USDA, USDI Species Review Panel 1999b; USDA, USDI Species Review Panel 1999c) although most of these sites do not occur on federally managed land, or in reserve land allocations. Risk to the species may be increased if it is later determined that these sites on federally managed lands are necessary for maintaining stable well-distribution populations. Due to the limited information available on this species, the to the species risk of not protection known sites is uncertain, though probably would not be high. Recreational development may threaten sites where this species occurs on nonfederal land. This species may be common to abundant where it occurs, and it is unlikely that much timber harvest would occur in its coastal shorepine habitat. Therefore, the risk of losing important sites would be moderate and very localized.

Under Alternative 2, only the sites known as of September 30, 1999, would be managed. This may result in loss of future sites that are necessary to maintain stable, well-distributed populations of *Kaernefeltia californica* throughout its range. The risk of losing important sites would be moderate and very localized because this species may be

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common to abundant where it occurs, and it is unlikely that timber harvest would occur in its coastal shorepine habitat. After 5 years, this species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed. programs.

Strategic surveys would be required for *Kaernefeltia californica* under the three action alternatives, and extensive surveys would be required under the No-Action Alternative. These surveys would provide information regarding the distribution, habitat requirements and expected populations of this species throughout the Northwest Forest Plan area. Information from these surveys would help determine if this species is closely associated with late-successional old-growth forests, if the reserve land allocations provide for this species, and what the appropriate management would be to maintain stable, well-distributed populations. Strategic surveys would be effective in gathering information about this species, as they can focus in areas with a high likelihood of locating the species, and provide information that can assist in management of the species. Strategic surveys could provide the information necessary to determine the appropriate mitigation to address concerns for *Kaernefeltia californica* throughout its range.

Background and Affected Environment - *Cladonia norvegica, Heterodermia sitchensis, Hypogymnia vittata, Hypotrachyna revoluta, Nephroma isidiosum, Ramalina pollinaria*

These six species were not rated by the FEMAT lichen panel because of insufficient information (USDA et al. 1993), and outcomes under the different alternatives could not be assessed. They were included in the Survey and Manage Standards and Guidelines because of persistence concerns since they were thought to be quite rare (Appendix J2 in USDA, USDI 1994b). Still very little is known about these species, and their status in the Northwest Forest Plan area is undetermined. Little is known of these species distribution, habitat or populations in the Northwest Forest Plan area. In addition, they may not be closely associated with late-successional old-growth forests.

Cladonia norvegica is known to occur in western North America from Alaska to Oregon, in Great Britain and Europe. The number of known sites has increased from 2 to 17 since 1993, with additional unreported sites in the Northwest Forest Plan area. Ten of the 17 sites occur in Late-Successional Reserves (USDA, USDI Species Review Panel 1999b). This species is noted as occurring on rotten wood and tree bases (McCune and Geiser 1997).

Heterodermia sitchensis, Hypogymnia vittata and *Nephroma isidiosum* have not been documented in the area of the Northwest Forest Plan, and they are poorly known in this area. They are known to occur in British Columbia, and it is suspected that suitable habitat may exist in the Northwest Forest Plan area (USDA, USDI Species Review Panel 1999b).

Hypotrachyna revoluta has a broad global distribution, and is reported to occur in western North America from coastal Alaska to California (Purvis *et al*., 1992, McCune and Geiser 1997). There is only one documented site for this species in the Northwest Forest Plan area, but land ownership is unknown.

Ramalina pollinaria is reported to occur in western North America from the Cascades to the Rockies (McCune and Geiser 1997), and along the coast in California and Oregon (USDA, USDI Species Review Panel 1999b); it is also known in Great Britain, Europe and Scandinavia (Purvis *et al*. 1992). There are 12 documented sites for this species in the Northwest Forest Plan area, most on nonfederal land, with four reported since 1993 (USDA, USDI Species Review Panel 1999b). In the Northwest Forest Plan area, this

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species is reported to occur on bark and wood, often in low elevation swamps with spruce (McCune and Geiser 1997).

Environmental Consequences and Comparison of Alternatives - *Cladonia norvegica, Heterodermia sitchensis, Hypogymnia vittata, Hypotrachyna revoluta, Nephroma isidiosum, Ramalina pollinaria*

Information regarding distribution, abundance, habitat and persistence concerns is limited for these lichen species. Under the No-Action Alternative, these species are in Category 3 where extensive surveys would be required to find high-priority sites for management, although no specific site management is prescribed under Category 3.

The status of these species is undetermined under the three action alternatives, because they are not known to occur in the Northwest Forest Plan area, are not known to be closely associated with late-successional old-growth forests, or there is uncertainty regarding concerns for their persistence. In Alternative 1 these species are in Category 1E, and in Alternative 2 they are in Category 2C. The mitigation is identical under Alternatives 1 and 2, where strategic surveys would be conducted to determine if these species meet the basic criteria for Survey and Manage. All current and future known sites would be managed until strategic surveys can determine if the species meets the basic criteria for Survey and Manage. Alternative 3 provides the greatest protection for these species. In Alternative 3, these species are in Category 3A, where all current and future known sites would be managed with a 250-meter buffer. Equivalent-effort surveys would be conducted before habitat-disturbing activities, with the objective to find occupied sites and minimize the inadvertent loss of undiscovered sites. Strategic surveys would be conducted to address species information and management needs.

Management of known sites for these species would be required under the three action alternatives. If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for these species, then more area would be protected around known sites under Alternative 3 than under Alternatives 1 and 2 because a 250-meter buffer is prescribed for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger, or more stable populations over time. However, if the species is thought to require interior microclimate, there would be little difference between site management under the action alternatives. The area necessary to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer).

In all action alternatives, management of known sites would help maintain the current distribution of populations. *Heterodermia sitchensis, Hypogymnia vittata* and *Nephroma isidiosum* are not currently known from the Northwest Forest Plan area. *Cladonia norvegica, Hypotrachyna revoluta, and Ramalina pollinaria* occur in very limited distributions with few sites. Therefore, management of currently known sites for these species would not, by itself, provide for a stable, well-distributed populations in the Northwest Forest Plan area. There would be no management of known sites under the No-Action Alternative. The risk to the species would be increased under this alternative, because sites may be lost that could be important in providing for stable, well-distributed populations.

Surveys prior to habitat-disturbing activities would be required for these species under Alternative 3. However, because these surveys would be conducted relative to project locations and not in the most likely habitat, these surveys would likely provide only limited additional information for management. Sites discovered as a result of pre-disturbance surveys would be managed and would contribute to maintaining the current distribution of populations of the species. There is some risk of loss of sites under Alternatives 1 and 2, because surveys prior to habitat-disturbing activities would

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not be conducted. Because the current known sites of these species are limited in distribution, any new sites could be important to maintenance of these species in stable, well-distributed populations across their range in the Northwest Forest Plan area. However, given that these species are extremely rare, it is unlikely that many new sites would be found with pre-disturbance surveys.

Strategic surveys would be required under the three action alternatives, and extensive surveys under the No-Action Alternative. These surveys would focus on likely sites where the species may occur, and address questions necessary for the management of these species. Information from these surveys would enable managers to determine if the species occur in the area of the Northwest Forest Plan, provide habitat information to determine if the species are closely associated with late-successional old-growth forests, and help address species management needs to maintain stable, well-distributed populations of these species in the area of the Northwest Forest Plan. In addition, any site found with these surveys would be managed to maintain the species persistence at the site under the three action alternatives. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for these species in the area of the Northwest Forest Plan.

Background and Affected Environment - *Leptogium burnetiae* var. *hirsutum*, *Leptogium cyanescens* and *Leptogium teretiusculum*

These three species of *Leptogium* are poorly known in the area of the Northwest Forest Plan. Information is limited on their distribution, habitat and abundance in this region. These species have scattered distributions at northern latitudes (incompletely circumboreal) (Goward *et al*. 1994), and *Leptogium cyanescens* is also reported as cosmopolitan in temperate and subtropical regions (Purvis *et al*. 1992).

These species are known from a very limited number of sites in the area of the Northwest Forest Plan. *Leptogium burnetiae* var. *hirsutum* is known from only one site in the Northwest Forest Plan area; this site has been reported since 1993, but the land ownership is unknown (USDA, USDI Species Review Panel 1999b). There are three known sites for *Leptogium cyanescens*, all reported since 1993, with two in reserved land allocations and one on nonfederal land. *Leptogium teretiusculum* is known from three sites, with one reported since 1993; this is the only site for this species known on federally managed land (USDA, USDI Species Review Panel 1999b).

These species may not be closely associated with late-successional old-growth forests. *Leptogium teretiusculum* is typically found on bark of deciduous trees; *Leptogium burnetiae* var. *hirsutum* is typically epiphytic but also occurs on decaying logs, mosses and rock; and *Leptogium cyanescens* is typically found on mossy trees, rotten logs and mossy rocks (McCune and Geiser 1997).

These three species of *Leptogium* were included in the Riparian Lichen group for the FEMAT analysis (USDA et al. 1993). The ratings for this group reflected concerns because of the narrow riparian buffers for the original Option 9 compared to some of the other alternatives (Appendix J2 in USDA, USDI 1994b), although the ratings for this group were fairly low across all options, even Option 1 (USDA et al. 1993). The riparian buffers were increased between the Draft and Final SEIS, so this concern may have been reduced somewhat for these species. However, these species still appear to be quite rare in the Northwest Forest Plan area based on the number of reported sites (USDA, USDI Species Review Panel 1999b). Concerns were also expressed for cumulative effects on nonfederal land, and impacts to these species from harvest of special forest products (Appendix J2 in USDA, USDI 1994b).

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Environmental Consequences and Comparison of Alternatives - *Leptogium burnetiae* var. *hirsutum*, *Leptogium cyanescens* and *Leptogium teretiusculum*

Information regarding distribution, abundance, and habitat is limited for *Leptogium burnetiae* var. *hirsutum*, *L. cyanescens* and *L. teretiusculum*. Under the No-Action Alternative, these species are in Category 4 where general regional surveys would be required to gather additional information and to determine necessary levels of protection.

The status of these species is undetermined in the three action alternatives, because they are known from very few sites, they may not be closely associated with late-successional old-growth forests, and there is uncertainty regarding concerns for maintaining stable, well-distributed populations in the Northwest Forest Plan area. These species are in Category 1E in Alternative 1 and in Category 2C in Alternative 2. In Alternatives 1 and 2, strategic surveys would be conducted to determine if these species meet the basic criteria for Survey and Manage. All current and future known sites would be managed until strategic surveys can determine if the species meets the basic criteria for Survey and Manage. Alternative 3 would provide the greatest protection for these species. In Alternative 3 these species are in Category 3A, where all current and future known sites would be managed with a 250-meter buffer. Equivalent-effort surveys would be conducted before habitat-disturbing activities, with the objective to find occupied sites and minimize the inadvertent loss of undiscovered sites. Strategic surveys would be conducted to address species information and management needs.

Management of known sites for these *Leptogium* species would be required under the three action alternatives; management recommendations would direct the management of known sites. Under Alternatives 1 and 2, management would be the same (to maintain the persistence of the species at the site). If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for the species, then more area would be protected around known sites under Alternative 3 than Alternatives 1 and 2 because a 250-meter buffer is prescribed for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger, or more stable populations over time. However, if the species is thought to require interior microclimate, there would be little difference between site management under the action alternatives. The area necessary to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer).

There would be no management of known sites under the No-Action Alternative. The risk to the species may be increased under this alternative, because sites may be lost that could be important in providing for stable, well-distributed populations.

In all action alternatives, management of known sites would help maintain the current distribution of populations. However, since so few populations are known for these species in the Northwest Forest Plan area, and only three of the known sites are on federally managed land, management of known sites may not, by itself, increase the likelihood of maintaining stable, well-distributed populations for these species in the Northwest Forest Plan area. However, riparian buffers may provide some protection of known sites under the No-Action Alternative, given the reported association of these lichens with riparian vegetation (Appendix J2 in USDA, USDI 1994b). Riparian protection may be beneficial in the action alternatives as well, if populations exist in these areas.

Equivalent-effort surveys prior to habitat-disturbing activities would be required under Alternative 3. There may be additional known sites discovered because of these pre-disturbance surveys. There may be inadvertent loss of sites under Alternatives 1 and 2 because these surveys prior to habitat-disturbing activities would not be conducted.

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This could result in the loss of sites that may be important to maintaining stable, well-distributed populations of these species in the area of the Northwest Forest Plan. However, given that these species are extremely rare, it is unlikely that many new sites would be found with pre-disturbance surveys.

Strategic surveys would be required under the three action alternatives, and general regional surveys under the No-Action Alternative. These surveys would focus on likely sites where the species may occur, and address questions necessary for the management of these species. Information from these surveys would enable us to determine where the species occur in the area of the Northwest Forest Plan, provide habitat information to determine if the species are closely associated with late-successional old-growth forests, and help address species management needs to maintain stable, well-distributed populations of these species in the area of the Northwest Forest Plan. In addition, any site found with these surveys in the action alternatives would be managed to maintain the species persistence at the site. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for these species in the area of the Northwest Forest Plan.

Background and Affected Environment - Rare Oceanic-Influenced Lichens: *Bryoria pseudocapillaris, Bryoria spiralifera, Buellia oidalea, Erioderma sorediatum, Leioderma sorediatum, Leptogium brebissonii, Niebla cephalota, Usnea hesperina*. Common Oceanic-Influenced Lichens: *Heterodermia leucomelos, Pyrrhospora quernea*. Rare Nitrogen-fixing lichen: *Pannaria rubiginosa*. Aquatic Lichens: *Leptogium rivale, Dermatocarpon luridum*.

These lichen species may not be closely associated with late-successional old-growth forests, which is one of the three basic criteria for inclusion in the Survey and Manage Standards and Guidelines (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). There are high concerns for the persistence of these species (USDA et al. 1993; USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b). These lichens are rare in the area of the Northwest Forest Plan, and most have a very low number of known sites, low numbers of individuals, a limited distribution and a narrow ecological amplitude.

There were twelve lichen species in the Rare Oceanic-Influenced Lichens group considered in the FEMAT analysis, eight are discussed here because of their uncertain association with late-successional old-growth forests: *Bryoria pseudocapillaris*, *Bryoria spiralifera*, *Buellia oidalea*, *Erioderma sorediatum*, *Leioderma sorediatum*, *Leptogium brebissonii*, *Niebla cephalota*, and *Usnea hesperina*. *Heterodermia leucomelos* and *Pyrrhospora quernea* were in the Common Oceanic-Influenced Lichens group (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). The Rare Oceanic group had the lowest ratings in the lichen analysis (USDA et al. 1993). These ratings indicated a high level of concern for these species because of their rarity in the Northwest Forest Plan area (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). At the time they were known only from one or very few populations in the Northwest Forest Plan area, and had very limited distribution. In the Pacific Northwest, they occur along the immediate coast from central Oregon south into California, and the populations are typically disjunct and isolated. Ratings were also low for the Common Oceanic-Influenced Lichen group (but not as low as the Rare Oceanic Group), and similar concerns were expressed for these species as well (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b).

Bryoria pseudocapillaris and *Bryoria spiralifera* are western North American endemics that occur from California to Oregon in coastal fog belt areas (USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b). *Bryoria pseudocapillaris* was known only from two locations in 1993 (Appendix J2 in USDA, USDI 1994b). This species is now known from seven populations along the immediate coast, but only two of these locations are on federally managed land (USDA, USDI 1999a). *Bryoria spiralifera* was known only from one

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location in 1993 (Appendix J2 in USDA, USDI 1994b), and is now known from nine populations in seven locations along the immediate coast, but only three of these locations are on federally managed land. These species are found on exposed trees (Sitka spruce and shorepine) and shrubs on coastal windswept dunes and rocky headlands within 3 kilometers of the ocean (USDA, USDI 1999a). These species may not be closely associated with late-successional old-growth forests.

Buellia oidalea is endemic to the Pacific Coast of North America, and is known from Baja California north to Vancouver Island, British Columbia. This species was known only from two locations in 1993 (Appendix J2 in USDA, USDI 1994b), and is now known from eight locations along the coast in the Northwest Forest Plan area, but only four of these locations occur on federally managed land. It is found on red alder, Monterey cypress, Sitka spruce, shorepine, willow, on redwood posts, and shrubs (USDA, USDI 1999a). Its occurrence on young shorepine on the deflation plain coastward from Carter Lake in Douglas County, Oregon, suggests it may be more common north of California than the few records indicate (McCune et al. 1997).

Erioderma sorediatum is found in western North America from Alaska to Oregon within the coastal fog belt and also in New Zealand and the Philippines (USDA, USDI 1999a). This species was known only from three sites in 1993 (Appendix J2 in USDA, USDI 1994b), and is now known from nine locations along the coast in the Northwest Forest Plan area, but only six are known to be on federally managed land (ownership is uncertain for two sites, and one occurs on private land on the Olympic Peninsula). In Oregon, its distribution is limited to the extensive dune system between Heceta Head and Cape Arago. It has been found in open shorepine and Sitka spruce forests and shrub thickets on coastal dunes in Oregon, and on young red alder on the Olympic Peninsula (USDA, USDI 1999a).

Leioderma sorediatum is found in western North America from British Columbia to Oregon, and has a broad global distribution (McCune et al. 1997). In 1993, it was known from two sites (in Oregon) in the area of the Northwest Forest Plan (Appendix J2 inUSDA, USDI 1994b), with one additional population reported since then on the Olympic Peninsula on private land. Only the two Oregon sites are on federally managed land. It has been found in semi-open coastal thickets on ericaceous shrubs, dune woodlands and on young red alder in coastal forests (USDA, USDI 1999a).

Leptogium brebissonii occurs in western North America from Alaska to Oregon, and has a broad tropical distribution (McCune et al. 1997). It was known only from one location in 1993 (Appendix J2 in USDA, USDI 1994b), and is now known from nine locations along the coast in the Northwest Forest Plan area; six of these locations are on federally managed land in Oregon (USDA, USDI 1999a). It has been found in semi-exposed sites on deciduous trees, shrubs and conifers in coastal forests and dunes, and in coastal wetland shrub thickets (USDA, USDI 1999a; McCune et al. 1997).

Niebla cephalota is a North American coastal endemic from Baja California to Washington in coastal fog belt areas (McCune et al. 1997). It was known only from six locations in 1993 (Appendix J2 in USDA, USDI 1994b), and is now known from nine locations along the coast in the Northwest Forest Plan area, with only two of these locations on federally managed land (USDA, USDI 1999a). It is typically found on exposed open-grown Sitka spruce (McCune et al. 1997), and occurs on other conifers, shrubs and rock in open sites on forest edges, windswept headlands, sand dunes, and sparsely forested estuaries and willow swales (USDA, USDI 1999a).

Usnea hesperina is found in western North America from British Columbia to Oregon within the coastal fog belt, and has a broad global distribution (McCune et al. 1997). It was known from only one site in 1993 (Appendix J2 in USDA, USDI 1994b), and is now known from ten locations along the coast in the Northwest Forest Plan area. Seven of

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these locations are on federally managed lands. In Oregon, this species occurs in exposed sites on conifers, hardwoods and shrubs on windswept headlands and dunes (USDA, USDI 1999a).

Heterodermia leucomelos was one of four species included in the Common Oceanic-Influenced Lichens group for the FEMAT analysis (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). *Heterodermia leucomelos* is known to occur in western North America from British Columbia to California and has a broad global distribution (Purvis et al. 1992; USDA, USDI 1999a). The known sites for this species in the Northwest Forest Plan area have increased from five to 16 since 1993, with one on federally managed land (USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b). This species is found in Oregon on windswept headlands, particularly on the edges of dense thickets of Sitka spruce (McCune *et al*. 1997).

Pyrrhospora quernea was one of four species included in the Common Oceanic-Influenced Lichens group for the FEMAT analysis (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). *Pyrrhospora quernea* is known to occur along the coast in western North America from Washington to California (USDA, USDI 1999a), as well as in other parts of North America, Europe, and Micronesia (Purvis *et al*. 1992). The number of known sites for this species has increased from 4 to 13 since 1993, with four known to be on federally managed land (USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b). It is found along the immediate coast in estuaries, stabilized dunes, and rocky headlands on Sitka spruce and shorepine in older forests; on oak, alder, elderberry, and other coastal shrubs; and on old board fences and other wood (USDA, USDI 1999a).

Pannaria rubiginosa was one of six species included in the Rare Nitrogen-fixing group under the Northwest Forest Plan (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). *Pannaria rubiginosa* has a broad global distribution (Purvis *et al*. 1992). It is known from three historical collections in Washington, and four sites in Oregon (USDA, USDI 1999a). In 1993, it was only known from two sites in Oregon (Appendix J2 in USDA, USDI 1994b). This species is found in low elevation moist conifer and deciduous forests, and in willow and ericaceous shrub thickets in coastal dune areas (USDA, USDI 1999a; McCune et al. 1997; McCune and Geiser 1997).

Leptogium rivale and *Dermatocarpon luridum* were included in the Aquatic Lichen group for the FEMAT analysis (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). *Leptogium rivale* is endemic to western North America. *Dermatocarpon luridum* has a broad global distribution (USDA, USDI 1999a). Since 1993, the number of known sites for *Leptogium rivale* in the Northwest Forest Plan area has gone from 2 (Appendix J2 in USDA, USDI 1994b) to 20 in Washington and Oregon, with additional unreported locations (USDA, USDI Species Review Panel 1999b). *Leptogium rivale* is an aquatic species growing on rock in small, clear, cold streams and springs from 500 to 6,500 feet in elevation (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b). All but one site is on federally managed land, and these all occur in Riparian Reserves.

Dermatocarpon luridum is an aquatic lichen with a broad global distribution (USDA, USDI 1999a). The number of known sites in the Northwest Forest Plan area has gone from 1 to 19 since 1993, (USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b) with additional unreported locations (USDA, USDI Species Review Panel 1999b). *Dermatocarpon luridum* is an aquatic lichen growing on rock in or alongside lakes and small streams, with a broad elevational range from 1,000 to 6,500 feet (McCune and Geiser 1997; USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). Adjacent vegetation varies, and may be deciduous or conifer forests of various ages, or subalpine meadows. About half of the known sites are on federally managed land, and of these federal sites, all are in Riparian Reserves (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b).

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Environmental Consequences and Comparison of Alternatives - Rare Oceanic-Influenced Lichens: *Bryoria pseudocapillaris*, *Bryoria spiralifera*, *Buellia oidalea*, *Erioderma sorediatum*, *Leioderma sorediatum*, *Leptogium brebissonii*, *Niebla cephalota*, *Usnea hesperina*. Common Oceanic-Influenced Lichens: *Heterodermia leucomelos*, *Pyrrhospora quernea*. Rare Nitrogen-fixing lichen: *Pannaria rubiginosa*. Aquatic Lichens: *Leptogium rivale*, *Dermatocarpon luridum*.

These species may not be closely associated with late-successional/old-growth forests. However, these lichens were rated as having a low likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federally managed lands (USDA et al. 1993). These lichens are rare in the area of the Northwest Forest Plan, with limited distribution, very low number of known sites, few sites on federally managed land, low numbers of individuals and narrow ecological amplitudes. Between the Draft and Final FSEIS for the Northwest Forest Plan, the riparian protection was increased. Therefore, the aquatic lichen species (*Leptogium rivale* and *Dermatocarpon luridum*) which occur in streams, should receive protection from the Aquatic Conservation Strategy.

Under the No-Action Alternative, these 12 species are in Categories 1 and 3. Under these categories, all current and future known sites would be managed, extensive surveys would be required, and high-priority sites would be selected for management.

The status of these species is undetermined in the three action alternatives because of the uncertainty about whether they meet the basic criteria for inclusion in Survey and Manage. These species may not be closely associated with late-successional old-growth forests. For the two aquatic species, *Leptogium rivale* and *Dermatocarpon luridum*, the reserve land allocations and other standards and guidelines of the Northwest Forest Plan, particularly the Aquatic Conservation Strategy, may provide a reasonable assurance for persistence of these two species.

These species are in Category 1E under Alternative 1, and in Category 2C in Alternative 2. In Alternatives 1 and 2, strategic surveys would be conducted to determine if these species meet the basic criteria for Survey and Manage. All current and future known sites would be managed until strategic surveys can determine if these species meet the basic criteria for inclusion in Survey and Manage.

Alternative 3 would provide the greatest protection for these species. In Alternative 3, these species are in Category 3A, where all current and future known sites would be managed with a 250-meter buffer. Equivalent-effort surveys would be conducted before habitat-disturbing activities, with the objective to find occupied sites and minimize the inadvertent loss of undiscovered sites. Strategic surveys would be conducted to address species information and management needs.

Management of known sites for these *Leptogium* species would be required under the three action alternatives; management recommendations would direct the management of known sites. Under Alternatives 1 and 2, management would be the same (to maintain the persistence of the species at the site). If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for the species, then more area would be protected around known sites under Alternative 3 because a 250-meter buffer is prescribed for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger, or more stable populations over time. However, if the species is thought to require interior microclimate, there would be little difference between site management under the action alternatives. The area necessary to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer).

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In all alternatives, management of known sites would help maintain the current distribution of populations on federally managed lands. However, since these species have very limited distribution and limited populations, and few populations are on federally managed land (particularly for the Oceanic species), management of known sites alone may not increase the likelihood of maintaining stable, well-distributed populations for these species in the Northwest Forest Plan area.

Equivalent-effort surveys prior to habitat-disturbing activities are required under Alternative 3. There may be additional known sites discovered and managed as a result of these pre-disturbance surveys. There may be inadvertent loss of sites under Alternatives 1 and 2 and the No-Action Alternative, because these surveys prior to habitat-disturbing activities would not be required. This could result in the loss of sites that may be important to provide for stable, well-distributed populations of these species in the area of the Northwest Forest Plan. However, given that these species are extremely rare, it is unlikely that many new sites would be found with pre-disturbance surveys.

Strategic surveys would be required under the three action alternatives, and extensive surveys under the No-Action Alternative. These surveys would focus on likely sites where the species may occur, and address questions necessary for the management of these species. Information from these surveys would provide habitat information to determine if the species are closely associated with late-successional old-growth forests, and help address species management needs to maintain stable, well-distributed populations of these species in the area of the Northwest Forest Plan. In addition, any site found with these surveys would be managed to provide for the species persistence at the site. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for these species in the area of the Northwest Forest Plan.

The status of these species is undetermined under the three action alternatives, because it is uncertain if they meet the basic criteria for Survey and Manage. If the information acquired through strategic surveys demonstrates that these species are not closely associated with late-successional old-growth forests, they would be removed from the Survey and Manage mitigation. However, these species are thought to be very rare and with limited distribution in the area of the Northwest Forest Plan. If these species are not protected under the Northwest Forest Plan because they are not late-successional old-growth associated, they would be evaluated for inclusion in the agencies sensitive species programs.

Background and Affected Environment - *Ramalina thrausta* and *Platismatia lacunosa*

Ramalina thrausta and *Platismatia lacunosa* were included in the Riparian Lichen group during the FEMAT analysis (USDA et al. 1993). *Ramalina thrausta* is reported to occur in boreal North America, south to Oregon, and in western Montana (McCune and Geiser 1997). The number of known sites in the Northwest Forest Plan area has increased from 5 (Appendix J2 in USDA, USDI 1994b) to 41, occurring in Oregon and Washington, with more than half of the sites on federally managed land (USDA, USDI Species Review Panel 1999b). *Ramalina thrausta* is typically found on bark and branches of trees, primarily conifers, in low to mid-elevation moist forests and riparian areas. This species can be mistaken for the widespread and common lichen, *Alectoria sarmentosa* (McCune and Geiser 1997). To date, many of the locations for this species have been reported from mature or old-growth forests (USDA, USDI Species Review Panel 1999b).

Platismatia lacunosa is known from Alaska to California (McCune and Geiser 1997). The number of known sites in the Northwest Forest Plan area has gone from 24 (Appendix J2 in USDA, USDI 1994b) to 58 since 1993, with additional unreported

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locations (USDA, USDI Species Review Panel 1999b). *Platismatia lacunosa* has been found on bark and wood from mainly deciduous trees (especially alder) and occasionally on mossy rock (McCune and Geiser 1997; USDA, USDI Species Review Panel 1999b) from the coast to the Cascades (USDA, USDI Species Review Panel 1999b). It appears to occur in a wide range of habitats, from mid- to late-seral conditions in moist riparian forests and cool upland sites (McCune and Geiser 1997). This species is currently considered to be closely associated with late-successional old-growth forests (USDA, USDI Species Review Panel 1999b).

Concern was expressed for the group of Riparian Lichen species during the FEMAT lichen analysis as indicated by the outcome ratings under Option. Concerns were expressed regarding declining air quality, commercial harvesting of secondary forest products, and cumulative effects on nonfederal land (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). It was also mentioned that riparian buffers were narrower under this alternative than for some others. However, the riparian buffers were increased between the Draft and Final Northwest Forest Plan SEIS, so this concern may be reduced somewhat for these species.

Environmental Consequences and Comparison of Alternatives - *Ramalina thrausta* and *Platismatia lacunosa*

Ramalina thrausta and *Platismatia lacunosa* are in Category 4 under the No-Action Alternative where general regional surveys would be required.

Under Alternative 1, *Ramalina thrausta* is in Category 1D. Under this category, all current and future known sites would be managed until high-priority sites can be determined. Strategic surveys would be conducted to address species information and management needs. Under Alternative 1, *Platismatia lacunosa* is in Category 1C. Under this category, all current and future known sites would be managed until high-priority sites can be determined. Pre-disturbance surveys would be conducted to minimize inadvertent loss of undiscovered sites. Strategic surveys would be conducted to address species information and management needs.

Under Alternative 2, *Ramalina thrausta* and *Platismatia lacunosa* are in Category 2D, where all sites known as of September 30, 1999 would be managed, and strategic surveys would be conducted for five years. Based on strategic survey information, the species would be: (1) considered for inclusion in the sensitive species programs of the Agencies, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed.

Under Alternative 3, *Ramalina thrausta* and *Platismatia lacunosa* are in Category 3B. This category would require management of high-priority sites. Equivalent-effort surveys would be required for *Ramalina thrausta* prior to disturbance activities, and pre-disturbance surveys would be required for *Platismatia lacunosa* to minimize inadvertent loss of undiscovered sites. Strategic surveys would be conducted to address species information and management needs.

These species would receive greater protection under the three action alternatives than under the No-Action Alternative. There is no site management under the No-Action Alternative. Alternatives 1 and 3 would provide the most protection for *Platismatia lacunosa*, and Alternative 3 would provide the most protection for *Ramalina thrausta.* The action alternatives would provide management of known sites, some pre-disturbance surveys, and strategic surveys.

Known site management varies for *Ramalina thrausta* and *Platismatia lacunosa* in the alternatives. The No-Action Alternative would provide no site protection. Under

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Alternatives 1 and 3, only the high-priority sites would be managed. The Management Recommendations for *Ramalina thrausta* and *Platismatia lacunosa* would identify the high-priority sites, but until these documents are approved, all known sites would be managed. Sites that are not considered necessary for species persistence may be lost under Alternatives 1 and 3.

The least amount of site protection in the action alternatives occurs under Alternative 2, where only sites known as of September 30, 1999would be managed. This could result in loss of sites that may be important for maintaining these species well distributed throughout their range in the Northwest Forest Plan area. After 5 years, these species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed.. The current known sites are patchily distributed due, in part, to uneven survey effort. Therefore, limiting management of known sites to current levels may leave substantial gaps in the distribution. Failure to manage for new sites located in these gaps would increase the risk that the Northwest Forest Plan would not provide for stable, well-distributed populations of these species.

There would be no management of known sites under the No-Action Alternative. The risk to these species would be increased under this alternative, because sites may be lost that could be important in providing for stable, well-distributed populations.

Pre-disturbance surveys would only occur for *Ramalina thrausta* under Alternative 3. These surveys would likely provide only limited additional information for management because these surveys would be conducted relative to project locations and not in the most likely habitat, and because of the difficulty in finding or differentiating this species from a common species. Sites that are discovered would be managed to provide for species persistence if they are identified as high-priority sites. The absence of pre-disturbance surveys in the other three alternatives may increase the risk to *Ramalina thrausta* if loss of sites occurs within a portion of its range where additional populations are necessary to provide for its distribution and abundance. However, due to the habitat protected in the reserves and provided by other standards and guidelines, including Riparian reserves and the green tree retention standard and guideline, the risk of losing important sites would likely be low.

Pre-disturbance surveys would be required for *Platismatia lacunosa* under Alternatives 1 and 3. Sites that are discovered would be managed to provide for species persistence if they are identified as high-priority sites. The absence of pre-disturbance surveys in the other alternatives may increase the risk to *Platismatia lacunosa* if loss of sites occurs within a portion of its range where additional populations are necessary to provide for its distribution and abundance. However, due to the habitat protected in the reserves, particularly riparian reserves, the risk of losing important sites would likely be low.

Strategic surveys would be required for *Ramalina thrausta* and *Platismatia lacunosa* under all action alternatives, although these surveys would only occur for 5 years in Alternative 2. These surveys occur as general regional surveys under the No-Action Alternative. Strategic surveys would determine what the level of concern is for *Ramalina thrausta* and *Platismatia lacunosa* throughout their range, determine if the reserve land allocations provide for the species, identify high-priority sites for management, and determine what the appropriate management is for *Ramalina thrausta* and *Platismatia lacunosa* in order to maintain well-distributed populations throughout their range in the Northwest Forest Plan area. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for the species.

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Background and Affected Environment - *Calicium abietinum* and *Stenocybe clavata*

Calicium abietinum and *Stenocybe clavata* were included in the Pin Lichen group for the FEMAT analysis (USDA et al. 1993). The ratings at that time reflected a high level of concern, since they were thought to be late-successional or old-growth associated species, and little was known of their abundance or distribution in the area covered under the Northwest Forest Plan (Appendix J2 in USDA, USDI 1994b). *Calicium abietinum* has a broad global distribution (Purvis et al. 1992). The number of known sites for this species in the Northwest Forest Plan area increased from 1 in 1993, to 9 with additional unreported locations (Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b). Only six sites are known on federally managed land (USDA, USDI Species Review Panel 1999b). *Calicium abietinum* has been found on wood of conifers and deciduous trees (Tibell 1975; USDA, USDI Species Review Panel 1999b) from the Coast Range to the Cascades. It is still considered to be closely associated with late-successional/old-growth forests (USDA, USDI Species Review Panel 1999b).

Stenocybe clavata is endemic to the Pacific Northwest (USDA, USDI Species Review Panel 1999b). The number of known sites for this species in the area of the Northwest Forest Plan has increased from suspected to occur in 1993 (Appendix J2 in USDA, USDI 1994b), to 11 (in Oregon and Washington) with only limited surveys. This species is known to occur on 150-200+ year-old Douglas-fir, Sitka spruce, and Engelmann spruce. This species appears to be closely associated with late-successional/old-growth forests (USDA, USDI Species Review Panel 1999b).

These species are still poorly known in the Northwest Forest Plan area. Very little information is available regarding the distribution, ecology or abundance of *Calicium abietinum* and *Stenocybe clavata* in the Pacific Northwest. The relatively few records probably reflect the lack of widespread surveys and the small size of these lichens.

Environmental Consequences and Comparison of Alternatives - *Calicium abietinum* and *Stenocybe clavata*

In the FEMAT analysis, *Calicium abietinum* and *Stenocybe clavata* were anticipated to benefit from the protection of old-growth stands in landscape areas where little late-successional forest exists (USDA, USDI 1994b C-44). If the oldest stands (greater than 200 years) are not selected for protection in landscape areas where little late-successional forest exists, this could result in loss of undiscovered populations, and decrease the likelihood of maintaining stable, well-distributed populations in the Northwest Forest Plan area. Instructions for the implementation of the 15 percent retention are contained in the September 14, 1998, Instruction Memorandum (USDA, USDI 1998h). Under these conditions, the Survey and Manage mitigation would become more important for these species.

Calicium abietinum and *Stenocybe clavata* are in Category 4 under the No-Action Alternative where general regional surveys would be required.

These species are in Category 1B under Alternative 1, and Category 2B under Alternative 2. The management direction for these categories would be identical. All current and future known sites would be managed. Pre-disturbance surveys are considered not practical for these species (USDA, USDI Species Review Panel 1999b), given the cryptic nature of these species and/or the difficulty with locating and identifying them in the field, and the potential difficulty in accurately identifying specimens by skilled taxonomists. Strategic surveys would be required. These surveys would be conducted to minimize the inadvertent loss of undiscovered sites. Strategic surveys would also be conducted to address species information and management needs.

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Under Alternative 3, these species are in Category 3A. In this category, all current and future known sites would be managed with a 250-meter buffer. Equivalent-effort surveys would be conducted before habitat-disturbing activities, with the objective to find occupied sites and minimize the inadvertent loss of undiscovered sites. Strategic surveys would be conducted to address species information and management needs.

Management of known sites for *Calicium abietinum* and *Stenocybe clavata* would be required under the three action alternatives. Management Recommendations would direct management of known sites; under Alternatives 1 and 2, management would be the same in that management would be to maintain species persistence at the site. If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for the species, then more area may be protected around known sites under Alternative 3, which prescribes a 250-meter buffer for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger, or more stable populations over time. However, if the species is thought to require interior microclimate, there would be little difference between site management under the action alternatives. The area necessary to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer). Management of known sites would help provide for a distribution of populations. However, since these species have limited distributions, management of known sites may not increase the likelihood of maintaining stable, well-distributed populations for these species in the Northwest Forest Plan area.

There would be no management of known sites under the No-Action Alternative. These species are very rare and all sites would be important to provide for stable, well-distributed populations. Lack of known site management would greatly increase the risk to the species under this alternative.

Equivalent-effort surveys prior to habitat-disturbing activities are required for these two species under Alternative 3. Additional known sites may be discovered and managed as a result of these pre-disturbance surveys. However, because these surveys would be conducted relative to project locations as opposed to the most likely habitat, and because there is difficulty in finding or identifying these species, these surveys would likely provide only limited additional information for management. There would be some risk of loss of sites under Alternatives 1 and 2, because surveys prior to habitat-disturbing activities would not be conducted. However, considering that these species are very difficult to locate and also the rarity of these species, the risk of losing important sites would be low to moderate.

Strategic surveys would be conducted under all three action alternatives, whereas general regional surveys are required under the No-Action Alternative. These surveys would address questions for management of these two species and focus on likely sites where the species may occur. Strategic surveys could be conducted to minimize the inadvertent loss of undiscovered sites. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for these species.

Calicium abietinum and *Stenocybe clavata* would receive greater protection under the three action alternatives than the No-Action Alternative. The action alternatives provide management of all known sites and strategic surveys; Alternative 3 includes "equivalent-effort surveys." Under the No-Action Alternative, these species would receive general regional surveys with no site protection.

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Background and Affected Environment - *Bryoria subcana, Bryoria tortuosa* (west of the Cascade Crest), *Sticta sp. #1* (previously referred to as *Dendriscocaulon intricatulum*), *Nephroma occultum, Pseudocyphellaria* #1 (previously referred to as *Pseudocyphellaria mougeotiana*), and *Tholurna dissimilis* (south of the Columbia River)

Bryoria subcana has been found from Alaska to California usually within 30 miles of the coast, and also in Great Britain (USDA, USDI 1999a). *Bryoria subcana* was one of twelve species in the Rare Oceanic-Influenced Lichen group for the FEMAT analysis (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). The viability ratings at that time reflected a high level of concern, since it was known only from one location (Appendix J2 in USDA, USDI 1994b). This species is now known from five locations along the coast within the area of the Northwest Forest Plan, with only three of these sites on federally managed land. Its habitat varies from the bark and wood of conifers in forests of coastal bays and streams, to high precipitation ridges and summits in late-successional or old-growth, and conifer and mixed conifer-deciduous forests (USDA, USDI 1999a).

Bryoria tortuosa was considered a Rare Forage Lichen for the FEMAT analysis (USDA et al. 1993, Appendix J2 in USDA, USDI 1994b). The viability ratings at that time reflected a high level of concern, because of its apparent rarity, its limited distribution, and because it was known only from approximately 20 locations in the area of the Northwest Forest Plan (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). This species grows on trees in well-lit, open stands, most frequently on oaks and pines, although it has been collected on a large variety of trees and shrubs (Brodo and Hawksworth 1977). The species is known from less than 15 sites west of the Cascade crest and is still considered rare in this area (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). It is more common and abundant in the drier habitats on the east side of the Cascades in Oregon and Washington. (See previous discussion in this chapter for *Bryoria tortuosa* on the east side of the Cascades). Most of the sites west of the Cascades are historic locations in the Puget Sound area, the Willamette Valley, and northern California. It is unknown if the species is still present at those sites. In addition, nearly all of the historic sites were on nonfederal land (USDA, USDI 1999a).

Sticta sp. #1 (previously referred to as *Dendriscocaulon intricatulum*) and *Nephroma occultum* were included in the Rare Nitrogen-fixing group for the FEMAT analysis (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). The low outcome ratings reflected high concerns for this group and were based on the limited distribution, low number of sites, narrow ecological amplitude, and sensitivity to air pollution (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). *Sticta* sp. #1 is a Pacific Northwest endemic ranging from southeast Alaska to northern California (USDA, USDI Species Review Panel 1999b). The number of known sites for this taxon in the Northwest Forest Plan area has gone from 1 to 16 (USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b). The taxonomy of this taxon is being revised (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). *Sticta* sp. #1 has been found in a variety of habitats, including open-grown conifer and deciduous stands, oak balds, and moist conifer forests at low to mid-elevation in the western Cascades. Most known sites in Washington and Oregon are on federally managed land, but the land allocation status is undetermined. The lichen thallus is quite small and difficult to detect (USDA, USDI 1999a).

Nephroma occultum is a western North American endemic occurring from British Columbia to southern Oregon (USDA, USDI 1999a). The number of known sites for this species in the Northwest Forest Plan area has increased from 5 to about 50 since 1993 (USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b; USDA, USDI Species Review Panel 1999b). It occurs as a canopy lichen in older, moist conifer forests, from low- to mid-elevation on the west slope of the Cascades in Oregon and Washington (USDA, USDI 1999a; McCune and Geiser 1997). Populations are sporadically distributed in the

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region, with most known sites in the central Oregon Cascades (USDA, USDI 1999a). All known sites are on federally managed land, with 37 percent occurring in reserve land allocations. It occurs on large old lateral limbs of conifers, and is rarely found on the forest floor as litterfall. This species is closely associated with old-growth forests and is thought to require interior forest microclimate conditions.

Pseudocyphellaria sp. #1 (previously referred to as *Pseudocyphellaria mougeotiana*), was included in the Rare Oceanic-Influenced Lichen group for the FEMAT analysis (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). The viability ratings at that time reflected a high level of concern, since it was known only from one location (Appendix J2 in USDA, USDI 1994b). This taxon is now known from three locations within a small geographical area along the Oregon Coast, and only one of these locations is known to be on federally managed land (USDA, USDI 1999a). There is currently taxonomic uncertainty with this taxon. Some lichenologists consider it to be a variant *of Pseudocyphellaria crocata* (Goward *et al*. 1994, McCune and Geiser 1997). *Pseudocyphellaria* sp. #1 has been found in conifer litter in a riparian old-growth Sitka spruce, Douglas-fir, and western hemlock forest on the immediate coast, and on shaded branches of bristly manzanita in a shrub community on stabilized sand dunes (USDA, USDI 1999a).

Tholurna dissimilis is known from North America and Scandinavia. In the area of the Northwest Forest Plan this species is known from Washington, south into Oregon where it reaches its southern extent in the central Oregon Cascades (USDA, USDI 1999a). The number of known sites in the Northwest Forest Plan area has gone from 9 (Appendix J2 in USDA, USDI 1994b), to 21 since 1993; 18 of these sites are in Washington. It is only known from three widely scattered locations in the Oregon Cascades, all on federally managed land (USDA, USDI 1999a). The rarity of *Tholurna dissimilis*, its sparseness, and stunted condition suggest that conditions at the southernmost site are near the limit for its growth (Pike 1972). Oregon populations are at high elevations in timberline or alpine situations (USDA, USDI 1999a). The amount of suitable habitat is limited in extent in the Oregon Cascades. Concerns for this species in Oregon have not changed since the FEMAT analysis (USDA et al. 1993; USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b), when a high level of concern was indicated for its persistence under Option 9.

Environmental Consequences and Comparison of Alternatives - *Bryoria subcana, Bryoria tortuosa* (west of the Cascade Crest), *Sticta sp. #1* (previously referred to as *Dendriscocaulon intricatulum*), *Nephroma occultum, Pseudocyphellaria* #1 (previously referred to as *Pseudocyphellaria mougeotiana),* and *Tholurna dissimilis* (south of the Columbia River)

In general, there is not substantial new information that would change the assumptions of the Northwest Forest Plan and the effects that were predicted (USDA, USDI Species Review Panel 1999b), with two known exceptions. *Tholurna dissimilis* remains at risk of not maintaining stable, well-distributed populations in Oregon, but is of less concern in Washington (USDA, USDI 1999a)(see previous discussion in this chapter for *Tholurna dissimilis* in Washington). *Nephroma occultum* occurs primarily in the oldest stands on the landscape, and is rarely found in stands less than 400 years old (USDA, USDI 1999a). In the FEMAT analysis, *Nephrom occultum* and *Sticta* sp. #1 (previously referred to as *Dendriscocaulon intricatulum*) were anticipated to benefit from the protection of old growth stands in landscape areas where little late-successional forest exists (USDA, USDI 1994b, p. C-44). If the oldest stands (greater than 200 years) are not selected for protection in landscape areas where little late-successional forest exists (USDA, USDI 1994b, p. C-44), this could result in loss of undiscovered sites and decrease the likelihood of maintaining stable, well-distributed populations of these species in the Northwest Forest Plan area. Instructions for the implementation of the 15 percent retention are contained in an instruction memorandum dated September 14, 1998 (USDA, USDI 1998h). Under these conditions, the Survey and Manage mitigation would become more important for theses species.

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Management would be similar for these six species under the No-Action Alternative, where they are in Categories 1 and 3. Under the No-Action Alternative, all current and future known sites would be managed, extensive surveys would be required, and high-priority sites would be identified for management.

These species are in Category 1B under Alternative 1, and Category 2B under Alternative 2. All current and future known sites would be managed. Pre-disturbance surveys are not considered practical for these species (USDA, USDI Species Review Panel 1999b) given their cryptic nature and/or the difficulty with locating and identifying them in the field. There is a potential difficulty in accurately identifying specimens by skilled taxonomists because of taxonomic uncertainty surrounding *Sticta* sp. #1 and *Pseudocyphellaria* sp. #1. Strategic surveys would be required. These surveys would be conducted to minimize the inadvertent loss of undiscovered sites. Strategic surveys would also be conducted to address species information and management needs.

These species are in Category 3A under Alternative 3. All current and future known sites would be managed with a 250-meter buffer. Pre-disturbance surveys would be conducted, with the objective to find occupied sites and minimize the inadvertent loss of undiscovered sites. Strategic surveys would be conducted to address species information and management needs.

Management of known sites for these *Leptogium* species would be required under the three action alternatives; management recommendations would direct the management of known sites. Under Alternatives 1 and 2, management would be the same (to maintain the persistence of the species at the site). If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for the other species, then more area may be protected around known sites under Alternative 3 because a 250-meter buffer is prescribed for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger, or more stable populations over time. However, if the species is thought to require interior microclimate, there would be little difference between site management under all the alternatives. The area necessary to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer). Management of known sites would help provide for a distribution of populations. However, since these species have limited distributions with few known sites, and few sites on federally managed land in the case of *Bryoria tortuosa* west of the Cascade crest, *Bryoria subcana* and *Pseudocyphellaria* sp. #1, management of known sites may not increase the likelihood of maintaining stable, well-distributed populations for these species in the Northwest Forest Plan area.

Equivalent-effort surveys prior to habitat-disturbing activities would be required for these six species under Alternative 3. Additional known sites may be discovered and managed as a result of these pre-disturbance surveys. However, because these surveys would be conducted relative to project locations and not in the most likely habitat, and given the difficulty in finding or identifying these species, these surveys are likely to provide limited additional information for management. There would be a moderate risk of loss of sites under Alternatives 1 and 2 and the No-Action Alternative, because surveys prior to habitat-disturbing activities would not be conducted. There would a moderate risk that this potential loss of sites could eliminate populations that are important to provide for stable, well-distributed populations of these species throughout their range in the Northwest Forest Plan area.

Strategic surveys would be conducted under all three action alternatives, and extensive surveys under the No-Action Alternative. These surveys would address the questions for the management of these six species, and would focus on likely sites where the

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species may occur. Strategic surveys would be conducted to minimize the inadvertent loss of undiscovered populations. Additional known sites may be discovered and managed as a result of these surveys. Strategic surveys could provide the information necessary to determine the appropriate mitigation to reduce concerns for these species.

Background and Affected Environment - *Hypogymnia duplicata*, *Lobaria linita*, *Pseudocyphellaria rainierensis*, and *Teloschistes flavicans*

Hypogymnia duplicata is endemic to the Pacific Northwest, and known to occur from Alaska to northwestern Oregon (USDA, USDI 1999a). It was one of two species in the Rare Leafy Arboreal Lichen group for the FEMAT analysis. Low ratings for this group indicated high concern for this species because of its limited distribution, apparent rarity, and sensitivity to air pollution (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). The number of known sites for this species in the area of the Northwest Forest Plan has increased from 4 to more than 60 since 1993. Most of the known sites are in northwestern Washington, and the majority occur on federally managed land (USDA, USDI 1999a; USDA, USDI Species Review Panel 1999b). This species is found in old-growth forests in high precipitation areas, between 1,100 and 5,500 feet elevation, in the western Cascades, Olympics, and Oregon Coast Range (McCune and Geiser 1997; USDA, USDI 1999a). Populations of this species occur sporadically across the landscape, and it is seldom abundant where it occurs. Known sites become very limited south of Snoqualmie Pass, possibly because of limited availability of suitable habitat. Since 1993, concerns have decreased somewhat for this species in northern Washington because of the increase in number of sites, although it is still restricted to specific habitat conditions and considered rare (USDA, USDI 1999a).

Lobaria linita occurs sporadically in northern Europe and Asia, and is known to occur in North America from Alaska to northern Oregon (USDA, USDI 1999a). It was one of six species included in the Rare Nitrogen-fixing Lichen group for the FEMAT analysis (USDA et al. 1993). Low ratings for this group indicated high concern for this species because of its limited distribution, apparent rarity and sensitivity to air pollution (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). Since 1993, the number of known sites for this species in the Northwest Forest Plan area has increased from 10 to 82, although only 35 are recent collections (since 1993) (USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b). Some of these records represent the subalpine variety of this species. The majority of the known sites are in northwestern Washington, with 15 records in reserve land allocations (USDA, USDI Species Review Panel 1999b). *Lobaria linita* occurs in old-growth forests primarily in the Pacific Silver Fir Zone, where it grows on lower boles and on moss-covered rocks in interior forest conditions. It is limited and sporadic in its distribution, and is often absent in what appears to be suitable habitat, Mt. Baker-Snoqualmie Ecology Program data files). Typically, only a few individuals are present in a population (USDA, USDI 1999a).

Pseudocyphellaria rainierensis is endemic to the Pacific Northwest and is known to occur from southeastern Alaska to southern Oregon, west of the Cascade crest (USDA, USDI 1999a). It was one of six species included in the Rare Nitrogen-fixing Lichen group for the FEMAT analysis (USDA et al. 1993). Low ratings for this group indicated high concern for this species because of its limited distribution, apparent rarity and sensitivity to air pollution (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). Since 1993, the number of known sites for this species in the Northwest Forest Plan area have increased from 16, to more than 40 (USDA, USDI 1999a), with less than half in reserve land allocations (USDA, USDI Species Review Panel 1999b). This species is found in cool, humid old-growth conifer forests, from low to mid-elevations west of the Cascade crest. It grows on lower boles and in the lower canopy in interior forest conditions (McCune and Geiser 1997; USDA, USDI 1999a). It is limited and sporadic in its

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distribution, and is often absent in what appears to be suitable habitat. Typically only a few individuals are present in a population (USDA, USDI 1999a). This species is still considered rare (McCune and Geiser 1997; USDA, USDI 1999a)

Teloschistes flavicans is a widespread tropical and subtropical species in the Western Hemisphere, and is found in western North America from Oregon to California within the coastal fog belt. In the area of the Northwest Forest Plan, it is only known from six locations in a limited geographic area along the immediate Oregon Coast. Populations are small at all but one site, which is on nonfederal land (USDA, USDI 1999a). *Teloschistes flavicans* was one of 12 lichens in the Rare Oceanic-Influenced Lichen group for the FEMAT analysis (USDA et al. 1993; Appendix J2 in USDA, USDI 1994b). Low ratings for this group indicated high concern for this species because of its limited distribution and apparent rarity in the Northwest Forest Plan area. In 1993, *Teloschistes flavicans* was known only from two locations (Appendix J2 in USDA, USDI 1994b). It is now known from six locations along the immediate coast, although only two of these populations are on federally managed land. It is found on exposed headlands and dunes, where it grows in exposed sites on conifers, deciduous trees and shrubs in coastal forests and shrub thickets (McCune and Geiser 1997; USDA, USDI 1999a).

Environmental Consequences and Comparison of Alternatives - *Hypogymnia duplicata, Lobaria linita, Pseudocyphellaria rainierensis,* and *Teloschistes flavicans*

Management would be similar for *Hypogymnia duplicata*, *Lobaria linita*, *Pseudocyphellaria rainierensis* under the No-Action Alternative, where these species are in Categories 1, 2 and 3. Under the No-Action Alternative, all current and future known sites would be managed, pre-disturbance surveys and extensive surveys would be required, and high-priority sites would be identified for management.

In general, there is no substantial new information that would change the assumptions of the Northwest Forest Plan and the effects that were predicted (USDA, USDI Species Review Panel 1999b). One exception is the change in original assumptions for *Hypogymnia duplicata*, *Lobaria linita*, and *Pseudocyphellaria rainierensis*. These species occur primarily in the older stands on the landscape, and are rarely found in stands less than 400 years old (USDA, USDI 1999a, Mt. Baker-Snoqualmie Ecology Program data files). If the oldest stands (greater than 200 years) are not selected for protection in landscape areas where little late-successional forest exists (USDA, USDI 1994b, p. C-44), this could result in loss of undiscovered populations, and decrease the likelihood of maintaining stable, well-distributed populations in the Northwest Forest Plan area. Instructions for the implementation of the 15 percent retention are contained in an instruction memorandum dated September 14, 1998 (USDA, USDI 1998h). Under these conditions, the Survey and Manage mitigation would become more important for these species. In addition, the number of known sites has increased for *Hypogymnia duplicata* and *Lobaria linita* in northwestern Washington. The likelihood of providing stable, well-distributed populations for these species in northwest Washington has increased since the FEMAT analysis (USDA et al. 1993; USDA, USDI 1999a; Appendix J2 in USDA, USDI 1994b).

Under the No-Action Alternative, *Teloschistes flavicans* is in Categories 1 and 3. All current and future known sites would be managed, extensive surveys would be required, and high-priority sites would be identified for management.

Under Alternatives 1 and 2, these four species are in Category 1A and 2A, respectively. The management direction for both Categories 1A and 2A is identical. All current and future known sites would be managed, and pre-disturbance surveys would be conducted. Strategic surveys would be conducted to address species information and management needs.

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Under Alternative 3, these four species are in Category 3A. Under Category 3A, all current and future known sites would be managed with a 250-meter buffer, pre-disturbance surveys would be conducted prior to habitat-disturbing activities, and strategic surveys would be required to address species information and management needs.

Management of known sites for these four species is required under all alternatives. Management recommendations would direct to manage known sites; under the No-Action Alternative and Alternatives 1 and 2, management would be the same (to maintain the persistence of the species at the site). If interior microclimate is not specified as a necessary habitat condition in the Management Recommendations for the other species, then more area may be protected around known sites under Alternative 3 which prescribes a 250-meter buffer for each known site. The prescribed area for known sites under Alternative 3 may provide larger habitat areas for recruitment and expansion of the population, and could result in larger, or more stable populations over time. Since *Lobaria linita*, *Pseudocyphellaria rainierensis*, and possibly *Hypogymnia duplicata*, are thought to require interior microclimate, site management for these species would be similiar under all alternatives. The area need to provide for interior microclimate conditions would be very similar to the area provided under Alternative 3 (250-meter buffer). Management of known sites would help maintain the current distribution of populations on federally managed lands. However, since these species have limited distributions in certain geographic areas, relatively few known sites, and very few sites on federally managed land in the case of *Teloschistes flavicans*, the management of known sites may not increase the likelihood of maintaining stable, well-distributed populations for these species in the Northwest Forest Plan area.

Pre-disturbance survey requirements would be similar for *Hypogymnia duplicata*, *Lobaria linita*, and *Pseudocyphellaria rainierensis* under the alternatives. All alternatives would require pre-disturbance surveys for these species, which are likely to discover additional populations occurring in the project areas. Sites discovered by these surveys would be managed and contribute to providing well-distributed populations across the species ranges in the Northwest Forest Plan area.

Teloschistes flavicans would receive greater protection under the three action alternatives than the No-Action Alternative because of the provision for pre-disturbance surveys. However, because this species is restricted to a small geographic area, it occurs in specialized habitat, and has very little habitat on federally managed land, only a few new populations would likely be discovered. Sites discovered by these surveys would be managed and contribute to providing a distribution of populations across its range in the Northwest Forest Plan area.

Strategic surveys would be required in all alternatives to gather the information needed to manage these species to maintain stable, well-distributed populations across their range in the Northwest Forest Plan area. Strategic surveys would be effective in providing for species persistence as they can be conducted in areas with high likelihood of locating the species, provide information that can assist in management of the species, and narrow the habitat where pre-disturbance surveys would be required. Sites discovered by these surveys would be managed and would contribute to providing a distribution of populations across their range in the Northwest Forest Plan area. Strategic surveys could provide needed information to determine the appropriate mitigation for reducing concerns for *Hypogymnia duplicata*, *Lobaria linita*, *Pseudocyphellaria rainierensis*, and *Teloschistes flavicans*.

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Vascular Plants

Background and Affected Environment

The largest and most dominant organisms of the late-successional old-growth forest ecosystem are the vascular plants, some of which grow taller than 300 feet and have lifespans greater than 1,000 years. Vascular plants create the structure of the forest and function as the primary producers, capturing sunlight through photosynthesis and converting their energy to foods consumed by animals and fungi. Ranging from the dominant conifers to the delicate ferns, vascular plants are defined as those that contain conducting or vascular tissue. They include seed-bearing plants (flowering plants and conifers), and spore-bearing forms such as ferns, horsetails, and clubmosses.

In addition to their vital role in maintaining a functioning forest ecosystem, vascular plants provide important commercial resources, including timber and other special forest products.

The Survey and Manage Standards and Guidelines was originally applied to 18 vascular plant species in the Northwest Forest Plan FSEIS Record of Decision in 1994. Field surveys, research, and monitoring done since that time have provided additional information on the abundance, distribution, and range for most of these species (USDA, USDI Species Review Panel 1999b). Additional sites have been located for all species except *Bensoniella oregana*. The number of known sites has increased considerably for some species. An additional 884 sites, for example, have been located since 1993 for *Allotropa virgata*, which is an increase of over 500 percent. Field surveys have extended known ranges farther south for *Botrychium minganense* and *Corydalis aquae-gelidae*, whereas validation of existing known sites have reduced the known ranges of *Coptis aspleniifolia* and *Platanthera orbiculata*. The two latter species were previously thought to occur in Oregon and Washington, but are now known to be restricted to the state of Washington (USDA, USDI 1998c). Four species (*Arceuthobium tsugense*, *Clintonia andrewsiana*, *Pedicularis howellii*, and *Scoliopus bigelovii*) have been determined to occur in a wider range of habitats and seral stages (Hildebrand 1995, Williams 1999, Williams 1996a and Williams 1996b). Additional information obtained for *Arceuthobium tsugense* resulted in a change in the Survey and Manage Standards and Guidelines in 1995 (REO Memorandum, July 24, 1995).

Summary of Effects for Vascular Plants

A brief summary of effects for vascular plants is provided here, prior to the detailed discussion, because of the large number of species discussed.

Under the action alternatives, four species of vascular plants would be removed from Survey and Manage Standards and Guidelines and two species would be removed in part of their range because these species no longer meet all basic criteria for Survey and Manage Standards and Guidelines.

For the remaining species, the four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives would increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

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The three action alternatives have similar provisions for adaptive management to allow the agencies to respond to changing information and to provide appropriate management for species. Adaptive management will result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

Compared to the No-Action Alternative, species receive different management under the action alternatives as a result of the application of new information and the slightly different emphasis of the alternatives. Under Alternative 1, 2 and 3, strategic surveys would be added for 11 vascular plants, and 6 vascular plants would be removed from the Survey and Manage Standards and Guidelines in all or part of their range.

Under Alternative 2, one vascular plant would receive increased known site protection, and pre-disturbance surveys would be removed for four vascular plants.

Under Alternative 3, one vascular plant would receive increased known site protection.

All six of the vascular plants that are removed from the Survey and Manage Standards and Guidelines are expected to have stable, well-distributed populations.

All 12 of the vascular plant species that remain on the Survey and Manage Standards and Guidelines are expected to have stable, well-distributed populations. The likelihood of stable, well-distributed populations for these species is greater under Alternatives 1 and 3 compared to the No-Action Alternative, and is greater under the No-Action Alternative compared to Alternative 2.

Environmental Consequences and Comparison of Alternatives

In analyzing the effects of the alternatives, two assumptions were applied to two species of vascular plants.

- Riparian reserves for wetlands less than one acre do not provide sufficient protection of known sites because reserves may be too small to maintain populations (reserves extend only to the outer edge of riparian vegetation). This assumption was applied to Coptis trifolia.

- Potential habitat in reserve allocations would support a similar number of known sites as potential habitat in the Matrix. This is based on survey results obtained since 1993 and applies to Allotropa virgata.

Based on the above assumptions and information compiled since publication of the Northwest Forest Plan FSEIS in 1994, conclusions were made regarding the distribution and long-term survival of Survey and Manage vascular plants in the comparison of the four alternatives.

Compared to the No-Action Alternative, the persistence of the following six species would not be affected by removal of the Survey and Manage Standards and Guidelines in at least part of their range in Alternatives 1, 2, and 3:

- Allotropa virgata
- Botrychium minganense *in Washington*
- Clintonia andrewsiana
- Galium kamtschaticum *in the western Cascades of the Mt Baker-Snoqualmie National Forest*
- Pedicularis howellii
- Scoliopus bigelovii

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Allotropa virgata was identified at 884 locations between 1994 and 1998, increasing the number of known sites by over 500 percent. Previously, *A. virgata* was thought to be limited to low elevation forests (USDA, USDI 1994a). Surveys conducted since 1994 have located the species at elevations up to 10,000 feet in *Abies amabilis* (silver fir) forests. Potential habitat in reserves is expected to support additional populations of *Allotropa virgata* based on survey efforts conducted since 1993 (USDA, USDI 1998g). The increase in the abundance and distribution, in combination with the availability of potential habitat in withdrawn land allocations, has reduced concerns for this species (USDA, USDI Species Review Panel 1999b). *Allotropa virgata* no longer meets the basic criteria for Survey and Manage, and is expected to remain well distributed without the Survey and Manage Standards and Guidelines

Botrychium minganense is no longer a concern in the state of Washington because the number of sites in protected land allocations (USDA, USDI 1998c, Holmes et al.1999). The species no longer meets the basic criteria for Survey and Manage in Washington, and is expected to remain well distributed in the state of Washington without the Survey and Manage Standards and Guidelines.

Clintonia andrewsiana is limited to the redwood forests of northern California, and long-term survival of the species across its range has never been a concern. The original FEMAT team gave a very high likelihood of this species being well distributed and stable across federally managed lands. *C. andrewsiana* is expected to remain well distributed without the Survey and Manage Standards and Guidelines Also, since 1994, *Clintonia andrewsiana* has been found to occur in a wider range of habitats (roadsides, trails, exposed ridges, and old logging roads) and is not considered closely associated with late-successional and old-growth forests (Williams 1996a; USDA, USDI Species Review Panel 1999b). Since it is not closely associated with late-successional and old-growth forests, it does not meet the basic criteria for the Survey and Manage Standards and Guidelines.

Galium kamtschaticum is not a concern west of the Cascades in the Mt. Baker-Snoqualmie National Forest because a high number of healthy populations (41 out of 46) occur in reserves spanning an array of geographic locations and habitats (USDA, USDI 1998c; USDA, USDI Species Review Panel 1999b). The species no longer meets the basic criteria for Survey and Manage in the west Cascades of the Mt. Baker-Snoqualmie National Forest, and will remain well distributed in this National Forest without the Survey and Manage Standards and Guidelines.

Pedicularis howellii is not a concern because of its habitat association and the proportion of sites in protected habitats (administratively withdrawn). *Pedicularis howellii* is no longer considered closely associated with late-successional and old-growth forests (USDA, USDI Species Review Panel 1999b), and therefore does not meet the basic criteria for the Survey and Manage Standards and Guidelines. Recent analysis indicates that approximately 30 percent of the populations are associated with streams, lakes, and meadows, and 40 percent are located along forest edges created by trails, roads, and other forest canopy openings (Williams 1999). Williams (1999) also estimated approximately 95 percent of the populations as occurring in protected habitats (administratively withdrawn), therefore the species would remain well distributed without the Survey and Manage Standards and Guidelines.

Scoliopus bigelovii is not a concern throughout the species range because of its habitat association and abundance (USDA, USDI Species Review Panel 1999b). *Scoliopus bigelovii* has been located in a variety of habitats including clearcuts, second and third growth forests of 30 to 40 years, rock outcrops, rocky headlands, road cutbanks, highway rights-of-way, fire trails, hardwood forests, and edges of parking lots

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(Williams 1996b). The original FEMAT team gave a very high likelihood of this species being well distributed and stable across federally managed lands. It is expected to remain well distributed without the Survey and Manage Standards and Guidelines.

Compared to the No-Action Alternative, the persistence of four species (*Corydalis aquae-gelidae*, *Cypripedium fasciculatum*, *Cypripedium montanum*, and *Platanthera orbiculata* var. *orbiculata*) would not be affected by limiting management to high-priority sites in Alternative 1 and 3.

Corydalis aquae-gelidae would not be jeopardized by limiting management to high-priority sites because of the number (93) of extant sites (USDA, USDI 1998c). *Cypripedium fasciculatum* and *Cypripedium montanum* would not be jeopardized by limiting management to high-priority sites because both species have a relatively high number of extant sites (908 sites for *C. fasciculatum* and 345 sites for *C. montanum*), have low-to-high numbers of individuals per site, and moderate-to-broad ecological amplitude. *Platanthera orbiculata* ssp. *orbiculata* would not be jeopardized by limiting management to high-priority sites because of the moderate-to-high likelihood of sites occurring in reserves (USDA, USDI 1998c). All four species would remain well distributed with management of high-priority sites.

Compared to the No-Action Alternative, the following 12 species would benefit from strategic surveys in at least part of their range in Alternatives 1 and 3: *Arceuthobium tsugense* ssp. *mertensiana*; *Bensoniella oregana*; *Botrychium minganense* in Oregon and California; *Botrychium montanum*; *Coptis aspleniifolia*; *Coptis trifolia; Corydalis aquae-gelidae*; *Cypripedium fasciculatum*; *Cypripedium montanum*; *Eucephalus vialis*; *Galium kamtschaticum* in the Olympic Peninsula, the eastern Washington Cascades, and the Western Cascades of the Gifford Pinchot National Forest; and *Platanthera orbiculata* var. *orbiculata*.

All of the above 12 species have potential habitat in withdrawn land allocations (USDA, USDI 1998c; USDA, USDI Species Review Panel 1999b). Strategic surveys conducted in these areas would provide a more accurate understanding of the abundance and distribution of the species and improve the opportunity and flexibility for their management. Therefore, the probability for maintaining well-distributed populations would be increased for each species if these surveys were conducted.

Compared to the No-Action Alternative, two species would benefit from application of the Survey and Manage Standards and Guidelines throughout their entire range in Alternatives 1 and 3: *Cypripedium fasciculatum* and *Cypripedium montanum*.

Cypripedium fasciculatum is known from the Cascades of Washington, Oregon, and California; the interior valleys of Oregon; and the Klamath Mountains of Oregon and California. *Cypripedium montanum* is known from the Cascades of Washington and Oregon; the interior valleys of Oregon; and the Klamath Provinces of Oregon and California. Currently, the Survey and Manage Standards and Guidelines only applies to the Klamath Mountain Province for *Cypripedium fasciculatum* and the west Cascades for *Cypripedium montanum*. Concerns in regard to long-term survival and maintaining well-distributed populations were documented for both species throughout their respective ranges in the 1994 FSEIS (58% to 92% chance of extirpation or restriction to refugia). Applying the Survey and Manage Standards and Guideline to the entire range of each species within the Northwest Forest Plan area would improve the chances for well-distributed populations for both species (USDA, USDI Species Review Panel 1999b).

Compared to the No-Action Alternative, the probability for maintaining well-distributed populations may be decreased for four species by eliminating the requirements for pre-disturbance surveys and management of known sites discovered after September 30, 1999, in Alternative 2: *Corydalis aquae-gelidae*; *Cypripedium fasciculatum*; *Cypripedium montanum* and *Platanthera orbiculata*.

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All of these species have potential habitat in land allocations subject to habitat-disturbing activities (USDA, USDI 1998c). Populations that may contribute to the long-term survival of these species could be extirpated if pre-disturbing surveys are not conducted and if known sites discovered after September 30, 1999, are not managed over the five year period prescribed in Alternative 2. Populations providing genetic variation and connectivity could be lost. In spite of these impacts, extant known sites are sufficiently well distributed to provide for long-term survival for all four species.

In summary, all four alternatives provide for well-distributed populations over the long term for the 16 Survey and Manage vascular plants within the Northwest Forest Plan area. The likelihood of maintaining well-distributed populations is greater in Alternatives 1 and 3 as compared to the No-Action Alternative, because of the strategic survey requirements and the extended application of the Survey and Manage Standards and Guidelines to the entire range of *Cypripedium fasciculatum* and *Cypripedium montanum* within the Northwest Forest Plan area. The likelihood of maintaining well-distributed populations is less in Alternative 2 as compared to the No-Action Alternative because pre-disturbance surveys are not required and known sites discovered after September 30, 1999, do not have to be managed.

Arthropods

Background and Affected Environment

Arthropods are invertebrates with jointed legs, a segmented body, and an exoskeleton (an external supporting covering). They include insects, crustaceans, arachnids, and myriapods. Collectively, arthropods constitute over 85 percent of the biological diversity in late-successional and old-growth forests in the Pacific Northwest (Asquith et al. 1990). Arthropods assume numerous ecological roles that are crucial to ecosystem function. Lattin (pers. com.) estimates that there are between 20,000 and 25,000 described species of arthropods within the range of the northern spotted owl, and as many more yet to be described.

Arthropods inhabit virtually every part of the coniferous forest ecosystem, including coarse woody debris, litter and soil layers, understory vegetation, canopy foliage, tree trunks, snags, and the aquatic system. The litter and soil of the forest floor are the site of some of the greatest biological diversity found anywhere. The soil under a square yard of forest may hold as many as 250 species and 2 million individual mites from a single taxonomic group, as well as thousands of other mites, beetles, centipedes, pseudoscorpions, springtails, and spiders. Many of these species have not been described and most are poorly understood.

The structure and function of temperate forest soils is largely determined by the dietary habits of soil arthropods. They are the basic consumers of the forest floor where they ingest and process massive quantities of organic litter and debris, from large logs to bits of moss (Lattin and Moldenke 1992). While the richness of arthropod species in late-successional and old-growth forests suggests a great number of different processes and functions, relatively little is known about how arthropods interact, survive, and contribute to ecosystem function.

Arthropods in late-successional and old-growth forests are of concern for several reasons. First, many of the species are flightless, which means their dispersal capabilities are limited. In fact, little is known about the dispersal capabilities of these invertebrates. Second, their flightless condition is believed to reflect habitat stability and permanence of a long period and therefore they are susceptible to changes or disturbances to their

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habitat. Third, many of the old-growth forest associated species have disjunct distributions and are found only in undisturbed forests. They are often found only within the range of coniferous forests within the Pacific Northwest and are therefore endemic to this area. Fourth, arthropods are key to ecosystem function and may serve as indicators of ecosystem health. They are (1) a key element in the nutrient cycling of down longs, (2) major components in the litter and soil, (3) herbivores of the forest canopy, (4) pollinators of flowering plants, and (5) play important roles in aquatic systems. Lastly, many of the species native to this region have not been described or named, and the number of known species probably represents less than half of the number of species estimated to exist (Lattin and Moldenke 1992).

Environmental Consequences

The four arthropod guilds (litter and soil dwelling species, coarse wood chewers, understory and forest gap herbivores, and canopy herbivores, all in the south range) are placed in Category 4, General Regional Surveys in the No-Action Alternative, Category 1F in Alternative 1, Category 2D in Alternative 2, and Category 3C in Alternative 3. Because arthropods are treated as functional groups with many taxa represented in each group, the only difference among the alternatives is that the three action alternatives include provisions that specifically describe the adaptive management process. The primary reason why arthropods were included in the Survey and Manage Standards and Guidelines was a concern that their ecological functions may not persist.

The effects analysis on the four arthropod guilds in the Northwest Forest Plan FSEIS section describes the effects of Alternative 9 and reflects the expected effects of the No-Action Alternative in this SEIS. Since 1994, new information based on surveys of soil-dwelling beetles (Rappaport pers. comm.) indicates that a high percentage (at least 5% to 10%) of the arthropod fauna are newly discovered, suggesting that the degree of endemism may be greater than anticipated. For oribatid mites, prescribed fire always resulted in a significant change in community structure, but did not always result in lower numbers or lower species diversity. It appears that moderately intense to very intense prescribed burns do result in a significant reduction in both individual numbers and species diversity, but further survey work needs to be completed to validate this presumption. This new information does not substantially alter the basic assumptions or conclusions of the Northwest Forest Plan FSEIS for persistence of the four arthropod guilds.

Mollusks

Background and Affected Environment

Mollusks represent a major part of the biological diversity in late-successional forests of the Pacific Northwest. Mollusk species associated with Northwest coniferous forests include land snails, slugs, aquatic snails and clams. Mollusks may be found in a variety of habitat types. Land mollusks generally inhabit the forest litter and duff or low vegetation layers during suitably moist seasonal conditions. Many species require refugia such as large down wood, rocky outcrops, and moss-covered substrates that maintain relatively constant environmental conditions during cold or dry seasons. Some species (such as *Vertigo*) are primarily arboreal, while others (*Monadenia*) are partially arboreal and climb trees to forage, find suitable temporary cover, or escape from flooding. Local populations of slugs or snails are called colonies. Colonies vary from hundreds to tens of thousands of individuals, with colonies occupying areas ranging in size from tens to hundreds of square feet.

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As a group, mollusks are diverse in both the number of species and the roles they play in ecosystem functions. Some have very restricted geographic ranges and narrow ecological requirements. Scientists are still discovering new species in coniferous forests of the Pacific Northwest and estimate that the known fauna may eventually double (Taylor 1981, Frest and Johannes 1993). Currently, approximately 350 species of mollusks are known to occur in forests within the range of the northern spotted owl (Frest and Johannes 1993).

Land snails and slugs account for more than 150 of the currently known fauna of 350 species of mollusks. Most are found in moist forest environments and riparian areas near streams, springs and seeps. Basalt and limestone talus outcrops are also important habitats for many species. Their present distribution has been influenced by a combination of geologic, hydrologic, climatic, and biotic history in the region. More than 100 mollusk species were identified as being associated with late-successional forests (USDA et al. 1993). Within the range of the northern spotted owl, particularly in the Columbia Gorge, southwestern Oregon and northwestern California, there are groups of mollusks that are endemic (found no where else). There are concentrations of endemic species in the land snail genus *Monadenia*, the slug genus *Hemphillia,* and the aquatic snail genera *Fluminicola*, *Juga* and *Lyogyrus*.

Most mollusks are herbivores, detritivores and/or fungivores (Frest and Johannes 1993, Roth 1993). By consuming leaf litter, terrestrial snails and slugs contribute to nutrient cycling and soil productivity. Two slug species (*Prophysaon coeruleum* and *P. dubium*) consume the fruiting bodies and hyphae of forest floor fungi, and disperse viable spores and hyphal fragments in their feces (Duncan 1999). A few terrestrial mollusk species consume animal matter and fecal material, and several species (*Ancotrema*, for example) feed on other invertebrate species, including other mollusks. Many small mammals, and some birds and ground beetles consume land snails and slugs. Aquatic snails are herbivores and/or detritivores feeding on algae, bacteria and fungi growing on rocks, wood or submerged leaves (Brown 1991, pp. 293-295; Frest and Johannes 1993).

Summary of Effects for Mollusks

A brief summary of effects for Mollusks is provided here, prior to the detailed discussion, because of the large number of species discussed and the length of this section.

There are no mollusks that would be removed from Survey and Manage Standards and Guidelines under the alternatives.

The four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives will increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the agencies to respond to changing information and to provide appropriate management for species. Adaptive management will result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

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Compared to the No-Action Alternative, species receive different management under the action alternatives as a result of the application of new information and the slightly different emphasis of the alternatives. Under Alternatives 1, 2 and 3, strategic surveys are added for 47 mollusk species.

Alternative 1 would remove pre-disturbance surveys for 11 mollusk species and would remove 2 mollusk species from known site protection. Alternative 2 would remove pre-disturbance surveys from 13 mollusk species. Alternative 3 would add pre-disturbance surveys for one mollusk species.

Under the action alternatives, 42 mollusks would be expected to have the outcome of a stable, well-distributed population. For the remaining 5 mollusk species that have some risk to a stable, well-distributed population, Alternative 3 provides the best opportunity for stable, well-distributed population. Compared to the other alternatives, Alternative 1 would present a greater risk to 2 species, while Alternative 2 would present a greater risk to 5 mollusk species. The No-Action Alternative presents the greater risk to all but 2 of these species compared to the action alternatives.

Environmental Consequences and Comparison of Alternatives

Throughout the following discussion of the effects of the alternatives on the Survey and Manage mollusk species, the number of known sites given is based on data collected and stored in the Interagency Species Management System (ISMS) database. These data are a combination of the previous Known Sites database records and new information compiled from data supplied by field units in September 1998. Some field units did not provide data during this time, and as a consequence, the ISMS data may not reflect accurate numbers of known sites as of that date. During Step 2 of the species review process (analysis of known site data), in several instances these numbers were in conflict with information recorded in other documents, such as draft Management Recommendations (USDA, USDI 1998d; USDA, USDI 1998e), or published research reports (e.g., Frest and Johannes 1997). Field information collected since September 1998 (and other data not supplied during the previous ISMS data request) has not been entered into this database and is available only as estimated numbers of sites provided by field units in their responses to questionnaires. All mollusk field data collected between September 1998 and September 1999 are currently being entered into a standard database and are expected to be available by December 1999.

All action alternatives include an exception to the requirement for management of known sites. This exception refers to an occasional site which would not require management if it is determined by taxa specialists that the loss of that site would not be needed for persistence of the species.

The Survey and Manage Standards and Guidelines applied to 47 mollusk species in the Northwest Forest Plan (USDA, USDI 1994b). All of these species were assigned to categories 1 (manage known sites) and 2 (conduct surveys prior to ground-disturbing activities) (see USDA, USDI 1994b, Table C-3, pp. 59-60). The Protect from Grazing Standards and Guidelines applied to 10 species in the Northwest Forest Plan Record of Decision (USDA, USDI 1994b, p. C-6). *Pristiloma arcticum crateris, Fluminicola seminalis*, and *Fluminicola* n. spp. 1, 3, 11, 19 and 20 are both Protect from Grazing, and Survey and Manage Species. *Ancotrema voyanum*, *Monadenia fidelis klamathica* and *M. f. ochromphalus* are Protect from Grazing species only. Field surveys, research, searches of museum collections and monitoring accomplished under the Northwest Forest Plan have provided additional information for many of these species which is summarized in Table 3&4-4 (located at the end of Chapter 3).

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New known sites have been identified for 31 species; for 11 of these species the number of these sites has been increased by at least 100 percent. The distributions of these new sites were also evaluated to determine whether any constituted extensions of known ranges for a species. The new sites were interpreted as range extensions if collections were made in any National Forest or BLM District where the species was previously not expected or suspected to occur based on known ranges described in Table 1 of the Survey Protocols for aquatic and terrestrial Survey and Manage species (USDA, USDI 1998a, b). These new records have resulted in an increase in the known ranges for 14 species (see Table 3&4-4 and discussions below).

Environmental consequences for each alternative vary depending on the management proposed under each alternative and the biological attributes of each species. To simplify the analysis and presentation of environmental consequences, the 46 mollusk taxa have been organized into six groups based on the management categories described in Chapter 2 (see Tables S-2 and 2-2). The environmental consequences for each of the six groups of mollusks will be discussed separately below.

The first group is composed of species assigned to Category 1A in Alternative 1, 2A under Alternative 2, and Category 3A under Alternative 3 (see Table 2-2) and includes 31 species, of which 17 are terrestrial and 14 are aquatic. The terrestrial species are: *Cryptomastix devia*, *C. hendersoni*, *Helminthoglypta hertleini*, *H. talmadgei*, *Hemphillia burringtoni*, *H. glandulosa*, *Monadenia chaceana*, *M. fidelis minor*, *M. troglodytes troglodytes*, *M. troglodytes wintu*, *Oreohelix* n. sp., *Prophysaon coeruleum* (north of Oregon State Highway 22), *Trilobopsis roperi*, *T. tehamana*, *Vertigo* n. sp., *Vespericola pressleyi*, and *V. shasta.* The aquatic species are *Fluminicola* n. spp. 1, 3, 11, 14, 15, 16, 17 and 18, *F. seminalis*, *Juga* (*O.*) n. spp. 2 and 3, and *Lyogyrus* n. spp. 1, 2, and 3. The entire group is characterized by species that have limited known ranges and/or a low number of known sites. As a result, there was a high concern that they would experience a loss of connectivity in suitable habitat and restriction of populations to refugia, or even extirpation or extinction. Collection efforts since the Northwest Forest Plan Record of Decision have indicated increased ranges for eight species in this group: *Cryptomastix hendersoni* (one site has been added since 1994, but it represents a range extension from the vicinity of the Dalles, Oregon, southwest into the Mt. Hood National Forest), *Helminthoglypta hertleini* (three new sites have been discovered since 1994, but these have extended the known range from Siskiyou County, California, south into Trinity County, California), *Helminthoglypta talmadgei* (from 21 to 168 total sites), *Hemphillia burringtoni* (from 1 to 9 sites), *H. glandulosa* (from 5 to 69 sites), *Monadenia chaceana* (from 21 to 56 sites), *M. fidelis minor* (14 to 27 sites), *Prophysaon coeruleum* (from 2 to 4,772 sites), and *Trilobopsis tehamana* (6 to 9 sites). In light of this new information there is a lower level of concern for these species because they are more abundant and widely distributed than previously thought and knowledge of their habitat associations is improved.

The likelihood that members of this group will maintain or even expand their current abundance and distributions would be similar for each alternative because management of all known sites and surveys prior to habitat-disturbing activities would continue. Adoption of any of the action alternatives would result in a greater assurance that these species will remain well distributed than the No-Action Alternative because the action alternatives require strategic surveys. Strategic surveys would provide beneficial effects to these species by focusing surveys on areas of habitat that are most suitable to these species, such as late-successional forests and riparian reserves. Focusing strategic surveys on likely suitable habitat would increase the likelihood of detecting additional sites and, therefore, provide a more thorough basis for (1) defining habitat requirements, (2) evaluating the effectiveness of designated reserves in providing sufficient habitat to protect the species, and (3) deciding on the most appropriate kind of management to support stable, well-distributed populations. Strategic surveys can also provide information that is necessary for understanding the biology and ecology of these species and selecting high-priority sites for management.

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In summary, when compared to the No-Action Alternative, each action alternative would equally improve management to achieve the objective of ensuring that populations of the species in this group are stable and well distributed throughout the region. This improvement is due to the beneficial effects provided by strategic surveys required under the action alternatives.

The second group is composed of a single terrestrial species, *Pristiloma arcticum crateris*, which is assigned to Category 1B in Alternative 1, 2B under Alternative 2, and Category 3A under Alternative 3 (see Table 2-2). This species is characterized by its small size and cryptic habits, which make surveys impractical because individuals are difficult to find unless special survey techniques are employed. This species has a restricted known range and was known from only four sites prior to the Northwest Forest Plan Record of Decision. Collections since then have extended the range from the vicinity of Crater Lake, Oregon, to the north by the addition of a single site in the Bull Run watershed in Multnomah County, Oregon; there are no known sites in between these two areas.

Prisitloma arcticum crateris is less than 3 millimeters in size. Its range and habitat requirements are poorly understood because it is easily overlooked during a standard protocol survey. Effective surveys require special techniques that are described in the Survey Protocol, but surveyors are not required to apply them. This species is presently known from only five sites. Therefore, strategic surveys would be more efficient than standard protocol surveys prior to habitat-disturbing activities at detecting the presence of this species and, thereby, would be more efficient at clarifying its actual distribution and habitat needs. Strategic surveys are advantageous because they are focused on areas of habitat that are most suitable to these species, such as late-successional forests and riparian reserves. This would enhance the chances of discovering additional known sites, thereby providing a more thorough basis for (1) defining habitat requirements, (2) evaluating the effectiveness of designated reserves in providing sufficient habitat to protect the species, and (3) deciding on the most appropriate kind of management to support stable, well-distributed populations. Strategic surveys would also provide information that is valuable in selecting high-priority sites for management.

For this species, the requirement to manage known sites is maintained under all four alternatives. However, unlike the No-Action Alternative and Alternative 3, there is no requirement to survey prior to habitat-disturbing activities in Alternatives 1 and 2. Therefore, if Alternative 1 or 2 were implemented there would be the potential adverse effect of losing undetected populations. Due to the rarity of this species (5 known sites), this effect would be significant because it could adversely affect connectivity of sites, eventually lower genetic variability and expose populations to extirpation. The strategic surveys that are a feature of the action alternatives provide beneficial effects to this species because the surveys would be focused on areas of habitat that are most suitable to this species, such as late-successional forests and riparian reserves. Focusing strategic surveys on likely suitable habitat would increase the detection of additional sites. This focused approach would be a more thorough basis for defining habitat requirements, evaluating the effectiveness of designated reserves in providing sufficient habitat to protect the species and deciding on the most appropriate kind of Management Recommendations to support stable, well-distributed populations. Areas designated to maintain site conditions would be considerably smaller under the No-Action Alternative and Alternatives 1 and 2 in comparison to Alternative 3. Therefore, the chances that site conditions and habitat quality would be maintained are greatest under Alternative 3, because surveying a larger area would reduce the likelihood that disturbance would result in greater exposure to wind and sunlight, and avoid detrimental reductions in available moisture. The larger survey areas under Alternative 3 also have the advantage of best ensuring that connectivity within and between populations is maintained.

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In summary, the No-Action Alternative and Alternative 3 require pre-disturbance surveys, whereas Alternatives 1 and 2 do not. All alternatives require management of known sites, but the size of the survey sites would be largest under Alternative 3. The No-Action Alternative does not require strategic surveys, whereas the action alternatives do. Therefore, Alternative 3 would provide the most effective mitigation for this species, and Alternatives 1 and 2 would provide the least.

The third group is composed of two terrestrial species: *Hemphillia malonei* and *Monadenia churchi*. Members of this group are assigned to Category 1C under Alternative 1, Category 2D under Alternative 2, and Category 3B under Alternative 3 (see Table 2-2). These species are characterized by their occurrence at a much higher number of sites than what was known prior to the Northwest Forest Plan Record of Decision. *Hemphillia malonei* was known from only four sites prior to the Northwest Forest Plan Record of Decision and recent collections have established an additional 366 sites. *Monadenia churchi* was known from 40 sites and 763 sites have been added since 1994 (Table 3&4-2). These new records have increased the known ranges for both species.

Management of known sites would continue for these two species under all alternatives, except for Alternative 2 where management of known sites would apply only to sites identified prior to September 30, 1999. Surveys prior to habitat-disturbing activities would also continue under all alternatives, except for Alternative 2, where they would no longer be required. Management of these species under Alternative 2 would emphasize the generation of information to allow for a reevaluation of the status for each species in this group to determine the most appropriate management. Under these circumstances, compared to the other alternatives, Alternative 2 places both species at an increased risk of losing populations because surveys prior to habitat-disturbing activities would not be conducted, their presence would be unrecognized, and sites where they occur would not be managed. All of the action alternatives require strategic surveys, whereas the No-Action Alternative does not. Alternative 2 differs from Alternatives 1 and 3 in that the strategic surveys must be completed in 5 years. Strategic surveys provide beneficial effects to these species because the surveys provide a more thorough basis for (1) defining habitat requirements, (2) evaluating the effectiveness of designated reserves in providing sufficient habitat to protect the species, and (3) deciding on the most appropriate kind of management to support stable, well-distributed populations. Strategic surveys can also provide information that is valuable for better understanding the biology and ecology of these species and evaluating and selecting high-priority sites and/or populations critical to maintaining distribution, connectivity, range, abundance and genetic variability. Alternative 2 differs from Alternatives 1 and 3 in that the strategic surveys would be completed in 5 years. At that time, based on the information gathered, each species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed.

In summary, adoption of Alternatives 1 or 3 would best ensure the continued stability of populations and desired distribution for the species in this group because of the advantages of strategic surveys coupled with the requirement to continue surveys prior to habitat-disturbing activities. Alternative 2 would represent the greatest risk to these species because populations could be lost, resulting in a loss of connectivity and a reduction in distribution when surveys are not conducted prior to habitat disturbance.

The fourth group is composed of three terrestrial species: *Megomphix hemphilli, Prophysaon coeruleum* south of Oregon State Highway 22, and *Prophysaon dubium*. These species are assigned to Category 1D under Alternative 1, Category 2D under Alternative 2, and Category 3B under Alternative 3 (Table 2-2). These species are characterized by their occurrence at a high number of surveyed sites, and as a consequence, their ranges have all been greatly expanded compared to what was known prior to the Northwest

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Forest Plan Record of Decision. At the time of the FEMAT process, the terrestrial mollusk fauna of the Pacific Northwest had been the subject of very limited exploratory surveys (Frest and Johannes 1993, Roth 1993). As a result, these species were thought to be rare. It is now apparent from new survey results that they are actually fairly wide ranging and common in some parts of their ranges. *Megomphix hemphilli* was known from only a dozen locations prior to 1994 and since then has been found at over 700 additional sites as a result of the Survey and Manage efforts (see Table 3&4-4). Likewise, *Prophysaon coeruleum* was known from 2 sites and has been found at an additional 4,770 sites. (Note that under all action alternatives, management would continue to treat *Prophysaon coeruleum* as a rare species north of Oregon State Highway 22. The northern population was included in the 31 species of the first group and consequences of management for this northern population are evaluated along with the other members of that group.) Approximately 95 percent of the new records for *Prophysaon coeruleum* are from south of Oregon State Highway 22, and it is in this southern part of its range that many more sites were found than had been expected. Finally, *Prophysaon dubium* was known from only one site prior to the Northwest Forest Plan Record of Decision, and now is known from 2,043 sites (Table 3&4-2). As a result of these surveys, the known ranges for all three of these species have been increased, and concern for their persistence is lower because all are present at a much larger number of sites, the habitats occupied by them are not as restricted as previously thought, and known sites are now much better distributed across the landscape.

For these three species, the requirement to manage known sites is maintained under all four alternatives. However, unlike the No-Action Alternative and Alternative 3, there is no requirement to survey prior to habitat-disturbing activities in Alternatives 1 and 2. The basis for omitting surveys prior to habitat-disturbing activities from Alternatives 1 and 2 is the belief that strategic surveys would better provide the information necessary to ensure that these species are protected. Information concerning the habitat associations and conditions required to maintain populations of these species would be attained more efficiently by strategic surveys, which are a feature of all the action alternatives, than by surveys prior to habitat-disturbing activities. Strategic surveys would be more advantageous by focusing surveys on areas of habitat most suitable to these species, such as late-successional and riparian reserves. This focus would increase the likelihood of discovering additional known sites, thereby providing a more thorough basis for (1) defining habitat requirements, (2) evaluating the effectiveness of designated reserves in providing sufficient habitat to protect the species, and (3) deciding on the most appropriate kind of management to support stable, well-distributed populations. Strategic surveys would also provide information valuable to understanding life history traits and selecting high-priority sites for management. The strategic surveys under Alternative 2 would be less effective than under Alternatives 1 and 3 because they would be limited to the first 5 years after the Record of Decision for this SEIS is signed, after which time the status of these species would be reevaluated. The unlimited strategic surveys required in Alternatives 1 and 3 would be more advantageous for ensuring that populations remain stable and well distributed than under Alternative 2, because these surveys would continue beyond 5 years allowing for a continual improvement in knowledge of these species ranges and habitat requirements.

In summary, all three action alternatives would be an improvement over the No-Action Alternative because the strategic surveys in the action alternatives more than compensate for dropping the requirement for surveys prior to habitat-disturbing activities under Alternatives 1 and 2. Alternatives 1 and 3 are better than Alternative 2, because those two alternatives extend strategic surveys beyond 5 years. Alternative 3 would provide the best chance of ensuring stable, well-distributed populations when compared to all other alternatives, because it retains surveys prior to habitat-disturbing activities in addition to unlimited strategic surveys.

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The fifth group is composed of species assigned to Category 1E under Alternative 1, Category 2C under Alternative 2, and Category 3A under Alternative 3 (see Table 2-2) and includes eight species, of which three are terrestrial and five are aquatic. The terrestrial species are *Deroceras hesperium*, *Hemphillia pantherina* and *Monadenia fidelis klamathica.* The aquatic species are *Fluminicola* n. spp. 2, 19 and 20, *Vorticifex klamathensis sinitsini*, and *Vorticifex* n. sp. 1. This group is characterized by species that have very limited known ranges and/or a low number of known sites. In spite of survey efforts, new sites for members of this group have only been established for *M. f. klamathica* since the Northwest Forest Plan Record of Decision. *M. f. klamathica* is a Protect from Grazing species and surveys for it are not required under the Northwest Forest Plan. With the exception of *M. f. klamathica*, it appears unlikely that additional sites will be discovered. As a result of their limited distribution and abundance, there is a concern that the species in this group could experience a loss of suitable habitat; which would restrict populations to refugia or even cause extirpation or extinction.

The likelihood that members of this group will maintain their current abundance and distributions would be similar under all alternatives because management of all known sites would continue. However, Alternatives 1, 2 and 3 would result in a greater assurance that these species would remain well distributed than the No-Action Alternative because they require strategic surveys. Strategic surveys would be advantageous by concentrating surveys in areas of most suitable habitat, such as late-successional old-growth forests. This approach would enhance the chances for discovering additional known sites, thereby providing a more thorough basis for: (1) defining habitat requirements, (2) evaluating the effectiveness of designated reserves in providing sufficient habitat to protect the species, and (3) deciding on the most appropriate kind of management to support stable, well-distributed populations. Strategic surveys would also provide information valuable to understanding life history traits and selecting high-priority sites for management. The No-Action Alternative and Alternative 3 would maintain surveys prior to habitat-disturbing activities, and these surveys would be eliminated in Alternatives 1 and 2. It is unlikely that this provision would have any beneficial consequences because it is unlikely that additional populations that would benefit from protection will be found with further survey efforts.

In summary, the consequences for species in this group would be similar under all alternatives because their approach is to manage known sites due to the unlikelihood of discovering additional sites. However, the action alternatives are clearly an improvement over the No-Action Alternative because of their benefits afforded by strategic surveys.

The sixth group has two terrestrial snail species: *Ancotrema voyanum* and *Monadenia fidelis ochromphalus*. These species do not appear to be rare, but their present status is undetermined and additional information is needed to determine whether management under the Survey and Manage Standards and Guidelines is appropriate. Under the No Action Alternative, these species are managed under the Protect from Grazing Standards and Guidelines. Members of this group are assigned to Category 1F under Alternative 1, Category 2D under Alternative 2, and Category 3C under Alternative 3 (see Table 2-2). These species are presently managed according to the Protect from Grazing Standards and Guidelines only. Livestock grazing in the semi-dry forests where these two species occur can threaten their local survival by trampling snails that are on or within ground vegetation, and/or reducing the cover provided by herbaceous vegetation, exposing the snails to desiccation and predation. As a result of their previous status, they have not been the subject of systematic surveys and the addition of new known sites has been limited to casual discoveries and sites found incidentally while surveying for other species. There are 20 historic sites that were located before the Northwest Forest Plan Record of Decision plus 22 new sites for *Ancotrema voyanum*, and 39 historic sites, as well as 37 new sites for *Monadenia fidelis ochromphalus* (Table 3&4-2).

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Discovery of these new sites does not constitute an increase in the known range for either species.

All three action alternatives propose to move these two species from "Protect from Grazing" status to "Survey and Manage." However, the absence of required surveys prior to habitat-disturbing activities would continue. Management of known sites to protect these species from grazing impacts would continue under the No-Action Alternative. Known sites would be managed to prevent adverse impacts to these species under Alternatives 2 and 3, with a provision under Alternative 2 that no sites discovered after September 30, 1999, would be managed. Strategic surveys would be required under all three action alternatives; however, under Alternative 2, these surveys would be suspended after 5 years, at which time the status of both species would be reevaluated.

Since all of the action alternatives require strategic surveys, adoption of any one of them would allow for information to be generated that would resolve the uncertain status of each species in this group. Strategic surveys would be advantageous because surveys would be concentrated in areas of most suitable habitat, such as old-growth reserves. This approach would enhance the chances that additional known sites would be discovered by providing a more thorough basis for defining habitat requirements, evaluating the effectiveness of designated reserves in providing sufficient habitat to protect the species and deciding on the most appropriate kind of management to support stable, well-distributed populations. If information on the abundance, distribution and habitat associations generated by strategic surveys reveals that these species are more widely distributed and abundant than originally anticipated, then it would be possible to remove them from Survey and Manage status because they would not require further surveys and special management to ensure their persistence. If information generated by strategic surveys reveals that these species are vulnerable because they are rare and there is a valid reason for managing to ensure their continued existence, then the surveys will have provided the basic knowledge necessary to place them in a management category that is appropriate to ensure their protection and continued existence. Under Alternative 1, populations of these species would be at highest risk because there is no requirement to manage known sites during the period when status and appropriate management are evaluated. This circumstance raises the possibility that some populations would be disturbed and, as a result, suffer increased mortality and loss of connectivity under this alternative. Even though the No-Action Alternative does not require strategic surveys, it does require that known sites be managed which is an improvement over Alternative 1 because known populations would be subject to management. In addition to strategic surveys, Alternatives 2 and 3 also require management of known sites which is an improvement over the other two alternatives because both known and yet-to-be-discovered sites would receive management to protect these species. Alternative 3 is better than Alternative 2 because the benefits of strategic surveys would be extended beyond five years.

In summary, the species in this group would be expected to be at greatest risk under Alternative 1 because there is no requirement to manage known sites and, as a result, populations could be extirpated or experience a loss of connectivity due to habitat-disturbing activities. These species would have the greatest opportunity to have stable, well-distributed populations under Alternative 3 because of the advantages of strategic surveys and the continued management of known sites.

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Amphibians

Background and Affected Environment

Approximately 32 species of amphibians are found in the Pacific Northwest, but fewer are found in coniferous forests. The amphibian fauna of the Pacific Northwest includes 20 species that are endemic to, or have a majority of their ranges within, the Northwest Forest Plan area. The Pacific Northwest supports the second highest number of amphibian species in the United States, second only to the southeast.

Amphibians are functionally important components of coniferous forests in the Pacific Northwest. Amphibians, particularly salamanders, can reach high densities in forest ecosystems. Larvae, juveniles, and adults may function as predators or as a major food source for other vertebrate species and invertebrates.

Amphibians are particularly sensitive to environmental change because their complex life cycle exposes them to hazards in both aquatic and terrestrial environments. Most of the species require cool, moist conditions to maintain respiratory function. Stream dwelling species generally require cool water, and are sensitive to sedimentation that can inhibit reproduction and foraging. Within locales in the Pacific Northwest, populations of several species of amphibian have been extirpated, and the ranges of numerous species have been drastically reduced. Most declines have occurred in forest-dwelling species.

For detailed background information on these salamanders, see Appendix H.

Summary of Effects for Salamanders

A brief summary of effects for salamanders is provided here, prior to the detailed discussion, because of the length of this section.

Five salamanders, Del Norte, Larch Mountain, Shasta, Siskiyou Mountains, and Van Dyke's, are included in the Survey and Manage Standards and Guidelines under all alternatives. There are no salamanders that would be removed from Survey and Manage Standards and Guidelines under the alternatives.

The four alternatives have similar management actions: manage known sites, pre-disturbance surveys, and strategic surveys or extensive and regional surveys. The provision for conducting strategic surveys under the action alternatives will increase the efficiency and effectiveness of species management in the future, by prioritizing and targeting surveys to address specific questions relative to management necessary for a species.

The three action alternatives have similar provisions for adaptive management to allow the agencies to respond to changing information and to provide appropriate management for species. Adaptive management will result in more effective species management by placing the species in the category that provides the appropriate level of mitigation needed for species persistence.

Compared to the No-Action Alternative, species receive different management under the action alternatives as a result of the application of new information and the slightly different emphasis of the alternatives. Under Alternatives 1, 2 and 3, strategic surveys are added for all five salamander species.

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Alternative 1 would remove pre-disturbance surveys for the Del Norte salamander. Alternative 2 would remove pre-disturbance surveys for the Del Norte, Larch Mountain and Siskiyou Mountains salamanders.

Under Alternative 1 and 3, all five salamanders (Del Norte, Larch Mountain, Siskiyou Mountains, Shasta and Van Dyke's) are expected to have stable, well-distributed populations.

Under Alternative 2, the Shasta and Van Dyke's salamanders are expected to have a stable, well-distributed population. The Del Norte, Larch Mountain salamanders are expected to have stable, well-distributed populations, although with somewhat greater risk for this outcome. Under Alternative 2, the Siskiyou Mountains salamander may be at a substantial risk to its population and range.

Background - Shasta Salamander (*Hydromantes shastae*)

In the Northwest, this species is the least known salamander with the smallest range (Appendix J2 USDA, USDI 1994b). Concern for the maintenance of its few, scattered populations stems from its low dispersal ability, low reproductive rate, and narrow habitat/microclimate requirements that are sensitive to disturbance (see below; USDA, USDI in prep.).

Habitat is primarily limestone rock outcrops, as originally described in the Northwest Forest Plan (Appendix J2 in USDA, USDI 1994b). New information has demonstrated that this animal also inhabits the forested slopes adjacent to rock outcrops, at least up to 200 meters from the edge of an outcrop (Lewendal 1995; USDA, USDI in prep.). Recent Survey and Manage mollusk surveys determined additional habitat that is occupied by this species: forested sites distant from rock outcrops (P. Lewendal, pers. comm., P. Crumpton, pers. comm.). This new habitat knowledge is important because the species may have a broader distribution than historically recognized. Surveys for this species have focused on limestone rock outcrops (Papenfuss and Brouha 1979, Lewendal 1995). Potential habitat has not been well surveyed (P. Lewendal, pers. comm.).

Cool, moist microclimate conditions are important for this species survival. (USDA, USDI in prep.). During seasons of surface activity, downed wood appears to be used as dominant microhabitat cover by this animal in forested slopes adjacent to outcrops and in those few sites not associated with rock (Lewendal 1995; USDA, USDI in prep.). Changes in habitat that alter microclimates (such as increasing temperatures or decreasing moisture levels) or microhabitat structure (reduced wood or compacted substrates) are expected to have adverse effects on the survival of this animal. Such changes occur with timber harvest and ground-disturbing activities (de Maynadier and Hunter 1995).

The Northwest Forest Plan FSEIS and FEMAT Report do not discuss the species being associated with late-successional old-growth forest habitat, yet there are attributes of late-successional old-growth forests (such as down wood and cool moist microclimates) that are important for this species survival (USDA, USDI Species Review Panel 1999b; USDA, USDI Species Review Panel 1999c). These attributes can occasionally appear in younger age class forest habitat. At some localities, the species appears to persist without canopy closure because those sites have deep rocky substrates (USDA, USDI in prep.).

As stated in the Northwest Forest Plan FSEIS, this species occurs as naturally disjunct populations that are genetically isolated (USDA, USDI 1994a). There is a concern about some populations of this species in light of the genetic information (Wake et al. 1978; Pappenfus and Brouha 1979; USDA, USDI in prep.). Genetic differences among some adjacent populations of the Shasta salamander are as great as between this species and

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its congener in the Sierra Nevada Range. This is relevant because loss of single populations may represent a significant loss of biodiversity.

Currently, there have been 35 sites discovered that likely represent 14 populations (USDA, USDI 1999b). Two levels of patchiness apply to the distribution of this species: (1) their suitable habitat is patchy in distribution, and (2) the species distribution is patchy within apparently suitable habitat.

Most sites were reported over two decades ago. It is not known how many sites are extant (USDA, USDI 1999a). After 1993, the Northwest Forest Plan led to a surge of federal survey efforts for salamander species named in the Survey and Manage mitigations (USDA, USDI 1999b). Only two sites have been identified since 1993 on federally managed lands within this species range.

Federally managed lands figure prominently as habitat for this animal (USDA, USDI 1994b). Currently, 23 of 35 known sites are on federally managed lands. Likewise, about 70 percent of the known range is on federally managed lands, with about 23 percent in Administratively Withdrawn and 47 percent in Matrix (Nauman and Olson, 1999).

Background - Van Dyke's Salamander (*Plethodon vandykei*) - Cascade Range Populations

Concern for the maintenance of the few, scattered populations of this species in the Cascade Range stems from its low dispersal ability, low reproductive rate, and narrow habitat and microclimate requirements that are sensitive to disturbance (see below; USDA, USDI 1999b). Also, there is concern about some populations of this species in light of potential genetic and morphologic variation (Brodie 1970, Highton and Larson 1979). Loss of biodiversity (such as evolutionary significant units) could result if sites are not maintained.

Although the definition of habitat is very broad when including caves, talus, streams, and lakes, this species appears to have a strong association with riparian environments. In and near aquatic habitats, the most important habitat attributes appear to be cool temperatures (4 to 14°C) (USDA, USDI 1999b) and moist habitats with geologically stable substrates. Such microclimates can be found in interior forest stands, but may be affected by a variety of timber harvest and other land management activities (Chen et al. 1995, Brosofske et al. 1997).

There may be attributes of late-successional old-growth forests (such as cool, clear, water; and cool moist microclimates) to which this species has associations, however, this has not yet been clearly established for the Washington Western Cascades Province (USDA, USDI 1999b; USDA, USDI Species Review Panel 1999b). Preliminary results from the Olympic Peninsula population have found the species to have a higher frequency of occurrence and greater abundances in stands with late-seral characteristics (L. Jones, M. Raphael and P. Bisson, unpublished). The Northwest Forest Plan FSEIS reported 8 known sites, and Wilson et al. (1995) documented 23 sites; currently, 28 sites are known (USDA, USDI 1999b).

The known sites within the Cascade Range are extremely patchy in distribution (USDA, USDI 1999b). Although habitat is not homogeneous in this area, the known locations of Van Dyke's salamanders are more spotty in distribution than would be expected given the available riparian habitat (USDA, USDI Species Review Panel 1999b).

Federally managed lands figure prominently as potential habitat for this animal (USDA, USDI 1994a). Currently, 20 of 28 (70%) known sites, and 49 percent of the known range, are on federally managed lands (USDA, USDI 1999b). Sites occur in several federally

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managed land allocations: seven sites are in Withdrawn lands, eight in Matrix, and five sites are in Late-Successional Reserves.

Several potential and known threats to the maintenance of this salamander at known sites are identified due to adverse effects on habitats and microclimates. These include road building and timber harvest. In particular, channel scouring resulting from mass-wasting events, such as landslides, may be detrimental to this species (Crisafulli, pers. comm.; USDA, USDI Species Review Panel 1999b).

Environmental Consequences - Shasta Salamander and Van Dyke's Salamander

All four alternatives set forth in this SEIS contribute significantly to the maintenance of the few, scattered populations of these two species on federally managed lands within the Northwest Forest Plan area. Under all four alternatives, all current and future known sites would be managed and surveys would be required for the species before habitat disturbance. However, there are risks to the maintenance of salamanders at known sites under the No-Action Alternative, as discussed below. The three action alternatives do not have these risks.

Also under all four alternatives, Riparian Reserves provide protection for Van Dyke's salamander populations in or near aquatic habitats. Management within Riparian Reserves (such as activities to achieve restoration or late-successional old-growth forest objectives) also could adversely affect salamanders within these areas by direct habitat disturbance or indirect adverse effects on animals by altered microclimate regimes.

Shasta Salamander: Under the No-Action Alternative, this species is a Protection Buffer species and listed under the Survey and Manage provision Categories 1 and 2. Under these categories, all current and future known sites would be managed and pre-ground disturbing surveys would be required for the species. However, several adverse effects of this alternative on the species are identified.

There is conflicting guidance between the Protection Buffer management standards for known sites and those of Survey and Manage, because the activities and the areas managed under the two standards and guidelines differ (see below). This results in potential management inconsistencies that could have adverse effects on the maintenance of salamanders at known sites.

Importantly, the Protection Buffer guidelines do not recognize the area surrounding limestone rock outcrops as habitat for this species; outcrops are buffered to at least the distance of the height of one site-potential tree or 100 feet. Yet this species occurs at least up to 200 meters from outcrops (Lewendal 1995; USDA, USDI in prep.). Utilization of the Protection Buffer guidance will lead to adverse impacts to individuals and potentially populations reliant on slope habitat adjacent to outcrops. Some sites are not associated with limestone outcrops. Management of such sites is not addressed by the Protection Buffer provision, which would put those populations at significant risks to extirpation.

Additionally, the Protection Buffer guidance protects outcrop sites from timber harvest, mining, quarry activity, and road building. Olson and Lewendal (USDA, USDI 1999b) identified recreation as a threat. In the region of Shasta Lake, recreational use of federally managed lands is escalating significantly. Collection of downed wood for firewood can have significant effects on the availability of surface refugia for salamanders, affecting survival and population maintenance.

Since Protection Buffer guidance provides for a standard 100-foot buffer from the perimeter of limestone outcrops and does not allow for the inclusion of adjacent habitat

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(see above), there will be a significant adverse effect of loss of salamander habitat and potential loss of the animals themselves if vegetation management or adverse recreational effects occur in occupied areas outside the 100-foot buffer.

Van Dyke's Salamander: Under the No-Action Alternative, this is a Survey and Manage Category 2 species. Under this category, pre-ground disturbing surveys are required for the species. Also, under this category, known sites are managed. Management recommendations are to be developed to manage habitat for the species on sites where they are located.

Both Shasta and Van Dyke's salamanders are in Category 1A under Alternative 1, Category 2A under Alternative 2, and Category 3A under Alternative 3. Contributing to these placements is the fact that these species are known from very few sites that represent even fewer known populations because some sites together represent only one population. Other contributing factors are their extremely restricted geographic ranges, their narrow habitat requirements, their high site fidelity and low dispersal rates, their low reproductive rates, and the extent of their geographic range on nonfederally managed lands (see above). Under these action alternatives, all current and future known sites would be managed and pre-disturbance surveys would be conducted to minimize the inadvertent loss of undiscovered sites. Strategic surveys would be required.

Alternatives 1, 2 and 3 provide for several beneficial effects to the maintenance of these species as compared to the No-Action Alternative. First, there are no potential inconsistencies or variable interpretations in the standards and guidelines for species protection, as there is in the No-Action Alternative with conflicting Protection Buffer, and Survey and Manage provisions.

Second, the Management Recommendation guidance in Alternatives 1, 2, and 3 for these species allows more management latitude over Protection Buffer guidance under the No-Action Alternative. Under Categories 1A, 2A and 3A, all current and future known sites are to be managed. Under Alternative 3, in particular, all occupied sites would be managed with a buffer of 250 meters at minium (which equates to19.6 hectares, or 48.5 acres). This 250-meter buffer requirement of Alternative 3 recognizes the microclimate constraints needed by these two species, because it is designed to provide "interior" forest conditions (Chen et al. 1995). The Management Recommendations identify the appropriate management for the site. Such guidance provides a mechanism for management flexible enough to allow entry into this buffer or an occupied site if a proposed activity does not adversely affect the species (that is, does not impact its microclimates, species habitats, or the species themselves). In comparison to Alternatives 1 and 2, however, it is likely that this measure has negligible species benefits because direction for Management Recommendations developed under all three action alternatives is similar, even though a buffer is delineated in Alternative 3. For microclimate and microhabitat maintenance, a buffer concept is likely to be applied in Alternatives 1 and 2, as in the existing Management Recommendations under the No-Action Alternative (USDA, USDI 1999b; USDA, USDI in prep.).

Areas within sites, components of sites, or entire occupied sites needed for species persistence can be identified in the action alternatives. Additionally, significant population centers critical to species persistence can be identified. This results in a management strategy that is not restricted to the individual site scale, but that considers adjacent habitats and populations during site management decisions; it can cross spatial scales, which results in a more comprehensive and viable approach for species conservation. Similarly, Categories 1A, 2A, and 3A address issues of habitat fragmentation and dispersal capability relative to federally managed lands. These issues will lead to an across-scale examination of population dynamics and species distributions when strategic surveys are designed and implemented. Under

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Alternatives 1, 2 and 3, these issues can be addressed by management guidance. Alternatives 1, 2 and 3 will lead to significant positive effects to species conservation because site and population dynamics that rely on processes occurring at larger scales than an individual site are being addressed in the species management.

Lastly, the addition of strategic surveys to these alternatives, in comparison with the No-Action Alternative, has important implications. The following information is unknown: (1) the extent of the range for these animals; (2) habitat associations across their ranges; (3) which historic sites are extant; (4) relative abundance of animals at each known site or population; and (5) the distribution of the species on all protected land allocations. New information compiled from strategic surveys would aid further refinement of Survey Protocols and Management Recommendations for this species, contributing to maintenance of the population or species.

The three action alternatives, as compared to the No-Action Alternative, contribute significantly more to the maintenance of the few, scattered populations of these two species on federally managed lands in the Northwest Forest Plan area.

Background - Siskiyou Mountains Salamander (*Plethodon stormi*) and Larch Mountain Salamander (*Plethodon larselli*)

This species is included in the Survey and Manage provision due to its high site fidelity and low movement rate, narrow habitat and microclimate requirements (see below), patchy habitat distribution across the known range, patchy distribution among sites containing suitable habitat, very limited overall range relative to the areal extent of the Northwest Forest Plan, and the sensitivity of both the species and its required habitat elements to adverse disturbance effects (Welsh and Lind 1992; USDA, USDI 1994a; USDA, USDI 1999b). Additionally, species in this genus are long lived but slow to develop to sexual maturity, and have small clutch sizes (Houck 1977). Both the identification and maintenance of occupied habitats are essential for management contributing to the long-term maintenance of this species on federally managed lands.

Known habitat for this species is as originally described in the Northwest Forest Plan FSEIS: forested rocky substrates under a closed canopy that provides cool, moist microclimates suitable for salamander surface activity (Appendix J2 inUSDA, USDI 1994b). Edaphic conditions (regolith: soil and rocky substrate) may be a surrogate for the canopy relative to microclimate buffering (deMaynadier and Hunter 1995). The species can occur in all seral stages, but abundances in southwestern Oregon are higher in older forests (Nussbaum 1974).

Habitat in the form of rocky substrates is relatively widespread throughout the range of the species, but is often extremely patchy in its distribution and is highly variable in patch size and contiguity (USDA, USDI Species Review Panel 1999b; USDA, USDI 1999b; USDA, USDI in prep). Occupancy rates in suitable habitat are quite low, ranging from 20 percent south of the Siskiyou crest in California to 30 percent north of the Siskiyou crest in Oregon (L. Ollivier, unpubl. data).

Recent federal survey efforts have contributed significantly to knowledge of the species distribution and habitat. This species is found only in the Oregon and California Klamath Provinces. Due to federal research and survey efforts since the implementation of the Northwest Forest Plan, the range has been extended approximately 18 kilometers to the south, 11 kilometers east, and 16 kilometers west. These range extensions include the addition of one to two populations south of the Klamath River. The upper elevational limit has been extended to 1,830 meters (6,000 feet). The range has roughly

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doubled to approximately 130,000 hectares since 1993 (with the addition of Mill Creek, Thompson Creek, and Grider Creek in California). The edge of the northern portion of the range is fairly well delineated. Although the species range is significantly expanded, it remains limited to a small area of the Oregon/California border.

Currently, there are 163 known sites of this species within a range covering 136,595 ha (federal and nonfederal lands) (USDA, USDI Species Review Panel 1999b). Most of the sites have been discovered by recent federal research and surveys: 116 were found after 1993. Sites reported prior to 1993 may no longer be extant particularly, on nonfederal land, because of adverse impacts from land management activities on habitat and microclimate in these occupied sites. For analysis in this document all sites reported from 1980 to present (129) are considered possibly extant. There appear to be 6 to 10 populations based on contiguous habitat and site clusters; some may be more isolated than others (USDA, USDI Species Review Panel 1999b).

Federally managed lands figure prominently as habitat for this animal (USDA, USDI 1994a). Currently, 151 sites (93%) and 84 percent of the range are on federally managed lands (USDA, USDI 1999b). Of the 151 occupied sites on federally managed lands: 109 sites (67%) are predominantly located in Adaptive Management Areas, 3 sites (2%) are in Matrix, 35 sites (21.5%) occur in Late-Successional Reserves, and 4 sites (2.5%)occur in Administratively Withdrawn Areas. There are currently no sites identified in the Congressionally Withdrawn Areas. About 27 percent of the current known range is in Late-Successional Reserves, 38 percent of the range is located in Adaptive Management Areas, 9 percent is in the Matrix, 7 percent is in Administratively Withdrawn Areas, and 4 percent is in Congressionally Withdrawn Areas (USDA, USDI 1999b). The remaining 14 to15 percent of the range is on nonfederal land.

There is concern about some populations of this species in light of the new genetic and morphologic information. Preliminary results from a recent genetics study indicate that several sites in California show genetic divergences that may be species level differences. (USDA, USDI Species Review Panel 1999b). Potential loss of genetic biodiversity is a significant concern if unique populations are lost, regardless of the extent of future taxonomic revisions.

Background - Larch Mountain Salamander (*Plethodon larselli*)

This species is included in the Survey and Manage provision due to its high site fidelity, low movement rate, long generation time, microclimate constraints and association with late-successional old-growth forest components (USDA, USDI 1994a). The species range is very limited in size relative to the Northwest Forest Plan area, and occupied sites are found in limited areas within the known range. Additionally, species in this genus are long-lived but slow to develop to sexual maturity, and have small clutch sizes (Houck 1977).

Habitat types are as originally described in the FEMAT Report and the Northwest Forest Plan FSEIS, including talus and rocky slopes with a dense conifer overstory (Herrington and Larsen 1985; Appendix J-2 in USDA, USDI 1994b). Recent additions to this description depart from the previous narrow habitat description; characteristics of these sites are much broader (Aubry et al. 1987; Chrisafulli 1999; USDA, USDI in prep).

The species has a narrow range of microclimate requirements at all sites. The majority of known sites for this species reflect narrow habitat and microclimate requirements.

Currently, there are 99 known sites of the Larch Mountain salamander. About a third of these have been identified since implementation of the Northwest Forest Plan (USDA, USDI 1999b).

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The range of the Larch Mountain salamander is not well delineated. From relatively recent Northwest Forest Plan surveys, the range has been extended approximately 67 kilometers to the north. Total area encompassed by known sites has increased from 167,281 hectares in 1980: to 625,029 hectares in 1993; and to 1,077,587 hectares in 1998 (USDA, USDI 1999b).

Federally managed lands are important for this species (USDA, USDI 1994a). Of the 99 known sites, 58 sites (70% of the range) are located on federally managed lands. Of those, 37 sites are located in Late-Successional Reserves, 4 in Administratively Withdrawn areas, 6 in Congressionally Withdrawn Areas, 6 in Adaptive Management Areas, and 5 in Matrix (USDA, USDI 1999b).

Environmental Consequences - Siskiyou Mountains Salamander and Larch Mountain Salamander

All four alternatives contribute to the distribution of populations within the range of these two species on federally managed lands within the range of the northern spotted owl. There are distinct differences among the effects on the species by alternative.

The No-Action Alternative would require surveys prior to habitat-disturbing activities and management of current and future known sites. The No-Action Alternative also places the Siskiyou Mountain and Larch Mountain salamander species under the Protection Buffer Standards and Guidelines. There is conflicting guidance between the Protection Buffer management standards for known sites, and those of Survey and Manage because both activities and areas managed differ (see below). This results in potential management inconsistencies that could have adverse effects on the maintenance of salamanders at known sites.

In each case, Management Recommendations have been drafted to meet site management requirements under Survey and Manage. The Management Recommendations recognize that management activities and site conditions vary, and that approaches for species protection need to consider both. Under Protection Buffer Standards and Guidelines, all sites are provided a Managed Late-Successional Area land-use allocation with a single size buffer of 100 feet or one site potential tree height, whichever is larger. Since Protection Buffer guidance provides for a uniformly applied 100-foot buffer there is no allowance for determining a site-specific buffer that may need to be greater than 100 feet to maintain the integrity of the site's microclimate.

The No-Action Alternative contributes to the maintenance of populations of these species on federally managed lands through management of all current and future known sites, but does not contribute to maintenance of gene flow among the scattered populations of these species in their ranges by addressing connectivity of sites. This loss of gene flow among sites can lead to loss of genotypes.

Under Alternative 1 both species are placed in Category 1C. For species in this category, all current and future known sites would be managed until high-priority sites are determined. Pre-disturbance surveys would be conducted to minimize the inadvertent loss of undiscovered sites. Strategic surveys would be required under this category.

For these two species, Alternative 1 provides for several beneficial effects to the maintenance of these species as compared to the No-Action Alternative. First, there are no inconsistencies in the standards and guidelines for species protection, as there are with both Protection Buffer and Management Recommendation guidelines in the No-Action Alternative that could lead to loss of salamander sites.

Second, managing all known sites (and presumed occupied sites in the case of the Siskiyou Mountains salamander, see pp. 2-33, 2-52) for occupancy is required until

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Management Recommendations are developed, approved and adopted. This is essential to eliminate loss of potential high-priority sites while Management Recommendations are designed. In contrast to the No-Action Alternative, the Management Recommendations identify high-priority sites for management. At the remaining known sites, land management activities would be permitted that could have adverse effects to the species and its habitat on some sites without adversely affecting the species distribution across its range. Significant population centers critical to species persistence can be identified. This approach retains some populations and provides repopulation sources (Wilcox 1980). This results in a management strategy that is not restricted to the individual site scale, but that considers adjacent habitats and populations during site management decisions; it can cross spatial scales which results in a more comprehensive approach for species conservation. In addition, this results in negligible risks to these species because they will remain distributed at sites throughout their ranges.

A beneficial effect of Alternative 1 as compared to the No-Action Alternative is that Management Recommendations for these species are not restricted in scope to the scale of known sites. Management Recommendations can consider the aggregates of sites that form more biologically-significant units, such as populations or metapopulations, in the prioritization process. Management Recommendations developed under Alternative 1 cross spatial scales and consider population ecology (Soulé 1980, Leigh 1981, Wilcox and Murphy 1985; Welsh 1990). This is particularly significant because these species will have their high-priority sites identified with the new information gained from strategic surveys concerning their population ecology.

As in the No-Action Alternative, detection of new sites is possible as a result of pre-disturbance surveys and strategic surveys. This mitigation measure reduces the risk of inadvertent loss of undiscovered sites through impacts from land management activities. All sites are identified and considered during site prioritization in the development of the Management Recommendations.

Strategic surveys would be required in Alternative 1. New information compiled from strategic surveys would be critical for refining and updating Survey Protocols and management guidelines for these two species through better defining source populations, habitat requirements and geographic range. Site prioritization for the Management Recommendations for these species will be limited without information that can be acquired through implementing strategic surveys. This includes lack of information on location of extant sites, geographic range, distribution of these species on protected land allocations and distribution of unique populations.

Overall, Alternative 1 differs from the No-Action Alternative by shifting management for species persistence away from individual sites to populations and larger spatial scales. Alternative 1 does contain the risk of extirpation of species individuals at local sites due to direct adverse effects of land management on microclimates necessary to the species. Information to fill critical knowledge gaps could be gained from strategic surveys. When strategic surveys are implemented, more scientifically credible high-priority sites may be identified. Greater connectivity of sites is possible through Management Recommendations under Alternative 1, in comparison to known site management alone in the No-Action Alternative. Such connectivity results in greater stability of high-priority sites over the long term (Soulé 1980, Wilcox 1980, Leigh 1981, Wilcox and Murphy 1985, Welsh 1990, Welsh and Lind 1992).

Alternative 2 places the Siskiyou Mountains and Larch Mountain salamander in Category 2D. All known sites (including presumed occupied habitats, see pp. 2-33, 2-52) located as of September 30, 1999 are managed. No pre-disturbance surveys would be required, and no newly detected sites would be managed. Strategic Surveys would be completed in five years. Based on the information gained from Strategic Surveys, these

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species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed.

Alternative 2 creates uncertainty in how species will be managed following the 5-year interval. Information on the species that can be reliably acquired in that time frame includes species distribution in withdrawn and reserve land-use allocations, distribution of sites in range, distribution of habitat in all withdrawn or reserve land-use allocations, and range extent. In the case of the Larch Mountain salamander, large increases in number of known sites are unlikely because few new known sites have been detected in the five years following implementation of the Northwest Forest Plan (27 of 99). During this same amount of time, 116 new sites for the Siskiyou Mountains salamander were identified, but the majority of those were detected through Northwest Forest Plan-related research directed at habitat modeling, not surveys for species distribution. The research data took 4 years to collect and will require over 1 year for analysis and model development. Population demography information such as status and characteristics must span at least one generation of the species to be informative. Both the Siskiyou Mountains and Larch Mountain salamanders are long-lived and slow to develop to reproductive maturity like other species in their family (Houck 1977).

Among the unknown data for these species are: (1) their range extent, (2) habitat associations across their ranges, (3) which historic sites are extant, (4) relative abundance of animals at each known site or population, and (5) the distribution of the species on all protected land allocations. In five years, it is likely that range extent and distribution questions could be answered, but as stated above, habitat association information for Larch Mountain salamanders may not be attainable. This lack of information on these species population ecology can not be achieved in 5 years. Therefore, a decision to recommend one of the following: (1) consideration of these species for sensitive species designation, (2) consideration for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed; would be based on this incomplete information and level of uncertainty. The greater the uncertainty, the more difficult it is to manage risk (see Ch 3&4, Forest Ecosystems). Alternatives 1 and 3 do not have this five year time limit on completing strategic surveys. Therefore, these two action alternatives could delay the decision on the long-term management of these species until a time when there was more information available to make future Management Recommendations and therefore reduce uncertainty and reduce difficulty in managing risk in maintaining stable well-distributed populations of these species.

The most consequential difference in effects of Alternative 2 compared to the other alternatives is that pre-disturbance surveys would not be required and sites discovered after September 30, 1999 would not be managed. This management would continue for five years, after which information gained through strategic surveys would be used to determine the further management of these species as described above. The result of management under Alternative 2 would be to increase risk of loss of known sites that may be important to these species distribution. The extent or magnitude of this risk to the species is difficult to characterize because of current incomplete information. However, some understanding of the risk of adverse effects can be made by examining the extent of management activities during the five year period and the amount of the species range within land-use allocations that provide various degrees of protection to habitat.

The extent of management activities that would modify late-successional habitat can be characterized on an overall basis in the Northwest Forest Plan area (see Ch 3&4, Forest Ecosystems). Although this overall characterization provides some useful information,

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it lacks the local specificity to accurately assess risks at the microsite habitat level that is important to these species.

Under Alternative 2 loss of salamanders at unidentified sites may occur because no new sites will be detected through pre-project surveys and managed after September 30, 1999. This may be important because large areas of the species ranges remain unsurveyed. In particular, land management activities in Matrix, Adaptive Management Areas, and Late-Successional Reserves have the potential to adversely effect microclimate and other habitat requirements for these species. For example, in Late-Successional Reserves, thinning in stands less than 80 years old to accelerate late-successional old-growth forest development reduce canopy closure to below recommended levels for these species and disturb suitable habitats at undetected sites (Welsh and Lind 1995; USDA, USDI in prep).

The level and extent, especially at local levels, of management activities during this five year period that have the potential to adversely affect species sites is difficult to estimate with accuracy. However, despite this incomplete information, conclusions concerning risk to species sites, populations and range may be further assessed by examining the percentage of the species range in these land-use allocations. Under Alternative 2, sites for Siskiyou Mountains and Larch Mountain salamanders would be most secure within Congressionally Withdrawn areas; less secure in Administratively Withdrawn Areas, Late-Successional Reserves, and Riparian Reserves; and least secure in Adaptive Management Areas and Matrix. The reason for this descending order of security for species sites is because the level and extent of management activities that could lead to adverse effects on species sites varies within these land-use allocations. Congressionally Withdrawn Areas have almost no management activities and Administratively Withdrawn areas have very little management activities that would adversely affect species sites. Although Late-Successional Reserves and Riparian Reserves are limited in management activities through standards and guidelines and Late-Successional Reserve assessments, there could still be adverse effects to species sites through habitat restoration or enhancement activities such as thinning or prescribed burning. Although under all alternatives, the level of timber harvest in the Matrix is anticipated to decrease (see Ch 3&4, Timber), management activities in the Matrix are more likely to have adverse effects on species sites because the level and extent of management activities is greater than in the other land-use allocations.

In the discussions below of the percentage of species range in various land-use allocations, the Geographic Information System (GIS) is not able to differentiate the Riparian Reserves and Matrix land-use allocations. In any given overall area, a percentage of that area consists of Riparian Reserves. This percentage varies from approximately 80% in the Coast Range to 30% in the high elevation, lodgepole ecosystem of the Cascade and Sierra Ranges. The Siskiyou Mountains, Larch Mountain, and Del Norte salamanders are not particularly associated with riparian areas although they do not avoid these areas. The percentages of species range given for the Matrix in this discussion also includes Riparian Reserves, and is therefore presented as "Matrix/ Riparian Reserve".

The Siskiyou Mountains salamander's range is approximately distributed 4% within Congressionally Reserved areas, 7% within Administratively Withdrawn areas, 27% within Late-Successional Reserves, 38% within Adaptive Management Areas, and 9% within Matrix/Riparian Reserves. The remaining habitat is located on nonfederal land (USDA, USDI 1999b). Approximately 47% (Adaptive Management Areas and Matrix/ Riparian Reserves) of this species range is located within areas that are subject to higher levels of management activities that have the potential to cause loss of sites. The presence of Riparian Reserves and the five year time period lessens the amount of risk that the percentage of the range may appear to be subject to disturbance through

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management activities. However, on an overall basis, the percentage of range subject to loss of sites may present a substantial risk to the Siskiyou Mountain salamander's populations and range.

The Larch Mountain salamander's range is approximately distributed 22% within Congressionally Reserved areas, 4% within Administratively Withdrawn areas, 19% within Late-Successional Reserves, 6% within Adaptive Management Areas, and 15% within Matrix/Riparian Reserves. The remaining habitat is located on nonfederal lands (USDA, USDI 1999b). Because of the relatively high percentage of this specie's range that is distributed in the more protective land-use allocations, risk to the Larch Mountain salamander's population and range is relatively low.

The Siskiyou Mountains and Larch Mountain salamander would be at greater risk to their populations and distribution under Alternative 2 compared to the other alternatives because the other alternatives have a lower risk of loss of species sites through the application of pre-disturbance surveys and management of known sites. However, on an overall basis, these species populations and distribution may be at a relatively low to substantial risk under Alternative 2 because of the percentage of its range within the Adaptive Management Areas and Matrix compared to other land-use allocations where species sites are less likely to be lost through management activities. Although the extent of these species distribution or habitat distribution within reserves is not fully known, it is likely that significant increases in such information could be gained during the five year period of Strategic Surveys under Alternative 2.

Under Alternative 3, both species fall in Category 3B. Under this category, all current and future known sites would be managed until high-priority sites could be determined. Equivalent-effort surveys would be conducted in an effort to minimize the inadvertent loss of undiscovered sites. Strategic surveys would be conducted for the species to determine important habitat and the ability of reserves to provide reasonable assurance of persistence.

A beneficial effect of Alternative 3, compared to the No-Action Alternative, is that Management Recommendations for these species are not restricted in scope to the scale of known sites. Management Recommendations can consider the aggregates of sites that form more biologically-significant units such as populations, or metapopulations in the prioritization process. Management Recommendations developed under Alternative 3 cross spatial scales and consider population ecology elements of viability, which makes them more scientifically credible (Soulé 1980, Leigh 1981, Wilcox and Murphy 1985, Welsh 1990). This is particularly significant because these species will have their high-priority populations or sites identified with the new information gained from strategic surveys concerning their population ecology.

As in the No-Action Alternative, detection of new sites is possible as a result of equivalent-effort surveys prior to habitat-disturbing activities and strategic surveys. This mitigation measure reduces the risk of inadvertent loss of undiscovered sites through impacts from land management activities. All sites are identified and considered during site prioritization in the development of the Management Recommendations.

Strategic surveys would be required in this alternative and will have important implications to future site management. New information compiled from strategic surveys would be critical for refining and updating Survey Protocols and management guidelines for these two species through better defining source populations, habitat requirements and geographic range. Site prioritization for the Management Recommendations for these species will be limited without information that can be acquired through implementing strategic surveys. This includes lack of information on

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location of extant sites, geographic range, distribution of these species on protected land allocations and distribution of unique populations without information that can be acquired through implementing strategic surveys.

Overall, Alternative 3 differs from the No-Action Alternative by shifting management for species persistence from individual sites to populations and larger spatial scales. Alternative 3 does contain the risk of extirpation of species individuals at local sites due to direct adverse effects of land management on microclimates necessary to the species. At the outset of Alternative 3 implementation, it is possible that few high-priority sites could be identified with certainty in some areas. Information to fill important knowledge gaps needed to prioritize sites for management could be addressed by information gained from strategic surveys. When strategic surveys are implemented, more scientifically credible high-priority sites may be identified. Greater connectivity of sites is possible through Management Recommendations under Alternative 3, in comparison to known site management alone in the No-Action Alternative. Such connectivity results in greater stability of high-priority sites over the long term (Wilcox 1980, Soulé 1980, Leigh 1981, Wilcox and Murphy 1985, Welsh 1990, Welsh and Lind 1992).

The inclusion of pre-disturbance surveys in Alternative 3 eliminates the potential loss of newly identified sites in proposed project areas because they are managed once detected; Alternative 2 does not include this mitigation. All sites are identified and considered during site prioritization in the Management Recommendation. Additionally, Alternatives 1 and 3 do not have the limitation on time for completing strategic surveys that is found in Alternative 2. This is a significant benefit to the species through providing adequate time to collect information necessary to determine status and concern for these species and make suitable recommendations regarding future management. This ensures the highest likelihood of species remaining wide-spread throughout their range among all alternatives due to protection of occupied sites throughout the species range and management that includes consideration of connectivity and genetic consequences.

Background - Del Norte Salamander (*Plethodon elongatus*)

This species is included in the Survey and Manage provision due to its high site fidelity and low dispersal rate, narrow habitat and microclimate requirements (see below), patchy habitat distribution across the known range, patchy distribution among sites containing suitable habitat, very limited overall range relative to the area of the Northwest Forest Plan, and the sensitivity of both the species and its required habitat elements to adverse disturbance effects (Welsh and Lind 1992). Additionally, species in this genus are long-lived but slow to develop to sexual maturity, and have small clutch sizes (Houck 1977). Both the identification and maintenance of occupied habitats are essential for management contributing to the long-term maintenance of this species on federally managed lands.

New information since 1994 details attributes of old-growth or Late-Successional forest (i.e., cool moist microclimates during times of salamander surface activity, dense canopy closures, and down wood) that are important to this species (Feder 1983; USDA, USDI Species Review Panel 1999b; USDA, USDI 1999b; USDA, USDI in prep). At interior sites with deep rocky substrates, Del Norte salamanders may occur in conjunction with lower canopy closures. The elevational extent for this species increased to 5,700 feet (1,737 meters) (USDA, USDI 1999b; USDA, USDI Species Review Panel 1999b; USDA, USDI in prep). The species can occur in all seral stages, but abundances in Northwestern California are significantly higher in older forest (Welsh and Lind 1995).

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Habitat in the form of rocky substrates is relatively widespread throughout the range of the species, but is often extremely patchy in distribution and is highly variable in patch size and contiguity (USDA, USDI 1999b; USDA, USDI Species Review Panel 1999b; USDA, USDI in prep).

Riparian reserve areas are not likely to provide significant habitat for this species because habitat components important for this species do not always occur in close association with riparian areas (USDA, USDI 1999b; USDA, USDI Species Review Panel 1999b; USDA, USDI in prep) and this species does not require standing or running water to complete its life cycle (Feder 1983).

Unique populations of this species have been identified. Potential loss of biodiversity is a concern if unique populations (e.g., evolutionary significant units) are lost.

Recent federal survey efforts have contributed significantly to our knowledge of the species distribution. This species is found in the Oregon and California Coast Provinces, and the Oregon and California Klamath Provinces. Due to federal survey efforts since the implementation of the Northwest Forest Plan, the range has been extended 8 kilometers north, and 32 kilometers east. The upper elevational limit has been expanded to 1,737 meters (5,700 feet). The edges of the range are not well delineated.

Currently, there are 882 known sites of this species within a range covering 574,408 hectares (federal and nonfederal lands) (USDA, USDI 1999b). Most of the sites have been discovered by recent federal surveys (266 of 882 after 1993). Sites identified prior to 1993 may no longer be extant because of adverse impacts from land management activities on habitat and microclimate in these occupied sites. As a conservative approach, the sites located after 1993 (266) and approximately half of the sites located previous to 1993 sites (198) were considered extant (464) for analysis in this document.

New information since 1994 demonstrates that federally managed lands figure prominently as habitat for this animal (USDA, USDI 1994a). Currently, 689 sites (72%) and 70 percent of the range are on federally managed lands (USDA, USDI 1999b). The 689 sites are distributed in the among the various land-use allocations in the following proportion: 33 (4%) are in Adaptive Management Area, 314 (36%) are in Matrix, 270 (31%) are in Late-Successional Reserves, 38 (4%) are in Administratively Withdrawn, and 34 (4%) sites in Congressionally Withdrawn Areas. About 26 percent of the known range is Late-Successional Reserve, 5 percent is Administratively Withdrawn, and 21 percent is Congressionally Withdrawn Areas (USDA, USDI 1999b).

Environmental Consequences - Del Norte Salamander

All four alternatives contribute significantly to maintaining well-distributed populations on federally managed lands throughout the range of this species on federally managed lands. There are distinct differences among the effects on the species by each alternative.

Under the No-Action Alternative, the Del Norte salamander is covered in both the Protection Buffer and Survey and Manage (Category 2) provisions. Under these categories, all current and future known sites would be managed and pre-project surveys are required. However, several adverse effects of this alternative on the species are identified.

The No-Action Alternative mandates surveys prior to habitat-disturbing activities and management of current and future known sites. The No-Action Alternative also places the Del Norte salamander under the Protection Buffer Standards and Guidelines. There is conflicting guidance between the Protection Buffer management standards for known sites, and those of Survey and Manage because both activities and areas managed differ

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(see below). This results in potential management inconsistencies that could have adverse effects on the maintenance of salamanders at known sites on federally managed lands throughout their range.

In each case, Management Recommendations have been drafted to meet site management requirements under Survey and Manage. The Management Recommendations recognize that management activities and site conditions vary, and that approaches for species protection need to consider both. Under the Protection Buffer Standards and Guidelines, all sites are provided a Managed Late-Successional Area land-use allocation with a single-size buffer of 100 feet, or one site potential tree height, whichever is larger. Since Protection Buffer guidance provides for a uniformly applied 100-foot buffer, there is no allowance for determining a site-specific buffer that may need to be greater than 100 feet to maintain the integrity of the site microclimate (Chen et al. 1995; USDA, USDI in prep).

The percent canopy cover prescribed by the Protection Buffer Standards and Guidelines (40% post-disturbance) is considered too low to provide for species needs, leading to significant adverse microclimate changes from some land management activities. The percent canopy closure over occupied habitat is recommended to be 72 percent or greater (Welsh and Lind 1995; USDA, USDI 1999b; USDA, USDI in prep).

The No-Action Alternative contributes to the maintenance of well-distributed populations of this species on federally managed lands through management of all current and future known sites if the protection buffer guidance is removed, but does not contribute maintenance of gene flow among the patchily distributed populations of this species within its range by addressing connectivity of sites. This loss of gene flow among sites can lead to loss of genotypes.

Under Alternative 1, the Del Norte salamander is in Category 1D. For species in this category, all current and future known sites would be managed until high-priority sites are determined and strategic surveys are conducted for the species. No pre-disturbance surveys are conducted.

Alternative 1 has several beneficial effects to the maintenance of this species as compared to the No-Action Alternative. First, there are no inconsistencies in the standards and guidelines for species protection. There is no possibility for confusion or variable interpretation of the guidance, as there is with both Protection Buffer Standards and Guidelines and Management Recommendations in the No-Action Alternative.

Second, managing all known sites (and presumed occupied sites) for occupancy is required until Management Recommendations are developed, approved and adopted. This is an essential element to eliminate loss of potential high-priority sites while Management Recommendations are designed. In contrast to the No-Action Alternative, the Management Recommendations identify priority sites for management. Significant populations that are important to maintain overall species stability and distribution can be identified. This approach retains some populations and provides repopulation sources (Welsh 1990, Wilcox 1980). This results in a management strategy that is not restricted to the individual site scale, but that considers adjacent habitats and populations during site management decisions. It can cross spatial scales which results in a more comprehensive approach for species conservation. In addition, this results in negligible risks for this species because it will remain well-distributed at sites throughout the range.

A beneficial effect of Management Recommendations for this species is that recommendations do not restrict scope to the scale of known sites. Management Recommendations can consider the aggregates of sites that form more biologically-significant units, such as populations or metapopulations. These Management

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Recommendations, therefore, cross spatial scales and result in a more comprehensive and viable plan for species persistence throughout the known range in addressing connectivity. Further, planning at the range scale prevents population fragmentation and the accompanying increased restriction of gene flow that could threaten species persistence (Soulé 1980, Leigh 1981, Wilcox and Murphy 1985, Welsh 1990).

The addition of strategic surveys to this alternative, in comparison with the No-Action Alternative, has important implications. New information compiled from strategic surveys will be important for refining and updating Survey Protocols and management guidelines for this species through better defining source populations, habitat availability, and geographic range. Site prioritization for the Management Recommendations for this species will be limited without information that can be acquired through implementing strategic surveys. This includes the lack of information on location of extant sites, geographic range, distribution of this species on protected land allocations and distribution of unique populations.

In comparison to the No-Action Alternative, Alternative 1, lack of pre-disturbance surveys may result a loss of sites not yet detected. This does not affect species distribution across its range, but may disrupt the integrity of local populations and lead to loss of connectivity (Welsh 1990, Wilcox 1980).

An important feature of Alternative 1 is that habitat that has been presumed to be occupied since the Northwest Forest Plan, but that has no official designation as a known site due to lack of survey, is continued to be presumed occupied and managed as such, until development of Management Recommendations or until it is surveyed (see pp. 2-33, 2-52). Such a scenario has occurred if likely habitat has been avoided during development of management proposals since 1993 (USDA, USDI 1999b). Such habitat that has been presumed occupied may figure prominently in species distribution and connectivity at the local to landscape scales. In a metapopulation dynamic, such areas may be source populations (Welsh and Lind 1992). Their protection during Management Recommendation design is a critical element of Alternative 1.

Overall, Alternative 1 differs from the No-Action Alternative by shifting management away from individual sites to populations and larger spatial scales. Alternative 1 does contain the risk of extirpation of individuals at local sites due to direct adverse effects of land management on microclimates necessary to the species. Information to fill critical knowledge gaps could be addressed by information gained from strategic surveys. When strategic surveys are implemented, more scientifically credible high-priority sites may be identified. Greater connectivity of sites is possible through Management Recommendations under Alternative 1, in comparison to known site management alone in the No-Action Alternative. Such connectivity results in greater stability of high-priority sites over the long term (Soulé 1980, Wilcox 1980, Leigh 1981, Wilcox and Murphy 1985, Welsh 1990, Welsh and Lind 1992).

Alternative 2 places the Del Norte salamander in Category 2D. All known sites (including presumed occupied habitats) located as of September 30, 1999 are managed. No pre-disturbance surveys would be required, and no newly detected sites would be managed. Strategic Surveys would be completed in five years. Based on the information gained from Strategic Surveys, this species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed.

Alternative 2 creates uncertainty in how species will be managed following the 5-year interval. Information on the species that can be reliably acquired in that time frame includes species distribution in withdrawn and reserve land-use allocations, distribution of sites in range, distribution of habitat in all withdrawn or reserve land-use allocations,

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and range extent. Population demography information such as status and characteristics must span at least one generation of the species to be informative. The Del Norte salamander is long-lived and slow to develop to reproductive maturity like other species in its family (Houck 1977). In the five years following the initial implementation of the Northwest Forest Plan, 266 new sites for this species were detected.

Among the unknown data for this species are: (1) its range extent, (2) habitat associations across its ranges, (3) which historic sites are extant, (4) relative abundance of animals at each known site or population, and (5) the distribution of the species on all protected land allocations. In five years, it is likely that range extent and distribution questions could be answered, but as stated above, habitat association information for may not be attainable. This lack of information on this species population ecology can not be achieved in five years. Therefore, a decision to consider this species for sensitive species designation, listing under the Endangered Species Act, or drop this species from special management consideration because no additional species-specific provisions would be needed would be based on this incomplete information and level of uncertainty. The greater the uncertainty, the more difficult it is to manage risk (see Ch 3&4, Forest Ecosystems). Alternatives 1 and 3 do not have this five year time limit on completing strategic surveys. Therefore, these two action alternatives could delay the decision on the long-term management of this species until a time when there was more information available to make future Management Recommendations and therefore reduce uncertainty and reduce difficulty in managing risk in maintaining stable well-distributed populations of this species.

The most consequential difference in effects of Alternative 2 compared to the other alternatives is that pre-disturbance surveys would not be required and sites discovered after September 30, 1999 would not be managed. This management would continue for five years, after which information gained through strategic surveys would be used to determine the further management of this species as described above. The result of management under Alternative 2 would be to increase risk of loss of known sites that may be important to this species distribution. The extent or magnitude of this risk to the species is difficult to characterize because of current incomplete information. However, some understanding of the risk of adverse effects can be made by examining the extent of management activities during the five year period and the amount of the species range within land-use allocations that provide various degrees of protection to habitat.

The extent of management activities that would modify late-successional habitat can be characterized on an overall basis in the Northwest Forest Plan area (see Ch 3&4, Forest Ecosystems). Although this overall characterization provides some useful information, it lacks the local specificity to accurately assess risks at the microsite habitat level that is important to this species.

Under Alternative 2 loss of salamanders at unidentified sites may occur because no new sites will be detected through pre-project surveys and managed after September 30, 1999. This may be important because large areas of the species range remain unsurveyed. In particular, land management activities in Matrix, Adaptive Management Areas, and Late-Successional Reserves have the potential to adversely affect microclimate and other habitat requirements for this species. For example, in Late-Successional Reserves, thinning in stands less than 80 years old to accelerate late-successional old-growth forest development reduce canopy closure to below recommended levels for this species and disturb suitable habitats at undetected sites (Welsh and Lind 1995; USDA, USDI in prep).

The level and extent, especially at local levels, of management activities during this five year period that have the potential to adversely affect species sites is difficult to estimate with accuracy. However, despite this incomplete information, conclusions concerning

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risk to species sites, populations and range may be further assessed by examining the percentage of the species range in these land-use allocations. Under Alternative 2, sites for Del Norte salamander would be most secure within Congressionally Withdrawn areas; less secure in Administratively Withdrawn Areas, Late-Successional Reserves, and Riparian Reserves; and least secure in Adaptive Management Areas and Matrix. The reason for this descending order of security for species sites is because the level and extent of management activities that could lead to adverse effects on species sites varies within these land-use allocations. Congressionally Withdrawn Areas have almost no management activities and Administratively Withdrawn areas have very little management activities that would adversely affect species sites. Although Late-Successional Reserves and Riparian Reserves are limited in management activities through standards and guidelines and Late-Successional Reserve assessments, there could still be adverse effects to species sites through habitat restoration or enhancement activities such as thinning or prescribed burning. Although under all alternatives, the level of timber harvest in the Matrix is anticipated to decrease), management activities in the Matrix are more likely to have adverse effects on species sites because the level and extent of management activities is greater than in the other land-use allocations.

In the discussions below of the percentage of species range in various land-use allocations, the Geographic Information System (GIS) is not able to differentiate the Riparian Reserves and Matrix land-use allocations. In any given overall area, a percentage of that area consists of Riparian Reserves. This percentage varies from approximately 80% in the Coast Range to 30% in the high elevation, lodgepole ecosystem of the Cascade and Sierra Ranges. The Del Norte salamander is not particularly associated with riparian areas although it does not avoid these areas. The percentages of the species range given for the Matrix in this discussion also includes Riparian Reserves, and is therefore presented as "Matrix/Riparian Reserve".

The Del Norte salamander's range is approximately distributed 21% within Congressionally Reserved areas, 5% within Administratively Withdrawn areas, 26% within Late-Successional Reserves, 3% within Adaptive Management Areas, and 15% within Matrix/Riparian Reserves. The remaining habitat is located on nonfederal land (USDA, USDI 1999b). Approximately 18% (Adaptive Management Areas and Matrix/Riparian Reserves) of this species range is located within areas that are subject to higher levels of management activities that have the potential to cause loss of sites. The presence of Riparian Reserves and the five year time period lessens the amount of risk that the percentage of the range may appear to be subject to disturbance through management activities. Because of the relatively high percentage of this species range that is distributed in the more protective land-use allocations, risk to the Del Norte salamander's population and range is relatively low.

The Del Norte salamander would be at greater risk to their populations and distribution under Alternative 2 compared to the other alternatives because the other alternatives have a lower risk of loss of species sites through the application of pre-disturbance surveys and management of known sites. However, on an overall basis, this species populations and distribution may be at a relatively low risk under Alternative 2 because of the percentage of its range within the Adaptive Management Areas and Matrix compared to other land-use allocations where species sites are less likely to be lost through management activities. Although the extent of these species distribution or habitat distribution within reserves is not fully known, it is likely that significant increases in such information could be gained during the five year period of Strategic Surveys under Alternative 2.

Under Alternative 3, the Del Norte salamander is in Category 3B. Under this category, all current and future known sites would be managed until high-priority sites could be determined. Pre-disturbance surveys would be conducted to minimize the inadvertent

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loss of undiscovered sites. Strategic surveys would be conducted for species to determine important habitat and the ability of reserves to provide reasonable assurance of persistence.

A beneficial effect of Alternative 3, compared to the No-Action Alternative, is that Management Recommendations for this species are not restricted in scope to the scale of known sites. In the prioritization process, Management Recommendations can consider aggregates of sites that form more biologically significant units, such as populations or metapopulations. Management Recommendations developed under Alternative 3 cross spatial scales and consider population ecology elements of viability and, therefore, are more scientifically credible (Soulé 1980, Wilcox 1980, Leigh 1981, Wilcox and Murphy 1985, Welsh 1990). This is particularly significant because these species will have their high-priority sites identified with the new information gained from strategic surveys concerning population ecology.

Detection of new sites is possible as a result of equivalent-effort surveys prior to habitat-disturbing activities and strategic surveys. This mitigation measure reduces the risk of inadvertent loss of undiscovered sites through impacts from land management activities. All sites are identified and considered during site prioritization in the development of the Management Recommendations.

Strategic surveys would be required in this. New information compiled from strategic surveys would be important for refining and updating Survey Protocols and management guidelines for this species through better defining source populations, habitat requirements and geographic range. Site prioritization for the Management Recommendations for this species will be limited without information that can be acquired through implementing strategic surveys. This includes lack of information on location of extant sites, geographic range, distribution of this species on protected land allocations and distribution of unique populations.

Overall, Alternative 3 provides a different approach than the No-Action Alternative by shifting management for species persistence from individual sites to populations and larger spatial scales. Alternative 3 does contain the risk of extirpation of species individuals at local sites due to direct adverse effects of land management on microclimates necessary to the species. At the outset of Alternative 3 implementation, it is possible that few high-priority sites could be identified with certainty in some areas. Information to fill critical knowledge gaps could be addressed by strategic surveys. When strategic surveys are implemented more scientifically-credible high-priority sites may be identified. Greater connectivity of sites is possible through Management Recommendations under Alternative 3, in comparison to known site management alone in the No-Action Alternative. Such connectivity results in greater stability of high-priority sites over the long term (Soulé 1980, Wilcox 1980, Leigh 1981, Wilcox and Murphy 1985, Welsh 1990, Welsh and Lind 1992).

The inclusion of surveys prior to habitat disturbance in Alternative 3 eliminates the potential loss of newly identified sites in proposed project areas because they are managed once detected. Alternative 2 does not include this mitigation. All sites are identified and considered during site prioritization in the Management Recommendation. Additionally Alternatives 1 and 3 do not contain the limitation on time for Strategic Survey completion that is found in Alternative 2. This is a significant benefit to the species through providing adequate time to collect information necessary to determine status and concern for this species and make suitable recommendations regarding future management. This ensures the highest likelihood of species remaining wide-spread throughout their range among the alternatives, due to protection of occupied sites throughout the species range and management that includes consideration of connectivity and genetic consequences.

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Late-Successional Birds

Background and Affected Environment

The Northwest Forest Plan FSEIS and its supporting documents addressed the habitat needs of 36 bird species which were identified as closely associated with late-successional and old-growth forests. The majority of those species were assessed by FEMAT and found to be adequately provided for by Alternative 9 of the Northwest Forest Plan FSEIS (the selected alternative) (USDA, USDI 1994a, Table 3&4-29, p.3&4-179). These positive assessments for the late-successional bird species were due to the provision of Congressionally Withdrawn Areas, Late-Successional Reserves, Riparian Reserves, watershed analysis, and the retention of green trees, snags and coarse woody debris in areas of timber harvest. (See pages 3&4-177 through 3&4-179 of the Northwest Forest Plan FSEIS for explanation of the basis for the 1994 assessment ratings.)

There is no new information or changed circumstances which would alter the conclusions about 30 of the 36 late-successional birds addressed in the Northwest Forest Plan FSEIS. New information exists for the northern goshawk, black-backed woodpecker, white-headed woodpecker, pygmy nuthatch, flammulated owl, and great gray owl (see following sections). In general, there has been a slight beneficial effect from the reduced harvest levels from those anticipated in the Northwest Forest Plan Record of Decision. This has resulted in slightly less habitat loss than anticipated.

In 1998, the U.S. Fish and Wildlife Service conducted a status review for the northern goshawk, one of the species assessed by FEMAT as late-successional forest associated. The status review concluded that listing the goshawk as a threatened or endangered species was not warranted. In reaching that conclusion, the status review looked at the current management of federally managed lands throughout the western states. In the area of the Northwest Forest Plan, the review concluded that the reserve network of the Northwest Forest Plan was currently providing sufficient habitat for the goshawk and would continue to meet this species needs in the future (63 FR 35183).

Environmental Consequences

The three action alternatives considered in this SEIS would have nearly equal effect on late-successional birds, other than the Protection Buffer species, across the broad landscape of the Northwest Forest Plan. The primary effect of Alternatives 1, 2 and 3 on late-successional bird species, in general, would result from dropping protection for 64 Survey and Manage species and reduction in the area where the Survey and Manage Standards and Guidelines applies for seven species (see Chapter 2). This difference between the action alternatives and the No-Action Alternative would be the loss of protection for approximately 12,000 acres of late-successional forest at 5,100 locations across the Northwest Forest Plan area. However, the presence of other Survey and Manage species at the same locations could result in continued protection for some of these locations.

The acreage of protected habitat for Survey and Manage species, though significant for the individual Survey and Manage species, occurs as scattered, relatively small patches which overall provide little contribution to the maintenance of most of the wide-ranging bird species. While these areas may provide some benefits to bird species which successfully use smaller patches of late-successional forest and would provide some structure and habitat complexity to the harvested area through the next stand rotation, any effects are very small when compared to the contribution of Congressionally-withdrawn Areas, Late-Successional Reserves, and Riparian Reserves.

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The adaptive management component of the action alternatives leads to uncertainty as to its effect on other land management programs and environmental conditions due to the potential for changes in the Survey and Manage species, and therefore changes in the number of acres affected. The No-Action Alternative is somewhat static in the number of species it would retain in the program, though it is possible that species could be dropped. Even so, future surveys for the species covered under the No-Action Alternative will result in new locations and additional acres identified for the species management. Alternatives 1, 2 and 3 allow both deletions and additions to the Survey and Manage list, which exacerbates the uncertainty in the acres affected. With any of these alternatives, the impacts of the fluctuating list of species and the corresponding fluctuation in acreage protection for those species, along with the location of new species sites, adds uncertainty to the estimate of future effects of the alternatives. Nevertheless, because of the inconsequential amount of habitat for late-successional birds provided by the Survey and Manage and Protection Buffer Standards and Guidelines, there is sufficient information on which to base reasonable analyses and conclusion.

None of the alternatives in this SEIS will affect the original basis for most of the assessments of the effects to birds or the conclusions in the Northwest Forest Plan FSEIS. Congressionally Withdrawn Areas, Late-Successional Reserves, and Riparian Reserves will continue to be managed for late-successional forest in the Northwest Forest Plan area, and the standard and guideline for green trees, snags and coarse woody debris will continue to benefit these bird species by providing nesting, roosting, and foraging habitat. Therefore, none of the alternatives in this SEIS would affect the conclusions of the Northwest Forest Plan FSEIS that these late-successional bird species will be adequately provided for under the Northwest Forest Plan. The Protection Buffer bird species are addressed separately below.

Background and Affected Environment - Black-backed Woodpecker, White-headed Woodpecker, Pygmy Nuthatch and Flammulated Owl

The FSEIS concluded that there was a very high likelihood that the Alternative 9 (the selected alternative) would provide habitat sufficient to allow populations of the white-headed woodpecker, pygmy nuthatch and flammulated owl to stabilize, though with significant gaps in their historic distribution. For the black-backed woodpecker, Alternative 9 provided a high likelihood that habitat would be sufficient to support stable, well-distributed populations across its range. The Protection Buffer Standards and Guidelines focuses attention on the retention of large snags, which, along with the provision of Congressionally Withdrawn Areas, Late-Successional Reserves, Riparian Reserves, watershed analysis, and the retention of green trees, snags and coarse woody debris in areas of timber harvest, were the basis for the Northwest Forest Plan FSEIS conclusions for these four species.

These Protection Buffer species were not evaluated through the Species Review Process (Appendix F). These species and their standard and guideline did not lend themselves to the type of information review conducted for the other species because the management needs addressed in the Protection Buffer Standards and Guidelines are specific to primarily one component of the forest environment--snags.

These four species were addressed as part of the Columbia Basin Science Assessment work, which includes the eastern slope of the Cascade Range where this standard and guideline primarily applies. The Source Habitat Analysis (Wisdom et al. 1999) placed the white-headed woodpecker and the pygmy nuthatch in Family 1 and the flammulated owl and the black-backed woodpecker in Family 2, based on similar

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habitat needs. Family 1 was generally characterized as requiring large diameter (>53 cm [20 in]) snags with cavities, which are found in montane forests which are usually maintained by frequent, low-intensity fires. Many species in Family 2 are dependent on snags in multi-layered and single-layered montane forests. The analysis concluded that the habitat for both of these families has declined throughout the Columbia Basin and, in some areas, the species populations have also declined. The sensitivity of these species to the presence of snags, particularly large snags which may be affected by management activities, supports the need for consideration of these four species in the Northwest Forest Plan.

Environmental Consequences - Black-backed woodpecker, white-headed woodpecker, pygmy nuthatch, and flammulated owl

Under the No-Action Alternative, these four bird species are managed under the Protection Buffer Standards and Guidelines as applied to Riparian Reserves and Matrix lands outside spotted owl critical habitat. The three action alternatives move these species to separate standards and guidelines that apply to all land allocations, which would broaden the area where management attention is required for these species. The action alternatives also include three changes to the management requirements for these species. One change is that the new standard and guideline would allow removal of snags deemed to be in excess of the number needed to provide for 100 percent of the potential population levels of these four species. Another change is that the new standard and guideline includes a specific adaptive management clause that encourages timely adoption of new information. The third change is that the new standard and guideline provides clarification to management of even-aged, young stands with regards to these species.

The general effect of applying this standard and guideline to all land allocations in the action alternatives as compared to the No-Action Alternative would be minimal. Reserved land allocations (Late-Successional Reserves, Riparian Reserves, Congressionally Withdrawn Areas, and Administratively Withdrawn lands) should, for the most part, already be managed for maximum potential for snag-dependent species. Therefore, the addition of management to the reserves land allocations in this standard and guideline would have little impact.

The No-Action Alternative recommends retention of all snags greater than 20 inches diameter at breast height (dbh). The action alternatives would allow removal of some of these large snags that are deemed to be excess to these species needs. This could reduce the number of large snags retained on the landscape and have a slight negative effect on these species.

The action alternatives encourage adoption of new information through development or revision of Management Recommendations. This should result in a slight improvement of habitat management for these species. The development or revision of Management Recommendations would allow new scientific and management information to be more readily incorporated into management for the species. This would allow adoption of more up-to-date species and habitat information that may be quite different from the standards (Neitro et al. 1985) applied in the original Protection Buffer Standards and Guidelines under the Northwest Forest Plan.

The action alternatives include a clarification that young even-aged stands pose a unique management situation with regards to managing snags for these species, which should result in a slight improvement of habitat management for the species. This would allow thinning of even-aged young stands and would provide greater opportunity for silvicultural treatment of dense stands where snag levels are low. This would provide long-term benefits to forest structure and habitat for these four species.

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The action alternatives allow for loss of some large snags if they are in excess of what is needed to support 100 percent of the potential populations for these four species (Neitro et al. 1985). Because the models for determining the number of snags necessary to support the populations are based on regional information and there is natural variability across the range of these species, this may have a very slight negative effect on these species in some limited areas by reducing local nesting or foraging opportunities. However, this effect is likely counteracted by the ability to make timely changes based on new information and the slight improvement in the long-term habitat conditions for these species as the result of management in even-aged young stands. Therefore, none of the alternatives in this SEIS would affect the conclusions of the FSEIS that habitat for these four cavity nesting birds will be adequate under the Northwest Forest Plan

Background and Affected Environment - Great Gray Owl

Since signing of the Northwest Forest Plan Record of Decision there have been several developments related to the management of great gray owls, including the implementation of Survey Protocols, the documentation of an expanded range of known nesting and occurrence of great gray owls, and a reassessment of the state of knowledge of this species.

An auditory Survey Protocol for great gray owls was issued in May 1995 and amended in June 1997 in response to recommendations from scientists to improve the efficiency of the protocol (USDA, USDI 1997 [June 6, 1997 USFS and BLM letter]). Recent information indicates that auditory protocols may not be a reliable method of detecting great gray owls. For example, surveys of 80,000 acres of potential nesting habitat for great gray owls in the vicinity of past owl sightings have not resulted in great gray owl detections. However, given the lack of an alternative methodology to locate these birds, the Survey Protocol remains the best available approach for finding and protecting sites where the species is believed to be located.

There has been an increase in known range of the great gray owl since the Northwest Forest Plan FSEIS. At the time of the Northwest Forest Plan FSEIS analysis, the great gray owl was documented as nesting in an area along the central Cascade mountains of Oregon and in a small area southwest of Medford, Oregon. Published data (Hayward et al. 1994), and the results of agency surveys, indicate the species range is likely much larger. Great gray owls have been documented throughout the Cascade Range, though nesting has not been confirmed in these new areas. However, based on the locations and habitat, it is likely that these owls are nesting, and the Northwest Forest Plan standards and guidelines requirement to survey for and protect the nests applies to this broader area. In addition to increasing the geographic area of known and expected great gray owl nesting, recent information indicates that the owl uses elevations lower than the 3,000 feet described in those protocols (Huff et al. 1996; USDA, USDI Species Review Panel 1999b).

To date, federal agencies have located approximately 72 great gray owl sites which are currently being managed under the Northwest Forest Plan. Many of these sites were known at the time of the development of the Northwest Forest Plan and most received some form of protection under existing land-use plans. The Northwest Forest Plan provides additional protection of these sites documented prior to 1994. Currently, approximately 6,700 acres are managed to protect known great gray owl sites. The acreage allocated at each site varies, depending on local habitat conditions and whether the site contains a known nest.

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The federal agencies estimate that approximately 500,000 acres of potential nesting habitat have been surveyed for great gray owls. Approximately 1 million acres of forest which may be great gray owl habitat have not been surveyed. The estimate of a future great gray owl population in the area of the Northwest Forest Plan is about 135 sites, but its distribution remains in question. The current sites are not evenly distributed across the Northwest Forest Plan area.

The great gray owl is relatively widely distributed throughout the Northwest Forest Plan area, but the lack of documentation of nesting pairs in large portions of their range indicates that the population may be limited or rare in these areas, or that owls are not being detected with the current Survey Protocol. Based on knowledge of the bird's life history and habitat use patterns, the current population size is considered moderate to small.

Environmental Consequences - Great Gray Owl

The three action alternatives move the great gray owl from Protection Buffer Standards and Guidelines, to the Survey and Manage Standards and Guidelines. The management requirements and resulting environmental effects, as they relate to the great gray owl and its habitat, would be different among the alternatives.

The No-Action Alternative would require the management of 0.25-mile protection zones around all known great gray owl nests and pre-disturbance surveys of potential great gray owl habitat. In addition, it includes a 300-foot no-harvest buffer around all meadows and natural openings.

Alternative 1 would initially protect all current and future great gray owl sites, but would allow for the identification and protection of high-priority sites that are considered necessary to maintain the species well-distributed throughout the Northwest Forest Plan area. Pre-disturbance and strategic surveys would be required. The 300-foot no-harvest buffer around all meadows and natural openings will remain in effect until and unless it is replaced or removed in the Management Recommendations.

Alternative 2 would limit the protection of known sites to those which were documented as of September 30, 1999 (approximately 72 great gray owl sites). Strategic surveys would be conducted within 5 years throughout the area covered by the Northwest Forest Plan. Based on the strategic survey information, the great gray owl would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed. The 300-foot no-harvest buffer around all meadows and natural openings will remain in effect until and unless it is replaced or removed in the Management Recommendations.

Alternative 3 would initially protect all current and future known sites until high-priority sites could be determined. Equivalent-effort surveys, designed to find as many occupied sites as reasonably possible, would be conducted to minimize the inadvertent loss of undiscovered sites. For the great gray owl, equivalent-effort surveys are similar to the pre-disturbance surveys in Alternative 1. Strategic surveys would be conducted for the species to determine important habitat and the ability of reserves to provide reasonable assurance of persistence. The 300-foot no-harvest buffer around all meadows and natural openings will remain in effect until and unless it is replaced or removed in the Management Recommendations.

In the No-Action Alternative, the acreage set aside to protect nests and foraging habitat becomes a Late-Successional Reserve, with associated standards and guidelines. Applying the Late-Successional Reserve Standards and Guidelines to management of

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meadows as foraging habitat for great gray owls could result in management contrary to maintaining foraging habitat. The Late-Successional Reserve standards and guidelines are designed to encourage development of late-successional forest conditions. This direction could conflict with the need to reduce the encroachment of conifers into meadow habitat and to provide hunting perches and nesting snags near meadows. Therefore, the No-Action Alternative may be slightly detrimental to maintenance of the great gray owl.

All three action alternatives would manage habitat identified for the owl for continued use and occupancy by great gray owls. Such management would include the use of prescribed fire or other methods to maintain meadows through the development of Management Recommendations. The Management Recommendations would delineate the management area for great gray owls using current knowledge of the species home range size and habitat needs.

The No-Action Alternative does not provide for strategic surveys, but instead relies on the approach of managing individual sites as they are located through pre-ground disturbing surveys. This approach reduces the likelihood that information will be gathered on great gray owl populations inside reserves, since habitat-disturbing activities are generally less frequent in those land allocations and will become even less so in the future as forests reach the age limit for most activities (80 years in most Late-Successional Reserves). Therefore, the information base for the great gray owl management will continue to be generally limited to non-reserved lands, making population-level management difficult. All three action alternatives include the concept of strategic surveys, which would gather the information needed to manage great gray owls. Therefore, under the action alternatives, the information on which to base management decisions for great grey owl will likely include a more representative distribution within reserved lands, and ultimately provide data to improve population-level management decisions.

The No-Action Alternative does not have a specific statement of adaptive management which would be applied to great gray owl Protection Buffer Standards and Guidelines. Instead, it relies on general discussions of adaptive management, which are applicable to all aspects of the Northwest Forest Plan area. The three action alternatives all include specific adaptive management language for the great gray owl. The adaptive management components of the action alternatives would provide a more structured process for the agencies to address issues which are specific to this species, and determine how to best management for it.

The No-Action Alternative may be slightly detrimental to maintenance of the great gray owl because the management direction for the 300-foot buffers around meadows and natural openings may conflict with the need to reduce the encroachment of conifers into meadow habitat and provide hunting perches and nesting snags near meadows. All three action alternatives would provide benefits to the great gray owl by allowing for meadows and openings to be managed for continued use and occupancy by great gray owls, including the allowance of prescribed fire or other methods to maintain meadows, through the development of Management Recommendations. Management of the great gray owl under the action alternatives would allow for management to maintain habitat to support this species, well distributed throughout its range in the Northwest Forest Plan area.

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Late-successional Mammals

Background and Affected Environment

The Northwest Forest Plan FSEIS analysis of alternatives listed the land management factors that are most important for the 14 mammal late-successional forest associated mammal species (not including Canada lynx, bats, and red tree vole - addressed separately in this document) as the presence of dead and dying trees and the logs they produce; live, old-growth trees; presence of large areas of late-successional forest in Late-Successional Reserves; and protection of riparian zones. (USDA, USDI 1994a, pp. 3&4-182 through 3&4-185). After five years of implementing the Northwest Forest Plan, there has been a slight improvement in conditions for the 14 mammal species over the effects originally analyzed in the Northwest Forest Plan FSEIS as a result of lower than anticipated timber harvest levels in the Matrix and Adaptive Management Areas. However, the primary benefit of the Northwest Forest Plan to these species has been the retention of green trees, snags and coarse woody debris in harvest units, Late-Successional Reserves and Riparian Reserves as required in the Northwest Forest Plan Record of Decision (USDA, USDI 1994b). Management of the Congressionally Withdrawn Areas and Late-Successional Reserves has occurred as anticipated in the Northwest Forest Plan FSEIS. The most common activities inside the reserves are silvicultural thinning of stands in the Late-Successional Reserves to improve spotted owl habitat, and risk management (fuels reduction) in the drier forest types of the Late-Successional Reserves.

The primary effect of the Survey and Manage Standards and Guidelines on the late-successional forest associated mammal habitat has resulted from protection of small areas of late-successional habitat in the Matrix and Adaptive Management Areas as a result of the management of known sites. The retention of late-successional habitat through the Survey and Manage species location was not originally judged by the FEMAT panelists as contributing to the long-term management for the late-successional mammal species. The result of the Survey and Manage implementation has been a relatively minimal beneficial effect to the late-successional mammals. Beneficial effects for the late-successional mammals from other components of the Northwest Forest Plan, including Late-Successional Reserves, Riparian Reserves, and green tree, snag, and coarse woody debris retention, far outweigh the limited effect of the small scattered patches of late-successional forest provided by the Survey and Manage Standards and Guidelines.

Environmental Consequences

The three action alternatives considered in this SEIS would have nearly equal effect on late-successional mammals across the broad landscape of the Northwest Forest Plan because the components described above that most affect these species remain the same in all action alternatives. The primary effect of action alternatives on late-successional mammals, in general, would be from dropping of protection for 64 Survey and Manage and Protection Buffer Species and the reduced area where the Survey and Manage Standards and Guidelines applies for 7 species. This difference between the action alternatives and the No-Action Alternative, would be the loss of protection for approximately 12,000 acres of late-successional habitat at approximately 5,100 locations across the Northwest Forest Plan area. However, the presence of other Survey and Manage species at the same location could result in continued protection for some of these locations.

The acreage of protected habitat for Survey and Manage species, though significant for the individual Survey and Manage species, occurs as scattered, relatively small patches

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which provide little contribution to the maintenance of most of the wide-ranging mammals, such as fisher, pine marten and elk. While these areas may provide some structure and habitat complexity to the harvested area through the next stand rotation, any effects are very small when compared to the contribution of Congressionally Withdrawn Areas, Late-Successional Reserves, and Riparian Reserves.

The small patches of late-successional habitat retained for Survey and Manage species could be large enough to provide for individuals of the smaller mammal species assessed in the Northwest Forest Plan FSEIS. At a local level these patches would further improve the potential distribution of small mammals by providing additional, though scattered, habitat. However, Alternative 9 of the Northwest Forest Plan FSEIS (the selected alternative) was generally considered to provide sufficient habitat well distributed across the range for the late-successional mammals analyzed in the Northwest Forest Plan FSEIS without any anticipated contribution from the Survey and Manage Standards and Guidelines.

Because of the limited acreage and scattered nature of protected late-successional forest under the Survey and Manage Standards and Guidelines, and the Northwest Forest Plan FSEIS analysis that late-successional mammal species were adequately protected without any anticipated contribution from the Survey and Manage Standards and Guidelines, none of the alternatives will affect the original basis for the mammal assessments by FEMAT and the Northwest Forest Plan FSEIS conclusions. Under all four alternatives, Congressionally Withdrawn Areas, Late-Successional Reserves, and Riparian Reserves will continue to be managed for late-successional forest over much of the Northwest Forest Plan area, and standard and guidelines for green trees, snags and coarse woody debris in the Matrix will continue to convey significant benefits to these species. The result under all the alternatives will be well-distributed late-successional forest to support all of the mammal species assessed.

The adaptive management components of the Survey and Manage program lead to uncertainty as to its effect on other land management programs and environmental conditions due to the potential for changes in the Survey and Manage species managed and therefore changes in the number of acres affected. The No-Action Alternative is somewhat static in the number of species it would retain in the program, though it is possible that species could be dropped. Even so, future surveys for the species covered under the No-Action Alternative will result in new locations and additional acres identified for the species management. Alternatives 1, 2 and 3 allow both deletions and additions of species to the Survey and Manage Standards and Guidelines, which exacerbates the uncertainty in the acres affected. With any of these alternatives, the impacts of the fluctuating list of species affected and the corresponding fluctuation in acreage protection for those species, along with the location of new species sites, adds uncertainty to the estimate of future effects of the alternatives. Nevertheless, because of the inconsequential amount of habitat for late-successional mammals provided by the Survey and Manage and Protection Buffer Standards and Guidelines, there is sufficient information on which to base reasonable analyses and conclusion.

Congressionally Withdrawn Areas, Late-Successional Reserves, and Riparian Reserves will continue to be managed for late-successional forest in the Northwest Forest Plan area and standards and guidelines for green trees, snags and coarse woody debris will continue to benefit to these mammal species. Therefore, none of the alternatives in this SEIS would substantially affect the conclusions of the Northwest Forest Plan FSEIS that these late-successional mammal species will be adequately provided for under the Northwest Forest Plan.

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Background and Affected Environment - Bats

Bats received separate attention in the Northwest Forest Plan FSEIS because of their unique habitat and life history factors, including their use of human structures (buildings, bridges, mines, etc.), their migratory and winter roosting behavior, and other communal behavior. The Northwest Forest Plan FSEIS analysis listed the land management factors which are most important for the bats as: (1) the presence of large areas of late-successional forest in the Late-Successional Reserves throughout the Northwest Forest Plan area, (2) protection of riparian zones, and (3) retention of live, dead, and dying old-growth trees (USDA, USDI 1994a pp. 3&4-186 through 3&4-190). Bat use of a variety of structures and their vulnerability to human disturbance led to the addition of specific standard and guideline language (USDA, USDI 1994b p. C-43). Alternative 9 (the selected alternative) was generally considered to provide sufficient habitat well distributed across their range for the bat species analyzed in the Northwest Forest Plan FSEIS based on the land management factors described above and including the protection of caves, mines, and other structures.

After five years of implementing the Northwest Forest Plan, there has been a slight improvement in conditions for the 11 bat species over the effects originally analyzed in the Northwest Forest Plan FSEIS. This is a result of lower than anticipated timber harvest levels in the Matrix and Adaptive Management Areas. However, the primary benefit of the Northwest Forest Plan to these species has been the retention of clumps of green trees and snags in harvest units, the Late-Successional Reserves and the Riparian Reserves as required in the Northwest Forest Plan Record of Decision (USDA, USDI 1994b). Management of the Congressionally Withdrawn Areas, Late-Successional Reserves, and Riparian Reserves provide habitat at a coarse, regional scale for forest-dwelling bats in the Northwest Forest Plan area. The most common management activities inside these reserves are silvicultural thinning of stands in the Late-Successional Reserves to improve late-successional forest conditions and risk management (fuels reduction) in the drier forest types of the Late-Successional Reserves.

Based on five years of implementing the bat standard and guideline, agency biologists have identified that some components of the current bat standard and guideline may be detrimental to these species. For example, the bat standard and guideline would require searches for, and identification of, bat species. Searches for and capture of bats necessary to identify the species may be harmful to the bats by causing them to expend energy at times when their energy reserves are low (such as during hibernation) or may trigger abandonment of young. In addition, identifying bats species is not always necessary to the design of appropriate management of a bat site. Site management is often the same, regardless of the species of bat present.

The primary effect of the Survey and Manage Standards and Guidelines on bat habitat has resulted from protection of small areas of late-successional forest in the Matrix and Adaptive Management Areas as a result of the management of known sites. The late-successional forest retention which has resulted from the Survey and Manage has occurred in land allocations which were not originally judged by FEMAT panelists as contributing to the long-term management for the bats. The result of the Survey and Manage implementation has been a relatively minimal beneficial effect to the bats. Beneficial effects from other components of the Northwest Forest Plan, including Late-Successional Reserves, Riparian Reserves, and green tree, snag, and coarse woody debris retention, far outweigh the limited effect of the small scattered patches of late-successional forest provided by the Survey and Manage Standards and Guidelines. Because of the small size and scattered nature of these protected areas, the Survey and Manage Standards and Guidelines does not provide an essential habitat contribution to the maintenance of well-distributed late-successional forest at the landscape scale for these bat species.

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Environmental Consequences - Bats

The three action alternatives considered in this SEIS incorporate the same management direction for bats and would therefore have an identical effect on bats across the broad landscape of the Northwest Forest Plan. Under the action alternatives, Management Recommendations for bats may modify the survey and identification requirements to avoid adverse effects on bats, in contrast with the bat standard and guideline in the No-Action Alternative.

The action alternatives, would result from dropping protection for 64 Survey and Manage and Protection Buffer species and reduction in the area where the Survey and Manage Standards and Guidelines applies for 7 species. This difference between the action alternatives and the No-Action Alternative, would be the loss of protection for approximately 12,000 acres of late-successional forest at approximately 5,100 locations across the Northwest Forest Plan area. However, the presence of other Survey and Manage species at the same location could result in continued protection for some of these locations.

The acreage of protected habitat for Survey and Manage species, though significant for the individual Survey and Manage species, occurs as scattered, relatively small patches, but may provide some structure and habitat complexity to the harvested area through the next rotation. These small patches of late-successional forest retained for Survey and Manage species could be large enough to provide some habitat for the bats species assessed in the Northwest Forest Plan FSEIS. At a local level these patches would further improve the potential distribution of bats by providing additional, though scattered, habitat. However, Alternative 9 of the Northwest Forest Plan FSEIS (the selected alternative) was generally considered to provide sufficient habitat well distributed across the range for the bat species analyzed in the Northwest Forest Plan FSEIS without any anticipated contribution from the Survey and Manage Standards and Guidelines.

Because of the limited acreage and scattered nature of protected late-successional forest under the Survey and Manage Standards and Guidelines, and the Northwest Forest Plan FSEIS analysis finding that late-successional mammal species were adequately protected under the Northwest Forest Plan without any anticipated contribution from the Survey and Manage Standards and Guidelines, none of the alternatives would affect the original basis for the mammal assessments in the Northwest Forest Plan FSEIS. Under all four alternatives, large reserves and Riparian Reserves would continue to be managed for late-successional forest over much of the Northwest Forest Plan area, and the standard and guideline for green trees, snags and coarse woody debris in the Matrix would continue to convey significant benefits to these species. The result under all the alternatives would be well-distributed late-successional forest to support all of the bat species assessed.

The adaptive management components of the Survey and Manage program leads to uncertainty as to its effect on other land management programs and environmental conditions due to the potential for changes in the Survey and Manage species and therefore changes in the number of acres affected. The No-Action Alternative is somewhat static in the number of species it would retain in the program, though it is possible that species could be dropped. Even so, future surveys for the species covered under the No-Action Alternative would result in new locations and additional acres identified for the species management. Alternatives 1, 2 and 3 allow both deletions and additions to the Survey and Manage list, which exacerbates the uncertainty in the acres affected. With any of these alternatives, the impacts of the fluctuating list of species and the corresponding fluctuation in acreage protection for those species, along with the

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location of new species sites, adds uncertainty to the estimate of future effects of the alternatives. Nevertheless, because of the inconsequential amount of habitat for bats provided by the Survey and Manage and Protection Buffer Standards and Guidelines, there is sufficient information on which to base reasonable analyses and conclusion.

Congressionally-Withdrawn Areas, Late-Successional Reserves, and Riparian Reserves will continue to be managed for late-successional forest in the Northwest Forest Plan area and standard and guideline for green trees, snags and coarse woody debris will continue to benefit to these mammal species. Therefore, none of the alternatives in this SEIS would substantially affect the conclusions of the Northwest Forest Plan FSEIS that these late-successional mammal species will be adequately provided for under the Northwest Forest Plan.

Background and Affected Environment - Canada Lynx

The Canada lynx is a Protection Buffer species. Based on the latest information available, the lynx management direction was changed from requiring pre-project surveys to an extensive survey approach on June 11, 1996. This approach more closely addresses the primary survey need for the lynx, to define its range in the Northwest Forest Plan area. The lynx was not addressed further in the Species Review Process (Appendix F) because no substantial new information was available for the analysis. Information from the 1996 status change was used in the evaluation of this species.

The lynx was proposed for listing on July 8, 1998, as a threatened species under the Endangered Species Act (63 FR 36994). The U.S. Fish and Wildlife Service concluded that the population in the conterminous United States was threatened by human alteration of forests, low numbers as a result of past overexploitation, expansion of the range of competitors, and elevated levels of human access into lynx habitat. On July 8, 1999, the U.S. Fish and Wildlife Service published a notice of a six month extension for the decision on listing the lynx (64 FR 36836). The final decision is due in January, 2000. Concurrently with the listing process, a national interagency Canada Lynx Assessment and Conservation Strategy is being developed to provide a consistent and effective approach to conservation of Canada lynx on federally managed in the conterminous United States. The Forest Service, BLM, U.S. Fish and Wildlife Service, and National Park Service are all participants.

As a result of change in management direction, extensive surveys for lynx have been conducted for lynx and lynx occurrences have been documented in areas in which they were not known at the time of the Northwest Forest Plan FSEIS. In 1994, the Northwest Forest Plan FSEIS lynx information indicated the species occurred in the north-central portion of the Cascade Range in Washington State. The newly documented lynx distribution extends the likely range of the lynx in the Northwest Forest Plan area to the remainder of the Washington Cascades and most of the Oregon Cascades. Surveys continue to be conducted with the objective of clarifying the appropriate geographic area for lynx habitat management.

Environmental Consequences - Canada Lynx

All four alternatives would continue to provide management attention to the lynx, with the intention of providing adequate habitat to maintain the species throughout the areas where it may be documented.

The No-Action Alternative would retain the lynx Protection Buffer language on pages C-47 through C-48 of the Northwest Forest Plan Record of Decision (USDA, USDI 1994b), which applies special management in the Matrix and Adaptive Management

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Area land allocations. As documented in memoranda supporting the June 1996 Regional Interagency Executive Committee decision to change survey requirements, the maintenance of lynx as a Protection Buffer species does not effectively meet the species management needs. As a wide-ranging species, effective management of its habitat is more appropriate at a landscape level, rather than restricted to Matrix and Adaptive Management Area lands. Continuing the current Protection Buffer direction that focuses primarily on Matrix and Adaptive Management Area lands would be less effective in meeting the species needs by focusing on only part of the landscape used by lynx rather than analyzing conditions and capabilities for the species in all land allocations.

The three action alternatives would apply the Protection Buffer language (USDA, USDI 1994a pp. C-47 through 48) to all land allocations in the Northwest Forest Plan and would remove the species from the Survey and Manage program. Extensive regional surveys would continue to determine the range of the species. The action alternatives would improve the lynx habitat management strategy because the management requirements would be applied to all potential habitat on lands managed by the Forest Service and BLM, rather than just Matrix and Adaptive Management Areas. Extensive surveys would continue to be conducted and habitat management guidance and direction would be developed for the lynx in all three action alternatives.

When completed, the interagency Lynx Conservation Assessment and Strategy could become the basis for land management agencies to develop the habitat management plans described on page C-48 of the Northwest Forest Plan Record of Decision. The action alternatives encourage the adoption of new information, which should result in improvement of the habitat management for this species. This would allow adoption of more up-to-date species and habitat information, which may differ from the standards in the original Protection Buffer Standards and Guidelines.

Background and Affected Environment - Red Tree Vole

The Oregon red tree vole (*Arborimus longicaudus)* is the most arboreal mammal in the Pacific Northwest (Carey 1996) and is endemic to moist coniferous forests of western Oregon and extreme northwest California. Its distribution is naturally somewhat clumped and patchy, and is limited to coniferous forest west of the crest of the Cascade Mountains. Red tree vole depends on conifer tree canopies for nesting sites, foraging, travel routes, escape cover, and moisture (Carey 1991). Douglas-fir (*Pseudotsuga menziesii*) needles provide the primary food and building materials for nests. The vole is an important prey for the threatened northern spotted owl. Use of red tree voles as prey varies in different portions of the range of the northern spotted owl, from a low of 1 percent of the diet to a high of 6 percent. In Southwestern Oregon the vole made up 50 percent of the prey items consumed by two owl pairs, though due to their small size, red tree voles provided 16 percent of the total diet (Forsman et al. 1984). Red tree vole were rated as the most vulnerable of all arboreal rodents to local extirpations from habitat fragmentation or loss (Huff et al. 1992). Because they are closely associated with old-growth Douglas-fir forests (Carey 1989, Ruggiero et al. 1991) any major reductions in old-growth Douglas-fir forests in the future would likely result in significant declines in tree vole populations. Federally managed lands figure provide important habitat for red tree voles. More than 60 percent of the known sites and approximately 55 percent of the red tree vole's range are on federally managed lands.

This species has many life history characteristics, such as very small home ranges, low dispersal capability, extremely low reproduction potential, and a sensitivity to stand level disturbances that cumulatively raise concerns for this species long-term persistence (Carey 1989, Maser et al. 1981).

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Under the interim Survey Protocol for red tree voles, surveys prior to ground-disturbing activities were required in fifth-field watersheds with more than 10 percent federal lands and where less than 40 percent of the federal lands was in potential red tree vole habitat. Surveys were generally not conducted in areas above these thresholds. Potential red tree vole habitat for these surveys was defined as forest with (1) approximately 60 percent crown closure or greater; (2) average conifer dbh of approximately 10 inches or greater; and (3) where these minimum conditions could be maintained through the end of year 2000.

More than 650 pre-disturbance surveys have been conducted by Bureau Land Management and National Forest System biologists in western Oregon since implementation of the Northwest Forest Plan. These surveys have covered over of 85,932 acres (USDA, USDI Species Review Panel 1999b) and identified greater than 254 potential new red tree vole populations (USDA, USDI 1999e). Forty-four percent of the area, 81 percent of all pre- disturbance surveys conducted to date, and 83 percent (211) of potential new red tree vole populations were on the Medford BLM District (USDA, USDI Species Review Panel 1999b).

Due to the interim Survey Protocol, ten of twelve Forests and BLM Districts have not been required to survey or have been required to survey to only a few hundred acres for red tree voles (USDA, USDI Species Review Panel 1999b). Few pre-disturbance surveys have been conducted in the lower elevation forests of western Oregon, such as the Willamette Valley foothills or valley margins. These lowland forests tend to have limited federal ownership occurring in a checkerboard ownership pattern that can limit habitat management and tree vole dispersal. Other portions of the range that might also be of concern for the species include:

- Northern Coast Range - geographic isolation, low levels of federal ownership, and a separate sub-species from the remainder of the geographic range.
- Siskiyou Mountains - natural fragmentation, limited amounts of mesic forest conditions.
- Southern Willamette Valley Margin (BLM Matrix connectivity/diversity block land allocations) - Declining regional connectivity across this zone, limited federal ownership and the checkerboard ownership pattern that can limit dispersal.

Most federal known sites are not within reserve land allocations. Approximately 46 of the sites known before implementation of the Northwest Forest Plan fall within reserved land allocations (3 percent Congressionally Withdrawn, 2 percent Administratively Withdrawn, and 38 percent Late-Successional Reserves). Of the remaining sites, 37 percent falls in Matrix/Riparian Reserves, and 17 percent falls Adaptive Management Areas. Almost all sites found after implementation of the Northwest Forest Plan have been in Matrix/Riparian Reserves allocations due to the emphasis of on areas of proposed ground-disturbing activities. About 41 percent of the current range is in reserved land allocations. Based on estimates using the Bureau of Land Management Western Oregon Digital Image Project (WODIP) vegetation map for western Oregon, approximately 35 percent of the potential "primary red tree vole habitat" is within the three reserved allocations of Congressionally Withdrawn, Administratively Withdrawn, and Late-Successional Reserves (USDA, USDI 1999b).

Some physiographic provinces have far fewer known sites than. In 1995 the Mt. Hood National Forest surveyed 38,611 acres in these watersheds including 62 percent (26,976 acres) of all primary red tree vole habitat on the forest and verified only nine red tree vole nests (USDA Mt. Hood National Forest 1996). Primary habitat included the most likely habitat conditions for finding red tree vole populations and was defined as stands

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of large conifer (>21 dbh), less than 3000 feet elevation, within the western hemlock or pacific silver fir vegetation zones, and greater that 300 acres in size.

The state and private forests of the northern half of the Coast Range have very few known sites. Recent Coastal Oregon Productivity Enhancement Program (COPE) studies (as reported by Dr. John Hayes, OSU College of Forestry) in the Tillamook State Forest failed to detect the species on their study plots. Likewise the northern half of the Cascades including the Sandy, Clackamas, and North Santiam River basins have limited numbers of known sites. In portions of the northern Oregon Coast Range there are no reported survey efforts in the past five years, nor recent confirmations of extant sites on federal ownership. This region contains the entire range of a subspecies of the Oregon red tree vole (*A. l. silvicolus)*. Although the northern Coast Range is primarily nonfederal land, historic tree vole populations of both subspecies are known from federal sites. The incremental loss of any population in this region could make management more difficult along the northern coast because of the very low number of sites in the region, and possible unique ecological requirements of this subspecies.

Our understanding of the geographic range of the Oregon red tree vole has improved since the issuance of the Northwest Forest Plan Record of Decision. Medford District BLM and Pacific Norwest Research Station surveys have surveyed 521 locations and identified 211 new vole sites in the Rogue, Applegate, and Illinois River Valleys that help expand and delineate the eastern extent of the vole range in these dry forest communities. The most significant change in the species range since the Northwest Forest Plan, however, is a clarification in the taxonomic relationship of populations in northern California. In the original Northwest Forest Plan SEIS analysis the agencies followed the range suggested by Johnson and George (1991) when they originally split the sibling species, *Arborimus pomo*, from the Oregon tree vole. They suggested there was a break in the distribution between the two species near the California - Oregon border. Murry (1995) has subsequently presented new DNA information suggesting specimens from the Smith River drainage in Del Norte County, California, were more similar to the Oregon tree voles than to other California populations. In addition, Maser (1998), based on his collecting in the Smith River drainage, also suggests the Smith River population are *A. longicaudus*.

All recent studies have concluded that Oregon red tree voles are significantly more abundant in older forest conditions described as late-successional and old-growth forests than in younger stand conditions. For example, Gomez (1992) captured tree voles in old-growth stands 4.1 times more frequently than in large saw timber, and over 17 times more frequently than in stands of pole-sized trees in the Oregon Coast Range. While the species has been captured or detected in almost all seral stages of Douglas-fir forests (Carey 1989, Maser et al. 1981) it occurs with the greatest frequency and reaches greatest densities in old forest conditions (Corn and Bury 1986 and 1991, Carey 1989, Meiselman and Doyle 1996). The Coos Bay District, in a 1998 summary of known sites, listed conditions at 12 of 28 nest locations that could be described as mature to late-successional stand conditions as nests were in trees with diameters of 22 to 52 inches dbh. The Glendale Resource Area surveyed 79 potential sale units for their 1997 sale program. Red tree vole nests were located in 76 percent (60) of the units. Based on the Forest Operations Inventory, all of these stands were either large saw-timber greater than 21 inches, mixed aged/multilayered stands containing large saw-timber as a significant component of the stand, or classified as small saw-timber (11 to 21 inches dbh) but usually containing scattered trees greater than 21 inches dbh. All of these surveys indicate that Oregon red tree voles still exploit the structural characteristics of larger trees throughout their southern range (USDA, USDI Species Review Panel 1999a).

Estimates of red tree vole nest tree densities in 16 stands (9 old, 7 young) on the Rock Creek watershed in the central Coast Range found significantly more nest trees per acre in stands greater than 125 years old than in young stands 30-125 years. This watershed

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is dominated by mature and older forest conditions and has had relative little disturbance over the last 20 years. Mean densities were 2.04 (se 0.46) nest trees per acre in the older stands and 0.45 (se 0.33) in 30-125 year old stands (USDA, USDI Species Review Team 1999a).

As a comparison to the healthy populations in the Rock Creek watershed, results from the Grants Pass Resource Area's surveys of 101 potential timber sales suggest weaker population levels. The surveys were distributed over five fifth field watersheds. Of the 101 stands sampled only 14 (13.9%) had confirmed vole nests. Nest tree densities estimated by combining both "active" and "undetermined use" categories of nests in the 14 occupied stands averaged 0.17 (standard error 0.07) nest trees per acre (USDA, USDI Species Review Panel 1999b). Red tree vole nest tree densities were twelve times higher in the central Coast Range study as compared to those in scattered timber sale units in the Grants Pass Resource Area. These lower densities and fewer numbers of stands containing tree vole populations may represent the effect of the dry climate, less well developed canopy structures, or more limited habitat conditions.

Approximately 34 percent of the Congressionally Withdrawn Areas, Late-Successional Reserves, and Administratively Withdrawn lands are currently in conifer stands with trees greater than or equal to a 20" dbh threshold (USDA, USDI Species Review Panel 1999b). While some nests have been found in stands with trees less than 20 inches dbh, the majority of sites with good populations levels (greater than 2 active trees per acre) have been in stands with trees greater than or equal to a 20" dbh. Therefore, much of the reserve lands do not currently provide good habitat for red tree voles. Additionally, land management activities are permitted in Late-Successional Reserves below the Grants Pass line that delineates the Southern General Forest Management Area (USDA, USDI 1994a, USDA, USDI 1994b, p. C-42), which may impact tree vole populations in southern Oregon.

The surveys conducted prior to ground-disturbing activities as required by the Survey and Manage Standards and Guidelines have identified many new populations and potential sites in the Southern General Forest Management Area of the Medford District BLM. The identification and management of these new sites should help reduce the risk of population extirpation in these dry forest types. In the dry forest conditions, vole populations and habitat concerns with the natural fragmentation and distribution of mesic forest conditions are very different from the concern in the northern Coast Range or Cascades. Pre-habitat-disturbing and regional survey efforts in this area have located many sites containing evidence of current and past tree vole populations and helped delineate the southeastern boundary of the species range. Pre-habitat-disturbing surveys in the drier forests of southern Oregon are finding voles in stands with large trees but in more varied conditions than just mesic old-growth stands.

Results from pre-disturbance surveys by the Grants Pass Resource Area support the observation that tree vole populations have a patchy distribution across the dry forest conditions found in the Southern General Forest Manage Area in southern Oregon. Grants Pass Resource Area of the Medford BLM conducted pre-disturbance surveys in 101 proposed timber sale units distributed over eight fifth field watersheds. They sampled from 4 to 21 potential sale units per watershed with surveys covering from 40 to 100 percent of the acres of the units. Red tree vole nests, both active and old inactive nests, were confirmed in 14 (13.9%) of the 101 stands. Of 61 confirmed red tree vole nests in these units, 26 nests were considered active by the surveyors and 46 percent (12) of the active nests come from a single stand.

The risks to the species associated with the potential loss or disturbance of strategic populations is still a concern in the dry forests of the Rogue River Valley where canopy structural characteristics and moisture requirements for this species are relatively narrow and suitable habitat is patchy in distribution on the landscape. The amount and

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distributions of mesic forest conditions are extremely limited within this region (Johnson and George 1991). Significant changes in plant community and stand structural conditions can occur with slight changes in aspect or topography. Therefore, maintaining stands large enough and with the appropriate moisture conditions to support vole populations is critical to managing this species under these conditions.

Red tree voles are hard to locate, generally occurring in small clumped populations, and with a patchy distribution on the landscape (Carey 1991). In 1997 (last year with available analysis) 117 stands were located that contained tree vole nest trees. These surveys detected 443 individual nests, if which 19 percent (84) were confirmed as being occupied at the time of the survey. The remaining 81 percent (359) were old nests or in conditions such that surveyors could not determine current usage. Thirty-two percent (37) of the 1997 sites contained only a single old nest and 62 stands (55%) contained three or fewer old nests with no occupied nests detected. Fourteen of the sites were comprised of a single active nest and 27 percent (32) of the sites had one or more active nests. The remaining stands consisted of only old nests or surveyors could not determine current usage.

Overall, 55 percent of newly identified sites containing only a few old unoccupied tree vole nests, suggesting that many identified sites had very low vole populations levels or that the population is declining in these areas.

There is also some indication (Johnson and George 1991) that genetic variation within and between populations, possibly due to small population size and inbreeding, may have long range effects on populations. However, the extent to which genetic variations within and among populations may affect species management objectives is unknown.

The interim Survey and Manage Protocol requires the buffering of vole populations by 10 acres or the adjusting of the sale unit boundaries to incorporate the area of a vole population into the riparian reserves. Little is known about the overall effect of stand size or topographic position on maintaining vole populations. A study in which vole captures declined in old-growth stands less than 100 acres in size in the Cascades and Oregon Coast suggested a management strategy for tree vole populations that use a rating system that includes stand area as a factor in the likelihood of a vole population persisting in a stand over time. However, habitat models that can identify the correct combinations of moisture, topography, and stand structure to delineate primary red tree vole habitat in the dry forests conditions of southern Oregon have not been developed.

In general, pre-disturbance survey efforts since the Northwest Forest Plan have not indicated the species is either more rare or more abundant than expected. New surveys have found new localities but to date the data is far from conclusive. Surveys have not found red tree voles to be abundant in many lowland forests (USDA, USDI Species Review Team 1999a) where they have been previously collected and some surveys efforts have not found the species in sites where they were expected to occur (USDA Mt. Hood National Forest 1996). The majority of the new sites found after 1994 largely reflect tremendous survey efforts to implement the Survey and Manage provision of the Northwest Forest Plan in portions of their range. For most of these sites, all that is known is that a tree vole nest tree was found at the site. There is a lack of information specific to the status of the populations, habitat characteristics, patterns of abundance, and pattern of distribution for these sites. In addition, known sites identified prior to 1994 have not been revisited and may no longer be extant.

During the FEMAT process, the Oregon red tree vole was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to support the species population to stabilize, well distributed across federally managed lands, though with some possibility of significant gaps in the historic distribution. However, Appendix J2 (USDA, USDI 1994a pp. J2-473-475) raised concerns over the potential risk

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of genetic isolation of red tree vole populations. Appendix USDA, USDI 1994a states that the red tree vole is most abundant in late-successional forest, so populations are likely to be sparse in the Matrix in the future. The species also has limited dispersal capability, so forest fragmentation may limit connectivity between populations in the reserves. There is no new information that would alter these conclusions. The species is still most abundant in late-successional forest and has limited dispersal capability. Appendix USDA, USDI 1994a indicates that the combination of two mitigations (survey and manage known breeding colonies, and implement Riparian Scenario 1) would improve conditions for the red tree vole. Other mitigations might benefit the species, but were not expected to play a significant role in improving the outlook for the species.

A number of basic assumptions regarding the effects of the Northwest Forest Plan and conclusions of previous analysis efforts were brought forward to this analysis. These assumptions and conclusions include:

- Oregon red tree voles were added to Survey and Manage mitigation during the Northwest Forest Plan FSEIS analysis because the species was believed to need more protection than that provided by Riparian Reserves, the other standards and guidelines, and land-use allocations of the Northwest Forest Plan. There is no new information to alter this conclusion. Therefore, the analysis in this SEIS assumes that stable, well-distributed tree vole populations were dependent to some extent on maintaining some vole populations within the Matrix capable of re-occupying areas as stand conditions improved as a result of other standards and guidelines provided in the Northwest Forest Plan.

- Most timber harvest over the next decade will occur in late-successional stands (See Chapter 3 & 4, Effects - Timber, Johnson et al. 1993).

- As described in the Northwest Forest Plan, Late-Successional Reserves below the Grants Pass line that delineates the Southern General Forest Management Area (USDA, USDI 1994a, USDA, USDI 1994b, p. C-42) will have prescribed fires to reintroduce fire into the ecosystem and Northwest Forest Plan allows canopy disturbing projects, such as thinning in stands less that 80 years old, within these Late-Successional Reserves (Appendix B of USDA, USDI 1994a, pp. 7 and 8).

Environmental Consequences and Comparison of Alternatives - Red Tree Vole

The alternatives in this Supplemental EIS propose adjustments to the management direction for the Oregon red tree vole. Alternatives 1, 2, and 3 would reassign the Oregon red tree vole to slightly different Survey and Manage categories and slightly different management options than under the No Action Alternative.

The No-Action alternative would continue the current management direction where all current and future known sites would be managed and "[w]here surveys are completed, the information gathered from them should be used to establish managed sites for the species (USDA, USDI 1994a, USDA, USDI 1994b C-5) "Under this alternative, the Oregon red tree vole would remain as a category 2 only species, requiring surveys be completed prior to the design of all ground-disturbing activities within the tree vole's geographic range, but not requiring automatic protection of known sites. The Category 2 status alone imparts less protection for tree vole populations that for other Category 1 and 2 species because sites are not automatically protected as in Category 1.

Pre-project surveys help protect vole populations in the matrix by identifying new populations and avoiding inadvertent loss of populations. However, because pre-

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projects surveys do not collect quantitative data on species abundance at new sites nor determine populations trend or other demographic information, they will not provide all the information essential to developing Management Recommendations for the species. Strategic surveys are designed to gather this information, but they are not required in the No-Action Alternative.

Under Alternatives 1, the red tree vole is placed in Category 1C. Under this category, all current and future known sites would be managed until high-priority sites could be determined. Pre-disturbance surveys would be conducted to minimize the inadvertent loss of undiscovered sites. This alternative shifts from managing all known sites to identifying and managing high-priority sites. Until high-priority sites are identified, all current and future known sites will be managed to maintain the species. The high-priority sites identified for management through Management Recommendations should include all current and future sites necessary to maintain persistence of the species. This would likely include protection of sites necessary to maintain stable, well-distributed populations of the species in the Northwest Forest Plan area and avoidance of isolation of populations, as well as consideration of the risk of catastrophic losses, such as wildfires. After high-priority sites are identified, or after methods for determining which future sites are high priority are developed, the sites or populations not meeting these standards could be lost through management activities. However, the management of high-priority sites should ensure that the species remains **stable** and well distributed in the Northwest Forest Plan area.

The addition of strategic surveys to the requirements for red tree voles under Alternative has important implications. The following information is needed to develop management for the Oregon red tree vole:

- Which of its historic sites are extant.
- Its relative abundance at any of the known sites or populations.
- An understanding of the species habitat requirements.
- The distribution of tree vole populations in reserved land allocations.
- The extent to which genetic variations within and among populations may affect species management objectives.

New information compiled from strategic surveys would aid further refinement and revision of the Interim Survey Protocol and provide information for development of long-term Management Recommendations for the species.

An advantage of identifying high-priority populations and developing Management Recommendations, as defined in the action alternative, will be the broader scope of considerations that can be used for managing high-priority sites then the current approach of managing only known sites. The Management Recommendation could consider the aggregation of sites that form a more biologically-significant population or metapopulation for population management. Connectivity among sites or sub-populations can be considered in a Management Recommendations, whereas this concept is not considered in current Management Recommendations under the No-Action alternative.

Under Alternative 2 red tree voles are placed in Category 2D. All sites known as of September 30, 1999, would continue to be managed for the next 5 years. No new pre-project surveys would be conducted and strategic surveys would be conducted within 5 years throughout the range of the species in the Northwest Forest Plan area. After 5 years, site management for the red tree vole would be rescinded and, based on the strategic survey information, the species would be: (1) considered for inclusion in the agencies' for sensitive species programs, (2) considered for listing under the Endangered Species Act, or (3) dropped from special management consideration because no additional species-specific provisions would be needed.

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Managing only those known sites identified as of September 1999, and not conducting additional pre-projects surveys would increase the risk of losing populations throughout the northern Cascades, Oregon Coast Range, and northen California. This, in turn, would increase the risk of isolation of red tree vole populations in these areas. Therefore, this alternative may increase the isolation of tree vole populations. Due to the interim Survey Protocol, ten of twelve Forests and BLM Districts have not been required to survey or have been required to survey to only a few hundred acres for red tree voles (USDA, USDI Species Review Panel 1999b). Eighty-one percent of all pre-project surveys conducted to date, 44 percent of the surveyed area, and 83 % (211) of potential new red tree vole populations have been on the Medford BLM District. This leaves a significant portions of the species range, such as the northern Oregon Coast Range or northwestern California, exposed to the inadvertent loss of significant numbers of undiscovered populations under this alternative. Other than Medford District, most of these other areas have very few or no recently confirmed tree vole populations and historic known sites are a rarity.

Alternative 2 creates uncertainty in how the species will be managed following the 5 year interval. Given our limited knowledge of tree vole populations dynamics and ecology, the five year time line may not be sufficient for completion of the studies necessary to make an informed recommendation to the species future disposition. Pre-project surveys are only now starting to locate vole populations in many areas. To develop Management Recommendations to ensure stable, well-distributed populations of red tree voles on federal lands, biologists and managers need information on genetic variation between populations and other population-based data. Information on the genetic variation between these small isolated populations combined with studies of vole population trend, longevity, demographics, and populations densities specific to the status of populations require collection of information over several generations of voles (more than 5 years). The other three alternatives do not have restrictions on pre-disturbance surveys, nor the time limit on species or population protection measures for this endemic species.

Overall, Alternative 2 could increase the risk that Oregon red tree vole populations may decline throughout large portions of its range and that the remaining populations could become more isolated because it would only protect currently known sites and allow only 5 years to complete strategic surveys prior to determining whether to consider including the red tree vole on the Agencies' sensitive species lists. The extent or magnitude of this risk is difficult to characterize because of the current incomplete information. However, the limited and uneven survey efforts in significant portions of the species range has resulted in few, if any, known sites in these areas. The distribution of currently known sites is insufficient, by itself, to provide for stable, well-distributed populations of this species in the long term. Therefore, failure to locate and protect new known sites in these areas would increase the likelihood of isolating the remaining populations. In addition, information on population trend and genetic variation is very important to the determination of the location and condition of high-priority sites for management to protect against isolation and inbreeding. Information necessary to answer these questions would require more than 5 years to collect.

Alternative 3 place Oregon red tree vole into Category 3B. Under this category, all current and future known sites would be managed until high-priority sites could be determined. Pre-disturbance surveys, designed to locate occupied sites would be conducted to minimize the inadvertent loss of undiscovered sites. Strategic surveys would be conducted for the species to determine important habitat and the ability of reserves to provide reasonable assurance of persistence.

Alternative 3 is similar to Alternative 1 relative to its effects on the persistence of this species. The objective of the required strategic surveys is to find the most important

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habitat for the species and determine the ability of reserves to provide for the species persistence. This slightly greater emphasis on survey efforts in the reserved land allocations is consistent with the need to identify and manage tree vole populations. Knowledge of the status of vole populations and habitat conditions within the reserved land allocations will allow a better assessment of the importance of matrix populations in their role of providing prey populations for spotted owl populations as well as maintaining well-distributed tree vole populations. Determining the most important habitat for the species will require studies addressing the genetic variations within and among isolated populations and population demographic information.

As in Alternative 1, Alternative 3 shifts from managing all known sites to identifying and managing high-priority sites. Until high-priority sites are identified, all current and future known sites would be managed to maintain the species. High-priority sites identified for management through Management Recommendations should include all current and future sites needed to maintain persistence of the species. This would likely include protection of sites necessary to maintain stable, well-distributed populations of the species in the Northwest Forest Plan area and avoidance of isolation of populations, as well as consideration of the risk of catastrophic losses, such as wildfires. Once high-priority sites, or methods for determining which future sites are high priority, are developed, sites or populations not meeting these standards could be lost through management activities. However, the management of high-priority sites should ensure that the species remains stable and well distributed in the Northwest Forest Plan area.

Implementation of strategic surveys under all three action alternatives are vital to improving our understanding of red tree vole ecology, distribution, habitat relationships, populations trends and management options. The information gained through the process is essential to scientifically credible Management Recommendations in order to maintain stable, well-distributed populations. Current Survey Protocols and Management Recommendations could be improved with new information on the species reproductive potential, demographics, population status or trend, and the spatial extent of populations at known sites. Identifying high-priority populations for management without a better understanding of tree vole ecology could increase the risks to red tree vole populations because of the inherent uncertainties associated with a lack of information that could be provided by strategic surveys.

This species has many life history characteristics, such as very small home ranges, low dispersal capability, extremely low reproduction potential, and a sensitivity to stand level disturbances that cumulatively raise concerns for this species long-term persistence. Generally, the scientific information needed for management has not come solely from pre-project type surveys. To date pre-project survey information has been limited to locating new sites and collecting counts of the number of nests trees within projects. Without the additional information and analysis that come from strategic surveys, Management Recommendations will reflect the uncertainty of our knowledge.

The strategic surveys proposed in the three action alternatives provides information necessary for preparing Management Recommendations that can provide for managed red tree vole populations distributed throughout the species range. Some extensive surveys have been conducted under the No-Action Alternative, however they were not required .

Alternatives 1 and 3 are not significantly different relative to their effects on Oregon red tree vole populations. Both maintain similar pre-disturbance surveys and contain strategic surveys, though with slightly different emphasis that minimizes the inadvertent loss of undiscovered new sites which Alternative 2 does not provide. Strategic surveys under both provide needed ecological information on the species without the time limits imposed by Alternative 2. Alternatives 1 and 3 protect all

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current and future known sites until high-priority sites are identified and provide Management Recommendations for the long-term species management rather than possibly moving the species into the sensitive species programs. Alternatives 1 and 3 give the best overall protections to the species because they maintains pre-disturbance surveys, manages high-priority sites and the strategic surveys have a broader scope of emphasis on obtaining information on populations status, life history, and habitat relationships to improve site management and selection of high-priority populations for management.

Species Associated with Early-Successional Forest

Background and Affected Environment

The Northwest Forest Plan was developed to address federal land management issues related to late-successional forest associated species. Despite this emphasis, it was necessary for the FSEIS to analyze expected effects of the alternatives on early-successional associated species (pp. 3&4-203 - 205 incorporated here by reference). The Northwest Forest Plan FSEIS describes the broad ecological characteristics of early-successional associated species, and general conclusions about the abundance and distribution of early-successional forest prior to the influences of timber harvest and other modern land management practices. Those descriptions provide the basis for conclusions regarding effects on early-successional species from the alternatives in the Northwest Forest Plan FSEIS.

Alternative 9 of the Northwest Forest Plan FSEIS (the selected alternative) was found acceptable for sustaining adequate populations of species dependent upon young forest habitat. These conclusions were based on several interacting factors: (1) the large acreage in early-successional condition across federally managed lands, (2) the expectation that future timber harvest under all the alternatives would create more early-successional habitat, offsetting the regrowth of stands in previously harvested acreage, (3) the ecological characteristics of early-successional species, which generally include higher mobility to move from one early-successional patch to another as succession occurs, (4) timber harvest on nonfederal lands and natural disturbances which would continue to create early-successional habitat across the Northwest Forest Plan area, and (5) the knowledge that individual National Forest and BLM District plans would continue to address the needs of early-successional species.

With overall timber harvest levels below those anticipated in the Northwest Forest Plan Record of Decision, there is a trend toward slightly less early-successional habitat on federal matrix lands than was expected. However, the acreage of the anticipated timber harvest is a very minor component of the total federal acreage. This is largely because of the preponderance of early-successional habitat already existing across the Northwest Forest Plan area relative to what would be expected in a natural forest ecosystem.

Environmental Consequences

The adaptive management component of the action alternatives lead to uncertainty as to its effect on other land management programs and environmental conditions due to the potential for changes in the Survey and Manage species and, therefore, changes in the number of acres affected. The No-Action Alternative is somewhat static in the number of species it would retain in the program, though it is possible that species could be dropped. Even so, future surveys for the species covered under the No-Action Alternative will result in new locations and additional acres identified for the species

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management. Alternatives 1, 2 and 3 allow both deletions and additions to the Survey and Manage list, which exacerbates the uncertainty in the acres affected. With any of these alternatives, the impacts of the fluctuating list of species and the corresponding fluctuation in acreage protection for those species, along with the location of new species sites, adds uncertainty to estimates of the future effects of the alternatives.

Despite this uncertainty of acres of late-successional forest which would be retained under the Survey and Manage Standards and Guidelines, the effects of the four alternatives in this SEIS will have a negligible effect on the abundance and distribution of early-successional habitat across the Northwest Forest Plan area. This is due to the large extent of early-successional habitat currently available, and the reasonable expectation that nonfederal lands will continue to be harvested and natural disturbances will continue throughout the Northwest Forest Plan area. Therefore, there would have little effect on the populations of early-successional associated species in the planning area.

All three action alternatives retain most species in the Survey and Manage program, at least in the short term, and therefore, would continue to retain late-successional forest for those species. Because Alternatives 1, 2 and 3 would remove some species from the Survey and Manage program, there could be slightly more early-successional habitat under those alternatives in the near term as more acreage should be available for timber harvest. The negligible relative effect of the alternatives on early-successional habitat is the result of the relative large extent of early-successional habitat currently extant, and the reasonable expectation that nonfederal lands will continue to be harvested and natural disturbances will continue throughout the Northwest Forest Plan area. These latter two points would provide adequate acreage and distribution of early-successional habitat across the area to sustain adequate populations of species dependent on young forest habitat.

Threatened and Endangered Species

Background and Affected Environment - Northern Spotted Owl

Management of northern spotted owls and their habitat on federally managed lands was an important component in the design of the Northwest Forest Plan. Therefore, this species received extensive attention in the Northwest Forest Plan FSEIS and its supporting documents. The FSEIS (USDA, USDI 1994a pp. 3&4-211 through 245 and Appendices G, J.1 and J.3) provides the basis for concluding that the Northwest Forest Plan would serve as the federal agency contribution to spotted owl recovery.

The April 12, 1994, letter from the Northwest Forest Plan FSEIS Team Leader to the U.S. Fish and Wildlife Service specifically addressed the contribution to spotted owl habitat which would accrue from implementation of the Survey and Manage Standards and Guidelines. This discussion states that the expected small scale of late-successional forest areas that would be retained for the Survey and Manage Standards and Guidelines would have a negligible beneficial effect on the maintenance of spotted owl populations. This negligible effect results from the fact that the federal spotted owl population recovery strategy is primarily designed to retain and manage large blocks of late-successional habitat to provide for population clusters of spotted owl pairs (Biological Assessment of the Draft SEIS, dated October 1993). However, most Survey and Manage sites are small in comparison.

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An additional aspect of the Northwest Forest Plan spotted owl strategy was assurance of successful spotted owl dispersal among the large reserves through the relative proximity of large reserves to one another. The distance between reserves is generally less than population modeling indicated was needed to promote dispersal between the reserves. Also, the retention of late-successional forest in Riparian Reserves and the 100-acre owl activity centers would contribute to spotted owl dispersal by providing foraging and roosting conditions for dispersing spotted owls. The additional late-successional forest retained to protect Survey and Manage species would provide a minor acreage contribution that might contribute to spotted owl movement across a landscape.

The Northwest Forest Plan FSEIS anticipated that some of the acres of federally managed land in matrix and Adaptive Management Area harvested for timber in the future would be suitable spotted owl habitat and occupied by spotted owls (Appendix J3 in USDA, USDI 1994a, p. J3-8). Therefore, the anticipated rate of timber harvest in the matrix and Adaptive Management Areas was also part of the analysis of effects to spotted owls in the FSEIS. The conclusion in the Northwest Forest Plan FSEIS analysis was that the expected timber harvest would be compatible with spotted owl habitat and population management objectives of the Northwest Forest Plan. The loss of spotted owl habitat in the matrix and Adaptive Management Areas was anticipated to occur in a manner which would allow the spotted owl population to stabilize in the Congressionally Reserved Areas and Late-Successional Reserves while habitat was also regrowing in these areas.

The management for spotted owl habitat and population that is in the Northwest Forest Plan was based on providing large blocks of late-successional forest in Congressionally Reserved Areas and Late-Successional Reserves, with provisions for spotted owl dispersal between the reserves. Management of the Congressionally Reserved Areas and Late-Successional Reserves has occurred as anticipated in the Northwest Forest Plan FSEIS. The most common activities inside Late-Successional Reserves are silvicultural thinning of stands improve spotted owl habitat, and risk management (fuels reduction) in the drier forest types of the Late-Successional Reserves. After five years of implementing the Northwest Forest Plan, there have been fewer impacts to the spotted owl population in the matrix and Adaptive Management Areas than were originally anticipated due to lower than anticipated timber harvest and more the designation of Riparian Reserve acreage than originally modeled.

After five years, the scientific findings indicate that the original spotted owl management strategy is bring met. Publication of a new analysis of spotted owl demographic studies prepared as part of the Effectiveness Monitoring of the Northwest Forest Plan has provided updated information regarding the spotted owl population status (Franklin et al., 1999) and was based on the analysis of data compiled from study sites throughout the Northwest Forest Plan area. The 1998 results are similar to a comparable analysis from 1993 (Forsman et al. 1996), but indicate a slightly slower decline in the spotted owl population and a stabilization of the female survival rates. These conclusions are consistent with the Northwest Forest Plan FSEIS analysis.

Critical Habitat for the northern spotted owl was designated on January 15, 1992 (57 FR 1796). Federal agencies have continued to manage the spotted owl Critical Habitat in compliance with the Endangered Species Act, consulting on activities that may affect critical habitat. The FSEIS analysis assumed no contribution from spotted owl critical habitat above that already provided by the Northwest Forest Plan.

The Northwest Forest Plan FSEIS anticipated publication of a Section 4(d) Special Rule for spotted owls under the Endangered Species Act (USDA, USDI 1994a pp. 3&4-8 through 3&4-10) which has not been completed at this time. This rule would have released some nonfederal lands in portions of the spotted owl range in Washington

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from the prohibition against harming ("take" of) spotted owls. Many Habitat Conservation Plans have been completed, which result in a permit for the incidental take of spotted owls for activities conducted in compliance with those plans. All Habitat Conservation Plans which have undergone consultation relative to spotted owls under Section 7 of the Endangered Species Act were judged not to appreciably reduce the survival and recovery of the spotted owl in the wild. These plans have an affect similar to the proposed 4(d) rule by allowing some loss of spotted owls on nonfederal lands, and their affect is consistent with within the assumptions of the Northwest Forest Plan FSEIS analysis.

Environmental Consequences - Northern Spotted Owl

The four Alternatives considered in this SEIS would have very similar effects on spotted owl habitat management across the Northwest Forest Plan area, which is the meaningful scale for consideration of spotted owl populations. Large reserves and other components of the Northwest Forest Plan would continue provide habitat for populations and dispersal for spotted owls in all of the alternatives.

The primary effect of Alternatives 1, 2 and 3 on spotted owls would result from dropping protection for 64 Survey and Manage and Protection Buffer species and reduction in the area where the Survey and Manage Standards and Guidelines applies for 7 species. The primary difference between the action alternatives and the No-Action Alternative would be the loss of protection for approximately 12,000 acres of late-successional habitat at approximately 5,100 locations across the Northwest Forest Plan area. However, the presence of other Survey and Manage species at the same location could result in continued protection for some of these locations.

The acreage of protected habitat for Survey and Manage species, though significant for the individual Survey and Manage species, occurs as scattered, relatively small patches which provide little contribution to the maintenance of spotted owl populations. The small patches could often not be considered 'suitable' habitat for spotted owls unless they happen to be contiguous with other reserved habitat, to create a block of habitat large enough to support spotted owl use. While these areas may provide some benefits to dispersal of spotted owls by providing additional structure and habitat complexity to the harvested area through the next stand rotation, any effects are negligible when compared to the contribution of Congressionally Withdrawn Areas and Late-Successional Reserves.

One difference between the alternatives is the effect on the red tree vole (*Arborimus longicaudus)*. The red tree vole is an important prey for the spotted owl. Use of red tree voles as prey varies in different portions of the range of the northern spotted owl, from a low of 1 percent of the diet to a high of 6 percent. However, red tree voles may represent a higher proportion of the diet of individual spotted owls. In coastal southwestern Oregon, the vole made up 50 percent of the prey items consumed by two owl pairs, though due to their small size, red tree voles provided 16 percent of the total diet (Forsman et al. 1984).

Alternative 2 would increase the risk that Oregon red tree vole populations may decline throughout large portions of its range and that the remaining populations could become more isolated (see Red Tree Vole Effects Section) compared to Alternatives 1 and 3 and No-Action. The increased risk to red tree vole populations would be the result of management activities that would occur primarily in the Matrix and Adaptive Management Areas. Any effects on spotted owls would be greatest for resident spotted owls because they are dependent on prey availability within their individual home range. However, because red tree voles do not represent a large portion of the diet of most resident spotted owls and the Matrix and Adaptive Management Areas were not

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expected to provide long-term habitat for resident spotted owls, any effect to spotted owls from reductions of red tree vole populations is likely to be low.

The adaptive management components of the action alternative lead to uncertainty as to their effect on other land management programs and environmental conditions due to the potential for changes in the Survey and Manage species and therefore changes in the number of acres affected. The No-Action Alternative is somewhat static in the number of species it would retain in the program, though it is possible that species could be dropped. Even so, future surveys for the species covered under the No-Action Alternative will result in new locations and additional acres identified for the species management. Alternatives 1, 2 and 3 allow both deletions and additions to the Survey and Manage list, which exacerbates the uncertainty in the acres affected. With any of these alternatives, the impacts of the fluctuating list of species and the corresponding fluctuation in acreage protection for those species, along with the location of new species sites, adds uncertainty to the estimate the future effects of the alternatives. Nevertheless, because of the inconsequential amount of habitat for spotted owls provided by the Survey and Manage and Protection Buffer Standards and Guidelines, there is sufficient information on which to base reasonable analyses and conclusion.

None of the alternatives in this SEIS will affect the original basis for the assessment of the effects to spotted owls and conclusions in the Northwest Forest Plan FSEIS. Congressionally-Reserved Areas and Late-Successional Reserves will continue to be managed for late-successional habitat in the Northwest Forest Plan area, providing for spotted owl breeding clusters. Distances between the Congressionally-Reserved Areas and Late-Successional Reserves and the Riparian Reserve system will continue to provide for dispersal of spotted owls. The potential difference between alternatives has no effect on the spotted owl habitat management strategy because it results in only very minor fluctuations of habitat. The Northwest Forest Plan FSEIS assumptions and conclusions relative to a spotted owl 4(d) rule and Critical Habitat remain valid as described above. Therefore, none of the alternatives in this SEIS would affect the conclusions of the Northwest Forest Plan FSEIS that spotted owls will be adequately provided for under the Northwest Forest Plan.

Background and Affected Environment - Marbled Murrelet

Management of the marbled murrelet population and its habitat on federally managed lands was an important component in the design of the Northwest Forest Plan. Therefore, this species received extensive attention in the FSEIS and its supporting documents. The FSEIS (pages 3&4-245 through 249, Appendices G and J2) provides a detailed explanation of the basis for concluding that the Northwest Forest Plan would serve as the federal agency contribution to marbled murrelet recovery. Additional information was provided in the April 12, 1994 letter from the FSEIS Team Leader to the U.S. Fish and Wildlife Service.

The management strategy for marbled murrelets in the Northwest Forest Plan includes the protection and development of marbled murrelet nesting habitat inside the large reserves near the coast and the retention of all current and future known marbled murrelet nest sites in all land allocations by requiring surveys of potential marbled murrelet habitat prior to management activities and protecting occupied habitat.

Management of the Congressionally Withdrawn Areas and Late-Successional Reserves has occurred as expected. The most common activities in the coastal areas, primarily silvicultural thinning of stands in the Late-Successional Reserves to encourage late-successional forest development. After five years of implementing the Northwest Forest

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Plan, there have been fewer impacts to the late-successional forest in the matrix and Adaptive Management Areas than was originally expected due to lower than anticipated timber harvest and more Riparian Reserve acreage than originally modeled.

Because the pre-project survey requirements for potential marbled murrelet habitat prevent the inadvertent loss of occupied sites, there was no anticipated effect from the Survey and Manage and Protection Buffer Standards and Guidelines. Therefore, there is no new information that would substantially alter the conclusions of the Northwest Forest Plan SEIS concerning marbled murrelets.

Environmental Consequences - Marbled Murrelets

The four Alternatives considered in this SEIS would have very similar effects on marbled murrelet habitat management. The primary potential effect of Alternatives 1, 2 and 3 on marbled murrelets, would result from dropping protection for 64 Survey and Manage and Protection Buffer species and reduction in the area where the Survey and Manage Standards and Guidelines applies for 7 species. This difference between the action alternatives and the No-Action Alternative, would be the loss of protection for approximately 12,000 acres of late-successional habitat at approximately 5,100 locations across the Northwest Forest Plan area, much of which is outside the range of the marbled murrelet. However, the presence of other Survey and Manage species at the same location could result in continued protection for some of these locations. Further, the dropping of protection for these, or any Survey and Manage sites, is irrelevant to the protection of currently occupied marbled murrelet habitat, since marbled murrelet surveys and habitat protection measures would remain in place regardless of Survey and Manage species locations.

Background and Affected Environment - Northern Bald Eagle

Breeding and wintering populations of the bald eagle occur throughout the Northwest Forest Plan area and are addressed in the Pacific States Bald Eagle Recovery Plan and the Oregon-Washington Bald Eagle Working Team Implementation Plan. Agencies survey extensively for bald eagles. Management for the bald eagle includes site-specific management plans, providing protection zones and management areas as needed to effectively manage the species, its habitat, and potential threats. Management guidelines delineated in these plans address the potential loss of habitat from timber harvest activities, the distribution goals identified in the recovery plan, and to some extent, human disturbance.

Environmental Consequences - Northern Bald Eagle

All four alternatives in this SEIS would have very similar effects on bald eagle habitat management. The primary potential effect of Alternatives 1, 2 and 3 on bald eagles, would result from dropping protection for 64 Survey and Manage and Protection Buffer species and reduction in the area where the Survey and Manage Standards and Guidelines applies for seven species. This difference between the action alternatives and the No-Action Alternative, would be the loss of protection for approximately 12,000 acres of late-successional habitat at approximately 5,100 locations across the Northwest Forest Plan area. The current requirements to conduct specific surveys and develop site management plans for bald eagles greatly reduces any potential effect from changes in the Protection Buffer and Survey and Manage Standards and Guidelines. None of the alternatives in this SEIS will affect the original basis for the assessment of the effects to bald eagles and conclusions in the Northwest Forest Plan FSEIS.

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Background and Affected Environment - Gray Wolf

The range of the gray wolf includes portions of the Northwest Forest Plan area, including the northern Cascade Range in Washington. Gray wolves are not closely associated with late-successional forest, but use a variety of open and forested habitat that support deer and elk populations that are their primary prey, as well as areas supporting small mammal populations. Gray wolves are sensitive to human disturbance.

Environmental Consequences - Gray Wolf

All four alternatives in this SEIS would have nearly identical effects on gray wolf habitat. Because gray wolves are not dependent on late-successional forest, the small, isolated patches of late-successional forest that would be protected under the Survey and Manage Standards and Guidelines would have no effect on habitat for this species. None of the alternatives in this SEIS will affect the original basis for the assessment of the effects to gray wolves and conclusions in the Northwest Forest Plan FSEIS.

Background and Affected Environment - Grizzly Bear

The range of the threatened grizzly bear includes portions of the Northwest Forest Plan area, including the National Forests in the Cascade Range in Washington. While grizzly bears are not closely associated with late-successional forest, they use a variety of habitats, including forested areas for hiding and cover. Grizzly bears are sensitive to human disturbance.

Environmental Consequences - Grizzly Bear

All four alternatives in this SEIS would have nearly identical effects on grizzly bear habitat. Because grizzly bears are not dependent on late-successional forest, the small, isolated patches of late-successional forest that would be protected under the Survey and Manage Standards and Guidelines would have no effect on habitat for this species. None of the alternatives in this SEIS will affect the original basis for the assessment of the effects to grizzly bears and conclusions in the Northwest Forest Plan FSEIS.

Other Terrestrial Threatened and Endangered Species

The following terrestrial or inland-aquatic listed species occur within the area covered by the Northwest Forest Plan, but are not associated with late-successional/old-growth forests. The Protection Buffer and Survey and Manage Standards and Guidelines were developed to deal with species associated with late-successional forest. Any habitat protected by the Protection Buffer and Survey and Manage Standards and Guidelines is likely to be late-successional conifer forest. Therefore, any changes to the Protection Buffer and Survey and Manage Standards and Guidelines should not affect these species or the conclusions of the Northwest Forest Plan FSEIS.

Common Name	**Scientific Name**
Plants	
Sonoma alopecurus	*Alopecurus aequalis var. sonomensis*
MacDonald's rockcress	*Arabis macdonaldiana*
Marsh sandwort	*Arenaria paludicola*

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Applegate's milkvetch	*Astragalus applegatei*
Clara Hunt's milk-vetch	*Astragalus clarianus*
Tiburon paintbrush	*Castilleja affinis ssp. neglecta*
Golden Indian paintbrush	*Castilleja levisecta*
Howell's spineflower	*Chorizanthe howellii*
Sonoma spineflower	*Chorizanthe valida*
Baker's larkspur	*Delphinium bakeri*
Yellow larkspur	*Delphinium luteum*
Willamette daisy	*Erigeron decumbens* var. *decumbens*
Menzies' wallflower	*Erysimum menziesii*
Gentner's mission-bells	*Fritillaria gentneri*
Marin dwarf-flax	*Hesperolinon congestum*
Water howellia	*Howellia aquatilis*
Beach layia	*Layia carnosa*
Burke's goldfields	*Lasthenia burkei*
Contra costa goldfields	*Lasthenia cojugens*
Western lily	*Lilium ocidentale*
Bradshaw's lomatium	*Lomatium bradshawii*
Cook's lomatium	Lomatium cookii
Kincaid's lupine	*Lupinus sulphereus* var. *kincaidii*
Pt. Reyes clover lupine	*Lupinus tidestromii var. layneae*
Tidestrom's clover lupine	*Lupinus tidestromii var. tidestromii*
Many-flowered navarretia	*Navarretia leucocephala ssp. plieantha*
Slender Orcutt grass	*Orcuttia tenuis*
Yreka phlox	*Phlox hirsuta*
Hairy (Rough) popcorn flower	*Plagiobothrys hirtus*
Calistoga allocarya	*Plagiobothrys strictus*
Napa bluegrass	*Poa napensis*
Nelson's checkermallow	*Sidalcea nelsoniana*
Wenatchee Mountain checkermallow	*Sidalcea oregana var. calva*
Kenwood Marsh checker-mallow	*Sidalcea oregana var. valida*
Ladies'-tresses	*Spiranthes diluvialus*
Kneeland Prairie penny-cress	*Thlaspi montanum* var. *californicum*
Showy Indian clover	*Trifolium amoenus*

Invertebrates

Conservancy fairy shrimp	*Branchinecta conservatio*
Vernal pool fairy shrimp	*Branchinecta lynchi*
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*
Mission blue butterfly	*Icaricia icarioides missionensis*
San Bruno elfin butterfly	*Incisalia mossii bayensis*
Fender's blue butterfly	*Icaricia icarioides fenderi*
Vernal pool tadpole shrimp	*Lepidurus packardi*
Lotis blue butterfly	*Lycaeides argyrognomon lotis*
Shasta crayfish	*Pacifastacus fortis*
Callippe silverspot butterfly	*Speyeria calliope calliope*
Behren's silverspot butterfly	*Speyetia zerene behrensii*
Oregon silverspot butterfly	*Speyeria zerene hippolyta*
Myrtle's silverspot butterfly	*Speyetia zerene myrtleae*
California freshwater shrimp	*Syncaris pacifica*

Birds

Aleutian Canada goose	*Branta canadensis leucpareia*
Western snowy plover (coastal populations)	*Charadrius alexandrinus nivosus*
Brown pelican	*Pelcanus occidentalis*
California clapper rail	*Rallus longirostris obsoletus*

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Mammals	
Point Arena mountain beaver	*Aplodontia rufa nigra*
Steller (=northern) sea-lion	*Eumetopias jubatus*
Columbian white-tailed deer	*Odocoileus virginianus leucurus*
Salt marsh harvest mouse	*Reithrodontomys raviventris*

Costs of Management

Background and Affected Environment

Survey and Manage, Protection Buffers, Manage Recreation Areas to Minimize Disturbance to Species, Protect Sites from Grazing, and Provide Additional Protection [for Bats] are mitigation measures for species that are rare, or for which there is little known information, that are old-growth associated species that were thought to not be sufficiently protected under the Northwest Forest Plan. For purposes of this analysis, all of these standards and guidelines are referred to as Survey and Manage. The mitigation measures have several components, including management of known sites, surveys prior to ground-disturbing activities, and extensive and general regional surveys. The species were assigned to categories based on the amount of information about the species and the ability to do surveys prior to ground-disturbing activities.

The Agencies were to acquire information on known sites and begin management for Category 1 species immediately (1994), with a requirement that activities implemented in 1995 and later include provisions for known sites. Surveys were to start for one vertebrate species (great gray owl) in 1995; and surveys for other vertebrates (red tree vole, lynx, and salamanders) were to precede the design of all ground-disturbing activities that would be implemented in 1997 or later. For another 80 species, surveys were required before ground-disturbing activities that would be implemented in fiscal year 1999 or later. The Northwest Forest Plan Record of Decision also required that landscape-level surveys for fungi, plants and arthropods be underway by 1996. As described in the accomplishments table (Table 2-1), Survey Protocols and Management Recommendations were developed for most species that required surveys prior to ground-disturbing activities, and extensive and regional surveys have been undertaken.

For purposes of this analysis, costs of implementing the Survey and Management program are divided into regional costs (including development of Survey Protocols and Management Recommendations, and conducting extensive and general regional surveys, as well as data management and analysis), and field costs (which include completing pre-disturbance surveys and reworking projects). Figure 3&4-4a summarizes the historical costs of implementing the Survey and Manage guideline from 1994-1999 by category. Postponing or forgoing projects has additional costs associated with impacts on income and employment, as described in the social economic analysis later in this chapter.

Regional Costs

The Northwest Forest Plan required management of known sites, development of Survey Protocols and management standards, and extensive and general regional surveys (see description of the No-Action Alternative in Chapter 2). Since 1994, approximately $7.8 million has been spent on this effort through fiscal year 1999. The regional costs to implement the Survey and Manage Standards and Guidelines to 1999 are summarized on Table 3&4-5. This includes $1.9 million developing Management Recommendations, Survey Protocols, field guides, and training at the regional level, and $2.6 million on extensive and general regional surveys. Another $2 million has been spent on data development and management. These expenditures are discussed below.

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Figure 3&4-4a.

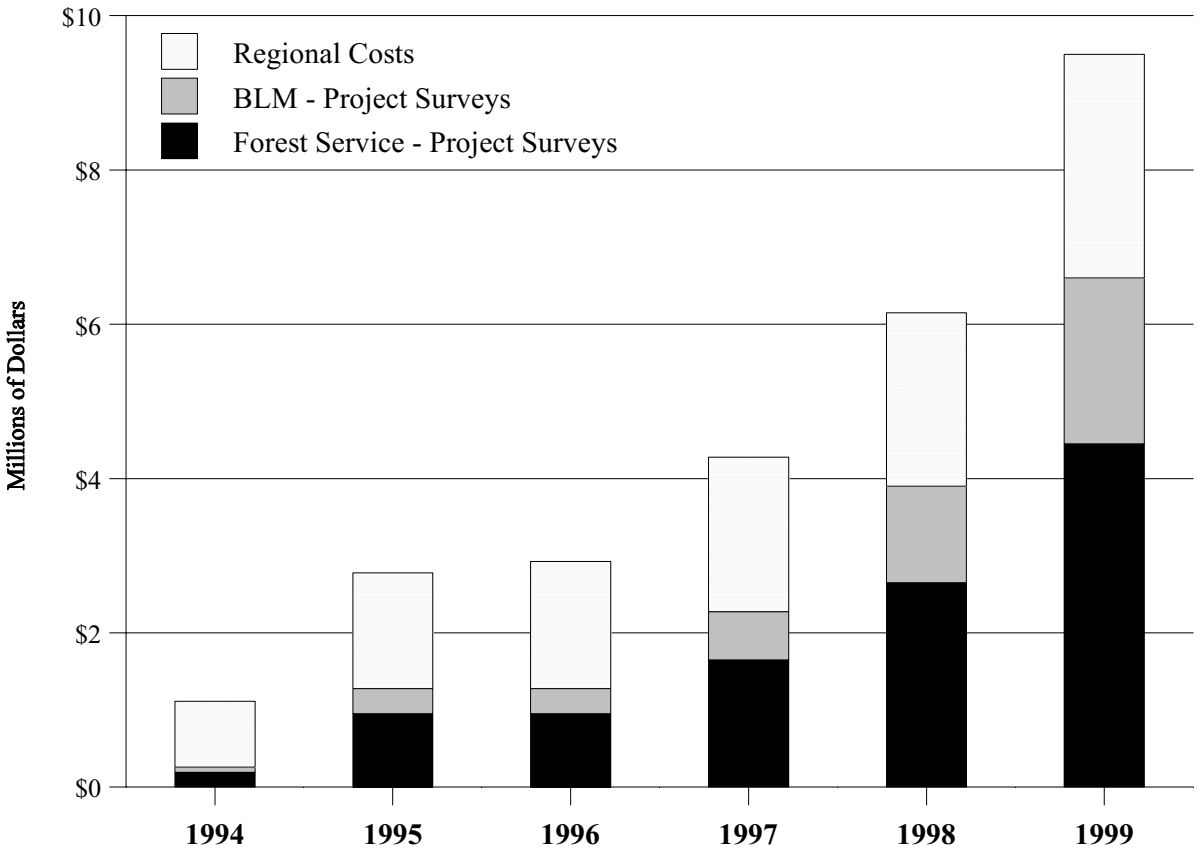

Table 3&4-5 - Regional Costs to Implement Survey and Manage, 1994-1999 (in thousands of dollars)	
General Costs	**Costs**
Program Management ($150,000/yearly)	$600
Species Related Costs	
Survey Protocols and Management Recommendations	$1,655
Field Guides	$250
Training and Species Identification	$675
Extensive and General Regional Surveys	$2,615
Total for Species Costs	**$5,225**
Data Management or Analytical Analysis	
Known Site Data Base	$610
Interagency Species Management System	$1,100
GAP Analysis	$260
Total For Data Management	$1,970
Total Regional 1994-1999 Survey and Manage Costs	$7,795

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Management Recommendations, Survey Protocols and Field Guides: Development of Management Recommendations and Survey Protocols was given first priority since most species requiring surveys and management were not known to field staff. The region has made significant progress on this work; to date, they have completed the first versions of Management Recommendations for more than 250 species, and Survey Protocols for almost all of the 87 Category 2 and Protection Buffer Species. Approximately $1.7 million has been spent on this effort through fiscal year 1999.

Management Recommendations and Survey Protocols are developed by Agency scientists and revised using a field review process. The initial document version is prepared and sent to the field for their use and comment, as well as being sent to outside scientists for peer review. After comments are collected from external scientists, field staff, and managers, a final version of the Management Recommendation or Survey Protocol is prepared and released. The final version remains in place unless new information becomes available that would cause a new evaluation of the Management Recommendations or Survey Protocol. Final versions of these documents, incorporating field comments and peer review, will be completed over the next two fiscal years (2000 and 2001). New information is gained continuously, especially as field staff survey for these species. It is expected that within the next 10 years, the Management Recommendations and Survey Protocols will need occasional updating. Such revisions are expected to cost $1.8 million over the next 10 years ($180,000 per year). Field guides have also been developed to help with species identification of bryophytes, lichens, mollusks, and fungi. An additional $250,000 has been spent developing field guides. Although costs for field guides are generally a one-time expenditure, some updates may be necessary. An additional cost of $200,000 is estimated to update field guides over the next 10 years ($20,000 per year).

Training and Species Identification: Yearly training is provided in surveys and species identification to facilitate doing the surveys. Approximately five training sessions for fungi, bryophytes, lichens, and mollusks, and approximately three training sessions for amphibians are held yearly. In fiscal year 1999, approximately 425 people received training on survey techniques and species identification. Survey crews are generally temporary employees who only work short periods of time, so the crews have a high rate of employee turnover. Because of this turnover in survey workers, the level of training is expected to continue. Regional costs to provide training were estimated at $100,000 for fiscal year 1999; this yearly cost is expected to remain at approximately the same level. Additional training costs are incurred by field offices in terms of salary and per diem. Specimen identification is also an ongoing cost for the species that are more difficult to identify. Costs for this work are approximately $80,000 yearly.

Extensive and General Regional Surveys: At the regional level, the Agencies have spent approximately $800,000 annually ($2.6 million total since 1994) on extensive and general regional surveys. Extensive and general regional surveys for fungi, lichens, and bryophytes were initiated in 1996. Two subteams (a regional Fungal Survey Team and a regional Lichen/Bryophyte Survey Team) were formed to conduct surveys for these taxa, which contained the overwhelming majority of species in Categories 3 and 4 (about 260 species). The teams have collected new information on distribution and habitat characteristics for most of these species, including habitat and range extensions for many species. Although survey efforts have been substantial, many years remain before completing survey efforts on the entire list of species throughout the Northwest Forest Plan area. Efforts are also underway for the arthropod guilds listed in Category 4. The arthropod surveys use a predominantly research-based experimental approach to examine the effects of disturbance (such as thinning and fire) on arthropod diversity and function. These disturbance effects were the primary concerns for arthropod persistence in the southern part of the region. Researchers are now completing the second year of multiple-year studies.

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Knowledge on species ranges and habitats has grown exponentially as a result of these surveys. In some instances, this has allowed Survey Protocols and species protection to become more focused; however, for most of the species there is substantial additional information needed to answer the questions of concern: (1) does the system of land-use allocations and standards and guidelines in the Northwest Forest Plan provide for the persistence of these species across federally managed lands, and (2) is additional protection needed to provide for this persistence? The Northwest Forest Plan anticipated that extensive and regional surveys would be expensive. Estimates of survey costs from Appendix J2 of the Northwest Forest Plan FSEIS for only some of the species exceeded $22 million. Although no estimates were developed in the Northwest Forest Plan FSEIS on total or yearly program costs for the extensive and regional surveys, the partial estimates in Appendix J2 would indicate that the region has not yet approached the level of spending on these surveys envisioned in the Plan.

Accomplishing the extensive and regional surveys has been a slow process due to a lack of available experts who are knowledgeable on these taxa. Therefore, the region prioritized the work to: 1) develop Management Recommendations for known site management; (2) develop Survey Protocols; (3) conduct field training and assistance so the field could accomplish the surveys prior to habitat-disturbing activities; and (4) conduct extensive and general regional surveys. Because of the scarcity of experts about the species, however, there are few available experts to train field personnel in conducting pre-disturbance surveys; to develop and answer questions on survey procedures and management strategies; to examine samples of species; and to provide expert identification. The prioritization of limited resources has slowed the rate at which the general regional and extensive surveys are being planned and accomplished. Since work on Management Recommendations and Survey Protocols is almost complete, and field personnel have increasing experience in species survey and identification, more resources will be available to concentrate on the regional surveys in the future.

Data Development and Management: The Northwest Forest Plan Record of Decision required that information on known sites be incorporated into management decisions on projects in 1995 and subsequent years. To accomplish this task a "known site" database was developed. Data was gathered from searches of herbaria, museums, and private records to create this database. Approximately $610,000 has gone into the development and update of the "known site" database.

Thousands of sites are being found annually from all levels of survey. These records are of value not only to the field unit where the site was found, but also to nearby field units and at a regional level to aid in describing the habitat and range extensions of the species as well as to determine if there still is concern for the species persistence. Shortly after adoption of the Northwest Forest Plan, it became apparent that an interactive, interagency database and geographic information system were needed so data could be accessed by field users. As no such database existed, the BLM and Forest Service in the Northwest Forest Plan area developed the "Interagency Species Management System" (ISMS)(see Appendix D). This system is scheduled to be in use in the coming year and will include regional information from field data used in this SEIS analysis. Development costs have exceeded $1 million. It is expected that approximately $125,000 per year will be needed to input field-level data, and approximately $225,000 per year will be needed for the next 10 years for system maintenance and data stewardship.

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Field Costs

By far the largest costs of the Survey and Manage program are field costs for surveys prior to ground-disturbing activities, and additional project design costs due to finding and protecting these species. As shown in Figure 3&4-4a, field costs have increased as additional species surveys are required. Surveys were implemented for great gray owls in 1994 for fiscal year 1995 activities and for five amphibians and red tree voles in 1996 for fiscal year 1997 activities. This required field units that had planned activities in the habitat and range of these species to complete surveys prior to ground-disturbing activity and to manage any sites that were discovered. Surveys for an additional 80 species were required prior to habitat-disturbing work "implemented" in fiscal year 1999. Surveys for 32 of these species were determined to be infeasible due to difficulty with species descriptions, the need for microscopic examination, identification dependent on fruiting for species which fruit irregularly or for very small time periods, or species where identification was possible only by a few experts. The implementation date of the surveys prior to ground-disturbing activities for these species was extended until fiscal year 2000 (see Changing Standards and Guidelines - Adaptive Management in Chapter 2.) Work was undertaken in fiscal year 1999 to make it possible to do surveys prior to ground-disturbing activities for some of these 32 species. As a result of this work, field guides and survey methodology have been developed for 19 of these species. However, there are still 13 species for which surveys are not practicable, extremely expensive, or which have a very small likelihood of finding the species.

No separate cost accounting exists at the field level for Survey and Manage program costs. It is estimated that approximately $9 million was spent by the field for required pre-ground disturbing surveys from 1994-1998. In 1999, actual expenditures for these field project surveys are estimated at $7 million. These expenditures do not reflect a yearly "no action" estimate since some of the projects executed in 1999 had decision notices implemented in 1998. Survey requirements for 1999 can be approximated. Using estimation techniques explained below, completing all field surveys for planned projects in fiscal year 1999 would cost approximately $21.9 million. The $21.9 million includes surveys for all but five species of fungi, which because of their ephemeral nature would require a 5-year protocol to have "a high likelihood" (protection buffer standard) of finding these species. Because so little is known about the distribution of these species, most projects would require surveys. These fungi surveys would require an additional $110.2 million annually for fiscal year 1999 and beyond.

Survey costs per acre were developed based on field office input for each taxon or species, and considering field survey experience and Survey Protocols (Nelson et al. 1999). Survey cost estimates for some of the taxa, such as terrestrial mollusks and amphibians, are fairly easy to estimate. For example, existing costs of surveys are available for terrestrial mollusks, lichens and bryophytes, and amphibians. Other survey costs (such as those for fungi), however, are more difficult to estimate because there is a lack of field survey experience for them. Estimated survey costs for fungi, therefore, are based on the assumption that a 5-year protocol (such as three repeat visits in both spring and fall, for five consecutive years) will be developed.

In addition to the variability in survey costs by species, costs of surveys vary considerably between National Forests and BLM Districts, depending on the mix of projects and the ranges of the species requiring surveys. For example, the majority of the acreage programmed for prescribed fire is on the east side of the Cascades or in the southern portion of the region. These regions have very different species and survey requirements than forests west of the Cascades. Because of the large variability, survey costs were estimated based on acres requiring surveys by National Forest and BLM District. Table 3&4-6 shows the acres of planned timber harvest, prescribed fire, and other projects for fiscal year 1999 summarized by State and Agency. Approximately

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87,000 acres of timber sales, 125,700 acres of prescribed burning, and 4,000 acres of restoration projects were planned for fiscal year 1999. It was assumed that the relative project levels (acres) would remain constant for these units over time for this analysis. Recent field experience indicates that approximately 1.5 acres are surveyed for every 1 acre of project work that is planned (excluding hazardous fuels reduction and restoration). To develop a cost estimate for surveys, the project acreage was expanded by the 1.5 factor to allow for a project design that includes protection of species found during surveys. For planned hazardous fuels reduction and restoration activities (prescribed fire), no expansion factor was used.

Table 3&4-6. Types of Projects and Number of Acres Requiring Surveys

State/Agency	Timber Sales (Acres)	Prescribed Fire (Acres)	Other Projects (Acres)
Washington	10,660	30,050	1,760
Oregon	55,870	59,350	1,700
California	20,480	36,300	580
Total	**87,020**	**125,700**	**4,040**
Forest Service	73,700	103,900	3,690
BLM	13,320	21,800	350
Total	**87,020**	**125,700**	**4,040**

There are also additional costs to field units of this program as species are found and projects have to be redesigned to manage for these species. Examples of these costs are shown below, but they were not summarized for this analysis.

- Some species have very short time periods in which they may be surveyed. When these short time periods prevent surveys or when surveys are prohibitively expensive, National Forests and BLM Districts have delineated areas of potential habitat and excluded these areas from projects.

- Some species are much more common than anticipated in the Northwest Forest Plan. This has resulted in many more sites being found for these species than anticipated. For example, a summary of data in the Interagency Species Management System and the 1999 reported sites shows that the number of blue-gray tail dropper mollusks increased from two known sites at the time of the FEMAT analysis in 1993, to more than 4,700 sites recorded by 1999. Impacts of finding multiple species locations vary widely among field offices, depending on the range of the more "common" species. This may result in significant impacts to other programs on individual field units.

Analysis of Alternatives

Table 3&4-7 summarizes costs for the Survey and Manage program by alternative. Total annual costs range from $132 million for the No-Action Alternative, primarily as a result of the multiple year fungi Survey Protocol, to $19 million for Alternative 2. These costs are discussed by major category below.

Strategic Surveys: Strategic survey efforts include a variety of information gathering techniques designed to gain specific useful information for maintaining species persistence. Approaches range from conducting literature reviews and obtaining

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collection information from herbaria and museums, to targeting surveys for historic known sites and conducting multiple species surveys at landscape scales. The region is currently developing a Strategic Survey Plan to prioritize the use of limited expertise and develop more consistency in survey procedures across the species based on species risk. Currently, various approaches are being used or considered to conduct extensive and general regional surveys. The approaches include: (1) a pilot study, based on developing detailed plant association maps, that uses predictive modeling to determine likely habitat and to search for lichens and bryophytes;; (2) a gap analysis approach primarily for modeling fungi; (3) consideration of using a multi-species, stratified random sampling approach across land allocations using existing Current Vegetation Survey or Ecology Plot locations; and, (4) the research approach being used to examine arthropods. It is likely that a strategic plan refining how these surveys will be done would include a combination of these approaches.

To develop an analysis of the range of alternatives, the following assumptions were developed to estimate strategic survey costs:

- It was assumed that a survey methodology utilizing a stratified random sample taken across land-use classifications and late-successional/non late-successional forests would be developed. It was estimated that 1,000 plots across the region would be adequate to answer basic questions on late-successional associations and rarity of the species (Alegria 1999). Survey costs were developed based on the number of times each plot needed to be surveyed for taxonomic groups. It was assumed that this approach would be utilized in all alternatives as an initial screen to determine if additional species specific information would be required. Red tree vole, lynx, great gray owl, and arthropods are assumed to require targeted surveys (see below) and surveys for these species are not included in this approach. Costs for this approach would be $1.9 million annually for all species if surveys were completed over 5 years (as required for old-growth in Alternatives 1 and 2, Category 1B and 2B, respectively), and $1.1 million annually for all species if surveys were completed over 10 years (Alternative 3). Costs for the No-Action Alternative utilizing this approach would be $880,000 annually over 10 years with no strategic surveys conducted for amphibians, mollusks, or vascular plants (presently these taxon are not included in Categories 3 or 4). The random survey portion of the strategic survey costs would be completed in the 5- to 10-year time frame, and these costs would not continue over the long term.

- It is also assumed that targeted strategic surveys would be conducted to answer specific species questions. Based on information from taxa experts, the red tree vole, great gray owl, lynx, and arthropods were assumed to require targeted surveys costing $1.1 million annually. These costs were not assumed to vary by alternative, except that red tree vole surveys are not conducted under the No-Action Alternative. Based on current expenditures, an additional cost of $310,000 annually was also assumed for other strategic surveys to answer specific questions not answered by the random sample approach. Costs of targeted surveys could decrease over time as information is gained on these species.

Other Regional Costs: Costs to complete Survey Protocols, Management Recommendations, field guides, species identification, training, and data management would continue under all alternatives (Table 3&4-5). Some of these costs do not vary by alternative. For example, it is expected that data management costs would be consistent across alternatives. For all alternatives except Alternative 3, it is assumed that development of the Survey Protocols and Management Recommendations, including the peer review and consolidation of field comments to produce version 3.0, would continue. Costs shown in Table 3&4-5 are annual costs based on an assumed equal flow

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of costs over the 10-year period. Alternative 3 differs from the other alternatives by replacing Management Recommendations with standard buffers around sites. Alternative 3 also requires equivalent-effort surveys, which require Survey Protocols and additions to the field guides to guide surveys and species identification. Training costs and species identification costs are also estimated to increase under this alternative.

Existing Management Recommendations would likely be revised for 27 Category 1C and 1D species under Alternative 1, to provide criteria to identify high-priority sites for management. These Management Recommendations have the potential to reduce the project survey efforts for these species. It is estimated that these Management Recommendations would cost $50,000 to $150,000 each to prepare, and that the plans would address individual species or groups of species in similar habitats or geographic areas. These documents are estimated to cost $270,000 annually ($2.7 million total), based on completing these Management Recommendations in 10 years. Although it is not possible to directly estimate project survey cost savings, it is expected that the completion of these surveys will be extremely cost effective. For example, project survey costs for Del Norte salamanders exceed $1 million annually, as opposed to a one-time cost of $150,000 to complete the Management Recommendation. Development of Management Recommendations for all "uncommon" species could save up to $8 million annually in pre-disturbance surveys based on the differences in survey costs between Alternatives 1 and 2.

Field Costs: Field costs by alternative were estimated as described in the background section. They represent the vast majority of the costs of the Survey and Manage program, ranging from 78 percent (Alternative 2), to 98 percent (No-Action Alternative) of the total costs of the program. The annual field costs range from approximately $129 million for the No-Action Alternative to $15 million for Alternative 2. The No-Action Alternative includes $110 million dollars for surveying fungi based on the assumption of a 5-year survey to clear these species. The primary determinant of project survey costs is the number of species requiring these surveys, but there is not a direct correlation since surveys are often conducted by species group, such as terrestrial mollusks. Alternative 3 would require pre-disturbance and equivalent-effort surveys for 319 species. The costs for these surveys would be $41 million annually. Alternatives 1 and 2 differ in the requirement to conduct pre-disturbance surveys for "uncommon" species. Pre-disturbance surveys for Alternative 1, which includes surveys for all "uncommon" species, would cost $23 million compared to $15 million for Alternative 2, which does not require these surveys. As described above, development of Management Recommendations (which reduces or eliminates the need to survey for "uncommon" species under Alternative 1) could eliminate most of this differential.

Total annual costs range from $132 million (a large portion of which is for multiple-year fungi Survey Protocol for the No-Action Alternative, to $19 million for Alternative 2 (Table 3&4-7 and Figure 3&4-4b).

By far the largest component of these costs are for surveys required prior to habitat-disturbing activities, which range from 78 percent of the costs of Alternative 2, to 98 percent of costs for the No-Action Alternative. These surveys are of less value in gaining scientifically credible information that will aid in the managing of these species than the strategic surveys since there is no scientific selection criteria to allow expansion of the data gathered. However, surveys prior to habitat-disturbing activity play a key function in reducing risk to the species by avoiding the loss of individuals or parts of the population.

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Figure 3&4-4b

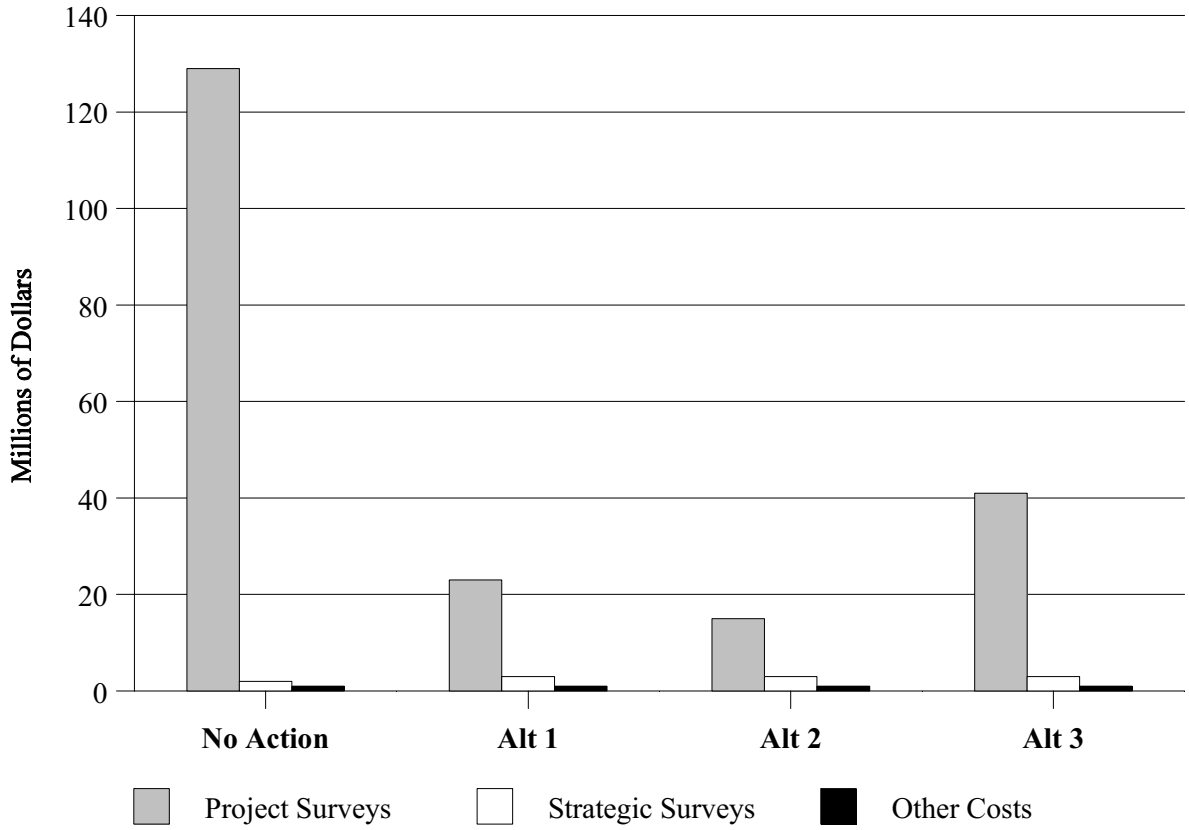

Table 3&4-7. Costs for Survey and Manage by Alternative (in thousands)				
Cost Element	**Alternative 1**	**Alternative 2**	**Alternative 3**	**No Action**
Pre-disturbance Surveys	$23,124	$15,149	$40,781	$129,059
Strategic Surveys				
Random Statistical Surveys	$1,936	$1,936	$1,118	$876
Targeted Strategic Surveys	$1,370	$1,370	$1,370	$1,230
Other Regional Costs				
Field Guides, Management Recommendations, Survey Protocols	$470	$200	$230	$200
Management Costs	$200	$200	$200	$200
Data Management	$350	$350	$350	$350
Training, Species Identification	$165	$165	$440	$165
Total Annual Costs	**$27,615**	**$19,370**	**$44,491**	**$132,080**

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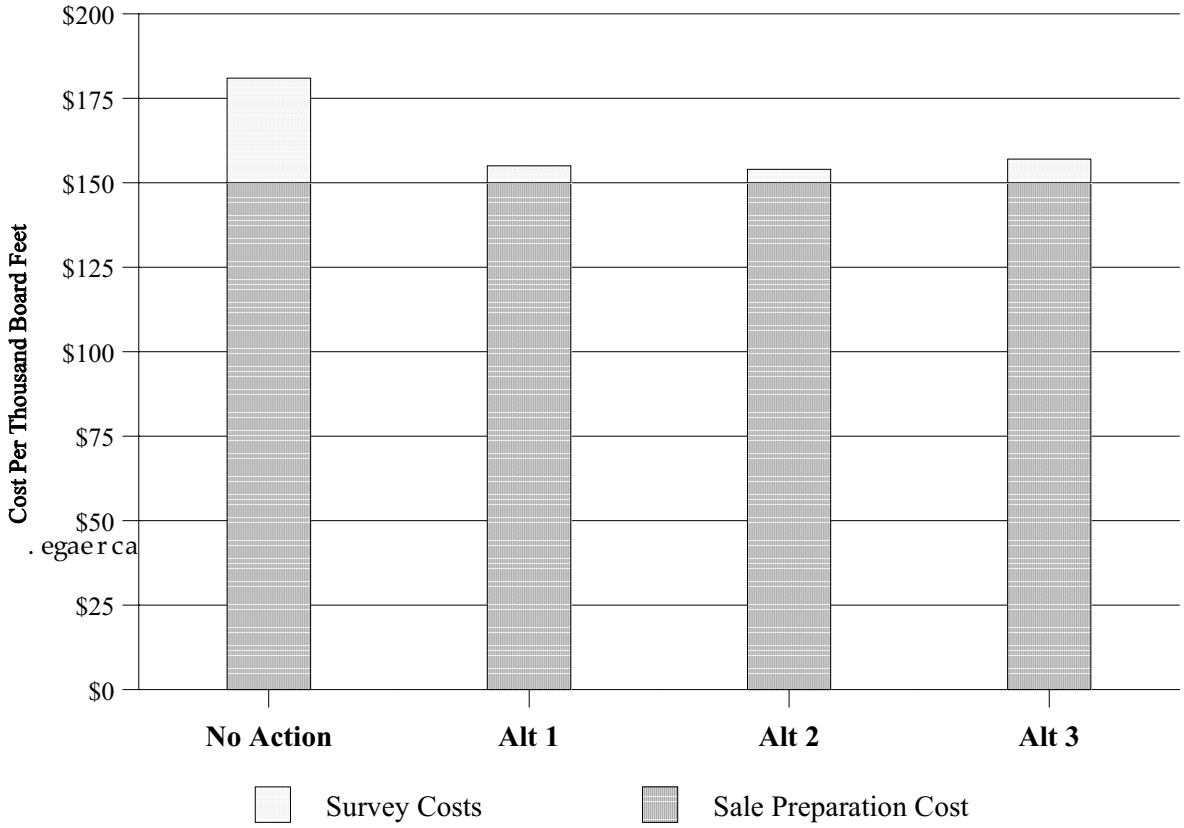
One way to look at the cost of pre-disturbance surveys is to see what portion of their cost is represented in the total cost of a project. Using an estimate of $150/MBF costs of preparing timber sales, pre-disturbance surveys would increase these costs to $156/MBF for Alternative 2; and to $205/MBF for the No-Action Alternative (Figure 3&4-4c). The proportional increase in the costs of prescribed fire would be greater than the timber costs because of the large acreage involved; the proportional increase in other projects would be less because of their proportionally smaller

Figure 3&4-4c.



Costs for strategic surveys will not be known until Survey Protocols are identified in the Strategic Survey Plan, but the costs will not vary by alternative as much as the surveys required before habitat-disturbing activity. These costs are estimated to range from approximately $2.1 million for the No-Action Alternative to approximately $3.3 million for Alternatives 1 and 2. Other regional costs vary even less by alternative and would continue to cost approximately $1 million yearly.

All of the above costs represent a substantial increase in the expenditures made on the program to date. It is estimated that the region spent an annual average of $8 million between 1998-1999 on all components of the Survey and Mange program. This cost compares to the estimated cost of $27.6 million for Alternative 1, which is a 350 percent increase in costs. However, appropriations have been declining.

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Socioeconomic Effects

Implementation of the Northwest Forest Plan has proceeded very much as anticipated by the FSEIS, with the majority of impacts occurring at the levels predicted (USDA, USDI 1999c). After a short ramp-up period, timber sales have reached projected levels. Actual timber harvest, a primary driver of economic, community, and social effects, has lagged behind anticipated levels for a variety of reasons, including the time lag between sale and harvest, appeals, lawsuits, and Rescission Act Sales.

Lumber and Wood Products employment changes have been very close to the impacts projected. Actual declines between 1990 and 1998 have been about 7,000 jobs in Washington, 14,700 jobs in Oregon, and 3,240 jobs in northern California. Projected changes under the alternative selected in the Northwest Forest Plan Record of Decision (Alternative 9) were: 9,500 in western Washington, 16,700 in western Oregon, and 2,800 in northern California.

Factors other than declining federal timber harvest have also influenced lumber and wood products employment. These include technological changes, growth in the manufactured home industry, and competition from other region (particularly the South), international competition, and wood products imports.

This SEIS examines alternative ways to change one aspect of the Record of Decision. This section examines how alternatives would alter existing and future actions that contribute to local, regional, national, and international economic activity.

Mineral Resources

Under the No-Action Alternative, new leaseable, locatable, and saleable mineral activities would require pre-disturbance surveys as part of required plans of operation. Project proponents would be required to conduct surveys and implement reasonable mitigation. The time period between project proposal and actual mineral development would be five years for completion of surveys for some fungi species. All action alternatives reduce this time period to two years or less. Some very small mineral operations are not required to prepare a plan of operation; these would not be subject to Survey and Manage species requirements.

Current Management Recommendations identify sedimentation, changing microclimate, alterations to hydrology, water diversions, physical destruction and trampling, and spread of noxious and invasive plants as threats to known sites. If these threats can be avoided or mitigated, mining could be compatible with management of known sites. Mineral development in accordance with the Management Recommendations is potentially constraining to mineral activities. This could increase the costs of mineral exploration and extraction, or prevent surface disturbance, resulting in less mining on federally managed lands in areas containing known sites and potential habitat.

Impacts to mining are correlated to the number of species requiring pre-disturbance surveys, the length of the survey period, and the number or acres of existing and projected known sites that would be managed. The No-Action Alternative would have the greatest impact because of 5-year Survey Protocol requirements for some fungi species that would delay mining activities. Also, 64 species would continue to be subject to Survey and Manage Standards and Guidelines, whereas these species are removed from the species lists under all action alternatives. Among the action alternatives, “known sites” is the primary factor because these acres would be unavailable for mining. Alternative 3 would have the greatest impact because of the

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establishment of 48.5-acre known sites. Projection of acres within managed known sites is greatest under Alternative 3, followed by the No-Action Alternative, Alternative 1, and finally Alternative 2 with the least acres of known sites protected.

Range/Grazing Resources

Under the No-Action Alternative, known sites for 10 mollusk species and 1 vascular plant specie (*Pedicularis howellii)* would continue to be protected from grazing. Future sites discovered through pre-disturbance, extensive, and general regional surveys would also be protected. The action alternatives would eliminate this specific direction and rely on Management Recommendations for protection of known mollusk sites. The vascular plant, *Pedicularis howellii*, would be removed from Survey and Manage because it is not associated with late-successional or old-growth forests.

Current Management Recommendations identify sedimentation, browsing, trampling, and spread of noxious and invasive plants as threats to known sites. Exclosures, changes in seasons of use, and integrated weed management are identified as mitigation measures.

Impacts to grazing are not discernibly different among the alternatives. The conclusions of the Northwest Forest Plan regarding impacts to grazing remain unaltered, " . . . consequences to the industry would be small based on the relatively minor amount of range production on federally managed lands within the planning area. These modifications would likely have consequences, however, for individual permittees" (USDA, USDI 1994a p. 3&4-276).

Special Forest Products

Under all alternatives, the need for pre-disturbance surveys would be based on Agency determination of the types of special forest products collections that would be considered as habitat disturbing.

Existing Management Recommendations identify special forest product collection as a threat to known sites for only two species, both vascular plants. Using rakes to collect matsutake mushrooms threatens mycorrhizl networks important to *Allotropa virgata*. Collection of moss threatens *Botrychiam montanum* (USDA, USDI 1998c).

The number and extent of pre-disturbance surveys required will determine the impacts to Forest Service and BLM special forest products programs. Alternative 3, with 319 species subject to pre-disturbance surveys, has the greatest potential impact. The No-Action Alternative is next, followed by Alternative 1, and finally Alternative 2 with the least number of species requiring pre-disturbance surveys. Strategic surveys and management of known sites are not expected to impact collection of special forest products, except for the two species mentioned above.

Commercial and Subsistence Fisheries Resources

None of the alternatives are anticipated to directly impact commercial or subsistence fisheries.

Northwest Forest Plan activities that improve "watershed protection may aid in the production of commercial and Indian subsistence fisheries (USDA, USDI 1994a p. 3&4-278). Existing Management Recommendations emphasize maintaining or enhancing water quality at known sites. This is consistent with riparian and water quality

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objectives in the Northwest Forest Plan.

Construction of in-stream structures and other habitat improvements would require pre-disturbance surveys under all alternatives. Pre-disturbance surveys add an additional step and could delay implementation of projects but they are not anticipated to affect achievement of riparian and water quality objectives. The number and extent of pre-disturbance surveys required will determine the impacts to Forest Service and BLM watershed enhancement programs. As such, Alternative 3 has the greatest potential impact, followed by the No-Action Alternative, Alternative 1, and finally Alternative 2 with the least impact. Strategic surveys and management of known sites are not expected to impact implementation of riparian and water quality objectives.

Recreation Resources

Under the No-Action Alternative, recreation areas are managed to minimize disturbance to known sites. Recreation site-related disturbances are subject to pre-disturbance surveys.

Current Management Recommendations list threats to known sites from recreation as picking, physical destruction and trampling, and spread of noxious and invasive plants. Mitigation measures such as relocation of roads, trails, and recreation facilities, and OHV closures are recommended for known sites susceptible to these threats (USDA, USDI 1997b; USDA, USDI 1998c)

New recreation facilities would require pre-disturbance surveys under all alternatives. The number and extent of pre-disturbance surveys required will determine the impacts to Forest Service and BLM recreation development programs. Therefore, Alternative 3 has the greatest potential impact followed by the No-Action Alternative, Alternative 1, and finally Alternative 2 with the least impact. Avoidance and mitigation measures associated with management of known sites are not expected to have a significant impact on recreation opportunities for the general public because most recreational uses are not habitat disturbing and could occur at most know sites with appropriate mitigation measures.

Lumber and Wood Products Employment

The Northwest Forest Plan FSEIS estimated employment affected per million board feet of timber processed by subregion. A region-wide average was also estimated. Since no new information is available to revise these statistics, they continue to be used for analytical purposes within the region. The distribution of the estimated 9.08 jobs per million board feet among the timber industry sectors is shown on Table 3&4-8 (USDA, USDI 1994a). The current employment in the lumber and wood products industry is 58,500 people in Oregon, 49,200 in Washington state, and 10,666 people in northern California counties. The employment figure for Oregon includes the paper industry (Oregon Employment Department 1999, State of California 1999, Washington State Employment Security 1999).

Since 1990, the timber industry in the Northwest has experienced transition initiated by outside forces. Reduction in federal timber harvest was a primary force; however, other factors such as technological advances, import competition from abroad and other regions in the United States, and most recently an economic downturn in Asia have also affected the industry (Figure 3&4-5). The future outlook includes slightly higher home mortgage rates that could reduce housing starts (USGPO [n.d.]).

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Figure 3&4-5. Federal Timber Sold and Harvested.

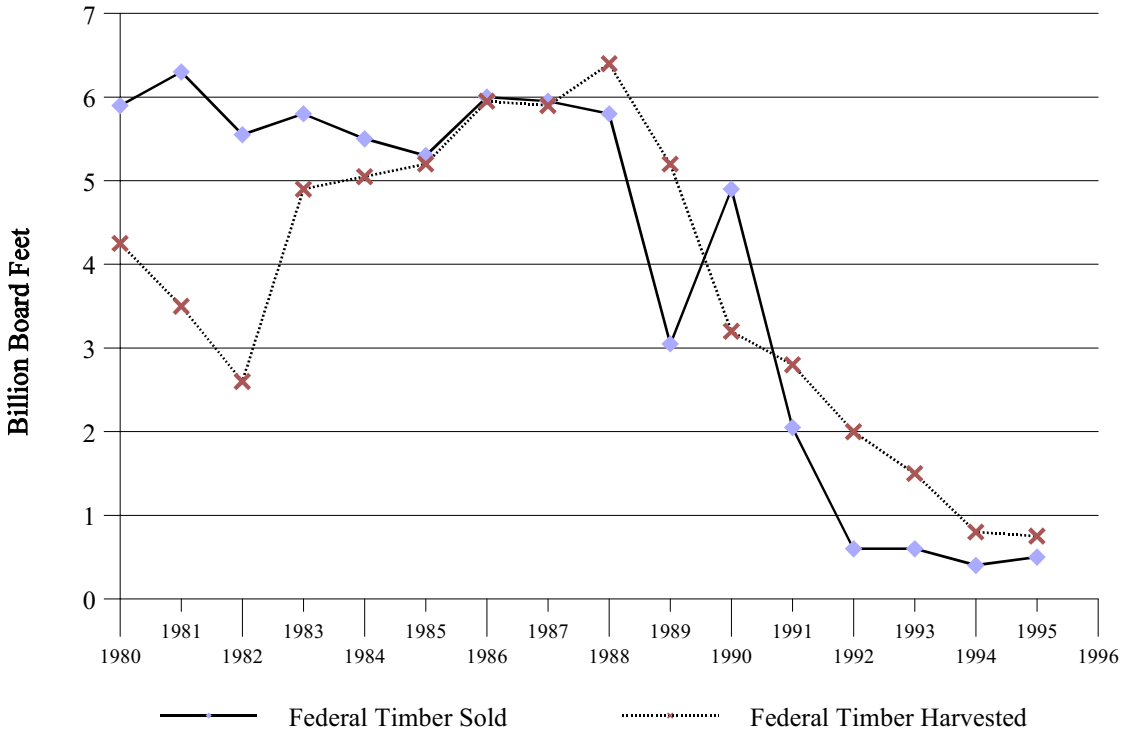

Table 3&4-8. Average Timber Industry Employment Affected Per Million Board Feet of Timber Harvested.

Employment Sector	Jobs Per MMBF of Timber Harvested
Logging	1.62
Sawmilling	3.08
Veneer and Plywood	1.33
Millwork	0.82
Other Wood Products	0.95
Pulp	0.17
Paper Processing	1.11
Total	9.08

Source: Northwest FSEIS (USDA, USDI 1994a)

Under the No-Action Alternative, timber harvest would only occur in young stands for the next 5 years, because 5-year Survey Protocols for some fungi species would preclude timber harvest in late-successional and old-growth stands. An estimated 790 jobs would be supported by harvests from younger stands. Timber sale volumes forgone during the 5-year period would impact 6,570 jobs. Following the survey period, timber sales would resume. Once sales resumed, an estimated 6,170 jobs would be supported by the

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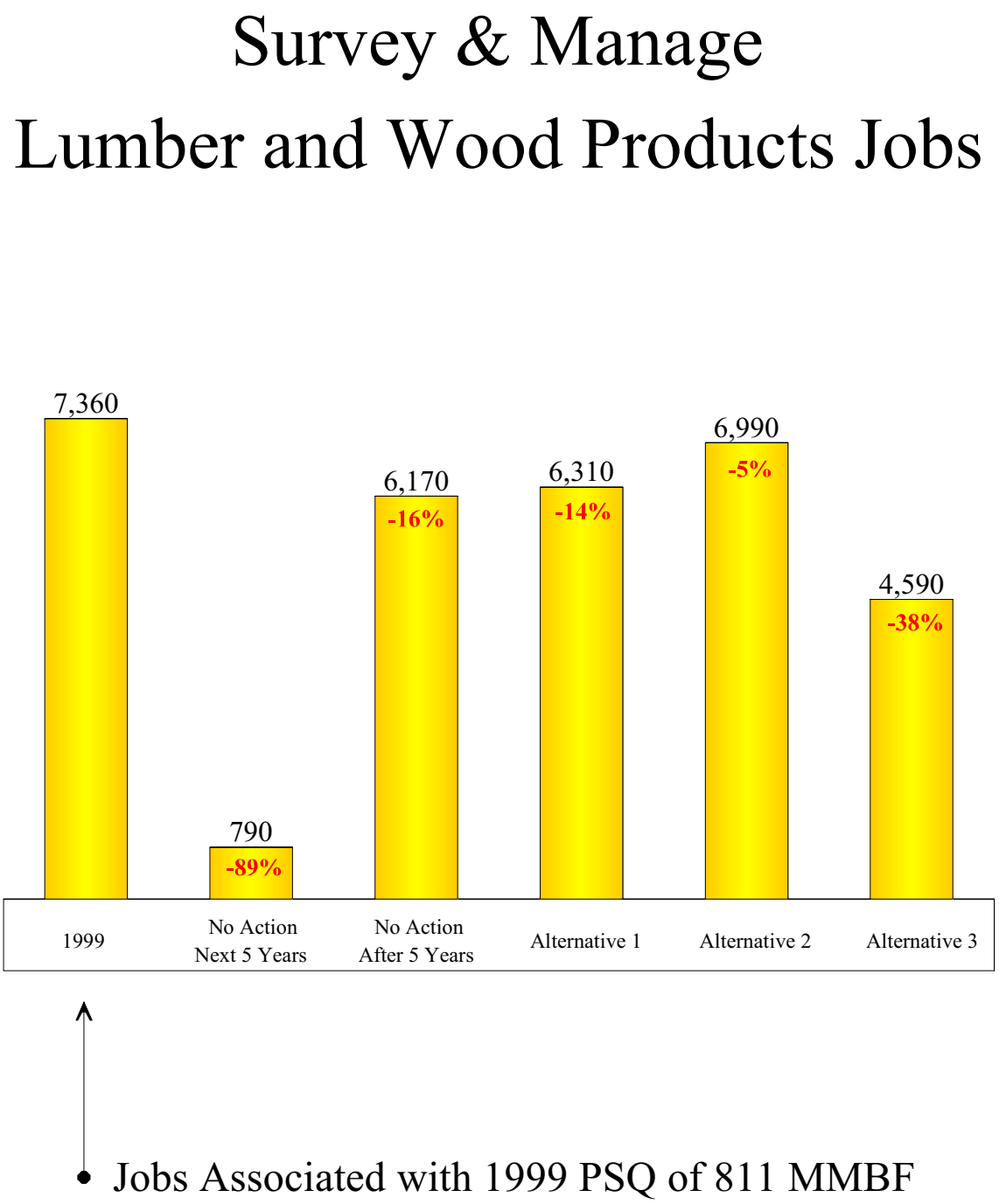
Figure 3&4-6.



No-Action Alternative. Timber sale volumes projected under Alternatives 1, 2, and 3 would support fewer jobs than actual timber sale volumes during 1999. Alternative 1 would support an estimated 6,310 jobs, representing a reduction of 1,050 jobs; Alternative 2 would support an estimated 6,990 jobs for a reduction of 370 jobs; and Alternative 3 would support an estimated 4,590 jobs for a reduction of 2,770 jobs (see Figure 3&4-6).

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Survey-Related Employment

The "Costs of Management" section earlier in this chapter examines the estimated costs of implementing each alternative. The assumptions used to build those estimates include direct survey costs (such as labor, vehicles, equipment, and lab fees). Labor costs were assumed to represent approximately 60 percent of total survey costs. Table 3&4-9 displays the estimated total cost by alternative and the portion attributed to labor.

Table 3&4-9. Estimated Total Cost By Alternative and Portion Attributed to Labor (in thousands of dollars)

Costs	No-Action	Alternative 1	Alternative 2	Alternative 3
Total Cost	132.1	27.6	19.4	44.5
Labor Cost	79.2	16.6	11.6	26.7

Currently, federal land-managing agencies hire a temporary and seasonal workforce to assist Agency employees conduct required surveys. Some surveys are also conducted through contracts. The wage scale for survey-related occupations appears to be broad (Table 3&4-10). Federal employees are typically receiving General Schedule (GS) 5, 7 or 9 pay rates, except for some supervisory and research staff who have higher salaries. The Oregon Employment Department publishes wage information annually for specific "occupational titles," but no specific occupational title exists for biological survey workers. There are three titles, however, that generally address the tasks associated with biological surveyors: Biological, Agricultural, and Food Technicians; Forest and Conservation Workers; and Surveying and Mapping Technicians. The hourly wage rates for General Schedule employees and "occupational title" occupations range from a low of about $8, to a high of approximately $20 (Table 3&4-10).

Table 3&4-10. Hourly Wage Rates for Survey-Related Occupations

Federal Pay Rate/State Occupational Title	Hourly Wage Rate	Average Hourly Wage
GS-5 Employee	$ 9.86 to $12.82	n/a
GS-7 Employee	$12.22 to $15.88	n/a
GS-9 Employee	$14.95 to $19.43	n/a
Biological, Agricultural, and Food Technicians	$ 7.94 to $19.30	$11.46
Forest and Conservation Workers	$ 8.84 to $19.46	$13.73
Surveying and Mapping Technicians	$ 9.66 to $19.30	$14.37

To estimate employment impacts, labor costs were assumed to represent 60 percent of the anticipated annual direct survey costs. Hourly wage rates of $12.22 and $15.88 (GS-7) were selected to estimate a range of employment effects, and full-time-equivalent (FTE) was selected to express employment generated. Also, the analysis assumed year-round employment, 40 hours per week, and 2,080 hours per year. Expressing employment in terms of FTE is not synonymous with jobs created, because most survey-related jobs are seasonal. The length of employment and season is highly variable, depending on the species and Survey Protocol. Table 3&4-11 displays estimated annual survey-related employment, expressed as FTE, by alternative for the two wage rates.

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Table 3&4-11. Annual Survey-Related Employment, Full-Time Equivalents (FTE)				
Rate of Pay	**No Action**	**Alternative 1**	**Alternative 2**	**Alternative 3**
FTE @ $12.22/hour	3,118	652	457	1,050
FTE @ $15.88/hour	2,399	502	352	808

Government Revenues

Outcomes associated with federal revenue sharing (such as receipts to counties) have been different that anticipated in the Northwest Forest Plan FSEIS, because Congress has provided an ongoing "special payment amount," also known as safety net payments. Current legislation provides for annual payments based on a declining percentage of the 1986-1990 average payment. The legislation applies to the BLM "50-percent payments" and to the Forest Service "25-percent payments" through fiscal year 2003. Beginning in 1999, the counties receive the greater of the special payment amount or revenue sharing as calculated under the original formula. With expiration of the "Safety Net" legislation, revenue sharing with the counties would again be based on current timber and other resource receipts. Revenues would likely be less than pre-Northwest Forest Plan levels given the lower harvest levels. This would occur in spite of significant increases in timber prices since the late 1980s.

To the extent that the No-Action Alternative and Alternatives 1, 2, and 3 reduce federal timber harvest below levels anticipated in the Northwest Forest Plan FSEIS, federal revenue sharing would also be reduced beginning in 2004. Reductions would be greatest under Alternative 3, followed by the No-Action Alternative, Alternative 1, and the least reductions would occur under Alternative 2. Effects of reduced payments to the counties would be the same type as those identified in the Northwest Forest Plan FSEIS, but to a greater extent.

"Under current policies, declines in federal timber harvest will reduce federal receipts to counties. ...Any reduction in these federal receipts shared with the counties . . . will correspondingly impact their school and road funds due to the nature of the distribution formula . . . " (USDA, USDI 1994a)

Community Capacity

Community capacity involves the ability of residents, community institutions, organizations, and leadership -- formal and informal -- to meet local needs and expectations. None of the alternatives would change the capacity ratings assigned by the Northwest Forest Plan FSEIS. Regions of lower capacity/negative consequences in the isolated interior Coast Range of Oregon and along the west slope of the Cascade Range, the central Olympic Peninsula, and along the north Cascade Range would be unchanged.

The Northwest Forest Plan FSEIS concluded that negative impacts to communities and regions with lower capacity were highly correlated to harvest levels. This was because "the effects . . . on rural communities are primarily those which flow directly and indirectly from changes in the regional and local economies." To the extent that the No-Action Alternative and Alternatives 1, 2, and 3 reduce federal timber harvest below level anticipated in the FSEIS, community and regional impacts would increase. Impacts to low capacity regions and communities would be greatest under Alternative 3, followed by the No-Action Alternative, Alternative 1, and least under Alternative 2. In the short

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term, the No-Action Alternative would have the greatest effect because its requirement for 5-year Survey Protocols for some fungi species would delay harvests for five years. Effects to the counties would be the same type as those identified in the Northwest Forest Plan FSEIS, but to a greater extent.

People Coping with Change

Four factors of social and cultural disruption were noted by the FSEIS (USDA, USDI 1994a, p. 3&4-307). The first three of these four factors will be influenced by some or all of the alternatives in this SEIS.

The first factor is "a shift from decentralized participatory forest land management that is oriented toward communities and workers to a centralized command and control for forests both public and private" (USDA, USDI 1994a, p. 3&4-307). All alternatives, including the No-Action, would continue this trend as anticipated in the FSEIS by maintaining Survey and Manage as an important regional, interagency activity with regional Management Recommendations and Survey Protocols.

The second factor is "the perception that the federal government has reneged on its commitment to maintain nondeclining, even flow of timber from federal forests" (USDA, USDI 1994a p. 3&4-307). Under the No-Action Alternative, the ability to meet harvest commitments made by the Northwest Forest Plan is reduced because "overlapping and unclear direction has resulted in funding surveys that may not be necessary or are inefficient given species protection objectives. This situation makes project costs high, limiting funds and personnel, which results in reducing the number of management activities that can be done" (See Chapter 1). Alternatives 1, 2, and 3 also reduce by varying degrees the ability to meet harvest commitments made in the Northwest Forest Plan FSEIS. Alternatives 1, 2, and 3 change management direction for Survey and Manage species, altering or reducing the ability of federal land management agencies to meet commitments for species protection made in the Northwest Forest Plan FSEIS.

The third factor is "a social structure that is less likely to adapt to a permanent loss of employment" (USDA, USDI 1994a p. 3&4-307). To the extent that the No-Action Alternative and Alternatives 1, 2 and 3 reduce federal timber harvest below levels anticipated in the FSEIS, additional social and cultural disruptions would be expected (see Lumber and Wood Products Employment earlier in this chapter).

The fourth factor is "the potential for conflict among different people in which the timber industry and workers, as well as other interest groups, are negatively stereotyped and stigmatized" (USDA, USDI 1994a p. 3&4-307). No change is anticipated in the level of controversy associated with public land management generally, and late-successional forests specifically, because this SEIS addresses only one of many issues associated with federal land management.

Environmental Justice

Environmental Justice was not specifically addressed by the FSEIS. Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, February 11, 1994) requires that all federal agencies "make achieving Environmental Justice part of [their] mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." (Frewing-Runyon 1999)

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Twenty-nine of the 51 counties covered by the Northwest Forest Plan have poverty rates above the rate for the state in which they are located.

Three of the 51 counties covered by the Northwest Forest Plan have African American populations above the rate for the state in which they are located.

Twenty-nine of the 51 counties covered by the Northwest Forest Plan have Native American populations above the rate for the state in which they are located. There are 25 federally recognized tribes in California and 36 in Oregon and Washington (USDA, USDI 1994a, p. 3&4-314).

Five of the 51counties under the Northwest Forest Plan have Asian or Pacific Islander populations above the rate for the state in which they are located.

Nine of the 51 counties covered by the Northwest Forest Plan have Hispanic (any race) populations above the rate for the state in which they are located.

The following potential impacts to environmental justice of all alternatives have been identified. The scope of these impacts varies among the four alternatives.

Native American issues and subsistence uses:

- Reductions in harvest reduce the likelihood that cultural sites and other special or religious sites would be damaged.
- Subsistence uses (such as bark and root collecting) may be suspended or restricted until surveys can be completed for activities that disturb the ground or habitat.

These impacts to subsistence uses may impact treaty-reserved rights and, therefore, the Agencies ability to execute its trust responsibilities.

There is high participation by minority and low-income populations in collecting special forest products. Permits for collecting wild plants, some mosses, bark, roots, and boughs could be restricted until surveys can be completed where such collections are deemed ground or habitat disturbing.

Species Values

Species protection contributes to a variety of social values. Previous effects sections focused on economic outcomes, as expressed by employment and the value of products sold in the marketplace. This section focuses on social outcomes, as expressed by types of social values.

The Survey and Manage species examined in this SEIS have no known *use value* to people. They are not collected for food, shelter, or decoration. However, they have a variety of non-use values, which include ongoing and new scientific research, and recreational observation and photography.

Many people value the persistence of these species for reasons unrelated to actually observing these species. These include their roles as indicators of healthy ecosystems for other species and humans, indicators of public land management responsibility, and the protection of environmental quality.

Looking to the future results in “option values.” These values are associated with undiscovered uses whether they are culinary, medicinal, or research. The possibility remains that these species may play an undiscovered yet critical role in healthy ecosystems for humans. “Bequest values” recognize that future generations will also value species for the same reasons they are currently valued and may discover additional use, non-use, existence, and option values.

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To the extent that species persistence is assured by the alternatives, the types of species values discussed above would be maintained.

Timber Harvest

Background and Affected Environment

Each alternative would directly affect the level of timber harvested from forest lands administered by the Forest Service and the BLM within the planning area. The purpose of this analysis is to project the effects of the alternatives on the probable sale quantity (PSQ) at the Northwest Forest Plan scale (25 million acres), and provide a relative comparison of the alternatives. Effects at the administrative unit would vary from this regional-level analysis. This analysis is not intended to have the precision necessary for re-declaring the PSQ for the Forests and Districts.

The federal forests of the region are managed under a non-declining yield mandate. This direction means that scheduled annual harvest levels can be maintained without decline over the long term if the Agencies adhere to land allocations and associated standards and guidelines, and the planned schedule of harvest and regeneration. The Northwest Forest Plan established the term "Probable Sale Quantity (PSQ)" for estimates of sale levels likely to be achieved, in lieu of using the term Allowable Sale Quantity (ASQ), which estimates the upper-limit harvest levels. The use of the term "PSQ" recognizes the inherent uncertainties in the estimates (Johnson et al. 1993).

As noted in the Northwest Forest Plan FSEIS, the PSQ was based only on those lands considered suitable for production of programmed, sustainable timber yields. These lands are only in the Matrix or Adaptive Management Areas Northwest Forest Plan land allocations. Riparian, Late-Successional, and other reserves do not contribute to PSQ. The PSQ calculated for the Northwest Forest Plan is displayed in the 1994 Northwest Forest Plan FSEIS (pp. 3&4-268), under Alternative 9. The Northwest Forest Plan FSEIS estimated the PSQ at 958 million board feet (MMBF), plus an additional 10 percent volume estimated in "other wood" (cull and submerchantable material) for a total of 1.1 billion board feet.

Changes From 1994 Northwest Forest Plan FSEIS to Present

The Northwest Forest Plan FSEIS addressed the potential for the PSQ to change as National Forest and BLM District plans were completed or revised, stating "sustainable sale estimates will be made using more refined data and procedures available when Draft Forest and District Plans are completed or current plans are revised" (USDA, USDI 1994a p. 3&4-267). When the Northwest Forest Plan PSQ of 958 million board feet was calculated, land and resource management plans for western Oregon BLM districts and four Forest Service Region 5 (California) Forests were not final. These western Oregon BLM and Forest Service Region 5 plans were completed in 1995. In 1998, six Forest Service Region 6 (Oregon and Washington) Forests revised their PSQs. Revised estimations of the extent of riparian reserves by the BLM and Forest Service was the largest single factor in changes to the PSQ. The cumulative result of these actions is a combined PSQ for the Forest Service and for the BLM within the Northwest Forest Plan area of 811 MMBF (not including "10% other wood").

None of these PSQ adjustments were made for Survey and Manage species. As a result of these revisions by the BLM and the Forest Service, there has been a 15 percent overall reduction in the PSQ from 1994 to 1999 as shown in Figure 3&4-7.

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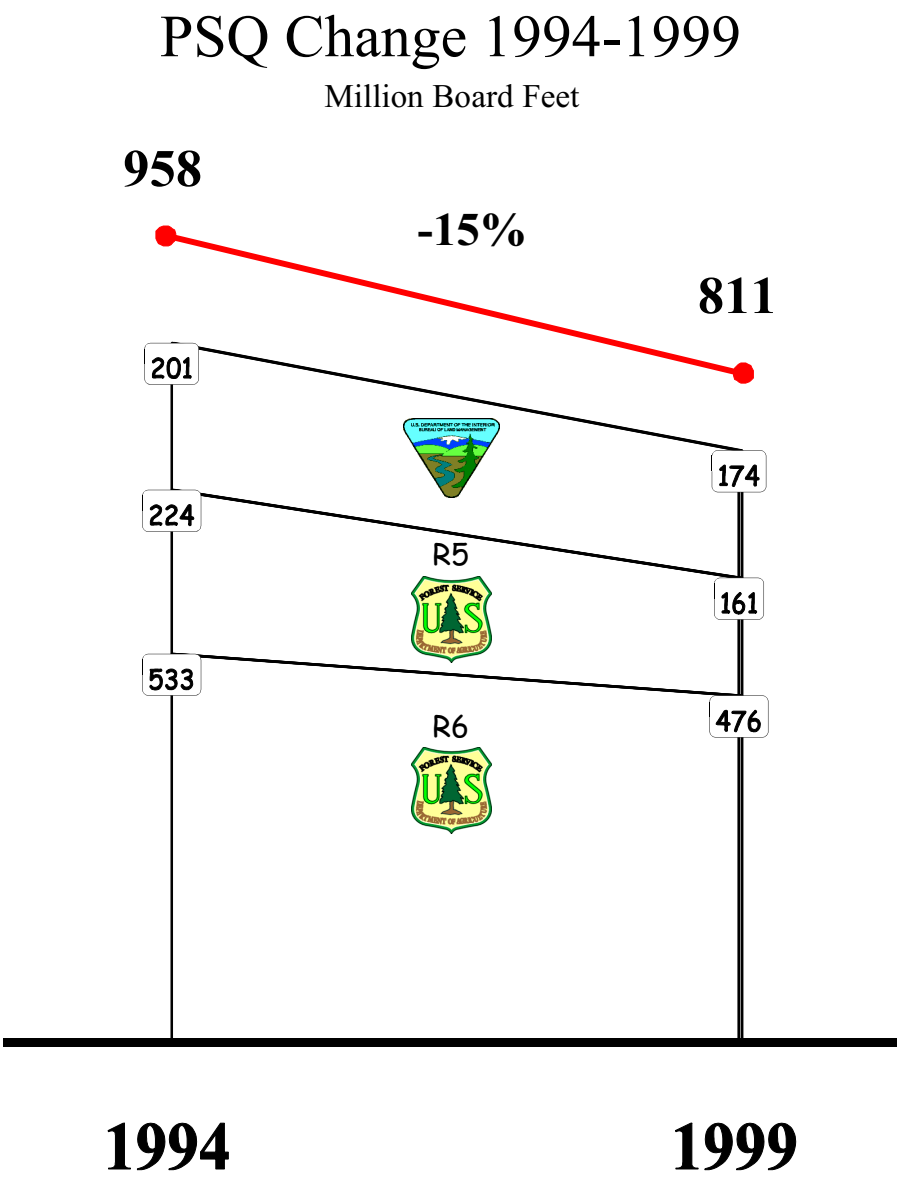

Note: PSQ Expressed in Scribner 32' Long Log Measure.

Figure 3&4-7. Changes in PSQ (1994-1999)

Late-Successional Forest Acres Available for Harvest

K. Norman Johnson (Johnson et al. 1993, p.14) reported the baseline forest seral stage data that was used in the Northwest Forest Plan FSEIS. At that time there was a total of 8 million acres identified as late-successional forest, (medium and large conifer categories) in all land allocations on all federally managed lands in the area covered by the Northwest Forest Plan. A total of 1.3 million acres, or 17 percent of the 8 million acres of late-successional forest, was in Matrix and Adaptive Management Areas and available for harvest as part of PSQ (Figure 3&4-8)

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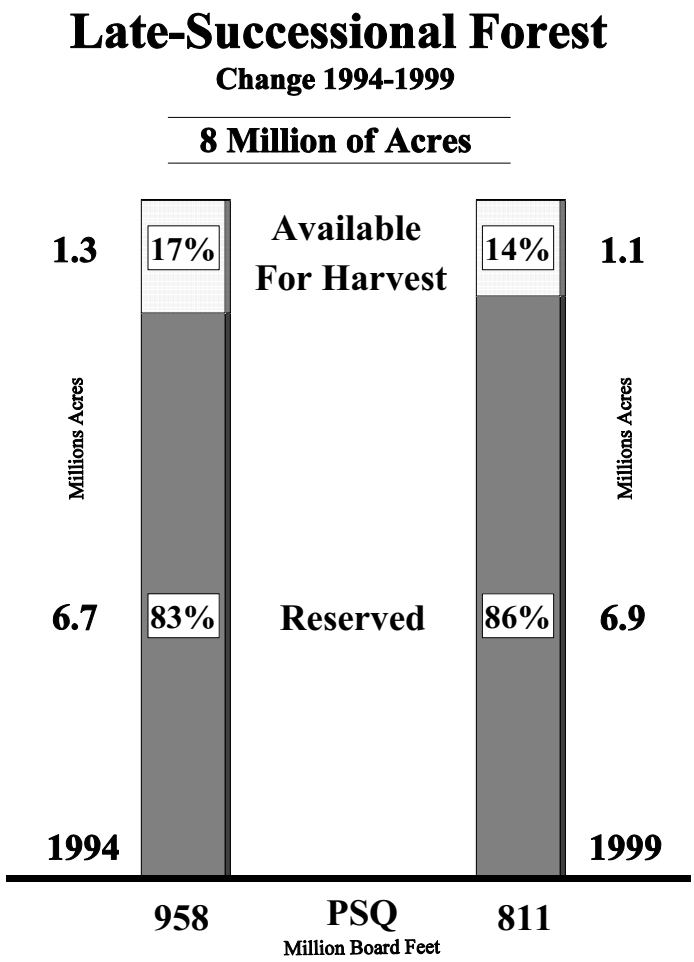
Figure 3&4-8. Late-Successional Forest



With the 15 percent reduction in PSQ levels from 1994 to 1999 it is estimated that there is a corresponding effect on the amount of late-successional forest available for harvest. For analysis purposes it is assumed that 1.1 million acres in the Matrix and Adaptive Management Areas, or 14 percent of the 8 million acres of late-successional forest, remain available for harvest.

Relationship of PSQ and Late-Successional Forest

There are 3.4 million acres of forest land within the Matrix and Adaptive Management Areas that contribute to PSQ. Approximately one-third of this 3.4 million acres, or 1.1 million acres, are late-successional forest. The PSQ is heavily dependent on harvesting late-successional forest for 3 to 5 more decades until early-successional stands begin to mature and become available for harvest. Although only about one-third of the 3.4 million acres suitable for harvest are late-successional forest, about 90 percent of PSQ over the next decade will be derived from harvest of late-successional forest. This situation was reflected in modeling PSQ for the Northwest Forest Plan as:

> *"Most of the harvest in Option 9* [the selected alternative]*... over the next decade will come from late-successional (over 80 years old)... While Option 9 may reserve sizeable amount of late-successional forest on federal land, it does not escape the historic dependance on late-successional forest and old growth as the source of harvest volume..."* (Johnson et al., p. 22).

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Managing sites under Survey and Manage Standards and Guidelines has a direct effect in reducing the amount of late-successional forest that is available for harvest. In turn, this reduction in the amount of late-successional forest available for harvest has a direct effect on PSQ.

The relationship between late-successional forests and PSQ can be quantified by comparing Alternatives 1 and 9 in the Northwest Forest Plan FSEIS (Table 3&4-12). Alternative 1 placed all late-successional stands in reserves and calculated PSQ using only early-successional forest (less than 80 years old). Otherwise, standards and guidelines and acreage available for PSQ were similar between the two alternatives. The difference between the PSQ for these two alternatives, therefore, approximates the amount of the PSQ from late-successional forest. The PSQ for 1999 shown on Table 3&4-13 was generated by assuming that the ratio between PSQ dependent on late-successional stands, and the PSQ dependent on early-successional stands is the same as in 1994.

Table 3&4-12. PSQ Contribution from Late-Successional Forests (Northwest Forest Plan FSEIS, Alternative 9 [in MMBF])

Alternative in the Northwest Forest Plan Final Environmental Impact Statement (USDA, USDI 1994a)	Northwest Forest Plan FSEIS PSQ (1994)	PSQ Reduced by 15 Percent (1999)
Alternative 9	958	811
Alternative 1 (No harvest in late-successional forests)	102	87

Quantifying the portion of PSQ that originates from late-successional forests permits quantifying the effects of Survey and Manage direction. Reductions to the 1.1 million acres of late-successional forest available for harvest were assumed to have a direct, proportional effect to the 724 MMBF portion of the PSQ dependent on late-successional forests. The 87 million board feet coming from early-successional forests was assumed to be unaffected by Survey and Manage direction, and was held constant across all alternatives in the PSQ analysis.

Northwest Forest Plan Assumptions on Survey and Manage and PSQ

Five years of implementation experience under Survey and Manage direction has resulted in new information about the effects of this mitigation measure. The 1994 Northwest Forest Plan FSEIS had little information with which to estimate magnitude or likelihood of effects on PSQ. However, this uncertainty was noted in the Northwest Forest Plan FSEIS. A 6 MMBF reduction in PSQ was made for 1993 known sites, but other potential effects were summarized as

> *"...other modifications made to Alternative 9 add to the uncertainty of the PSQ calculations. These changes include the requirement to survey and manage future sites of some late-successional forest associated species"* (USDA, USDI 1994a 3&4-267).

The Northwest Forest Plan FSEIS made no PSQ adjustments for management of Survey and Manage sites that would be identified in the future. It was assumed that occurrences of these sites would be rare and effects on lands available for harvest would be minimal.

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Methodology Used in Analysis of Probable Sale Quantity

Estimating the effects to PSQ is dependent on being able to determine the number of acres of late-successional forest that will ultimately be managed as known sites for Survey and Manage species. The Agencies have now had two years of experience conducting surveys prior to habitat-disturbing activities for most of the species requiring such surveys. Approximately 8 percent of the late-successional forest in Matrix and Adaptive Management Areas has been surveyed. The number of species sites detected during these surveys was used to project the number of sites that will be located in the future.

It was estimated that the late-successional forest in the Matrix and Adaptive Management Areas would be surveyed over the next 25 years. For most species a projection time frame of 25 years was used. The standards and guidelines for each alternative include an adaptive management process by which species will be removed from Survey and Manage when criteria such as the number and distribution of known sites indicate persistence is no longer a concern. The projections for the fourteen species with the highest acreage of known sites identified to date were capped (truncated) to reflect a best estimate of the application of the adaptive management process for these species. These 14 species make up a substantial portion of the projected known site acreage used in this analysis. The magnitude of actual PSQ effects for the various alternatives would vary if application of the adaptive management process and/or Management Recommendations results in management of a lower or higher number of future known sites than projected.

The average number of acres to be managed at each site varied by taxa group and, in some cases, by species, based on an interpretation of the average site size defined by existing Management Recommendations for each species or taxa group. The total number of projected sites with the associated acreage per site was used to estimate the overall effect on late-successional forest available for harvest and reductions to PSQ.

The total projection of known sites was increased 10 percent to include small, inoperable areas falling between known sites. It was projected that strategic surveys would locate 10 percent more known sites than expected with pre-disturbance surveys.

The number of acres of late-successional forest that may ultimately be managed as known sites for Survey and Manage species varies by alternative, depending on the number and size of sites to be managed. The differences between alternatives that are important to projecting late-successional forest acres affected under each alternative are described in the comparison of alternatives.

Environmental Effects and Environmental Consequences - Timber

Figure 3&4-9 summarizes the acres of late-successional forest in the Matrix and Adaptive Management Areas that are projected to be managed as known sites under each alternative, and the acres remaining available for harvest. As described above, the percent of late-successional forest projected as known sites has a corresponding effect on the late-successional forest portion of the PSQ. The Alternative 1 reduction in late-successional acres of 18 percent, for example, reduces the 724 MMBF of PSQ associated with late-successional forests by 18 percent to 594 MMBF. Adding this to the 87 MMBF of PSQ associated with early-successional forest, held constant for this analysis, results in a PSQ for Alternative 1 of 681 MMBF. The PSQ for each alternative is shown in Figure 3&4-2.

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Figure 3&4-9. Projected Acres of Survey and Manage Sites Affecting PSQ (based on two years of survey results.)

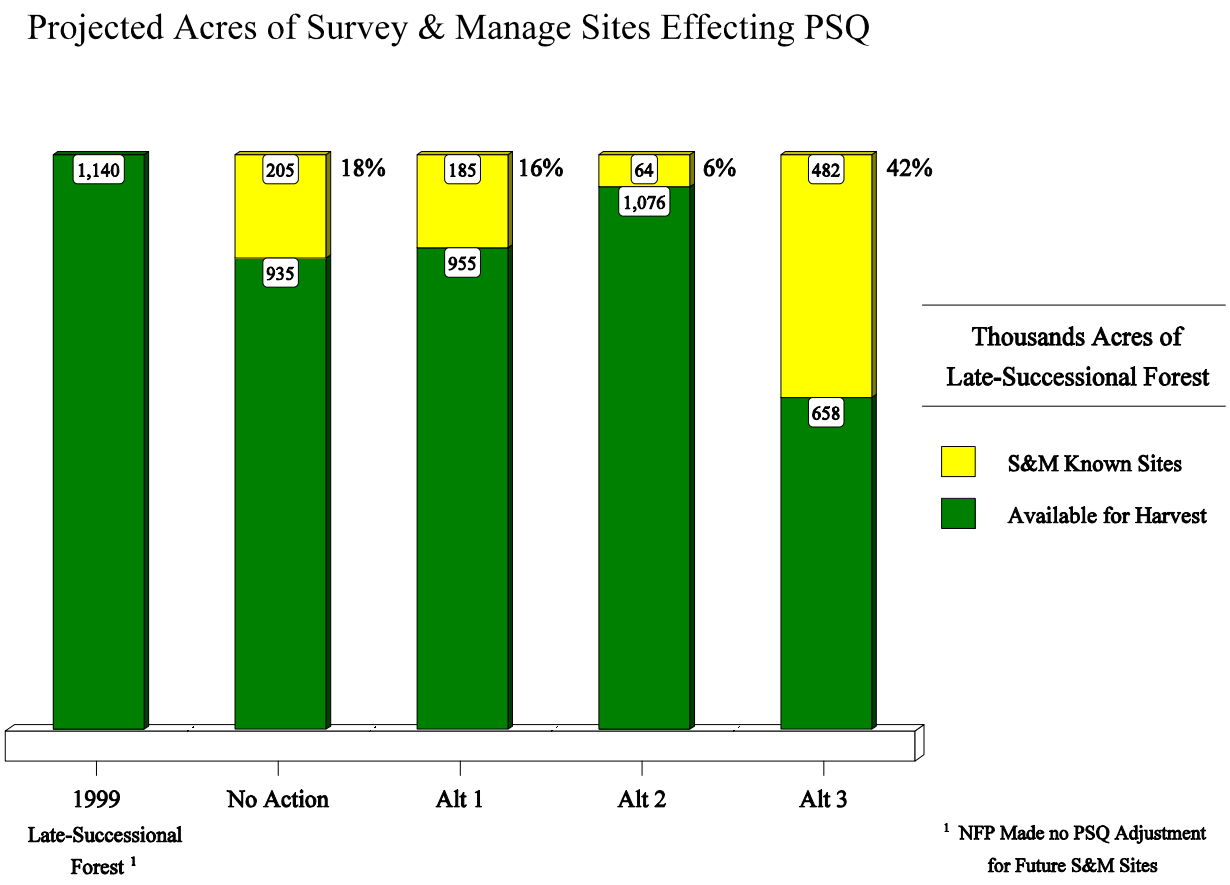
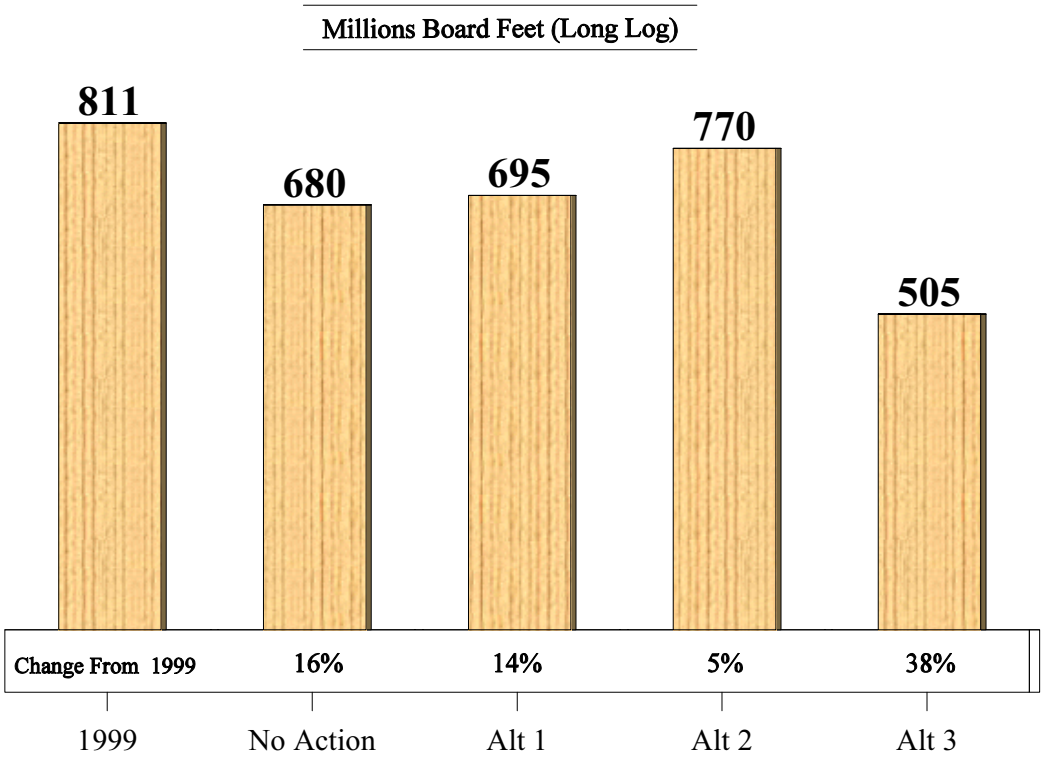


Figure 3&4-10. PSQ Results



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Note: The PSQ effects for the alternatives is based on projecting the results of two years of surveys for known sites, ahead for 25 years, with limits to 14 species. The analysis has been done at the planning area scale and does not consider the exact effects of the changes in the lands available for harvest at smaller scales. Effects at the administrative unit would vary from this regional level analysis. This analysis is not intended to have the precision necessary for re-declaring PSQ for the Forests and Districts. Actual PSQ will be affected by adaptive management decision and identification of high-priority sites in Management Recommendations.

PSQ estimates do not include the contribution of "10 percent other wood" (cull and sub-merchantable material).

PSQ volumes are expressed in 32' long log measure. Conversion to short log measure - Divide PSQ by .825.

No Action: Under the No-Action Alternative, the PSQ of 680 MMBF is 16 percent lower than the current PSQ of 811 MMBF. The 1994 Northwest Forest Plan FSEIS had little information with which to estimate magnitude or likelihood of effects of Survey and Manage on PSQ, other than a 6 MMBF reduction in PSQ for then-known sites. This was not unreasonable, as species included under Survey and Manage direction were expected to be rare and would have few known sites. As described above, however, the five years of implementation experience with Survey and Manage has provided new information about known sites.

The 64 species proposed for removal from Survey and Manage in the action alternatives were used in projections for the No-Action Alternative, but only for 3 more years. It is likely most of these species would be removed from Survey and Manage in the next 1 to 5 years under the No-Action Alternative

Achievement of PSQ in the No-Action Alternative is assumed to be delayed five years while protocols are designed and implemented for 13 species for which there are currently no Survey Protocols. Annual harvest during this time is estimated to come from the non late-successional and old-growth forest portion of the PSQ, or 87 MMBF.

Alternatives 1, 2, and 3 - The 64 species proposed for removal from Survey and Manage in the action alternatives were not used in projecting future acres of managed sites for these alternatives.

Alternative 1: Under Alternative 1, PSQ - 695 MMBF, Alternative 1 differs from the No-Action Alternative only in that the 64 species proposed for removal from Survey and Manage are removed immediately. Compared to the No-Action Alternative, 1 to 5 more years of new known sites do not get identified for these species, and the resultant 20,000 acres of late-successional forest are available for harvest as part of PSQ.

Alternative 2: Under Alternative 2, PSQ would be 770 MMBF. Alternative 2 differs from Alternative 1 only in the standards and guidelines related to the 53 "uncommon" species. Capping known sites for these 53 species at current levels, rather than projecting them as in Alternative 1, reduces the projected acreage of known sites to 64,000 acres in Alternative 2, compared to 185,000 acres in Alternative 1.

Sites for "uncommon" species (Category 2D) were not projected in Alternative 2 because "manage known sites" are capped at 1999 levels for 5 years. It was assumed that after 5 years, increases in known site acreage for some species included in sensitive species programs would be offset by decreases for species dropped from Survey and Manage in this category.

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Alternative 3: Under Alternative 3, PSQ would be 505 MMBF. This differs from Alternative 1 in two ways. Sites for "rare" species (Category 3A) are projected at 48 acres each, compared to 2 to 10 acres for sites in Alternative 1. Second, "equivalent-effort" surveys, while projected to find only 20 percent of the sites found during other pre-disturbance surveys, are nevertheless applied to five times as many species as Alternative 1 (or 319 species in Alternative 3 versus 60 species in Alternative 1). These two factors more than double the projected known site acres (Alternative 3 to 482,000, compared to 205,000 acres for Alternative 1).

The methods used to estimate and project known site acreage and its effect on PSQ is the most comprehensive possible given the relatively short experience the Agencies have with surveying for these species. The analysis of effects on the PSQ attempted to consider all significant factors in making these long-term projections. Additional information about methodology is included in Appendix G, and more detailed, sometimes species-specific, calculations are available in the administrative record.

The analysis of PSQ effects has been done at the planning area scale and does not consider the exact effects of the changes in the lands available for harvest at smaller scales. Effects at the administrative unit would vary from this regional level analysis. This analysis is not intended to have the precision necessary for re-declaring the PSQ for the affected National Forests and Districts. Modifications to National Forest and District level PSQs need to be based on the accumulation of specific unit-level effects.

At the range-wide scale, however, the PSQ effects calculated here are considered to be reasonable estimates of both the magnitude of effects, and of the differences between the alternatives.

Other Environmental Consequences

The Council on Environmental Quality regulations require that this discussion include ". . . any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented" (40 CFR 1502.16). These topics are addressed, where relevant, as part of the discussion of environmental consequences for each component of the environment.

The short-term use or protection of natural resources for long-term sustained yield is at the legislated basis of management direction for the Forest Service and Bureau of Land Management. The short-term uses of resources, in accordance with the standards and guidelines of the alternatives, would result in minimum long-term loss in productivity of forest components necessary for a healthy forest environment.

Implementation of projects, in accordance with the alternatives, would result in some loss of individuals, sites, or isolated populations of species. There are no irreversible or irretrievable commitments related to species closely associated with late-successional and old-growth forests that would prevent these species from being supported, well distributed throughout their historic range on federally managed lands for at least 100 years.

In examining environmental consequences, as discussed above in relation to actions that would modify mitigation measures, it is important to understand the overall purpose of mitigation. In general, mitigation is a measure taken to cause an action to become less harsh or severe. The Council on Environmental Quality regulations (40 CFR 1508.20)

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state that mitigation includes avoiding impacts, minimizing impacts, reducing impacts, or compensating for impacts. In analyzing the consequences of alternatives that vary in the way they would implement the same basic mitigation strategy, it would be expected that impacts may be slight or that the range of consequences may be narrow.

Conflicts with Other Plans

The Council on Environmental Quality regulations at 40 CFR 1502.16 requires a discussion of "possible conflicts between the proposed action and the objectives of federal, regional, State and local (and in the case of a reservation, Indian tribe) land-use plans, policies and controls for the areas concerned." This SEIS incorporates by reference the discussion in the Northwest Forest Plan FSEIS concerning conflicts with other plans (USDA, USDI 1994a, pp. 3&4-319 and 3&4-320, and Appendix D). Modifying some mitigation measures of the Northwest Forest Plan as in the proposed action of this SEIS (see Chapter 2, Background) would not alter the conclusion of the Northwest Forest Plan FSEIS regarding the possible conflicts with other plans.

The management direction in this SEIS applies only to federally managed lands where state and local land-use plans, policies and controls have little application. Similarly,

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Table 3&4-1- Federally Listed and Proposed for Listing Fish Species in Northwest Forest Plan Area	
Species Status: Endangered	**Date Listed**
Oncorhyncus tshawytscha (Upper Columbia River Spring chinook salmon)	1999
Oncorhyncus mykiss (Upper Columbia River steelhead trout)	1997
Oncorhyncus clarki clarki (Umpqua River cutthroat trout)	1996
Species Status: Threatened	
Salvelinus confluentus (Puget Sound bulltrout Distinct Population Segment)	1999
Oncorhynchus kisutch (Southern Oregon/Northern California coast coho salmon)	1997
Oncorhyncus kisutch (Oregon Coastal coho salmon)	1998
Oncorhyncus tshawytscha (Puget Sound chinook)	1999
Oncorhyncus tshawytscha (Upper Willlamette River chinook)	1999
Oncorhyncus tshawytscha (Lower Columbia River chinook)	1999
Oncorhyncus mykiss (Lower Columbia River steelhead)	1998
Oncorhyncus mykiss ssp. (Mid-Columbia River steelhead)	1999
Oncorhyncus mykiss ssp. (Upper Willamette River steelhead)	1999
Oncorhyncus keta (Hood Canal summer chum salmon)	1999
*Oncorhyncus keta (*Columbia River chum salmon)	1999
Salvelinus confluentus (Klamath River bulltrout Distinct Population Segment)	1998
Salvelinus confluentus (Columbia River bulltrout Distinct Population Segment)	1998
Species Status: Proposed	**Date Proposed**
Oncorhyncus tshawytscha (Southern Oregon/Coastal California chinook)	1998
*Oncorhyncus clarki clarki (*Southwest Washington/Columbia River cutthroat trout)	1999

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Table 3&4-2. Summary of Records/Sites Known for Each "Survey and Manage" and "Protection Buffer" Fungi Species (Prior to 1994, and 1994 and Later)

Notes: An asterisk (*) denotes name change since publication of the Northwest Forest Plan (NFP). First name is current accepted name; name in parenthesis is one in NFP, Table C-3.
ROD = Record of Decision

FUNGI	Prior to 1994 (Prior to NFP ROD)	Additional Locations (1994 and Later)
*Acanthophysium farlowii** *(Aleurodiscus farlowii)*	1	None
Albatrellus avellaneus	3	None
Albatrellus caeruleoporus	5	3
Albatrellus ellislii	7	3
Albatrellus flettii	24	11
Alpova alexsmithii	5	1
*Alpova aurantiacus** *(Alpova* sp. nov. # Trappe 1966)(syn. *Fevansia aurantiaca*)	2	None
Alpova olivaceotinctus	2	None
*Arcangeliella camphorata** (*Arcangeliella* sp. nov. #Trappe 12382; *Arcangeliella* sp. nov. #Trappe 12359)	9	None
Arcangeliella crassa	3	None
Arcangeliella lactarioides	2	1
Asterophora lycoperdoides	3	1
Asterophora parasitica	5	None
Baeospora myriadophylla	16	1
*Balsamia nigrens** *(Balsamia nigra)*	4	None
Boletus haematinus	1	None
Boletus pulcherrimus	8	None
*Bondarzewia mesenterica** *(Bondarzewia montana)*	9	32
*Bridgeoporus nobilissimus ** *(Oxyporus nobilissimus)*	3	2
Bryoglossum gracile	4	None
Cantharellus cibarius	= C. formosus	= C. formosus
Cantharellus subalbidus	18	24
Cantharellus tubaeformis	11	56
Cantharellus formosus	24	53
Catathelasma ventricosa	12	2
*Chalciporus piperatus** (*Boletus piperatus*)	57	13
*Chamonixia caespitosa ** (*Chamonixia pacifica* sp. nov. #Trappe #12768)	5	None
Choiromyces alveolatus	7	3

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Table 3&4-2. Summary of Records/Sites Known for Each "Survey and Manage" and "Protection Buffer" Fungi Species (Prior to 1994, and 1994 and Later)

Notes: An asterisk (*) denotes name change since publication of the Northwest Forest Plan (NFP). First name is current accepted name; name in parenthesis is one in NFP, Table C-3.
ROD = Record of Decision

FUNGI	Prior to 1994 (Prior to NFP ROD)	Additional Locations (1994 and Later)
Choiromyces venosus	1	None
*Chromosera cyanophylla** *(Mycena lilacifolia)*	30	5
Chroogomphus loculatus	1	3
Chrysomphalina grossula	13	None
Clavariadelphus borealis	= C. truncatus	= C. truncatus
Clavariadelphus ligula	14	6
Clavariadelphus lovejoyae	Not in NFP area	Not in NFP area
Clavariadelphus pistilaris	19	7
Clavariadelphus sachalinensis	4	1
Clavariadelphus subfastigatus	0	1
Clavariadelphus truncatus	22	12
Clavicorona avellanea	2	4
Clavulina cinerea	= C. cristata	= C. cristata
Clavulina cristata	Many	65
Clavulina ornatipes	9	1
Clitocybe senilis	2	None
Clitocybe subditopoda	4	None
Collybia bakerensis	14	None
Collybia racemosa	30	None
Cordyceps capitata	25	8
Cordyceps ophioglossoides	11	2
Cortinarius azureus	Data not available	None
Cortinarius boulderensis	6	2
Cortinarius cyanites	Data not available	None
Cortinarius magnivelatus	4	None
Cortinarius olympianus	10	6
*Cortinarius speciosissimus** *(Cortinarius rainierensis)*	4	None
Cortinarius spilomius	1	None
Cortinarius tabularis	5	None
*Cortinarius umidicola** *(Cortinarius canabarba)*	2	None

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Table 3&4-2. Summary of Records/Sites Known for Each "Survey and Manage" and "Protection Buffer" Fungi Species (Prior to 1994, and 1994 and Later)

Notes: An asterisk (*) denotes name change since publication of the Northwest Forest Plan (NFP). First name is current accepted name; name in parenthesis is one in NFP, Table C-3.
ROD = Record of Decision

FUNGI	Prior to 1994 (Prior to NFP ROD)	Additional Locations (1994 and Later)
Cortinarius valgus	Data not available	None
Cortinarius variipes	2	1
Cortinarius verrucisporus	Data not available	None
Cortinarius wiebeae	3	None
Cudonia monticola	3	4
Cyphellostereum laeve	3	None
Dermocybe humboldtensis	3	1
Destuntzia fusca	2	None
Destuntzia rubra	1	1
*Dichostereum boreale * (Dichostereum granulosum)*	2	None
Elaphomyces anthracinus	2	None
Elaphomyces subviscidus	8	None
Endogone acrogena	3	None
Endogone oregonensis	15	None
Entoloma nitidum (Rhodocybe nitida)*	6	4
Fayodia gracilipes	Data not available	None
Galerina atkinsoniana	Data not available	12
Galerina cerina	Data not available	1
Galerina heterocystis	Data not available	None
Galerina sphagnicola	Data not available	None
Galerina vittaeformis	Data not available	25
Gastroboletus imbellus	1	None
Gastroboletus ruber	11	4
Gastroboletus subalpinus	17	7
Gastroboletus turbinatus	Data not available	None
*Gastroboletus vividus** (*Gastroboletus* sp. nov. #Trappe 2897; *Gastroboletus* sp. nov. #Trappe 7515)	2	1
*Gastrosuillus amaranthii** (*Gastrosuillus* sp. nov. #Trappe 9608)	1	None
*Gastrosuillus umbrinus** (*Gastroboletus* sp. nov. #Trappes 7516)	1	None

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Table 3&4-2. Summary of Records/Sites Known for Each "Survey and Manage" and "Protection Buffer" Fungi Species (Prior to 1994, and 1994 and Later)

Notes: An asterisk (*) denotes name change since publication of the Northwest Forest Plan (NFP). First name is current accepted name; name in parenthesis is one in NFP, Table C-3.
ROD = Record of Decision

FUNGI	Prior to 1994 (Prior to NFP ROD)	Additional Locations (1994 and Later)
Gautieria magnicellaris	2	None
Gautieria otthii	2	None
Gelatinodiscus flavidus	9	5
Glomus radiatum	3	None
Gomphus bonarii	7	6
Gomphus clavatus	25	14
Gomphus floccosus	42	57
Gomphus kauffmanii	22	13
Gymnomyces abietis sp. nov.* (*Gymnomyces* sp. nov. #Trappe 1690, 1706, 1710; *Gymnomyces* sp. nov. #Trappe 4703, 5576; *Gymnomyces* sp. nov. #Trappe 5052; *Gymnomyces* sp. nov. #Trappe 7545; *Martellia monticola*; *Martellia* sp. nov. #Trappe 1700; *Martellia* sp. nov. #Trappe 311; *Martellia* sp. nov. #Trappe 5903)	17	1
Gymnopilus punctifolius	30	18
Gyromitra californica	Data not available	1
Gyromitra esculenta	Data not available	38
*Gyromitra gigas** *(Gyromitra montana)*	Data not available	12
Gyromitra infula	Data not available	11
Gyromitra melaleucoides	Data not available	12
*Hebeloma olympianum** *(Hebeloma olympiana)*	3	2
Helvella compressa	17	61
Helvella crassitunicata	19	1
Helvella elastica	14	11
Helvella maculata	14	3
Hydnotrya inordinata sp. nov.* (*Hydnotrya* sp. nov. #Trappe 787, 792)	3	1
Hydnotrya subnix sp. nov.* *(Hydnotrya subnix* sp. nov. #Trappes #1861)	1	None
Hydnum repandum	83	10
Hydnum umbilicatum	17	37
*Hydropus marginellus** *(Mycena marginella)*	31	1

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Table 3&4-2. Summary of Records/Sites Known for Each "Survey and Manage" and "Protection Buffer" Fungi Species (Prior to 1994, and 1994 and Later)

Notes: An asterisk (*) denotes name change since publication of the Northwest Forest Plan (NFP). First name is current accepted name; name in parenthesis is one in NFP, Table C-3.
ROD = Record of Decision

FUNGI	Prior to 1994 (Prior to NFP ROD)	Additional Locations (1994 and Later)
Hygrophorus caeruleus	1	3
Hygrophorus karstenii	Data not available	None
Hygrophorus vernalis	4	None
Hypomyces luteovirens	8	None
Leucogaster citrinus	7	None
Leucogaster microsporus	7	2
Macowanites chlorinosmus	11	None
Macowanites lymanensis	1	None
Macowanites mollis	2	None
Marasmius applanatipes	2	None
Martellia fragrans	3	1
Martellia idahoensis	2	None
*Martellia maculata** (*Elaphomyces* sp. nov. #Trappe 1038)	27	None
Martellia nondistincta sp. nov.* (*Martellia* sp. nov. #Trappe 649)	1	1
Mycena hudsoniana	8	None
Mycena monticola	6	11
Mycena overholtsii	9	None
Mycena quinaultensis	22	None
Mycena tenax	18	None
Mythicomyces corneipes	8	1
Neolentinus adhaerens	3	None
Neolentinus kauffmanii	29	2
Neournula pouchetii	8	17
Nivatogastrium nubigenum	21	None
*Octavianina cyanescens** (*Octavianina* sp. nov. #Trappe 7502)	1	None
Octavianina macrospora	1	None
Octavianina papyracea	2	None
Omphilina ericetorum (Phytoconis ericetorum)	60	41
Otidea leporina	5	12
Otidea onotica	8	44

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Table 3&4-2. Summary of Records/Sites Known for Each "Survey and Manage" and "Protection Buffer" Fungi Species (Prior to 1994, and 1994 and Later)

Notes: An asterisk (*) denotes name change since publication of the Northwest Forest Plan (NFP). First name is current accepted name; name in parenthesis is one in NFP, Table C-3.
ROD = Record of Decision

FUNGI	Prior to 1994 (Prior to NFP ROD)	Additional Locations (1994 and Later)
Otidea smithii	2	5
Phaeocollybia attenuata	37	15
Phaeocollybia californica (Phaeocollybia scatesiae)*	11	3
Phaeocollybia carmanahensis	= P. oregonensis	= P. oregonensis
Phaeocollybia dissiliens	4	4
Phaeocollybia fallax	45	7
Phaeocollybia gregaria	2	None
Phaeocollybia kauffmanii	28	14
Phaeocollybia olivacea	29	7
Phaeocollybia oregonensis	1	1
Phaeocollybia piceae	7	4
Phaeocollybia pseudofestiva	4	1
Phaeocollybia scatesiae	7	None
Phaeocollybia sipei	2	None
Phaeocollybia spadicea	20	7
Phellodon atratus (Phellodon atratum)*	28	1
Pholiota albivelata	28	None
Pithya vulgaris	20	16
Plectania melastoma	24	18
Plectania milleri	1	5
Podostroma alutaceum	10	None
Polyozellus multiplex	11	10
Pseudaleuria quinaultiana	4	None
Ramaria abietina	1	None
Ramaria amyloidea	3	4
Ramaria araiospora	7	11
Ramaria aurantiisiccescens	4	8
Ramaria botryis var. *aurantiiramosa*	1	None
Ramaria celerivirescens	4	4
Ramaria claviramulata	2	None

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Table 3&4-2. Summary of Records/Sites Known for Each "Survey and Manage" and "Protection Buffer" Fungi Species (Prior to 1994, and 1994 and Later)

Notes: An asterisk (*) denotes name change since publication of the Northwest Forest Plan (NFP). First name is current accepted name; name in parenthesis is one in NFP, Table C-3.
ROD = Record of Decision

FUNGI	Prior to 1994 (Prior to NFP ROD)	Additional Locations (1994 and Later)
Ramaria concolor f. marrii	1	None
Ramaria concolor f. tsugina		
Ramaria coulterae	0	2
Ramaria cyaneigranosa	6	6
Ramaria fasciculata var. *sparsiramosa*	2	None
Ramaria gelatiniaurantia	2	9
Ramaria gracilis	4	None
Ramaria hilaris var. *olympiana*	2	None
Ramaria largentii	2	3
Ramaria lorithamnus	1	None
`Ramaria maculatipes	3	None
Ramaria rainierensis	2	None
Ramaria rubella var. *blanda*	2	None
Ramaria rubribrunnescens	3	2
Ramaria rubrievansecens	5	6
Ramaria rubripermanens	1	6
Ramaria spinulosa var. *diminutiva** (*Ramaria spinulosa*)	2	None
Ramaria stuntzii	8	10
Ramaria suecica	1	None
Ramaria thiersii	1	None
Ramaria verlotensis	2	None
Rhizopogon abietis	6	None
Rhizopogon atroviolaceus	1	None
Rhizopogon brunneiniger	2	None
*Rhizopogon chamaleontinus** (*Rhizopogon* sp. nov. #Trappe 9432)	1	None
*Rhizopogon ellipsosporus** (*Alpova* sp. nov. # Trappe 9730)	1	None
Rhizopogon evadens var. *subalpinus*	13	6
Rhizopogon exiguus	5	None
Rhizopogon flavofibrillosus	5	1
Rhizopogon inquinatus	2	None

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Table 3&4-2. Summary of Records/Sites Known for Each "Survey and Manage" and "Protection Buffer" Fungi Species (Prior to 1994, and 1994 and Later)

Notes: An asterisk (*) denotes name change since publication of the Northwest Forest Plan (NFP). First name is current accepted name; name in parenthesis is one in NFP, Table C-3.
ROD = Record of Decision

FUNGI	Prior to 1994 (Prior to NFP ROD)	Additional Locations (1994 and Later)
*Rhizopogon parksii** (*Rhizopogon* sp. nov. #Trappe1692; *Rhizopogon* sp. nov. #Trappe 1698)	190	35
Rhizopogon truncatus	3	None
Rhodocybe speciosa	3	None
*Rickenella swartzii * (Rickenella setipes)*	6	None
Russula mustelina	0	None
Sarcodon fuscoindicum	29	7
Sarcodon imbricatus	39	7
Sarcosoma latahense (Plectania latahensis)*	3	13
Sarcosoma mexicana, Oregon Coast Range & Oregon Willamette Valley provinces.	Data not available	74
Sarcosoma mexicana, outside Oregon Coast Range & Oregon Willamette Valley provinces.	Data not available	12
Sarcosphaera eximia	Data not available	20
Sedecula pulvinata	2	None
*Sowerbyella rhenana * (Aleuria rhenana)*	8	8
Sparassis crispa	22	4
Spathularia flavida	23	1
Stagnicola perplexa	8	None
Thaxterogaster pavelekii sp. nov.* (*Thaxterogaster* sp. nov. #Trappe 4867, 6242, 7427, 7962, 8520)	90	15
Thaxterogaster pingue	9	2
Tremiscus helvelloides (Phlogoitis helvelloides)*	5	13
Tricholoma venenatum	1	None
Tricholomopsis fulvescens	5	1
*Tuber asa** (*Tuber* sp. nov. #Trappe 2302)	1	None
Tuber pacificum sp. nov.* (*Tuber* sp. nov. #Trappe 12493)	2	None
Tylopilus porphyrosporus (Tylopilus pseudoscaber)*	29	2

Note: Sites from two columns cannot be totaled because some reflect recent visits to historic sites.

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Table 3&4-3. Comparison of Categories and Management Elements for Protection Buffer and Category 2 Fungi Species.				
Species	**No-Action Alternative**	**Alternative 1**	**Alternative 2**	**Alternative 3**
Bondarzewia mesenterica	Categories: 1,2,3 Manage known sites. Pre-disturbance surveys. Extensive surveys.	Category: 1B Manage known sites. Strategic surveys.	Category: 2B Manage known sites. Strategic surveys.	Category: 3A Manage known sites at 48 acres, minumum. Equivalent-effort surveys. Strategic surveys.
Otidea leporina	Categories: PB, 3 Manage known sites. Pre-disturbance surveys. Extensive surveys.	Category: 1B Manage known sites. Strategic surveys.	Category: 2B Manage known sites. Strategic surveys.	Category: 3A Manage known sites at 48 acres, minimum. Equivalent-effort surveys. Strategic surveys.
Otidea smithii	Categories: PB, 1, 3 Manage known sites. Pre-disturbance sites. Extensive surveys.	Category: 1B Manage known sites. Strategic surveys.	Category: 2B Manage known sites. Strategic surveys.	Category: 3A Manage known sites at 48 acres, minimum. Equivalent-effort surveys. Strategic surveys.
Polyozellus multiplex	Categories: PB, 1, 3 Manage known sites. Pre-disturbance surveys. Extensive surveys.	Category: 1B Manage known sites. Strategic surveys.	Category: 2B Manage known sites. Strategic surveys.	Category: 3A Manage known sites at 48 acres, minimum. Equivalent-effort surveys. Strategic surveys.
Sowerbyella rhenana	Categories: PB, 1, 3 Manage known sites. Pre-disturbance surveys. Extensive surveys.	Category: 1B Manage known sites. Strategic surveys.	Category: 2B Manage known sites. Strategic surveys.	Category: 3A Manage known sites at 48 acres, minimum. Equivalent-effort surveys. Strategic surveys

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Table 3&4-3. Comparison of Categories and Management Elements for Protection Buffer and Category 2 Fungi Species.				
Species	**No-Action Alternative**	**Alternative 1**	**Alternative 2**	**Alternative 3**
Otidea onotica	Categories: PB, 3 Manage known sites. Pre-disturbance surveys. Extensive surveys.	Category: 1E Manage known sites. Strategic surveys.	Category: 2C Manage known sites. Strategic surveys.	Category: 3A Manage known sites. Equivalent-effort surveys. Strategic surveys.
Sarcosoma mexicana (outside of Oregon Willamette Valley and Oregon Coast Range provinces)	Categories: PB, 3 Manage known sites. Pre-disturbance surveys. Extensive surveys.	Category: 1E Manage known sites. Strategic surveys.	Category: 2C Manage known sites. Strategic surveys.	Category: 3A Manage known sites at 48 acres, minimum. Equivalent-effort surveys. Strategic surveys.

Table 3&4-4. Summary of Number of Known Sites for Each "Survey and Manage" and "Protect from Grazing" Mollusk, By Specified Periods of Time.

Species Code	Scientific Name One asterisk (*) indicates "Protect from Grazing" and "Survey and Manage" species. Two asterisks: (**) indicates "Protect from Grazing" species only.	Common Name	Prior to 1994 (Prior to NFP ROD)	Additional Locations (4/1994 - 9/1998) (ISMS Database)	Additional Locations (10/1998 to 9/1999) (Questionnaire Data)[1]	Increase in Known Range? N= No Y = Yes
ANVO	*Ancotrema voyanum***	hooded lancetooth	20	0	22	N
CRDE	*Cryptomastix devia*	Puget oregonian	24	5	0	N
CRHE	*Cryptomastix hendersoni*	Columbia oregonian	23	1	0	Y
DEHE	*Deroceras hesperium*	evening fieldslug	3	0	0	N
FLXX1	*Fuminicola* new species 1*	Klamath pebblesnail	10	2	0	N
FLXX2	*Fuminicola* new species *2*	tall pebblesnail	1	0	0	N
FLXX3	*Fuminicola* new species 3*	Klamath rim pebblesnail	3	1	0	N
FLXX11	*Fuminicola* new species 11*	Fredenburg pebblesnail	2	0	0	N
FLXX14	*Fuminicola* new species 14	Potem pebblesnail	9	4	0	N
FLXX15	*Fuminicola* new species 15	flat-top pebblesnail	4	0	0	N
FLXX16	*Fuminicola* new species 16	Shasta Springs pebblesnail	11	6	0	N
FLXX17	*Fuminicola new species 17*	disjunct pebblesnail	2	0	0	N
FLXX18	*Fuminicola* new species 18	globular pebblesnail	4	0	0	N
FLXX19	*Fuminicola* new species 19*	umbilicate pebblesnail	1	0	0	N
FLXX20	*Fuminicola new species 20**	Lost Creek pebblesnail	2	0	0	N
FLSE	*Fluminicola seminalis**	nugget pebblesnail	30	8	0	N

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Table 3&4-4. Summary of Number of Known Sites for Each "Survey and Manage" and "Protect from Grazing" Mollusk, By Specified Periods of Time. (Continued)

Species Code	Scientific Name One asterisk (*) indicates "Protect from Grazing" and "Survey and Manage" species. Two asterisks: (**) indicates "Protect from Grazing" species only.	Common Name	Prior to 1994 (Prior to NFP ROD)	Additional Locations (4/1994 - 9/1998) (ISMS Database)	Additional Locations (10/1998 - 9/1999) (Questionnaire Data)[1]	Increase in Known Range? N= No Y = Yes
HEHE	*Helminthoglypta hertleini*	Oregon shoulderband	15	1	2	Y
HETA	*Helminthoglypta talmadgei*	Siskiyou shoulderband	21	0	147	Y
HEBU	*Hemphillia burringtoni*	keeled jumping slug	1	0	8	Y
HEGL	*Hemphillia glandulosa*	warty jumping slug	5	5	59	Y
HEMA	*Hemphillia malonei*	Malone's jumping slug	4	42	324	Y
HEPA	*Hemphillia pantherina*	panther jumping slug	1	0	0	N
JOXX2	*Juga (Oreobasis)* new species 2	basalt juga	26	3	0	N
JUXX3	*Juga (Oreobasis)* new species 3	cinnamon juga	5	3	0	N
LYXX1	*Lyogyrus* new species 1	Columbia duskysnail	11	4	0	N
LYXX2	*Lyogyrus* new species 2	masked duskysnail	1	3	0	N
LYXX3	*Lyogyrus* new species 3	canary duskysnail	1	0	0	N
MEHE	*Megomphix hemphilli*	Oregon Megomphix	12	434	268	Y
MOCH	*Monadenia chaceana*	Chace's sideband	21	16	19	Y
MOCH2	*Monadenia churchi*	Church's sideband	40	15	748	Y
MOFIKL	*Monadenia fidelis klamathica***	Klamath sideband	11	0	0	N
MOFIMI	*Monadenia fidelis minor*	Dalles sideband	14	1	12	Y
MOFIOC	*Monadenia fidelis ochromphalus***	Yellow-based sideband	39	0	37	N
MOTRT	*Monadenia t. troglodytes*	Shasta sideband	10	0	0	N
MOTRW	*Monadenia troglodytes wintu*	Wintu sideband	7	0	2	N

Table 3&4-4. Summary of Number of Known Sites for Each "Survey and Manage" and "Protect from Grazing" Mollusk, By Specified Periods of Time. (Continued)

Species Code	Scientific Name One asterisk (*) indicates "Protect from Grazing" and "Survey and Manage" species. Two asterisks: (**) indicates "Protect from Grazing" species only.	Common Name	Prior to 1994 (Prior to NFP ROD)	Additional Locations (4/1994 - 9/1998) (ISMS Database)	Additional Locations (10/1998 - 9/1999) (Questionnaire Data)[1]	Increase in Known Range? N= No Y = Yes
ORXX1	*Oreohelix* new species 1	Chelan mountainsnail	1	13	0	N
PRARCR	*Pristiloma arcticum crateris**	Crater Lake tightcoil	4	1	0	Y
PRCO	*Prophysaon coeruleum*	blue-grey taildropper	2	1663	3107	Y
PRDU	*Prophysaon dubium*	papillose taildropper	1	315	1728	Y
TRRO	*Trilobopsis roperi*	Shasta chaparral	10	2	48	N
TRTE	*Trilobopsis tehamana*	Tehama chaparral	6	0	3	Y
VEXX1	*Vertigo* new species 1	Hoko Vertigo	1	0	0	N
VEPR	*Vespericola pressleyi*	Pressley hesperian	18	1	1	N
VESH	*Vespericola shasta*	Shasta hesperian	13	3	0	N
VOKLS	*Vorticifex klamathensis sinitsini*	Sinitsin ramshorn	2	0	0	N
VOXX1	*Vorticifex* new species 1	knobby ramshorn	2	0	0	N

[1]Based on number of new records estimated by BLM and USFS field units in the Northwest Forest Plan area, as of 10/2/99.

(Species codes are from the ISMS database.)

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Glossary

Adaptive management - A continuing process of action-based planning, monitoring, researching, evaluating and adjusting with the objective of improving implementation and achieving the goals of the selected alternative. (USDA, USDI 1994a)

Alternative - One of several policies, plans, or projects proposed for making decisions. (USDA, USDI 1994a)

Amphibians - Cold-blooded vertebrates (such as frogs, toads, or salamanders) intermediate in many characters between fishes and reptiles and having gilled aquatic larvae and air-breathing adults.

Arthropods - Invertebrates belonging to the largest animal phylum (more than 800,000 species) including crustaceans, insects, centipedes, and arachnids. Characterized by a segmented body, jointed appendages, and an exoskeleton composed of chitin. (USDA, USDI 1994a)

Bryophytes - Plants of the phylum Bryophyta, including mosses, liverworts and hornworts; characterized by the lack of true roots, stems and leaves. (USDA, USDI 1994a)

Bureau of Land Management (BLM) Administered Lands - Oregon and California Railroad lands (O&C), Public Domain (PD), Coos Bay Wagon Road (CBWR), acquired lands, and split estate (Federal minerals).

Category - In the action alternatives in this SEIS, groupings of species by relative rarity, practicality of pre-disturbance surveys, and information status. Management direction is generally the same for all species within a category, and differs between categories. For the No-Action Alternative, see "component."

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Cavity nester - Wildlife species, most frequently birds, that require cavities (holes) in trees for nesting and reproduction. (USDA, USDI 1994a)

Closely associated species - A species is designated as closely associated with a forest successional stage if the species is found to be significantly more abundant in that forest successional stage compared to the other successional stages, or if it is known to occur almost exclusively in that successional stage, or if it uses habitat components usually produced at that stage. (USDA, USDI 1994a) See Appendix E of this SEIS.

Coarse woody debris - Portion of a tree that has fallen or been cut and left in the woods. Usually refers to pieces at least 20 inches in diameter. (USDA, USDI 1994a)

Component - As it relates to the Survey and Manage standard and guideline in the No-Action Alternative, components are the specific strategies under which species are surveyed and known sites are managed to assure species persistence. Table C-3, provided in Appendix B of this SEIS and also on pages C-49 through C-61 of the Northwest Forest Plan Record of Decision (USDA, USDI 1994b), identifies which components apply to each species covered by the Survey and Manage standard and guideline. Synonymous with category.

Concern for persistence - See Chapter 2 of this SEIS.

Congressionally Reserved Areas - Areas that require Congressional enactment for their establishment, such as National Parks, Wild and Scenic Rivers, National Recreation Areas, National Monuments, and Wilderness. Also referred to as Congressional Reserves. (USDA, USDI 1994a)

Connectivity - A measure of the extent to which conditions among late-successional and old-growth forest areas provide habitat for breeding, feeding, dispersal, and movement of late-successional old-growth associated wildlife and fish species. Also see Late-Successional/Old-Growth Forest. (USDA USDI 1994a)

Council on Environmental Quality (CEQ) - An advisory council to the President established by the National Environmental Policy Act of 1969. CEQ reviews federal programs for their effects on the environment, conducts environmental studies, and advises the President on environmental matters. (Abstracted from the National Environmental Policy Act of 1969 as Amended.)

Cumulative effects - Impacts on the environment resulting from the incremental effect of the action when added to effects of past, present, and reasonably foreseeable future actions regardless of the agency (Federal or nonfederal) or person undertaking such other actions. Cumulative effects can result from individually minor, but collectively similar, actions occurring over a period of time. (USDA, USDI 1994a)

Draft Environmental Impact Statement (DEIS) - The draft statement of environmental effects, which is required for major federal actions under Section 102 of the National Environmental Policy Act, and released to the public and other agencies for comment and review.

Early-successional forest - Forest seral stages younger than mature and old-growth age classes. (USDA, USDI 1994a)

Ecological amplitude - The breadth of the biological and environmental requirements of the species (such as temperature, moisture regimes, soil types, hosts, and stand ages).

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Ecosystem approach - A strategy or plan to manage ecosystems to provide for all associated organisms, as opposed to a strategy or plan for managing individual species. (USDA et. al 1993)

Ecosystem management - Use of an ecological approach in land management to sustain diverse, healthy, and productive ecosystems. Ecosystem management is applied at various scales to blend long-term societal and environmental values in a dynamic manner that may be adapted as more knowledge is gained through research and experience.

Effects - Effects, impacts, and consequences, as used in this environmental impact statement, are synonymous. Effects may be direct, indirect or cumulative and may fall in one of these categories: aesthetic, historic, cultural, economic, social, health, or ecological (such as effects on natural resources and on the components, structures, and functioning of affected ecosystems). (USDA USDI 1994a)

Endemic - Unique to a specific locality.

Endangered Species Act (ESA) - A law passed in 1973 that identifies species of wildlife and plants determined by the Director of the U.S. Fish and Wildlife Service to be endangered or threatened with extinction. Among other things, the Endangered Species Act requires all federal agencies to conserve these species and consult with the U.S. Fish and Wildlife Service or National Marine Fisheries Service on all actions that may affect these species.

Environmental analysis - An analysis of alternative actions and their predictable short-term and long-term environmental effects, incorporating physical, biological, economic, and social considerations. (USDA, USDI 1994a)

Environmental Assessment (EA) - A systematic analysis of site-specific activities used to determine whether such activities would have a significant effect on the quality of the human environment, whether a formal environmental impact statement is required, and also to aid agency compliance with the National Environmental Policy Act when no environmental impact statement is necessary. (USDA, USDI 1994a)

Environmental Impact Statement (EIS) - A statement of the environmental effects of a proposed action and alternatives to it. It is required for major federal actions under Section 102 of the National Environmental Policy Act (NEPA), and released to the public and other agencies for comment and review. It is a formal document that must follow the requirements of NEPA, the Council on Environmental Quality (CEQ) guidelines, and directives of the agency responsible for the project proposal.

Equivalent-effort surveys - Pre-disturbance surveys for species whose characteristics, such as small size or irregular fruiting, prevent it from being consistently located during site-specific surveys. See Chapter 2.

Extant - Still present in a specific locality.

Extensive surveys - Surveys intended to locate populations outside the context of individual pre-disturbance surveys. They should be designed to be conducted on a landscape level with the goal of identifying likely occupied habitat. Habitats to survey will be prioritized based on species conservation needs, as well as management needs. In some instances, surveys of reserved areas may be more important than surveys within Matrix; in other instances, the reverse may be true. Extensive surveys are considered effective if they locate at least some individuals of the species in the majority of instances when the species is expected to be present at the survey location.

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Extirpation - The elimination of a species from a particular area. (USDA, USDI 1994a)

Fauna - Animal life of a region or geological period. (USDA, USDI 1994a)

Feasibility (of surveys) - See "Practicality (of surveys)."

Fecundity - Number of female young produced per adult female in the population of interest. (USDA, USDI 1994a)

Federal Land Policy and Management Act (FLPMA) - A law passed in 1976 applying to the Bureau of Land Management directing management of lands administered by that agency including the requirement to develop land use plans and prepare regulations to guide that development. (USDA, USDI 1994a)

Flora - Plant life of a region or geological period. (USDA, USDI 1994a)

Force account - Work done by or under the direct supervision of Agency crews (as opposed to contract work).

Forest Ecosystem Management Assessment Team (FEMAT) - An interagency, interdisciplinary team of scientists, economists, and sociologists led by Dr. Jack Ward Thomas and chartered to review proposals for management of federal forests within the range of the northern spotted owl. The team produced a report assessing ten options in detail, which were used as a basis for developing the Northwest Forest Plan (also described in glossary).

Forest land - Land that is now, or is capable of becoming, at least 10 percent stocked with forest trees and that has not been developed for nontimber use. (USDA, USDI 1994a)

Forest types - A classification of forest land based on the tree species presently forming a plurality of basal area stocking or crown cover of live trees. (USDA, USDI 1994a)

Forest watershed - The forested drainage area contributing water, organic matter, dissolved nutrients, and sediments to a lake or stream. (USDA, USDI 1994a)

Fragmentation - Process of reducing size and connectivity of stands that compose a forest. (USDA, USDI 1994a)

Fungi - Saprophytic and parasitic spore-producing organisms usually classified as plants that lack chlorophyll and include molds, rusts, mildews, smuts, mushrooms, and yeasts.

Ground-disturbing activity - For No-Action Alternative, defined by USFS/BLM memo 1734-PFP (BLM-OR931) 1920 (FS 11/1/96) as "habitat-disturbing activity." See "habitat-disturbing activity."

Habitat - Place or environment where a plant or animal naturally or normally lives and grows.

Habitat for surveys - Habitat specific to the species being surveyed; generally described in Survey Protocols or Management Recommendations.

Habitat-disturbing activity - Activities with disturbances having a likely significant negative impact on the species habitat, its life cycle, microclimate, or life support requirements. For additional definition of this term for the action alternatives, see Chapter 2 of this SEIS.

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Hibernacula - A case or covering protecting all or part of an animal or plant from extreme cold. A winter shelter for plants or dormant animals.

High-priority sites - A site or group of sites deemed necessary for species persistence. The high-priority sites may be identified as specific locations, sites meeting specific criteria, or as a distribution of populations or sites over a geographic area that may change over time. High-priority sites are designated through the Management Recommendations for the species. High-priority sites are generally a subset of known sites; however, in some cases, all known sites may be determined to be high-priority sites. Management of high-priority sites is necessary to ensure species persistence.

Hypogeous - Living or maturing below the surface of the ground (such as seedling cotyledons and fungi).

Implemented (*for the action alternatives in this SEIS*) - The date the NEPA decision document is signed for a project. Projects and activities will be considered *implemented* on the date the NEPA decision document is signed.

Implementing agencies - The Bureau of Land Management and Forest Service, which are the two agencies whose land and resource management plans incorporate the Northwest Forest Plan standards and guidelines.

Interagency Species Management System (ISMS) - A database system that contains information about Survey and Manage species in the Northwest Forest Plan area, including known sites, species locations and habitats, etc. See Appendix D.

Interdisciplinary team (ID team) - A group of individuals with varying areas of specialty assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad enough to adequately analyze the problem and propose action.

Irretrievable - Applies to losses of production, harvest, or commitment of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irreversible - Applies primarily to use of nonrenewable resources (such as minerals or cultural resources), or to those factors that are renewable only over long time spans (such as soil productivity). Irreversible also includes loss of future options.

Issue - A point, matter, or question of public discussion or interest to be addressed or decided through the planning process.

Key Watershed - Watersheds designated as part of the Northwest Forest Plan to provide high quality habitat or serve as sources of high quality water. The system of 164 Key Watersheds serve as refugia for maintaining and recovering habitat for at-risk fish stocks. They include high quality habitat as well as degraded habitat that is high priority for restoration.

Known site - Historic and current location of a species reported by a credible source, available to field offices, and that does not require additional species verification or survey by the agency to locate the species. Known sites includes those known prior to the signing of the Northwest Forest Plan Record of Decision (USDA, USDI 1994b), as well as sites located in the future. Known sites can be based on any documented and credible source (such as: herbaria/museum records, published documents, agency records, species expert records, and documented public information). Historic locations

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where it can be demonstrated that the species and its habitat no longer occur do not have to be considered known sites. A credible source is a professional or amateur person who has academic training and/or demonstrated expertise in identification of the taxon of interest sufficient for the agency to accept the identification as correct. These can include agency staff and private individuals.

The known site identification should be precise enough to locate the species by geographic coordinates, maps, or descriptions sufficient to design specific management actions or to be located by other individuals. A known site is the stand, or portion of the stand, on which the located individuals or populations depend, but in most cases should not be construed so narrowly as a single tree or down log.

Late-Successional/Old-Growth (LS/OG) forest - Forest stands consisting of trees, structural attributes, supporting biological communities, and processes associated with old-growth and/or mature forests. (USDA, USDI 1994a)

Land management - Intentional process of planning, organizing, programming, coordinating, directing, and controlling land use actions.

Land use allocation - Commitment of a given area of land or a resource to one or more specific uses (such as campgrounds or Wilderness).

Landscape - A heterogeneous land area with interacting ecosystems repeated in similar form throughout. (USDA, USDI 1994a)

Late-successional forests - Forest seral stages that include mature and old-growth age classes. (USDA, USDI 1994a)

Late-Successional Reserves (LSR) - Land allocation under the Northwest Forest Plan with the objective to protect and enhance conditions of late-successional and old-growth forest ecosystems that serve as habitat for late-successional and old-growth forest related species, including the northern spotted owl. Limited stand management is permitted, subject to review by the Regional Ecosystem Office. (USDA, USDI 1994b)

Lichens - Complex thallophytic plants comprised of an alga and a fungus growing in symbiotic association on a solid surface (such as a rock).

Long-term soil productivity - Capability of soil to sustain inherent, natural growth potential of plants and plant communities over time.

Manage (as in manage known sites) - To maintain the habitat elements needed to provide for persistence of the species at the site. Manage may range from maintaining one or more habitat components such as down logs or canopy cover, up to complete exclusion from disturbance for many acres, and may permit loss of some individuals, area, or elements not affecting continued site occupancy.

Managed Late-Successional Areas - Land allocation under the Northwest Forest Plan; similar to Late-Successional Reserves, but identified for certain owl territories in the drier provinces where regular and frequent fire is a natural part of the ecosystem. Unmapped Managed Late-Successional Areas also result from application of some Protection Buffers (see No-Action Alternative standards and guidelines in Appendix B of this SEIS). Certain silvicultural treatments and fire hazard reduction treatments are allowed to help prevent large-scale disturbance such as fires of high intensity or severity; disease, and insect epidemics.

Management area - An area with similar management objectives and a common management prescription. (36 CFR 219, National Forest Management Act Regulations)

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Management concern - An issue, problem, or condition that influences the range of management practices identified by the Forest Service in the planning process. (36 CFR 219, National Forest Management Act Regulations)

Management direction - A statement of multiple use and other goals and objectives, and the associated management prescriptions, and standards and guidelines for attaining them. (36 CFR 219 National Forest Management Act Regulations)

Management Recommendations - An interagency document describing management activities needed to maintain a species at a known site. Management Recommendations will, at a minimum, discuss known habitat requirements of the species, identify incompatible activities, discuss how edge effect might impact the species, and provide recommendations for determining management areas and buffer distances (if appropriate). Management Recommendations should also, when appropriate, identify areas or sites not needed to maintain species persistence. Management Recommendations may also identify sites needed to provide for long-term persistence of the species or describe high-priority habitats for surveys. In addition, Management Recommendations may address the species historic distribution (if known), current distribution, and projected future distribution based on adopting the recommendations.

Management requirement - Minimum standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, wildlife population viability, soil and water protection, and diversity to be met in accomplishing National Forest System goals and objectives. (36 CFR 219 National Forest Management Act Regulations)

Matrix - Federal lands outside of reserves, withdrawn areas, Managed Late-Successional Areas, and Adaptive Management Areas. (USDA, USDI 1994a)

Mitigation measures - Modifications of actions taken to: (1) avoid impacts by not taking a certain action or parts of an action; (2) minimize impacts by limiting the degree or magnitude of the action and its implementation; (3) rectify impacts by repairing, rehabilitating, or restoring the affected environment; (4) reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action; or (5) compensate for impacts by replacing or providing substitute resources or environments. (USDA, USDI 1994a)

Mollusks - Invertebrate animals (such as snails, clams, or squids) that have a soft unsegmented body usually (but not always) enclosed in a calcareous shell.

Monitoring - A process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned. (USDA, USDI 1994a)

National Environmental Policy Act (NEPA) - An Act passed in 1969 to declare a National policy that encourages productive and enjoyable harmony between humankind and the environment, promotes efforts that prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, enriches the understanding of the ecological systems and natural resources important to the nation, and established a Council on Environmental Quality. (USDA, USDI 1994a)

National Forest Management Act (NFMA) - A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring preparation of Forest Plans and the preparation of regulations to guide that development. (USDA, USDI 1994a)

Non-vertebrate species - A species that does not have a backbone.

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Northwest Forest Plan (NFP) - Coordinated ecosystem management direction incorporated into land management plans for lands administered by the Bureau of Land Management and the Forest Service within the range of the northern spotted owl. In April 1993, President Clinton directed his cabinet to craft a balanced, comprehensive and long-term policy for management of over 24 million acres of public land within the range of the northern spotted owl. A Forest Ecosystem Management Assessment Team (FEMAT) was chartered to develop a series of options. These options were modified in response to public comment and additional analysis, and then analyzed in a Final Supplemental Environmental Impact Statement (USDA, USDI 1994a). A Record of Decision was signed on April 13, 1994 by the Secretaries of the Department of Agriculture and the Department of Interior to adopt *Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (USDA, USDI 1994b). The Record of Decision, including the *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* is referred to as the Northwest Forest Plan.

Old-growth associated species - Plant and animal species that exhibit a strong association with old-growth forests. See "Closely associated species." (USDA, USDI 1994a)

Old-growth forest - A forest stand usually at least 180 to 220 years old with moderate-to-high canopy closure; a multi-layered, multi-species canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground. (USDA, USDI 1994a)

PSQ - See Probable Sale Quantity

Perennial stream - A stream that typically has running water on a year-round basis.

Persistence (as in population of a species) - See "Species Persistence" and Chapter 2.

Physiographic province - A geographic area having a similar set of biophysical characteristics and processes due to effects of climate and geology that result in patterns of soils and broad-scale plant communities. Habitat patterns, wildlife distributions, and historical land use patterns may differ significantly from those of adjacent provinces. (USDA, USDI 1994a)

Planning area - All of the lands within a federal agency's management boundary addressed in land management plans. (USDA, USDI 1994a)

Population viability - Probability that a population will persist for a specified period across its range despite normal fluctuations in population and environmental conditions. (USDA, USDI 1994a)

Practical Surveys (relative to surveys prior to habitat-disturbing activities) - Surveys are practical if characteristics of the species (such as size, regular fruiting) and identifying feature result in being able to reliably locate the species, if the species is present, within two field seasons and with a reasonable level of effort.

Characteristics determining feasibility of surveys include: individual species must be of sufficient size to be detectable; the species must be readily distinguishable in the field or with no more than simple laboratory or office examination for verification of identification; the species is recognizable, annually or predictably producing identifying structures; and the surveys must not pose a health or safety risk (see Chapter 2).

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Pre-disturbance surveys - See "Surveys Prior to Habitat-Disturbing Activities."

Prescribed fire - A wildland fire burning under specified conditions that will accomplish certain planned objectives. The fire may result from either planned or unplanned ignitions.

Prescription - Written direction for forest vegetation management, including timber harvest and regeneration activities.

Probable sale quantity (PSQ) - Term used by the Assessment Team rather than allowable sale quantity (ASQ) to describe the harvest levels of the various alternatives that could be maintained without decline over the long term if the schedule of harvests and regeneration was followed. "Allowable" was changed to "probable" to reflect some uncertainty in calculations for the various alternatives. PSQ is otherwise comparable to ASQ. PSQ includes only scheduled or regulated yields from the Matrix and Adaptive Management Areas and does not include harvests from reserves or administratively withdrawn areas, or "other wood," or volume of cull and other products not normally part of ASQ calculations. (USDA, USDI 1994a)

Project Surveys - See "Surveys Prior to Habitat-Disturbing Activities."

Protection Buffers - Additional standards and guidelines for specific rare and locally endemic species, and other species in the upland forest matrix, from the Scientific Analysis Team Report. See Appendix B of this SEIS. (USDA, USDI 1994b).

Protection Buffer Species - Species thought to be rare and locally endemic, as well as other specific species in the upland forest matrix identified by the Scientific Analysis Team and included in the standards and guidelines of the Northwest Forest Plan. They provide protection for occupied locations of certain species that might occur outside of reserves.

Range of the Northern Spotted Owl - Area generally comprised of lands in western portions of Washington, Oregon, and northern California (see Figure 1-1). (USDA, USDI 1994a)

Rare - A species is considered to be rare when: there are a low number of extant known sites with low numbers of individuals present at each site and populations are not well-distributed within its natural range. "Low" numbers and "not well distributed" are relative terms that must be considered in the context of other criteria such as distribution of habitat, fecundity, and so forth. See complete list of criteria under "Relative Rarity" in Chapter 2.

Record - A single database entry. There may be more than one record for a single location because the location was visited multiple times, the visit record was recorded more than once by multiple observers, or voucher specimens from the location were stored in several different locations.

Record of Decision - A document separate from, but associated with, an environmental impact statement that: states the management decision, states the reason for that decision, identifies all alternatives including the environmentally preferable and selected alternatives, and also states whether all practicable measures to avoid environmental harm from the selected alternative have been adopted, and if not, why not. (USDA, USDI 1994a)

Regional Ecosystem Office (REO) - The office that provides staff work and support to facilitate decision making of the Regional Interagency Executive Committee (RIEC) and to prompt interagency issue resolution in support of implementing the Northwest

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Forest Plan standards and guidelines. The REO is also responsible for evaluating major modifications arising from the adaptive management process and coordinating the formulation and implementation of data standards. This office reports to the RIEC and is responsible for developing, evaluating, and resolving consistency and implementation issues with respect to specific topics under the Northwest Forest Plan. (USDA, USDI 1994b)

Regional Interagency Executive Committee (RIEC) - This group consists of the Pacific Northwest federal agency heads of the Forest Service, Bureau of Land Management, Fish and Wildlife Service, National Marine Fisheries Service, Bureau of Indian Affairs, Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Geological Survey (Biological Resource Division), Natural Resources Conservation Service, and the National Park Service. The RIEC serves as the senior regional entity to assure prompt, coordinated, and successful implementation of the Northwest Forest Plan standards and guidelines.

Refugia - Locations and habitats that support populations of organisms limited to small fragments of their previous geographic range (that is, endemic populations). (USDA, USDI 1994a)

Reserves - Congressionally Reserved Areas (such as Wilderness) and land allocations that were designated under the Northwest Forest Plan, including Late-Successional Reserves, Riparian Reserves, and Managed Late-Successional Areas. Reserves help to protect and enhance conditions of late-successional and old-growth forest ecosystems. Stand management actions are either prohibited or limited within these allocations. The likelihood of maintaining a connected viable late-successional ecosystem was found to be directly related to the amount of late-successional forest in reserve status.

Riparian Reserves - Areas along live and intermittent streams, wetlands, ponds, lakes, and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis. Riparian Reserves are important to the terrestrial ecosystem as well, serving, for example, as dispersal habitat for certain terrestrial species. (USDA, USDI 1994b)

Scientific Analysis Team (SAT) Report - To address three court-identified defects in the *Final Environmental Impact Statement for Management for the Northern Spotted Owl in National Forests* (USDA 1992), the Forest Service established the Scientific Analysis Team, which included some members of the 1989-1990 Interagency Scientific Committee. These experts, in turn, conferred with additional scientists and specialists in preparing a detailed technical analysis of the three defects, including one which the Courts identified as the development of a plan which they know or believe will probably cause the extirpation of other native vertebrate species in the planning area. The team published their report, entitled *Viability Assessments and Management Considerations for Species Associated With Late-Successional and Old-Growth Forests of the Pacific Northwest* in March 1993 (Thomas et. al).

Scoping - A process defined, according to the provisions of the National Environmental Policy Act, as an early and open process for determining the scope of the issues to be addressed and for identifying the significant issues related to a proposed action.

Seeps - Places where water oozes from the ground to form a pool. (USDA, USDI 1994a)

Sensitive Species - Those species that: (1) have appeared in the Federal Register as proposed for classification and are under consideration for official listing as endangered or threatened species, or (2) are on an official state list, or (3) are recognized by the implementing agencies as needing special management to prevent their being placed on federal or state lists. (USDA, USDI 1994a)

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Seral stages - The series of relatively transitory plant communities that develop during ecological succession from bare ground to the climax stage. (USDA, USDI 1994a)

Silvicultural system - A planned sequence of treatments or prescriptions over the entire life of a forest stand needed to meet management objectives.(USDA, USDI 1994a)

Site - A single location where a specimen or population of the target species (taxonomic entity) was located or observed.

Snag - Any standing dead, partially dead, or defective (cull) tree measuring at least 10 inches in diameter at breast height, and at least 6 feet in height. A hard snag is composed primarily of wood in advanced stages of decay and deterioration, generally not merchantable. (USDA, USDI 1994a)

Soil - Surface portion of earth consisting of disintegrated rock and humus.

Soil productivity - Capacity or suitability of a soil to establish and grow a specified crop or plant species; primarily determined through nutrient availability. (USDA, USDI 1994a)

Species persistence - Maintaining presence of a species well distributed across its historic range for at least 100 years. The entire range of a species need not be occupied, but there should be an expectation that species will continue to be distributed across its historic range.

Stand (tree stand) - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition to be distinguishable from the forest in adjoining areas. (USDA, USDI 1994a)

Standards and Guidelines - The rules and limits governing actions, as well as the principles specifying the environmental conditions or levels to be achieved and maintained. (USDA, USDI 1994a)

Strategic surveys - Landscape-scale surveys designed to collect information about a species, including its presence and habitat. See Chapter 2.

Subspecies - An aggregate of phenotypically similar (alike in appearance) populations of a species generally inhabiting a geographic subdivision of the range of species and differing taxonomically (having different color or size, or differing in a set of morphological characteristics or behaviorally). (USDA, USDI 1994a)

Substrate - Any object or material on which an organism grows or is attached. (USDA, USDI 1994a)

Succession - A series of dynamic changes by which one group of organisms succeeds another through stages leading to a potential natural community or climax. An example is development of a series of plant communities (called seral stages) following a major disturbance. (USDA, USDI 1994a)

Supplemental Environmental Impact Statement (SEIS) - As defined by the National Environmental Policy Act (NEPA), a supplement to an existing Environmental Impact Statement is prepared when: (1) the agency makes substantial changes to the proposed action that are relevant to environmental concerns, or (2) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts, or (3) the agency determines that the purposes of NEPA would be furthered by doing so.

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Suppression - Process of extinguishing or confining fire.

Survey and Manage - Mitigation measure adopted as a standard and guideline within the Northwest Forest Plan Record of Decision that is intended to mitigate impacts of land management efforts on those species that are closely associated with late-successional or old-growth forests whose long-term persistence is a concern. These measures apply to all land allocations and require land managers to take certain actions relative to species of plants and animals, particularly amphibians, bryophytes, lichens, mollusks, vascular plants, fungi, and arthropods, which are rare or about which little is known. These actions include: (1) manage known sites; (2) survey prior to ground-disturbing activities; (3) conduct extensive surveys; and (4) conduct general regional surveys. (USDA, USDI 1994b)

Survey Protocol - Unless otherwise specified, Survey Protocols are for surveys prior to habitat-disturbing activities. They are an interagency document describing the survey techniques needed to have a reasonable chance of locating the species when it is present on the site, or needed to make an "equivalent-effort" of locating the species when it is present on the site. Survey protocols also identify habitats needing surveys and may identify habitats or circumstances not needing surveys. Instructions for conducting strategic surveys may be prepared along with the Strategic Survey Plan, and may be referred to as strategic survey protocols. Also see Chapter 2.

Surveys Prior to Habitat-Disturbing Activities - Surveys conducted to determine if the species is present at a site proposed for habitat-disturbing activities. Includes "practical surveys" and "equivalent-effort surveys." See Chapter 2.

Take - Under the Endangered Species Act, "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect an animal, or to attempt to engage in any such conduct. (USDA, USDI 1994a)

Taxon - A category in the scientific classification system, such as a class, family, phylum, species, subspecies, or race.

Taxonomic entity - A unique species, subspecies, or variety.

Threatened Species - Plant or animal species likely to become endangered throughout all or a significant portion of its range within the foreseeable future. A plant or animal identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register. (USDA, USDI 1994a)

Uncommon [species] - Species that does not meet the definition for rare, but where concerns for its persistence remain. See criteria under "Relative Rarity" in Chapter 2.

Understory - The trees and other woody species growing under the canopies of larger adjacent trees and other woody growth. (USDA, USDI 1994a)

Vagility - Capacity or tendency of an organism to become widely dispersed.

Vascular plants - Plants having a specialized fluid-conducting system that includes xylem and phloem.

Vertebrate species - A species that has a backbone or spinal column (includes fishes, amphibians, reptiles, birds, and mammals, all of which have a segmented bony or cartilaginous spinal column).

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Viability - Ability of a wildlife or plant population to maintain sufficient size to persist over time in spite of normal fluctuations in numbers, usually expressed as a probability of maintaining a specific population for a specified period. (USDA, USDI 1994a)

Viable population - A wildlife or plant population that contains an adequate number of reproductive individuals appropriately distributed on the planning area to ensure the long-term existence of the species. (USDA, USDI 1994a)

Watershed analysis - A systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives. Watershed analysis provides a basis for ecosystem management planning that is applied to watersheds of approximately 20 to 200 square miles. (USDA, USDI 1994a)

Wetlands - Areas inundated by surface water or ground water with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetative or aquatic life that require saturated or seasonally saturated soil conditions for growth and reproduction (Executive Order 11990). Wetlands generally include, but are not limited to, swamps, marshes, bogs, and similar areas. (USDA, USDI 1994a)

Wilderness - Areas designated by Congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or for a primitive and confined type of recreation; include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, education, scenic, or historical value as well as ecologic and geologic interest. (USDA, USDI 1994a)

Wildfire - Any wildland fire that is not prescribed (planned). Also see "Prescribed Fire." (USDA, USDI 1994a)

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References

Alegria 1999. Unpublished report on file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

Ammirati, J., [n.d.] Personnel communication.

Ammirati, J., S. Ammirati, L. Norvell [and others]. The Puget Sound Mycological Society. 1994. A preliminary report on the fungi of Barlow Pass, Washington, McIlvania 11: 10-33.

Arora, D. 1986. Mushrooms Demystified. Second Edition. Ten Speed Press,, Berkeley, California. 960 pp.

Asquith, A., J.D. Lattin and A.R. Moldenke. 1990. Arthropods: the invisible diversity. The Northwest Environmental Journal. 6(2):404-405.

Aubry, K. B., C.M. Senger and R. L. Crawford. 1987. Discovery of Larch Mountain salamanders *Plethodon larselli* in the central Cascade Range of Washington. Biological Conservation 42: 147-152.

Blaustein A.R., J.J. Beatty, D.H. Olson and R.M. Storm. 1995. The biology of amphibians and reptiles in old-growth forests in the Pacific Northwest. USDA Forest Service General Technical Report PNW-GTR-337. Portland, Oregon. 98 pp.

Binkley, Dan and R.L. Graham. 1981. Biomass, production, and nutrient cycling of mosses in an old growth Douglas-fir forest. Ecology. 62(5): 1387-1389.

Bogener, D.J., and P. Brouha. 1979. Comprehensive species management plan: Shasta salamander, *Hydromantes shastae*. Shasta-Trinity National Forest Contract Report: 10-36.

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

Brodie, E.D. Jr., 1970. Western salamanders of the genus *Plethodon*: systematics and geographic variation. Herpetologica 26: 468-516.

Brodo, I.M. and D.L. Hawksworth. 1977. *Alectoria* and allied genera in North America. Opera Botanica 42:1-164.

Brosofske, K.D., J. Chen, R.J. Naiman, and J.F. Franklin. 1997. Effects of harvesting on microclimatic gradients from small streams to uplands in western Washington. Ecological Applications 7:1188-1200.

Brown, K.M. 1991. Mollusca: Gastropoda. Pages 285-314 in J.H. Thorp and A. P. Covich, eds. Ecology and classification of North American freshwater invertebrates. Academic Press, Inc., San Diego, California. 911 p.

Brown, D.S. and J.W. Bates. 1990. Bryophytes and nutrient cycling. Bot. J. Linn. Soc. 104:129-147.

Cadwell, C. 1999a. Data base extracts. Unpublished technical paper and data compilation. [Unpaged.] On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

Cadwell, C. 1999b. GIS query method and results. Unpublished technical paper and data compilation. [Unpaged.] On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

Cadwell, C. and Denton, K. 1999. Survey and Manage Effects on PSQ - Estimation Process. Unpublished. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

Carey, A.B. 1989. Wildlife associated with old-growth forests in the Pacific Northwest. Natural Areas Journal. 9:151-162.

Carey, A.B. 1991. The biology of arboreal rodents in Douglas- fir forest. in: Huff, Holthausen, Aubry eds. Biology and management of old-growth forests. Gen. Tech. Report GTR-276. Portland, Oregon: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 46 p.

Carey, A.B. 1996. Interactions of Northwest forest canopies and arboreal mammals. Northwest Science. 70:72-78.

Cazares E., T. Driesbach and T. O'Dell. 1999. Unpublished data on file, Corvallis Forestry Sciences Lab, Corvallis, Oregon.

Chen, J., J.F. Franklin, and T.A. Spies. 1995. Growing-season microclimatic gradients from clearcut edges into old-growth Douglas-fir forests. Ecological Applications 5(1):74-86

Christy, J.A. and D.H. Wagner. 1996. Guide for the identification of rare, threatened or sensitive bryophytes in the range of the northern spotted owl, Western Washington, Western Oregon and Northwestern California. U.S. Department of Interior, Bureau of Land Management, Oregon State Office, Portland, Oregon.

Corn, P.L. and R.B. Bury. 1986. Habitat use and terrestrial activity by red tree voles (*Arborimus longicaudus*) in Oregon. Journal of Mammalogy. 67(2): 404-406.

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

Corn, P.S. and R. B. Bury. 1988. Distribution of the voles *Arborimus longicaudus* and *Phenacomys intermedius* in the Central Oregon Cascades. Journal of Mammalogy. 69(2): 427-429

Corn, P.S. and R.B. Bury. 1991. Small mammal communities in the Oregon Coast Range. In: Ruggiero, L. F., Aubry, K. B., Carey, A. B., and Huff, M. H. 1991. Wildlife and vegetation of unmanaged Douglas-fir forests. Gen. Tech. Rep. PNW-GTR-285. Portland, Oregon: U.S. Department of Agriculture, Forest Service. Pacific Northwest Research Station. 533 p.

Crisafulli, C. M. [n.d.] Personal communication.

Crumpton, P. 1999. Personal communication.

Dahlberg and Stenlid. 1990. Population structure and dynamics in *Suillus bovinus* as indicated by spatial distribution of fungal clones. New Phytologist 115:487-493.

deMaynadier, P. G. and M. L. Hunter, Jr. 1995. The relationship between forest management and amphibian ecology: A review of the North American literature. Environmental Reviews 3: 230-261.

Diller, L.V. and R.L. Wallace. 1994. Distribution and habitat of *Plethodon elongatus* on managed, young growth forests in north coastal California. Journal of Herpetology 28: 310-318.

Duncan, N. 1999. Personal communication, Bureau of Land Management, Roseburg District, Roseburg, Oregon.

Dunham, S., T. O'Dell and R. Molina. 1999. Genetic variation and habitat associations in an ectomycorrhizal fungus. Meeting abstract. Ecological Society of America Annual Meeting. Spokane, Washington.

Egli, S., F. Ayer and F. Chatelin. 1990. Der Einfluss des Pilzsammelns auf die Pilzflora. [The influence of mushroom picking on the fungal flora.] Mycologica Helvetica 3:417-428.

Feder, M. E. 1983. Integrating the ecology and physiology of Plethodontid salamanders. Herpetologica 39(3): 291-310.

Forsman, E.D., E.C. Meslow and H.M. Wight. 1984. Distribution and biology of the spotted owl in Oregon. Wildl. Monogr. 87. Washington, DC: The Wildlife Society. 64 p.

Franklin, A.B., K.P. Burnham, G.C. White [and others]. 1999. Range-wide status and trends in northern spotted owl populations. U.S. Geologic Survey - Biological Resources Division, Colorado Cooperative Fish and Wildlife Research Unit, Fort Collins, Colorado, and Oregon Cooperative Fish and Wildlife Research Unit, Corvallis, Oregon. 71 pp.

Frest, T.J. and E.J. Johannes. 1997. Upper Sacramento system freshwater mollusk monitoring, California. 1996 Final Report by Deixis Consultants to Cantara Trustee Council, iii + 95 p. with Appendices.

Frest, T.J. and E.J. Johannes. 1995. Freshwater mollusks of the Upper Sacramento system, California, with particular reference to the Cantara Spill. 1995 Final Report to California Department of Fish and Game. Deixis Consultants, Seattle, Washington. iii + 88 p., appendices.

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

Frest, T.J. and E.J. Johannes. 1993. Mollusc species of special concern within the range of the Northern Spotted Owl. Final Report to Forest Ecosystem Management Working Group, U.S. Department of Agriculture Forest Service. Deixis Consultants, Seattle, Washington. 98 p.

Frewing-Runyon, L. A. 1999. Environmental justice screening in NEPA analysis for Oregon, Washington, and Northern California. U.S. Department of Interior, Bureau of Land Management, Oregon/Washington State Office. Portland, Oregon. 17pp. BLM/OR/WA/PL-99/021+1792

Gerson, U. 1982. Bryophytes and invertebrates. In. A.J.E. Smith ed., Bryophyte ecology. Chapman and Hall, London. 291-332.

Gillesberg, A. and A.B. Carey. 1991. Arboreal nests of *Phenacomys longicaudus* in Oregon. Journal of Mammalogy. 72:784-787.

Gomez, D.M. 1992. Small mammal and herptafauna abundance in riparian and upslope areas of five forest conditions. M.S. Thesis. Oregon State University, Corvallis, Oregon. 118 pp.

Goward, T., B. McCune and D. Meidinger. 1994. The lichens of British Columbia. Illustrated keys. Part 1: Foliose and Squamulose Species. Ministry of Forests Research Program, Victoria, BC. 181 p.

Harpel, J. 1999. Personal communication. Gifford Pinchot National Forest, Vancouver, Washington.

Hawksworth, D.L. and D.J. Hill. 1984. The lichen-forming fungi. Blackie, Glasgow and London.

Hawksworth, D.L. 1999. The fungal dimension of biodiversity: magnitude, significance, and conservation. Mycological Research 95:641-655.

Hayes, J. [n.d.] Personal communication. Oregon State University, College of Forestry. Corvallis, Oregon.

Hayward, G.D. and J.V. Verner. 1994. Flammulated, Boreal, and Great Gray Owls in the United States: A Technical Conservation Assessment. USDA Forest Service General Technical Report RM-253. 213 pp.

Henderson, J.A., D.H. Peter, R.D. Lesher and D.C. Shaw. 1988. Forested plant associations of the Olympic National Forest. R6-ECOL-TP-001-88. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Portland, Oregon.

Herrington, R.E. and J.H. Larsen, Jr. 1985. The current status, habitat requirements and management of the Larch Mountain salamander. Biological Conservation 34: 169-179.

Herrington, R.E. 1988. Talus use by amphibians and reptiles in the Pacific Northwest. In: R.C. Szaro, K.E. Severson, and D. R. Patton (eds). Management of Amphibians, Reptiles and Small Mammals in North America. Gen. Tech. Rep. RM-166. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Fort Collins, Colorado. pp. 216-221.

Highton, R. and A. Larson. 1979. The genetic relationships of the salamanders of the genus Plethodon. Systematic Zoology 28:579-599.

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

Hildebrand, D. 1995. *Arceuthobium tsugense*, hemlock dwarf mistletoe. Unpublished Report. U.S. Department of Agriculture, Forest Service, Regional Office, Portland, Oregon.

Hong, W.S. 1992. *Plagiochila* in western North America. The Bryologist 95:142-147.

Houck, L.D. 1977. Life history patterns and reproductive biology of neotropical salamanders. In: Taylor, D.H. and S. I. Guttman, eds. The reproductive biology of amphibians. Plenum, New York: 43-71.

Huff, M., J. Henshaw and E. Laws. 1996. Great gray owl survey status and evaluation of guidelines for the Northwest Forest Plan. 47 pp.

Huff, M., R. Holthausen and K. Aubry. 1992. Habitat management for red tree voles in Douglas-fir forests. U.S. Department of Agriculture, Forest Service. PNW Research Station. General Technical Report PNW-GTR-302. Portland, Oregon. 16 p.

Johnson, M.L. and S.B. George. 1991. Species limits within the *Arborimus longicaudus* species-complex (Mammalia: Rodentia) with a description of a new species from California. In: Contributions in Science. Number 429. Natural History Museum of Los Angeles County, Los Angeles, California. pp. 1-16.

Johnson, K.N., S. Crim, K. Barber, M. Howell and C. Cadwell. 1993. Sustainable harvest levels and short-term timber sales for options considered in the Report of the Forest Ecosystem Management Assessment Team: methods, results, and interpretations. On file with: Regional Ecosystem Office, Portland, Oregon. 102 p.

Jones, L., M. Raphael and P. Bisson. [n.d.] Unpublished. (Van Dyke's salamander data from riparian management study in the Olympic Peninsula).

Lattin, J.D. [n.d.]. Personal communication.

Lattin, J.D. and A.R. Moldenke. 1992. Ecologically sensitive invertebrate taxa of Pacific Northwest old-growth conifer forests. Report to the Northern Spotted Owl Recovery Team on the Other Species and Ecosystems Committee. Portland, Oregon: U.S. Department of the Interior. 42 p. + figures.

Lawton, E. 1971. Moss flora of the Pacific Northwest. Hattori Botanical Laboratory, Nichinan, Japan. 362 p.

Leigh, E.G., Jr. 1981. The average lifetime of a population in a varying environment. Journal of Theoretical Biology 90: 213-278.

Lewendal, P. 1995. Habitat-use by the Shasta salamander *Hydromantes shastae*. Report to: California Department of Fish and Game, Redding, California. 32 p.

Lewendal, P. 1999. Pers. comm. (Observations from Shasta salamander surveys)

Maser, C., B.R. Mate, J.F. Franklin, and C.T. Dyrness. 1981. Natural history of Oregon Coast mammals. USDA Forest Service Gen. Tech. Rep. PNW-133. Portland, Oregon. 496 pp.

Maser, C. 1998. Mammals of the Pacific Northwest: From the coast to the high Cascades. Oregon State University Press, Corvallis, Oregon. 406 pp.

McCammon, B. 1999. Personal communication. Regional Hydrologist, Pacific Northwest Region, U.S. Department of Agriculture, Forest Service, Portland, Oregon.

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

McCune, B. 1993. Gradients in epiphyte biomass in three Pseudotsuga-Tsuga forests of different ages in western Oregon and Washington. The Bryologist, 96(3):405-411.

McCune, B. and L. Geiser. 1997. Macrolichens of the Pacific Northwest. Oregon State University Press, Corvallis, Oregon.

McCune, B., R. Rosentreter and A. DeBolt. 1997. Biogeography of rare lichens from the coast of Oregon. pp. 234-241. In: T.N. Kaye, A. Liston, R.M. Love, D.L. Luoma, R.J. Meinke and M.V. Wilson (eds.). Conservation and management of native plants and fungi. Native Plant Society of Oregon, Corvallis, Oregon. 296 p.

Meiselman, N. and A.T. Doyle. 1996. Habitat and microhabitat use by the red tree vole, *Phenacomys longicaudus*. American Midland Naturalist.135:33-42.

Murry, M.A. 1995. Biochemical systematics of the genus *Arborimus*. M.A. Thesis, Humboldt State University, Arcata, California. 46 p. On file at: Humboldt State University Library.

Nauman, R. and D. Olson. 1999. Unpublished data on file, Corvallis Forestry Sciences Lab, Corvallis, Oregon.

Neitro, W.A., V. W. Binkley, S.P. Cline [and others]. 1985. Pp. 130-164. In: Brown, E.R., tech. ed. Management of wildlife and fish habitats in forests of western Oregon and Washington. Portland, Oregon: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. In cooperation with: U.S. Department of Interior, Bureau of Land Management.

Nelson, J., W. Gilmore and J. Roden. 1999. Survey and Manage Costs: 1994-1999. Unpublished. On file with: Regional Ecosystem Office, 333 S.W. First Ave., Portland, Oregon 97208.

Noble, W.J. 1982. The lichens of the coastal Douglas-fir dry subzone of British Columbia. Ph. D. Thesis. University of British Columbia, Vancouver. Part II reprinted and updated in 1997.

Norvell, L.L. 1995. Loving the chanterelle to death? The ten year Oregon chanterelle project. McIlvainia 12: 6-25.

Norvell, L.L. 1998. The biology and taxonomy of Pacific Northwest species of *Phaeocollybia Heim* (*Agaricales, Cortinariaceae*). Ph. D. thesis. Department of Botany, University of Washington.

Nussbaum, R.A. 1974. The distributional ecology and life history of the Siskiyou Mountain Salamander, *Plethodon stormi* in relation to the potential impact of the proposed Applegate Reservoir on this species. 32 p + Supplemental Report. Report submitted to U.S. Army Corps of Engineers, Portland Division, P.O. Box 2946, Portland, Oregon 97208.

O'Dell, T.E., J.F. Ammirati and E.G. Schreiner. In press. Ectomycorrhizal Basidiomycete Diversity and Abundance on a Moisture Gradient in the *Tsuga heterophylla* Zone. Can. J. Bot.

O'Dell, T., [n.d.] Unpublished data on file. Corvallis Forestry Sciences Lab, Corvallis, Oregon

Ollivier, L. [n.d] Unpublished data on file, Pacific Southwest Research Lab, Arcata, California.

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

Olson, D.M. 1992. The northern spotted owl conservation strategy: implications for Pacific Northwest forest invertebrates and associated ecosystem processes. Final Report to the Northern Spotted Owl EIS Team. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

Oregon Employment Department. 1999. Oregon Wage Information 1999. Salem, Oregon. 27 p.

Oregon Department of Environmental Quality. 1999. <waterquality.deq.state.or.us/wq/303dlist/303dStatistics.htm>

Papenfus, T. and P. Brouha. 1979. The status of the Shasta salamander (*Hydromantes shastae*). In: Bogener, D.J., and P. Brouha. Comprehensive species management plan: Shasta salamander, *Hydromantes shastae*. Shasta-Trinity National Forest Contract Report: 10-36.

Peterson. R. [n.d.]. Unpublished report on file, Corvallis Forestry Sciences Lab, Corvallis, Oregon.

Peterson, R.H. and K. W. Hughes. 1999. Species and speciation in fungi. Bioscience 49: 440-452.

Pike, L.H. 1972. *Tholurna dissimilis* in Oregon. Bryologist 75(4):578-580.

Pojar, J. and A. MacKinnon. 1994. Plants of the Pacific Northwest Coast. Lone Pine Publishing, Redmond, Washington. 527 p.

Purvis, O.W., B.J. Coppins, D.L. Hawksworth [and others]. 1992. The Lichen Flora of Great Britain and Ireland. Natural History Museum Publications and British Lichen Society, London, England. 710 p.

Rappaport, N. [n.d.]. Personnel communication.

Redhead, S.A., L.L. Norvell, and E. Danell. 1997. *Cantharellus formusus* and the Pacific golden chanterelle harvest in western North America. Mycotaxon 65: 285-322.

Richardson, M. J. 1970. Studies on *Russula emetica* and other agarics in a scots pine plantation. Trans. Jbrit. Mysol. Soc. 55: 217-229.

Roth, B. 1993. Critical review of terrestrial mollusks associated with late-successional and
old-growth forests in the range of the northern spotted owl. Prepared for: Forest Ecosystem Management Working Group, U.S. Department of Agriculture. Forest Service. 82 p. + illus.

Ruggiero, L.F, L.L. C. Jones, and K.B. Aubry. 1991. Plant and animal habitat associations in Douglas-fir forests of the Pacific Northwest. In: Wildlife and vegetation of unmanaged Douglas-fir forests, 1991. Gen. Tech. Rep. GTR-285. Portland, Oregon: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. pp. 447- 462.

Russell, Loren K. 1979. A new genus and a new species of Boreidae from Oregon (Mecoptera). Proc. Entomol. Soc. Wash. 81:22-31.

Schofield, W.B. 1976. Bryophytes of British Columbia III: Habitat and distributional information for selected mosses. Syesis 9:317-354.

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

Schofield, W.B. 1990. Rare and endangered bryophytes in British Columbia. Bioline 9:15-17.

Selva, S.B. 1988. The Caliciales of Northern Maine. The Bryologist 91(1):2-17.

Smith, M. L., J.N. Bruhn and J.B. Anderson. 1992. The fungus *Armillaria bilbosa* is among the largest and oldest living organisms. Nature 356: 428-431.

Soulé, M.E. 1980. Thresholds for survival: Maintaining fitness and evolutionary potential. In: Soulé, M.E. and B.A. Wilcox, eds. Conservation biology: An evolutionary-ecological perspective. Sinauer Associates, Sunderland, Massachusetts: pp. 151-170.

State of California, Employment Development Department. 1999. Annual average Industry Employment, 1983-1998. Website: <http://www.calmis.cahwnet.gov/htmlfile/county/delnorte.html>
Also following county-specific files: glenn.html, humbolt.html, lake.html, lassen.html, mendocin.html, modoc.html, shasta.html, siskiyou.html, tehama.html, and trinity.html.

Stevens, J. 1986. Applied multivariate statistics for the social sciences. Lawrence Erlbaum Associates, Hillsdale, New Jersey.

Taylor, D.W. 1981. Freshwater mollusks of California: A distributional checklist. California Fish and Game 67(3):140-163.

Thomas, J.W., M.G. Raphael, R.G. Anthony [and others]. 1993. Viability assessments and management considerations for species associated with late-successional and old-growth forests of the Pacific Northwest. The Report of the Scientific Analysis Team. Portland, Oregon: U.S. Department of Agriculture, Forest Service, National Forest System, Forest Service Research. 530 p.

Tibell, L. 1975. The Caliciales of boreal North America. Symbolae Botanicae Upsalienses XXI:2. Acta Universitatis Upsaliensis

Trappe, J.M. [n.d.] Unpublished report on file. Corvallis Forestry Sciences Lab, Corvallis Oregon.

Trappe, J. and D. Luoma. 1992. The ties that bind: fungi in ecosystems. Pages 17-27 in: Carrol, G., and Wicklow, D. eds. The fungal community - its organization and role in the ecosystem. New York, NY: Marcel Dekker.

USDA Forest Service. 1995. Forest Service Manual. Chapter 2670: Threatened, endangered, and sensitive plants and animals. [irregular pagination]. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Mt. Hood National Forest administrative report. 1996. Mt. Hood National Forest survey and manage inventory report, 1995. 93 pp.

USDA Mt. Baker-Snoqualmie National Forest Ecology Program data files. [n.d.] Mt. Baker-Snoqualmie National Forest Supervisor's Office, Mountlake Terrace, Washington.

USDA Forest Service, U.S. Department of Commerce (National Oceanic and Atmospheric Administration), U. S. Department of Interior (Bureau of Land Management, National Park Service, and U.S. Fish and Wildlife Service) and the Environmental Protection Agency. 1993. Forest ecosystem management: An

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

ecological, economic, and social assessment. Report of the Forest Ecosystem Management Assessment Team [FEMAT]. U.S. GPO 1993-793-071. Available at: Regional Ecosystem Office, Portland, Oregon.

USDA Forest Service and USDI Bureau of Land Management. 1993. Draft supplemental environmental impact statement on management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl (Northwest Forest Plan). [Portland, Oregon]: U. S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management. [irregular pagination].

USDA Forest Service and USDI Bureau of Land Management. 1994a. Final supplemental environmental impact statement on management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl (Northwest Forest Plan). [Portland, Oregon]: U. S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management. [irregular pagination].

USDA Forest Service and USDI Bureau of Land Management. 1994b. Record of decision on management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl (Northwest Forest Plan). [Portland, Oregon]: U. S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management.

USDA Forest Service and USDI Bureau of Land Management. 1996. Draft management recommendations for bryophytes. Version 1.1. Irregular pagination. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1997a. Supplement to section ii of ecosystem analysis at the watershed scale: federal guide for watershed analysis. Version 2.2.

USDA Forest Service and USDI Bureau of Land Management. 1997b. Management recommendations for survey and manage fungi. Michael A. Castellano and Thomas O'Dell. Irregular pagination. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1998a. Survey protocol for aquatic mollusk species from the northwest forest plan. Furnish, J., R. Monthey and J. Applegarth. Version 2.0. Irregular pagination. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1998b. Survey protocol for terrestrial mollusk species from the northwest forest plan. Furnish, J., R. Monthey and J. Applegarth. Version 2.0. Irregular pagination. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1998c. Management recommendations for vascular plants. Irregular pagination. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1998d. Management recommendations for survey and manage aquatic mollusks. Version 2.0. Joseph Furnish and Roger Monthey. Irregular pagination. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

USDA Forest Service and USDI Bureau of Land Management. 1998e. Management recommendations for survey and manage terrestrial aquatic mollusks. Version 2.0. Thomas E. Burke, John S. Applegate, and Ted R. Weasma. Irregular pagination. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1998f. Management recommendations for bryophytes. Judy Harpel, Nancy Fredricks, and Robin Lesher. Irregular pagination. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1998g. Survey protocols for survey and manage strategy 2 vascular plants. Whiteaker, L., J. Henderson, R. Holmes [and others]. Irregular pagination. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208. 70 p.

USDA Forest Service and USDI Bureau of Land Management. 1998h. Memorandum on implementation of the 15 percent retention standard and guideline. September 14, 1998. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1999a. Management recommendations for survey and manage lichens. Chiska Derr, Linda Geiser, and Robin Lesher. Irregular pagination. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1999b. Survey protocols for amphibians under the Survey and Manage provision of the Northwest Forest Plan. Olson, Deanna S., ed., Irregular pagination. Unpublished Report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1999c. Final report. Results of FY 1998 implementation monitoring program. 25 pp. plus appendicies. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1999d. Survey protocols for Protection Buffer bryophytes. Irregular pagination. Unpublished report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. 1999e. Results of forest data request; including estimates of new sites found since ISMS, and total acres surveyed for suitable timber lands only. Compiled Sept. 24-Oct. 1, 1999. Unpublished compilation. Unpaged. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management. in prep. Management recommendations for amphibians under the Survey and Manage provision of the Northwest Forest Plan. Olson, Deanna S., ed., Irregular pagination. Unpublished Report. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management Species Review Panel. 1999a. Step 1. Taxon information summary tables. Working tables used by effects authors for organizing and analyzing existing taxon information. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

USDA Forest Service and USDI Bureau of Land Management Species Review Panel. 1999b. Step 2. Internal working document. Unpublished compilation. Unpaged. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDA Forest Service and USDI Bureau of Land Management Species review panel. 1999c. Step 3. Internal working document. Unpublished compilation. Unpaged. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

USDI Bureau of Land Management. 1990. Memorandum No. OR-91-57. On file with: Regional Ecosystem Office, P.O. Box 3623, Portland, Oregon 97208.

U.S. Government Printing Office. United States Statutes at Large, Vol. 108. 103rd Congress, 2nd Session. P.L.103-66, Sec. 13982 and Sec. 13983, pp. 107 Stat. 681-683.

Varga, J. 1992. Analysis of the fauna of protected moss species. Conservation Biology 59:171-173.

Wake, D.B., L.R. Maxson, and G.Z. Wurst. 1978. Genetic differentiation, albumin evolution, and their biogeographical implications in plethodontid salamanders of California and southern Europe. Evolution 32: 529-539.

Washington State Employment Security. 1999. Labor force and employment in Washington state - 1999. Olympia, Washington. 139 p.

Weber, N.S. [n.d.] Unpublished report on file, Corvallis Forestry Sciences Lab and additional data.

Welsh, Hartwell H., Jr. 1990. Relictual amphibians and old-growth forests. In: Conservation Biology 4(3): 309-319.

Welsh, H.H., Jr., and A.J. Lind. 1991. The structure of the herpetofaunal assemblage in the Douglas-fir/Hardwood forests of northwestern California and southwestern Oregon. In: L. F. Ruggiero, K. B. Aubry, A. B. Carey [and others] (eds.). Wildlife and vegetation of unmanaged Douglas-fir forests. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. Gen. Tech. Rep. PNW-285. Portland, Oregon.

Welsh, H. H., Jr. and A. J. Lind. 1992. Population ecology of two relictual salamanders from the Klamath Mountains of Northwestern California. In: McCullough, D. and R. Barrett, Eds. Wildlife 2001: Populations. Elsevier Science Publishers, Ltd., London: 419-437.

Welsh, H.H., Jr. and Amy J. Lind. 1995. Habitat correlates of the Del Norte salamander, *Plethodon elongatus* (Caudata: Plethodontidae), in Northwestern California. Journal of Herpetology 29(2): 198-210.

Wilcox, B.A. 1980. Insular ecology and conservation. In: Soulé, M.E. and B.A. Wilcox, Eds. Conservation biology: An evolutionary-ecological perspective. Sinauer Associates, Sunderland, Massachusetts: 97-117.

Wilcox, B.A., and D.D. Murphy. 1985. Conservation strategy: The effects of fragmentation on extinction. American Naturalist 125: 879-887.

Williams, B. 1996a. Proposal for Survey and Manage listing change, *Clintonia andrewsiana* (Redwood Beadlily). Unpublished Report. Klamath National Forest, Yreka, California.

To Return to the Table of Contents: Click here, Type a 9, and Hit Enter.

Williams, B. 1996b. Information summary for *Scoliopus bigelovii*. Unpublished Report. Klamath National Forest, Yreka, California.

Williams, B. 1999. *Pedicularis howellii* (Howell's Lousewort): Management Recommendation summary. Unpublished Report. Klamath National Forest, Yreka, California.

Wilson, A.G., Jr., J.H. Larsen, Jr., and K.R. McAllister. 1995. Distribution of Van Dyke's salamander (*Plethodon vandykei* Van Denburgh). American Midland Naturalist 134: 388-393.

Wisdom, M. J., R.S. Holthausen, B.K. Wales, D.C. Lee, C.D. Hargis, V.A. Saab, W.J. Hann, T.D. Rich, M. . Rowland, W.J. Murphy and M.R. Eames. In Press. Source habitats for terrestrial vertebrates of focus in the Interior Columbia Basin: broad-scale trends and management implications. USDA Forest Service. Gen. Tech. Rep. PNW-GTR. Portland, Oregon.

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List of Preparers and Document Distribution

Following is a list of contributors to this draft Supplemental Environmental Impact Statement.

EIS Core Team

Robin Bown - *Wildlife Biologist.* Robin holds a B.S. in Wildlife Biology, a B.A. in Botany, and a M.S. in Wildlife Biology from the University of Montana. Her work experience includes five years in forest wildlife management with the Roseburg District of BLM and nine years experience in endangered species management with the U.S. Fish and Wildlife Service. She is currently the Branch Chief for Forest Endangered Species (Oregon Cascades) in the Oregon State Office of the U.S. Fish and Wildlife Service.

Ken Denton - *Implementation Specialist*. Ken served on the interdisciplinary teams for the Northwest Forest Plan SEIS (1994) and for the Forest Service EIS for the Northern Spotted Owl (1992). As regional silviculturist for the Forest Service in Region 6 and member of Regional Ecosystem Office Late-Successional Reserve Work Group, he has helped implement the Northwest Forest Plan since 1994. He has 29 years experience with the Forest Service and has worked on five National Forests in California, Idaho, and Oregon in silviculture and planning, and as a District Ranger. He holds a B.S. in Natural Resources from Humboldt State University.

Phil Hall - *Assistant SEIS Team Leader*. Phil holds a B.S. in Forestry and a B.S. in Conservation from North Carolina State University. He served on the interdisciplinary team for the Northwest Forest Plan SEIS (1994), and was a lead planner in developing the western Oregon resource management plans tiered to the Northwest Forest Plan.

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He has served on regional teams for the development of watershed analysis guides, and for monitoring and research. He has also served as team leader for Late-Successional Reserve assessments. He has provided national level, interagency training for the National Environmental Policy Act. Phil has a broad understanding and familiarity of BLM programs and plans, including the Northwest Forest Plan and environmental impact statements. He has 27 years of federal service. Phil has been with the BLM since 1976 and has worked on two BLM Districts and seven resource areas. He is currently the planner for the Roseburg District BLM.

Donald T. Hicks - *Assistant SEIS Team Leader*. Don holds a B.S. in Forestry and a B.S. in Natural Resources from the University of Michigan. He has also completed post graduate work in Tree Improvement and Forest Genetics at Ohio State University. He has 21 years of experience in three BLM districts in Oregon in a variety of positions, including Forester, Assistant Area Manager, Supervisory Natural Resource Specialist, Administrative Officer, and District Forester.

Kathleen Helm - *Writer-Editor.* Kathleen attended Macon Jr. College in Georgia, and Southern Oregon State College and Southwestern Oregon State College in Oregon. She has 20 years experience working for the BLM in environmental planning in the preparation of various types of analysis documents and reports. She has served as writer-editor in the Medford, Coos Bay and Lakeview BLM districts and also been on several details at the state, region, and national levels, including the Northwest Forest Plan.

Hugh Snook. *Coordinator.* Hugh earned a B.S. in Forest Management from Oregon State University in 1988, and attended Silviculture Institute in 1994. He has 17 years experience working for the Forest Service in silviculture, fire management, and environmental planning.

Specialists

John Applegarth - *Wildlife Biologist*. John holds an A.B. in Biological Sciences from Stanford University and a Ph.D. in Biology from the University of New Mexico. He is a zoologist with special interests in malacology (study of mollusks), herpetology, and quaternary biology. After doing herpetological surveys and archaeofaunal analyses for federal and state agencies in New Mexico and Oregon, he joined the wildlife staff at the Eugene BLM District. His work there focuses on mollusk and amphibian issues.

Thomas Atzet - *Ecologist*. Tom has a B.S. in Forest Science, an M.S. in Physiological Ecology, and a Ph. D. in Forest Ecology. An ecologist for 25 years, he has worked in timber sale layout and contract administration, reforestation, silviculture, and vegetation management.

Brian Biswell - *Wildlife Biologist.* Brian has a B.S. in Wildlife Biology from the University of Washington, College of Forestry Resources. Since 1985, Brian has been involved in research programs studying wildlife habitat relationships in old-growth, naturally young, and managed forests in the Pacific Northwest. His research assignments have included the ecology of spotted owl prey species (flying squirrels, woodrats, and red tree voles). Currently, he is lead biologist on the Olympic Peninsula spotted owl demographic study. Brian is also a co-principal investigator studying the effects of landscape characteristics and stand structure on the distribution and abundance of red tree voles in western Oregon.

Chris Cadwell - *Natural Resource Information Specialist*. Chris served on FEMAT in the estimation of Probable Sale Quantities. He has coordinated PSQ estimations and GIS

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analysis supporting development and implementation of the BLM resource management plans in western Oregon. He is co-author of the Implementation Guidance for the 15% standard and guideline, and has been co-lead in developing interagency vegetation standards for the Northwest Forest Plan area. Chris has 20 years experience with BLM in western Oregon and currently is employed by the BLM Oregon/ Washington State Office. He holds a B.S. in Forest Management from Humboldt State University.

Robert H. Deibel - *Fishery Biologist*. Robert has a B.S. in Natural Resources Management (Fisheries) from California Polytechnic State University and an M.S. in Natural Resources (Fisheries) from Humboldt State University. He served as National Sea Grant Congressional Fellow to the Subcommittee on Oceanography, Committee on Merchant Marine and Fisheries, U.S. House of Representatives during 1983. Previous positions included Fishery Biologist for the U.S. Fish and Wildlife Service and Federal Energy Regulatory Commission and District Fishery Biologist, Assistant Regional Fishery Program Manager for the U.S. Forest Service Region 6. His current position is the National Hydropower Instream Flow Coordinator for the Forest Service.

Nancy Duncan - *Wildlife Biologist*. Nancy has a B.S. in Biology from Purdue University. She also attended graduate school at Southern Oregon State College (now Southern Oregon University) with an emphasis in wildlife biology. She has worked as a resource area wildlife biologist for 10 years with the Roseburg BLM District, and for the past two years has also served as the interagency mollusk Taxa Team Lead. Nancy has assisted with developing Protocols and Management Recommendations for mollusks, mollusk field guides, an Intranet mollusk information site; administering several research grants to gain mollusk DNA and diet information. She has also coordinated regional field training and is helping to coordinate development of a standard database for collecting mollusk field data.

Leslie Frewing-Runyon - *Economist*. Leslie has a B.A. in Economics from Willamette University. She has worked as an economist for the BLM in the Oregon/Washington State Office for the past 10 years, contributing to numerous environmental assessments and environmental impact statements. Other interagency work has included the Interior Columbia River Basin Ecosystem Project and FEMAT.

Joseph Furnish - *Aquatic Ecologist*. Joseph earned an M.A. in Biology from Humbodlt State University and a Ph. D. in Entomology from Oregon State University. He has worked for federal agencies for 12 years and specializes in bioassessment of water quality. Joseph currently works for the Forest Service as Regional Aquatic Ecologist in Region 5 (California).

Russ Holmes - *Botanist*. Russ holds both a B.S. and M.S. in Biology from East Carolina University. He has worked as a botanist for 19 years for the BLM in Wyoming and Oregon, and currently serves as senior staff botanist for the Roseburg BLM District in Oregon.

Robin Lesher - *Ecologist*. Robin holds a B.S. and M.S. in Biology with emphasis in botany and plant ecology from Western Washington University. She is currently a Ph.D. candidate at the University of Washington in the College of Forest Resources Ecosystem Science and Conservation Program. She has worked as an ecologist in the Area Ecology Program on the Mt. Baker-Snoqualmie and Olympic National Forests since 1984. Her work there involves conducting an ecological inventory and developing vegetation classifications for these two National Forests. As a member of the Scientific Analysis Team, FEMAT, and the Species Analysis Team for the Northwest Forest Plan FSEIS, Robin was responsible for the analysis of bryophytes, lichens, and fungi. She had been a member of the bryophyte and lichen taxa team since 1994.

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Cheryl McCaffrey - *Botanist*. Cheryl holds a B.S. in Botany from the University of Massachusetts, and an M.S. in Botany from the University of Georgia. She has been the BLM Oregon/Washington State Office Botanist since 1989, and for the past five years has served as the BLM representative to the Survey and Manage Core Team. Cheryl's experience includes vegetation and wetland mapping and plant community characterization in the eastern U.S. and Alaska; management of the BLM Special Status Plant program in BLM Burns District Office and for the BLM statewide in Oregon and Washington. She was first lead for the Regional Ecosystem Office Survey and Manage Work Group, which was responsible for coordinating numerous subgroups of taxonomic specialists and data managers. In that capacity, she helped develop and review Management Recommendations and Survey Protocols for Survey and Manage species, as well as assist with Survey and Manage and Protection Buffer standards and guidelines.

Loyal A. Mehrhoff - *Plant Ecologist*. Loyal has a B.A. in Botany from the University of Montana; an M.A. in Botany from the University of North Carolina, Chapel Hill; and a Ph.D. in Botany from the University of British Columbia. He has served as a representative with the Research and Monitoring Committee. Among his previous positions were Chief of the Listing Branch for the Pacific Islands Ecoregion; Research Botanist at Bishop Museum, Hawaii; and Research Associate at the University of Washington. His 7 years of federal service includes 4 years with the U.S. Fish and Wildlife Service implementing the Northwest Forest Plan.

Judy Ellen Nelson - *Economist*. Judy has a B.A. in History and Economics and an M.A. in Natural Resource Economics from the University of New Mexico. She has 11 years experience as an economist for various offices: the Soil Conservation Service, Outer Continental Shelf Office, Nevada State Office, Office of Coal Management, and the Division of Rangeland Resources in the National BLM Office in Washington, D.C. In Oregon, she has worked as Assistant District Manager of the BLM Vale District and District Manager in the BLM Lakeview and Eugene Districts. Judy has provided implementation guidance on standards and guidelines for Survey and Manage species pertinent to the Northwest Forest Plan and also for rangeland health in eastern Oregon. She is author or co-author of six published articles on rangeland and grazing. Currently, Judy is Branch Chief of Biological Sciences for the BLM Oregon State Office in Portland, Oregon. In that position, she provides policy and technical advice on forestry, range, wildlife, wild horses, botany, and fisheries for BLM-administered lands in Oregon and Washington.

Thomas Edward O'Dell - *Mycologist*. Thomas has a B.A. and B.S. in Biology from Evergreen State College in Olympia, Washington, and a Ph.D. in Botany and Plant Pathology from Oregon State University in Corvallis, Oregon. He has 10 years experience in research and teaching specific to botany and plant pathology. In addition to presently serving as Regional Mycologist, Thomas also is the Assistant Professor of Forest Science with Oregon State University. He has been with the USFS Pacific Northwest Research Station since 1996. He is author of over 20 scholarly publications.

Cay Ogden - *Wildlife Ecologist*. Cay attended Boise State University and the University of Idaho. Cay has18 years experience as wildlife biologist in various federal land management agencies, including the Bureau of Land Management, Bureau of Indian Affairs, and the U.S. Fish and Wildlife Service. She is currently employed with the Forest Service at the Region 6 office. Cay has expertise in northern spotted owl recovery issues, the Endangered Species Act, and forest ecology.

Lisa Ollivier - *Statistician (Biology)*. Lisa has an A.A. in biology from Ventura Junior College; a B.S. in Wildlife Management from California State University (Humboldt); and is currently working toward completion of an M.S. in Natural Resources, with emphasis on Wildlife Management and Biostatistics, from California State University.

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She has 11 years experience as a wildlife biologist in amphibian and reptile biology, habitat requirements, statistical data analysis, and sampling design with the Forest Service. She is also a part-time lecturer in biostatistics at Humboldt State University.

Deanna H. Olson - *Research Ecologist*. Deanna (Dede) Olson has a B.A. in Biology from the University of California and a Ph.D. in Zoology. She is currently a research ecologist with the Pacific Northwest Research Station in Corvallis, Oregon. She also serves as lead for amphibian subgroup under the Survey and Manage species of the Northwest Forest Plan, an associate editor for the *Herpetological Review*, and the *Northwestern Naturalist*, and co-chair for the Pacific Northwest Working Group, Declining Amphibian Task Force, International Union for the Conservation of Nature, Species Survival Commission. Her professional experience includes studying the ecology and behavior of every vertebrate class in a diverse array of habitats: desert, tropical rainforest, montane lakes, and coastal streams. She has 20 years experience working in biological research. For the last 9 years, Dede has worked for the Forest Service.

Nancy G. Rappaport - *Research Entomologist*. Nancy earned a B.A. and Ph.D. in Forest Entomology at the University of California, Berkeley. Among previous positions Nancy has held are: liaison between the Forest Health Protection staff and the Environmental Protection Agency Biopesticide Division; researcher with the Chemical Ecology of Forest Insects research team in Berkeley, California; postdoctoral researcher at the Institut National de la Recherche, in Olivet, France. She has 20 years experience in pesticide bioassay and residue analysis. Currently, Nancy is studying the role of soil, litter, and coarse woody debris arthropods in forest ecosystem processes as a member of the Long-Term Soil and Site Productivity Team at Pacific Southwest Research Station's Silviculture Laboratory in Redding, California.

Roger E. Sandquist - Entomologist. Roger has a B.A. in Biology and an M.S. and Ph.D. in Entomology. He has worked for the Forest Service for 25 years, including 6 years as a pesticide specialist in Washington, D.C. and Ogden, Utah, and the past 19 years as an entomologist at the Forest Service Region 6 office in Portland, Oregon.

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Special Acknowledgments

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Terry Fairbanks and *Sue Livingston* who acted for SEIS staff members during their absence for this process; *Bonnie Hogan* for her support; and the employees of the Forest Service Region 6 Regional Office, Klamath Falls Resource Area BLM, Malheur National Forest, Roseburg BLM, and U.S. Fish and Wildlife Service Oregon State Office. Many individuals in these offices shouldered extra work in the absence of staff detailed to the SEIS Team.

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Distribution List and Document Availability on the Internet

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In addition, the Draft SEIS will be available on the internet at: <http://www.or.blm.gov/nwfpnepa.htm>

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American Indian Tribes and Nations

Big Valley Band of Pomo Indians
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Burnt Ranch Indian Association
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Colville Confederated Tribes
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Confederated Tribes of Coos Lower Umpqua, and Siuslaw Indians
Confederated Tribes of Grande Ronde Indians
Confederated Tribes of Siletz Indians of Oregon
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Confederated Tribes of Siletz Indians
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Other Organizations

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Pilchuck Chapter
Portland Chapter
Redwood Chapter
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Rogue Valley Chapter
San Juan Islands Chapter
Seattle Chapter
Siskiyou Chapter
Spokane Chapter
Umpqua Valley Chapter
Washington State Office
Back Country Horsemen of Washington
Basketweavers Project
Bike to Nature
Blue Ribbon Coalition
Blue Mountain Native Forest Alliance
Breitenbush Community
Breitenbush Hot Springs
Brownsville Pioneer Saddle Club
California Cattlemen's Association
California Coalition Alternatives to Pesticides
California For Alternatives to Toxins
California Native Plant Society
California Sport Fishing Alliance
California Trout
California Wilderness Coalition
California Women in Timber
Cascade River Runners
Cascadia Forest Alliance
Cascadia Wildlands Project
Cascadians
Central Cascades Alliance
Central Oregon Motorcycle and ATV
Central Valley WQCB
CHEC Forest Watch
Cheetwoot Wilderness Alliance
Chehalis River Council
Citizens Committee to Save
Citizens For Better Forestry
Citizens Interested in Bull Run
Clackamas River Basin Council
Coast Range Association
Columbia Basin Wildlife Association
Communities for a Great Oregon
Concerned Citizens
Concerned Friends of Ferry County
Concerned Friends of the Winema
Concilio for the Spanish Speaking
Corvallis Forest Issues Group

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Cottage Grove Historical Society
Defenders of Wildlife
Drift-A-Way Snowmobile Club
Ducks Unlimited
Earth First! Wolf Action Network
Earth Work
Ecoforestry Institute
Ecorehab
Endangered Species Coalition
Essex Junction Environmental Group
For the Sake of the Salmon
Forest Conservation Council
Forest Guardians
Forest Landowners of California
Four Runners 4-Wheel Drive Club
Friends of Clackamas River
Friends of Columbia Gorge
Friends of Del Norte County
Friends of the Greensprings
Friends of the River
Friends of the Trees
Gifford Pinchot Task Force
Grants Pass Nordic Club
Greater Ecosystem Alliance
Greenworks
Greystone
Headwaters
High Desert Trail Riders
Hood Canal Coordinating Council
Humanity
Inlands Empire Public Lands Council
IPPA
Ironwood Evergreens LLC
Izaak Walton League of America
Keep Oregon Green
Kettle Range Conservation Group
Klamath Basin Horseman Club
Klamath Basin Snowdrifters Snowmobile Club
Klamath Bow Hunters
Klamath Cattlemen
Klamath Fast Trekkers
Klamath Forest Alliance
Klamath Historical Society
Klamath Potato Growers Association
Klamath Siskiyou Wildlands Center
Klamath Yacht Club
Lake Pillsbury CRMP
League of Women Voters of Lane County
Legacy
Lincoln County Mycological Society
M.U.D.D.
Mazama Conservation Committee
McKenzie Guardians
McKenzie River Trust
McKenzie Watershed Council
Mendocino Forest Watch
Mendocino Environmental Center

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Methow Valley Citizen's Council
Mt. Adams Adopt-A-District
Mt. Mazama Mushroom Association
Mule Deer Foundation
NCAP
NCASI West Coast Regional Center
NEDC
National Association of Conservation
Native Plant Society of Oregon
  Emerald Chapter
  North Coast Chapter
Northwest Coalition for Alternatives to Pesticides
North Applegate Watershed Association
North Coast Chapter NPS
North Coast Environmental Center
North Coast Recreation Coalition
North Coast Region Water Quality
Northwest Ecosystem Alliance
Northwest Environmental Defense Council
Northwest Forestry Association
Northwest Hardwoods
Northwest Mining Association
Northwest Power Planning Council
Northwest Rafters Association
Northwest Timber Review
Nuview Evaluation and Learning
OSGA
OSPIRG
Olympic Natural Resources Center
Olympic Peninsula Forestry Province
Olympic Rivers Council
Oregon Bicycling Advisory Committee
Oregon Cattlemen's Association
Oregon Council Rock and Mineral Clubs
Oregon Coast Mycological Society
Oregon Forest Industry Council
Oregon Geology and Mineral Industries
Oregon Historical Society
Oregon Hunters Association
Oregon Independent Miners/BMOA
Oregon Lands Coalition
Oregon Mycological Society
Oregon Mycological Society Conservation Commission
Oregon Natural Desert Association
Oregon Park Associates
Oregon Natural Resource Council
Oregon Shares Conservation Coalition
Oregon Sheep Growers Association
Oregon Small Woodlands Association
Oregon Trail Coordinating Council
Oregon Trout
Oregon Water Trust
Oregon Waterfowl and Wetlands Association
Oregon Wildlife Federation
Oregon for Action
Oregon for Food and Shelter
Oregon Wetlands Joint Venture

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Pacific Biodiversity Institute
Pacific Crest Biodiversity Project Reservation Ranch
Pacific Crest Trail Association
Pacific Logging Congress
Pacific Northwest 4-Wheel Drive
Pacific Northwest Trail Association
Pacific Rivers Council
People for Puget Sound
Perpetual Forest Resources
Predator Project
Public Lands Foundation
Reed College Forest Watch
Resources Limited
River Network
Rogue Basin Association
Rogue Fly Fishers
Rogue Forest Protection Association
Rogue Institute for Ecology
Rogue Valley Council of Governments
Rogue Forest Protective Association
Rogue Institute of Economy and Ecology
Roseburg Resources
Rural Information Network
San Juan Preservation Trust
Santiam Wilderness Commission
Save Our Klamath Jobs
Sierra Club
- Legal Defense Fund
- Many Rivers Group
- New York City Chapter
- Northwest
- Oregon Chapter
- Plant Society
- Redwood Chapter
- Rogue Group

Small Business Timber Council
Smith River Advisory Council
Smith River Alliance
SOCATS
Society for Range Management
Society of American Foresters
SOLV - Stop Oregon Litter
Southeastern Oregon Advisory Council
Southern Oregon Alliance for Resources
Southern Oregon Forest Coalition
Southern Oregon Timber Industry Association
Southern Willamette Earth First!
Southwest Forest Industries
Steamboaters
Sun Studs
TELAV
T.R.E.E.S.
Takilma Watershed Committee
Tenmile Creek Association
The Alliance
The Nature Conservancy
The Trees Foundation

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The Rascadians
The Trust for Public Lands
The Wildlife Society - Oregon Chapter
The Willamette River Club
Tohoma Mountaineers
Trots
Trout Unlimited
Umpqua Valley Land Exchange Project
Umpqua Watershed
United Anglers of California
Vancouver Wildlife
WCFAC
WELC
WFPA
Waldo Wilderness Council
Washington Native Plant Society
Washington State Hi-Lakers
Washington State Snowmobile Association
Washington Trout
Washington Wilderness Coalition
Water for Life
Western Ancient Forest Campaign
Western Environmental Law
Western Forest Industries Association
Western Forestry & Conservation Association
Western Mining Council
Western Regional Representative
Western Wood Products Association
Wetlands Conservancy
Wilderness Society
Wilderness Society (Northwest Region)
Wilderness Watch (Northwest Chapter)
Willamette Valley Mushroom Society
Willits Environmental Center
Wolftree
Women in Timber
Xerces Society

Libraries, Schools, and Universities

Central Washington University
Evergreen State College in Washington
Humboldt State University
Indian Action Council Library
Klamath County Library
Klamath Union High School
Lane Community College Library
Mazama High School
Oregon High Desert Museum
Oregon Institute of Technology
Oregon State University
Oregon State University Extension Office
Oregon State University Lichen & Bryophyte Study Group
Oregon State University & Northwest Mycological
Peninsula College
Reed College

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Stillwater Ecosystem, Watershed, and Restoration Sciences, UC - Berkeley
Survival Center of University of Oregon
University of California
University of California Cooperative Extension
University of Oregon
University of Washington
Utah State University
Washington State University Cooperative Extension

Media

Ashland Daily Tidings
The Associated Press
The Chronicle
The Columbian
The Empty Bell
The Gallatin Group
The Glide Weekly
The Oregonian
KMTX-TV
News Review

Individuals

Susan Applegate
Fritz and Ginger Bachem
Elmer Bauer
Jane Beckwith
Sandra Black
Charles Boyer
Roger Brandt
Richard Brown
Lou Bubala
Don Carlton
Jim Clover
Thomas and Marie Collier
Georgia Conti
Lowell D. Corbin
Susan E. Cox
S. Delles
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APPENDICES

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Appendix A

FSEIS on Management of Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl

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APPENDIX A

Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest-Related Species Within the Range of the Northern Spotted Owl

This appendix consists of the Final SEIS for the Northwest Forest Plan (USDA, USDI 1994a). It provides the analysis for the Northwest Forest Plan and served as the basis for the Record of Decision for Amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl.

The Northwest Forest Plan FSEIS is a two-volume document. Volume 1 consists of a summary and four chapters: Chapter 1-Purpose and Need, Chapter 2-Alternatives, and Chapter 3&4-Affected Environment and Environmental Consequences. Volume 2 has 10 appendices (A-J), as follows:

A - Forest Ecosystem Management: An Ecological, Economic, and Social Assessment (Report of the Forest Ecosystem Management Assessment Team)
B - Additional Information on Standards and Guidelines
C - Letters of Direction
D - Related Direction and Activities
E - Implementation Structure
F - Response to Public Comments
G - Final Biological Opinion
H - Scientific Analysis Team (SAT) Report
I - Monitoring and Evaluation Plan
J - Technical Information, including J2 on Results of Additional Species Analysis. (J2 is separately bound.)

The Northwest Forest Plan FSEIS also has a list of the authors and a glossary.

To receive a copy of the Northwest Forest Plan FSEIS, send a request specifying whether you want the entire document or only portions (Volume 1, Volume 2, or Appendix J2). Send your request to:

Project Leader
Survey and Manage SEIS Team
P.O. Box 3623
Portland, OR 97208-3623

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Appendix B

Text of Standards and Guidelines for No-Action Alternative

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APPENDIX B

Standards and Guidelines for the No-Action Alternative

The standards and guidelines in this appendix are from the Northwest Forest Plan's Record of Decision (USDA,USDI 1994b) for:

- *Survey and Manage*
- *Manage Recreation Areas to Minimize Disturbance to Species*
- *Protect Sites From Grazing*
- *Protection Buffers*
  - *Late-Successional Reserves*
  - *Managed Late-Successional Areas*
  - *Matrix*
- *[Bats] - Provide additional protection for caves, mines, and abandoned wooden bridges and buildings that are used as roost sites for bats.*

These standards and guidelines apply to the No-Action Alternative, which represents the current situation. These five elements are the only portions of the Northwest Forest Plan addressed in this SEIS. The text is excerpted verbatim from the Northwest Forest Plan's Record of Decision, except for minor text formatting such as underlines on section titles, spelling corrections of species names as noted, and changes and corrections made to Table 3-C as described in the background section of Chapter 2 of this SEIS. The page numbers in parentheses are the pages where the standards and guidelines appear in the Northwest Forest Plan's Record of Decision.

Survey and Manage

(Northwest Forest Plan Record of Decision, page C-4)

These measures may apply within any land allocations. However, the Survey and Manage provision for each species will be directed to the range of that species and the particular habitats that it is known to occupy. The "survey and manage" standard and guideline will provide benefits to amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropods. Table C-3 at the end of this section of these standards and guidelines shows what species are covered by the survey and manage provision, and which of the following four categories is to be applied to each. The standard and guideline has four components, and priorities differ among them.

1. ***Manage known sites.*** Management of known species sites should receive the highest priority of these four categories. Efforts must be undertaken to acquire information on these known sites and to manage this information so that it is available to all project planners. An effective way to accomplish this is to compile the information in a GIS data base. Those efforts should be coordinated by the Regional Ecosystem Office, and should be completed expeditiously. As soon as the information becomes available, it should be used in the design or modification of activities. Activities that are implemented in 1994 should use this information to the greatest degree possible. Activities implemented in 1995 and later must include provisions for these known sites. In most cases, the appropriate action will be protection of relatively small sites, on the order of tens of acres. For some species, including some vascular plants, the appropriate action will include the use of

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specific management treatments such as prescribed fire. For rare and endemic fungus species, areas of 160 acres should be temporarily withdrawn from ground-disturbing activities around known sites until those sites can be thoroughly surveyed and site-specific measures prescribed. For one fungus species, Oxyporous nobilissimus, there are only six known sites and two of these do not currently have a protected status. Management areas of all useable habitat up to 600 acres are to be established around these two sites for the protection of those populations until the sites can be thoroughly surveyed and site-specific measures prescribed. The actions to protect Oxyporous must be undertaken immediately.

2. ***Survey prior to ground-disturbing activities.*** Measures to survey for species and manage newly discovered sites are to be phased-in over a somewhat longer timeframe than the measures specified for currently known sites (see above). For some species, these efforts have been ongoing through rare and sensitive species programs. Where such efforts have been ongoing, they should continue. However, protocols have not been developed for surveys for all of these species, and the expertise needed to conduct them is not readily available in some cases. Efforts to design protocols and implement surveys should be started immediately. Where surveys are completed, the information gathered from them should be used to establish managed sites for species. Within the known or suspected ranges and within the habitat types or vegetation communities associated with the species, surveys for Del Norte, Larch Mountain, Shasta, Siskiyou Mountains, and Van Dyke's salamanders, and red tree voles (and lynx, see p. C-47) must precede the design of all ground-disturbing activities that will be implemented in 1997 or later.

   Development of survey protocols for the other 71 species listed in Table C-3 must begin in 1994 and proceed as soon as possible. These surveys must be completed prior to ground- disturbing activities that will be implemented in FY 1999 or later. Work to establish habitat requirements and survey protocols may be prioritized relative to the estimated threats to the species as reflected in the SEIS. Management standards will be developed to manage habitat for the species on sites where they are located. These surveys may be conducted at a scale most appropriate to the species. For most species, this survey would start at the watershed analysis level with identification of likely species locations based on habitat. Those likely locations would then be thoroughly searched prior to implementation of activities. For other species, the identification of likely sites may be most appropriately done at the scale of individual projects. Surveys should be designed for maximum efficiency, focusing on the likely range and habitats of the target species. Multi-species surveys should be used wherever they would be most efficient. To the degree possible, surveys should be designed to minimize the number of site visits needed to acquire credible information. Survey protocols and proposed site management should be incorporated into interagency conservation strategies developed as part of ongoing planning efforts coordinated by the Regional Ecosystem Office.

3. ***Extensive surveys.*** Conduct extensive surveys for the species to find high-priority sites for species management. Specific surveys prior to ground-disturbing activities are not a requirement. Rather, the surveys will be done according to a schedule that is most efficient, and sites will be identified for protection at that time. This strategy entails some risk because some species sites may be disturbed prior to completion of surveys. It is recommended primarily for species whose characteristics make site and time-specific surveys difficult. For example, some fungi only produce fruiting bodies under specific climatic conditions, so finding their location may take several to many years. It would be most efficient to do broad surveys for these species during times of appropriate conditions rather than attempting annual, site-specific surveys. Surveys under this strategy must be underway by 1996. As with surveys described in item 2 above, surveys should be designed for efficiency and standardized protocols should be developed.

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4. ***General regional surveys.*** The objective is to survey for the species to acquire additional information and to determine necessary levels of protection. Species intended to benefit from this standard and guideline are the arthropods, the fungi species that were not classed as rare and endemic, bryophytes, and lichens. These groups of species are particularly poorly known. Many species have likely not yet been identified, and there is only general information available on the abundance and distribution of known species. The information gathered through these efforts may be useful in refining these standards and guidelines to better provide for these species as part of the adaptive management process. These surveys are expected to be both extensive and expensive, but the information from them is critical to successful implementation of ecosystem management. They will be initiated no later than F.Y. 1996 and are to be completed within ten years.

Annual status reports are to be submitted to the Regional Ecosystem Office for review beginning at the end of FY 1995. As experience is acquired with these requirements, the Agencies may propose changes to the Regional Ecosystem Office for analysis. These changes could include changing the schedule, moving a species from one survey strategy to another, or dropping this mitigation requirement for any species whose status is determined to be more secure than originally expected. The Regional Ecosystem Office will forward such proposals, along with recommendations, to the Regional Interagency Executive Committee for action as appropriate.

Manage Recreation Areas to Minimize Disturbance to Species *(Northwest Forest Plan Record of Decision, page C-6)*

This standard and guideline applies throughout all land allocations. This standard and guideline will benefit a number of fungi and lichen species whose known locations are predominantly within established recreation sites. This standard and guideline falls within the category of the survey and manage standard and guideline above, and species to be protected through this standard and guideline are among those shown in Table C-3 at the end of this section of these standards and guidelines. Additional information on the habitat requirements of these species are discussed in Appendix J of the Final SEIS.

Protect Sites From Grazing

(Northwest Forest Plan Record of Decision, page C-6)

This standard and guideline applies throughout all land allocations. This standard and guideline is designed to benefit mollusks and vascular plants. Known and newly discovered sites of these species will be protected from grazing by all practicable steps to ensure that the local populations of the species will not be impacted. Species to be protected through this standard and guideline are:

Mollusks: *Ancotrema voyanum, Monadenia fidelis klamathica, Monadenia fidelis ochromphalus, Pristiloma articum crateris, Fluminicola n. sp. 1, Fluminicola n. sp. 11, Fluminicola n. sp. 19, Fluminicola n. sp. 20, Fluminicola n. sp. 3, Fluminicola seminalis*

Vascular Plants: *Pedicularis howellii*

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Protection Buffers

(Northwest Forest Plan Record of Decision, page C-9)

Late-Successional Reserves

Late-Successional Reserves have been designated based on five elements ..... [including] Protection Buffers for specific endemic species identified by the Scientific Analysis Team (SAT)(1993). Additional areas, such as 600 acres around known sites of fungus species *Oxyporous nobilissimus*, are protected under the survey and management standards and guidelines starting on page C-4 of these standards and guidelines. Details are as follows.

Protection Buffers

(Northwest Forest Plan Record of Decision, page C-11)
Unmapped Late-Successional Reserves result from the application of Protection Buffers (see standards and guidelines below).

Standards and Guidelines for Protection Buffers

(Northwest Forest Plan Record of Decision, page C-19)

Protection Buffers are additional standards and guidelines from the Scientific Analysis Team Report for specific rare and locally endemic species and for other specific species in the upland forest matrix. The following rare and locally endemic species are likely to be assured viability if they occur within reserves. However, there might be occupied locations outside these areas that will be important to protect as well. Protocols for surveys will be developed to ensure a high likelihood of locating these occupied sites; such surveys will be conducted prior to ground-disturbing activities within the known or suspected ranges and within the habitat types or vegetation communities occupied by these species, according to the implementation schedule for Survey and Manage Components 1 and 2 on pages C-4 and C-5 of these standards and guidelines. When located, the occupied sites need to be protected as follows.

Nonvascular Plants

Ptilidium californicum (Liverwort) - This species is rare and has a very limited distribution in old white fir forests with fallen trees. It occurs on trunks of trees at about 5,000-feet elevation. Mitigation options include finding locations and maintaining stands of over-mature white fir at about 5,000-feet elevation for inoculum and dispersal along corridors; and studying specific distribution patterns. Protect known occupied locations if distribution patterns are disjunct and highly localized by deferring timber harvest and avoiding removal of fallen trees and logs.

Ulota meglospora (Moss) - This species occurs in northern California and southwest Oregon. It is best developed (locally abundant) in very old stands of tan oak, Douglas-fir, and other conifer species further north, but is generally scarce throughout its range. The species is poorly known ecologically. Mitigation activities include conducting basic ecological studies and surveying for presence, particularly in Oregon. Protect known occupied sites if distribution patterns are disjunct and highly localized. Defer timber harvest or other activities that would not maintain desired habitat characteristics and population levels.

Aleuria rhenana (Fungus) - This mushroom is widely distributed but rare and little known throughout its range, known from one collection from Mt. Rainier National Park. It is a conifer litter decomposer. Mitigation activities include conducting ecological studies and surveys to determine localities. Protect known populations if surveys continue to indicate that the population is rare. Defer ground-disturbing activities.

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Otidea leporina, O. onotica, and O. smithii (Fungi) - These mushrooms occur in conifer duff, and are widespread in distribution but uncommon. They are dependent on older-age forests. Specific mitigation options include protecting older forests from ground disturbance where the species are located.

For the plants listed above, it is recommended that Regional or state office-level ecologists or botanists should: (1) maintain a spatially explicit data base of all known sites in National Forests and BLM Districts, and (2) develop species or area management plans, to be implemented under the guidance of the regional botany programs.

Amphibians

Shasta Salamander - This species is very narrowly distributed, occurring only in localized populations on the Shasta-Trinity National Forest. Only a small part of its range is included within Habitat Conservation Areas identified by the Interagency Scientific Committee (1990) (status within Late-Successional Reserves has not been determined). It occurs in association with limestone outcrops, protected by an overstory canopy. All known and future localities must be delineated and protected from timber harvest, mining, quarry activity, and road building within the delineated site, and a buffer of at least the height of one site-potential tree or 100 feet horizontal distance, whichever is greater, should surround the outcrop. Additional surveys conducted using a standardized protocol must be undertaken to identify and delineate all occupied sites within the species' potential range.

Birds

Great Gray Owl - Within the range of the northern spotted owl, the great gray owl is most common in lodgepole pine forests adjacent to meadows. However, it is also found in other coniferous forest types. In some locations, such as on the Willamette National Forest west of the crest of the Cascade Range, at least some shelterwood harvesting seems to be beneficial for the species by opening up otherwise closed canopy cover for foraging. In doing so, consequences to species such as northern goshawk and American marten must be evaluated. Specific mitigation measures for the great gray owl, within the range of the northern spotted owl, include the following: Provide a no-harvest buffer of 300 feet around meadows and natural openings and establish 1/4-mile protection zones around known nest sites. Within one year of the signing of the Record of Decision for these standards and guidelines, develop and implement a standardized protocol for surveys; survey for nest locations using the protocol. Protect all future discovered nest sites as previously described.

Managed Late-Successional Areas

(From Northwest Forest Plan Record of Decision, page C-23, Managed Late-Successional Areas, Description)

Managed Late-Successional Areas have been designated for these standards and guidelines based on two elements.....[including] Protection Buffers for specific endemic species identified by the Scientific Analysis Team (1993). Details are as follows.

Protection Buffers - Unmapped Managed Late-Successional Areas result from the application of Protection Buffers (see standards and guidelines below).

Standards and Guidelines for Protection Buffers
(Northwest Forest Plan Record of Decision, page C-26)

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The following standards and guidelines incorporated from the Scientific Analysis Team Report will result in adding unmapped areas to Managed Late-Successional Areas that should be managed as indicated below. These standards and guidelines are to be applied wherever the species occurs outside of designated areas.

The following rare and locally endemic species are likely to be assured viability if they occur within designated areas. However, there might be occupied locations outside these areas that will be important to protect as well. Protocols for surveys will be developed that will ensure a high likelihood of locating these occupied sites, and such surveys will be conducted prior to ground-disturbing activities within the known or suspected ranges and within the habitat types or vegetation communities occupied by these species, according to the implementation schedule for Survey and Manage Components 1, 2, 3, and/or 4 on pages C-4 through 6 of these standards and guidelines. When located, the occupied sites need to be protected as follows.

Nonvascular Plants

Brotherella roellii (Moss) - This very rare species is endemic to the Washington Cascades north of Snoqualmie Pass. It occupies rotting logs in low-to-mid elevation old-growth stands having dense shade, closed canopies, and high humidity. Mitigation options include locating specific populations and protection of large decay class 3, 4, and 5 logs and canopy closure greater than 70 percent. Defer management activities that conflict with maintaining suitable habitat characteristics and known populations levels. The implementation schedule for this species is the same as for survey and manage components 1 and 3.

Buxbaumia piperi, B. viridis, Rhizomnium nudum, Schistostega pennata, and Tetraphis geniculata (Mosses) [Note: Buxbaumia piperi was removed from Protection Buffer species status in July 1996 to correct an error in the Northwest Forest Plan's Record of Decision.] - Most of these species are fairly rare (the exception is B. piperi). They occur on rotten logs and some organic soil, and are shade dependent, occurring in old-growth forests. S. pennata occurs only in mature western red cedar forests in the Olympic National Forest and in the Washington Cascades. Mitigation activities include surveying to determine presence and distribution; and, where located, maintaining decay class 3, 4, and 5 logs and greater than 70 percent closed-canopy forest habitats for shade. Shelterwood and thinning prescriptions for timber harvest will cause their demise, as logs dry out. The implementation schedule for this species is the same as for survey and manage components 1 and 3.

Polyozellus multiplex (Fungus) - Ecologically, this mushroom was considered in the same species group as Albatrellus caeryliopus and others, listed earlier in the SAT Report under species aided by marbled murrelet mitigation measures. However, P. multiplex occurs in higher elevations of the Cascades in silver fir and mixed conifer (and is thus outside the range of marbled murrelet mitigations). It can be locally abundant and is a mycorrhizal species important to forest health. Like its group associates, it is a good indicator of old-growth forests. Mitigation activities for this species include conducting surveys to define its distribution, and studies to assess its habitat requirements. The implementation schedule for this species is the same as for survey and manage components 1 and 3.

Sarcosoma mexicana (Fungus) - This mushroom occurs in deep conifer litter layers in older forests. It is uncommon to rare and is found in the Oregon and Washington Coast Range into British Columbia. Mitigation activities include surveying for locations and protecting deep litter layers of older forests where found. Defer prescribed burning of understory or other activities which would not retain a deep litter layer. The implementation schedule for this species is the same as for survey and manage component 3.

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For the plants listed above, it is recommended that regional and state ecologists or botanists should: (1) maintain a spatially explicit data base of all known sites in National Forests and BLM Districts, and (2) develop species or area management plans, to be implemented under the guidance of the regional botany programs.

Amphibians

Larch Mountain Salamander - Because of the narrow distribution of this species, mostly within the Columbia River Gorge, primary emphasis should be to survey and protect all known sites. Sites must be identified based on fall surveys conducted using a standardized protocol. Known sites are included within boundaries of conservation areas and under these guidelines, are not to be disturbed. Surveys are needed at additional sites in the forest matrix along the Columbia River Gorge. Key habitat is mossy talus protected by overstory canopy. Avoiding any ground-disturbing activity that would disrupt the talus layer where this species occurs is the primary means of protection. Once sites are identified, maintain 40 percent canopy closure of trees within the site and within a buffer of at least the height of one site-potential tree or 100 feet horizontal distance, whichever is greater, surrounding the site. Larger buffer widths are appropriate upslope from protected sites on steep slopes. Partial harvest may be possible if canopy closure can be retained; in such cases logging must be conducted using helicopters or high-lead cable systems to avoid disturbance of the talus layer. The implementation schedule for this species is the same as for survey and manage components 1 and 2.

Siskiyou Mountain Salamander - This species occurs within an extremely narrow range on the Rogue River, Siskiyou, and Klamath National Forests. Its range does not fall within any of the Habitat Conservation Areas identified by the Interagency Scientific Committee in Oregon. Additional surveys conducted using a standardized protocol must be undertaken to delineate range and identify subpopulations. All populations must be protected by delineating an occupied site and avoiding disturbance of talus throughout the site, especially on moist, north-facing slopes, particularly in Oregon where Habitat Conservation Areas do not incorporate species' range. Because this species seems to require cool, moist conditions, a buffer of at least the height of one site-potential tree or 100 feet horizontal distance, whichever is greater, surrounding the site, must be retained around the outer periphery of known sites. Overstory trees must not be removed within the boundary of this buffer. The implementation schedule for this species is the same as for survey and manage components 1 and 2.

Del Norte Salamander - This species occurs in talus slopes protected by overstory canopy that maintains cool, moist conditions on the ground. The species is a slope-valley inhabitant, and sometimes occurs in high numbers near riparian areas. Riparian Reserves, in combination with Late-Successional Reserves and other reserves, will offer some protection to the species but significant numbers also occur in upland areas. Additional mitigation options in this upland matrix include identifying locations (talus areas inhabited by the species) by using a standardized survey protocol, then protecting the location from ground-disturbing activities. Designate a buffer of at least the height of one site-potential tree or 100-feet horizontal distance, whichever is greater, surrounding the location. Within the site and its surrounding buffer, maintain 40 percent canopy closure and avoid any activities that would directly disrupt the surface talus layer. Partial harvest within the buffer may be possible if 40 percent canopy closure can be maintained; in such cases, tree harvest must be conducted using helicopters or high-lead cable systems to avoid compaction or other disturbance of talus. The implementation schedule for this species is the same as for survey and manage components 1 and 2.

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Matrix

(Northwest Forest Plan Record of Decision, page C-45)

Protection Buffers

These standards and guidelines incorporated from the Scientific Analysis Team Report will result in protection for specific species. The following rare and locally endemic species are likely to be assured viability if they occur within designated areas. However, where these species occur in the matrix, the following standards and guidelines will be applied. For the birds listed below, activities that are implemented in 1994 should use this information to the greatest degree possible. Activities implemented in 1995 and later must include these provisions. For the Lynx, implementation should follow the schedule described for survey and manage component 3 (June 11, 1996 change; see page 2-8 in Chapter 2 of this SEIS.)

Birds

White-headed Woodpecker, Black-backed Woodpecker, Pygmy Nuthatch, and Flammulated Owl: These species will not be sufficiently aided by application of mitigation measures for riparian habitat protection or for marbled murrelets alone. They all occur on the periphery of the range of the northern spotted owl on the east slope of the Cascade Range in Washington or Oregon. Additionally, the white-headed woodpecker and flammulated owl occur in the Klamath Province in northwestern California and southwestern Oregon. The viability of all four species within the range of the northern spotted owl was rated as a medium risk on National Forests, although they each are much more widely distributed elsewhere.

Apply the following mitigation standards and guidelines to ensure that the distribution and numbers of all four species do not severely decline on National Forests and BLM Districts within the range of the northern spotted owl. These guidelines apply to the forest matrix outside designated habitat for the northern spotted owl and Riparian Reserves. Maintain adequate numbers of large snags and green-tree replacements for future snags within the four species' ranges in appropriate forest types. Where feasible, green-tree replacements for future snags can be left in groups to reduce blowdown. Specifically, the Scientific Analysis Team recommends that no snags over 20 inches dbh be marked for cutting. The Scientific Analysis Team recognizes, however, that safety considerations may prevent always retaining all snags. Use of standardized definitions of hazard trees is required. For the longer term, provide for sufficient numbers of green trees to provide for the full (100 percent) population potential of each species.

As depicted by Neitro in Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington (1985), the 100 percent population potential for white-headed woodpeckers is 0.60 conifer snags (ponderosa pine or Douglas-fir) per acre in forest habitats; these snags must be at least 15 inches dbh (or largest available if 15 inch dbh snags are not available) and in soft decay stages, and must be provided in stands of ponderosa pine and mixed pine/Douglas-fir. The 100 percent population potential for black-backed woodpeckers is 0.12 conifer snags per acre in forest habitats; these snags must be at least 17 inches dbh (or largest available if 17-inch dbh snags are not available) and in hard decay stages, and must be provided in stands of mixed conifer and lodgepole pine in higher elevations of the Cascade Range. Provision of snags for other cavity-nesting species, including primary cavity-nesters, must be added to the requirements for these two woodpecker species. Site-specific analysis, and application of a snag recruitment model (specifically, the Forest Service's Snag Recruitment Simulator) taking into account tree species, diameters, falling rates, and decay rates, will be required to determine appropriate tree and snag species mixes and densities. If snag requirements cannot be met, then harvest must not take place.

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As identified by the expert panel, black-backed woodpeckers also require beetle-infested trees for foraging; some such trees should be provided in appropriate habitat, and sanitation harvest of all such trees would be detrimental to the species. More information is needed on habitat use, seasonal occurrence, and use of forest age classes and burns, for the black-backed woodpecker.

Pygmy nuthatches use habitat very similar to those of white-headed woodpeckers. Pygmy nuthatches require large trees, typically ponderosa pine within the range of the northern spotted owl, for roosting. Provision of snags for white-headed woodpeckers is assumed to provide for the needs of pygmy nuthatch, as no species-specific guidelines for the species have been developed. Additional information on ecology of pygmy nuthatch within the range of the northern spotted owl is needed to develop more precise standards and guidelines.

Flammulated owls are secondary cavity-nesters and use cavities in snags and live trees that are created by woodpeckers or, less often, that occur naturally. It is assumed that standards and guidelines for snags and green-tree replacements for woodpeckers and other primary cavity-nesting species, as provided by existing National Forest and BLM District Land and Resource Management Plans and for the woodpeckers in this species group, would provide for flammulated owls.

Note: The snag recommendations above are based on the model presented by Neitro and others (1985). In that model, snag requirements for individual species were treated as additive in developing snag requirements for the overall community of cavity excavators. As noted above, "provision of snags for other cavity-nesting species, including primary cavity nesters, must be added to the requirements for these two woodpecker species" (black-backed and white headed woodpeckers).

Snag requirements are developed by the National Forests and BLM Districts for specific forest cover types, and these may be further broken down by geographic location. The intent is to tailor the requirements to those species that are actually expected to occur in an area. To determine if the protection buffer requirements should be added to existing Forest or BLM District Plan requirements, the basis for those existing requirements should be analyzed to determine if they include the species identified by SAT at the specified level of percent population potential. If they do not, then the SAT requirements must be added to the existing Forest and BLM District Plan requirements.

Mammals

Lynx - Lynx are rare within the range of the northern spotted owl, occurring primarily in the Okanogan area of Washington. The lynx is currently listed by the Fish and Wildlife Service as a Category 2 candidate (a species for which additional information is needed to propose listing as threatened or endangered). A petition was filed to list the lynx as endangered within the northern Cascades of Washington, based on small population size, population isolation, and lack of adequate prey base (snowshoe hare). However, the Fish and Wildlife Service ruled that available information does not warrant listing the lynx in Washington.

Three primary habitat components for lynx are (1) foraging habitat (15 to 35 year old lodgepole pine) to support snowshoe hare and provide hunting cover, (2) denning sites (patches of greater than 200-year old spruce and fir, generally less than 5 acres), and (3) dispersal/travel cover (variable in vegetation composition and structure). The major limiting factor is abundance of snowshoe hare, which in turn is limited by availability of winter habitat (primarily early-successional lodgepole pine with trees at least 6 feet tall). Past excessive trapping of lynx and incidental mortality of lynx from hunting of other species have depressed populations and may have been detrimental to local lynx

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populations in Washington. Roads provide access to hunters and trappers and thus road density may be related to lynx mortality.

The reserves and other designated areas in these standards and guidelines will provide denning habitat within protected forest stands in juxtaposition with early-successional vegetation in the forest matrix. Connectivity between many of the denning patches will be provided by the network of buffers along streams under the Riparian Reserves.

In addition, the Scientific Analysis Team proposed development of site-specific timber harvest, roading, and fire management plans in known lynx range. These plans should be developed in consultation with state wildlife agencies and should address: (1) minimizing road construction, closing unused roads, and maintaining roads to the minimum standard possible; (2) using prescribed fire to maintain forage for snowshoe hare in juxtaposition with hunting cover; (3) designating areas as closed to kill trapping of any furbearer to avoid incidental lynx mortality to maintain population refugia for lynx in key areas; (4) planning for kill trapping closure on a wider basis if data indicate a declining lynx population as a result of incidental trapping mortality; and (5) developing and implementing a credible survey and monitoring strategy to determine the distribution of lynx throughout its potential range.

[Bats]- Provide Additional Protection for Caves, Mines, and Abandoned Wooden Bridges and Buildings That are Used as Roost Sites for Bats

This standard and guideline appears in both the matrix and Adaptive Management Area land allocation sections (pages C-43 and D-10 , respectively) of the Northwest Forest Plan Record of Decision.

Most bat species occurring in the Pacific Northwest roost and hibernate in crevices in protected sites. Suitable roost sites and hibernacula, however, fall within a narrow range of temperature and moisture conditions. Sites commonly used by bats include caves, mines, snags and decadent trees, wooden bridges, and old buildings. Additional provisions for the retention of large snags and decadent trees are included in the standard and guideline for green tree patches in the matrix. Caves, mines, and abandoned wooden bridges and buildings, however, are extremely important roost and hibernation sites, and require additional protection to ensure that their value as habitat is maintained.

This provision is intended to apply in matrix forests and Adaptive Management Areas, and elements such as protection of known occupied caves should be considered for other land allocations. Conduct surveys of crevices in caves, mines, and abandoned wooden bridges and buildings for the presence of roosting bats, including fringed myotis, silver-haired bats, long-eared myotis, long legged myotis, and pallid bats. For the purposes of this standard and guideline, caves are defined as in the Federal Cave Resources Protection Act of 1988 as "any naturally occurring void, cavity, recess, or system of interconnected passages which occur beneath the surface of the earth or within a cliff or ledge (. . . but not including any . . . man-made excavation) and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or man-made." Searches should be conducted during the day in the summer (to locate day roosts and maternity colonies), at night during the late summer and fall (to locate night roosts, which are important for reproduction), and during the day in the winter (to locate hibernacula). If bats are found, identify the species using the site and determine for what purpose it is being used by bats. As an interim measure, timber harvest is prohibited within 250 feet of sites containing bats. Management standards and guidelines that may be included as mitigation measures in project or activity plans will be developed for the site. These standards will be developed following an

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inventory and mapping of resources. The purpose of the standards and guidelines will be protection of the site from destruction, vandalism, disturbance from road construction or blasting, or any other activity that could change cave or mine temperatures or drainage patterns. The size of the buffer, and types of activities allowed within the buffer, may be modified through the standards developed for the specific site. Retention of abandoned bridges or buildings must be made contingent on safety concerns.

Townsend's big-eared bats are of concern to state wildlife agencies in both Washington and Oregon. These bats are strongly associated with caves, and are extremely sensitive to disturbance, especially from recreational cavers. When Townsend's big-eared bats are found occupying caves or mines on federal land, the appropriate agency should be notified, and management prescriptions for that site should include special consideration for potential impacts on this species.

Table C-3 on the following pages is from the Northwest Forest Plan's Record of Decision, pages C-49 through C-61 as noted on the first page of this appendix.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
FUNGI				
Mycorrhizal Fungi				
Boletes				
Gastroboletus subalpinus	x		x	
Gastroboletus turbinatus			x	
Boletes, low elevation				
Boletus piperatus			x	
Tylopilus pseudoscaber	x		x	
Rare Boletes				
Boletus haematinus	x		x	
Boletus pulcherrimus	x		x	
Gastroboletus imbellus	x		x	
Gastroboletus ruber	x		x	
False Truffles				
Nivatogastrium nubigenum	x		x	
Rhizopogon abietis			x	
Rhizopogon atroviolaceus			x	
Rhizopogon truncatus			x	
Thaxterogaster pingue			x	
Uncommon False Truffle				
Macowanites chlorinosmus	x		x	
Rare False Truffles				
Alpova alexsmithii	x		x	
Alpova olivaceotinctus	x		x	
Arcangeliella crassa	x		x	
Arcangeliella lactarioides	x		x	
Destuntzia fusca	x		x	
Destuntzia rubra	x		x	
Gautieria magnicellaris	x		x	
Gautieria otthii	x		x	
Leucogaster citrinus	x		x	
Leucogaster microsporus	x		x	
Macowanites lymanensis	x		x	
Macowanites mollis	x		x	
Martellia fragrans	x		x	
Martellia idahoensis	x		x	
Martellia monticola	x		x	

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Rare False Truffles (continued)				
Octavianina macrospora	x		x	
Octavianina papyracea	x		x	
Rhizopogon brunneiniger	x		x	
Rhizopogon evadens var. *subalpinus*	x		x	
Rhizopogon exiguus	x		x	
Rhizopogon flavofibrillosus	x		x	
Rhizopogon inquinatus	x		x	
Sedecula pulvinata	x		x	
Undescribed Taxa, Rare Truffles & False Truffles				
Alpova sp. nov. #Trappe 9730	x		x	
Alpova sp. nov. #Trappe 1966	x		x	
Arcangeliella sp. nov. #Trappe 12382	x		x	
Arcangeliella sp. nov. #Trappe 12359	x		x	
Chamonixia pacifica sp. nov. #Trappe 12768	x		x	
Elasomyces sp. nov. #Trappe 1038	x		x	
Gastroboletus sp. nov. #Trappe 2897	x		x	
Gastroboletus sp. nov. #Trappe 7515	x		x	
Gastrosuillus sp. nov. #Trappe 7516	x		x	
Gastrosuillus sp. nov. #Trappe 9608	x		x	
Gymnomyces sp. nov. #Trappe 4703, 5576	x		x	
Gymnomyces sp. nov. #Trappe 5052	x		x	
Gymnomyces sp. nov. #Trappe 1690,1706,1710	x		x	
Gymnomyces sp. nov. #Trappe 7545	x		x	
Hydnotrya sp. nov. #Trappe 787, 792	x		x	
Hydnotrya subnix sp. nov. #Trappe 1861	x		x	
Martellia sp. nov. #Trappe 649	x		x	
Martellia sp. nov. #Trappe 1700	x		x	
Martellia sp. nov. #Trappe 311	x		x	
Martellia sp. nov. #Trappe 5903	x		x	
Octavianina sp. nov. #Trappe 7502	x		x	
Rhizopogon sp. nov. #Trappe 9432	x		x	
Rhizopogon sp. nov. #Trappe 1692	x		x	
Rhizopogon sp. nov. #Trappe 1698	x		x	
Thaxterogaster sp. nov. #Trappe 4867,6242,7427,7962,8520	x		x	
Tuber sp. nov. #Trappe 2302	x		x	
Tuber sp. nov. #Trappe 12493	x		x	
Rare Truffles				
Balsamia nigra	x		x	
Choiromyces alveolatus	x		x	
Choiromyces venosus	x		x	

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Rare Truffles (continued)				
Elaphomyces anthracinus	x		x	
Elaphomyces subviscidus	x		x	
Chanterelles				
Cantharellus cibarius			x	x
Cantharellus subalbidus			x	x
Cantharellus tubaeformis			x	x
Chanterelles - Gomphus				
Gomphus bonarii			x	
Gomphus clavatus			x	
Gomphus floccosus			x	
Gomphus kauffmanii			x	
Rare Chanterelle				
Cantharellus formosus	x		x	
Polyozellus multiplex	x		x	
Uncommon Coral Fungi				
Ramaria abietina			x	
Ramaria araiospora	x		x	
Ramaria botryis var. *aurantiiramosa*	x		x	
Ramaria concolor f. tsugina			x	
Ramaria coulterae			x	
Ramaria fasciculata var. *sparsiramosa*	x		x	
Ramaria gelatiniaurantia	x		x	
Ramaria largentii	x		x	
Ramaria rubella var. *blanda*	x		x	
Ramaria rubrievanescens	x		x	
Ramaria rubripermanens	x		x	
Ramaria suecica			x	
Ramaria thiersii	x		x	
Rare Coral Fungi				
Ramaria amyloidea	x		x	
Ramaria aurantiisiccescens	x		x	
Ramaria celerivirescens	x		x	
Ramaria claviramulata	x		x	
Ramaria concolor f. marri	x		x	
Ramaria cyaneigranosa	x		x	
Ramaria hilaris var. *olympiana*	x		x	
Ramaria lorithamnus	x		x	

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Rare Coral Fungi (continued)				
Ramaria maculatipes	x		x	
Ramaria rainierensis	x		x	
Ramaria rubribrunnescens	x		x	
Ramaria stuntzii	x		x	
Ramaria verlotensis	x		x	
Ramaria gracilis	x		x	
Ramaria spinulosa	x		x	
Phaeocollybia				
Phaeocollybia attenuata			x	
Phaeocollybia californica	x		x	
Phaeocollybia carmanahensis	x		x	
Phaeocollybia dissiliens	x		x	
Phaeocollybia fallax			x	
Phaeocollybia gregaria	x		x	
Phaeocollybia kauffmanii	x		x	
Phaeocollybia olivacea			x	
Phaeocollybia oregonensis	x		x	
Phaeocollybia piceae	x		x	
Phaeocollybia pseudofestiva			x	
Phaeocollybia scatesiae	x		x	
Phaeocollybia sipei	x		x	
Phaeocollybia spadicea			x	
Uncommon Gilled Mushrooms				
Catathelasma ventricosa			x	
Cortinarius azureus			x	
Cortinarius boulderensis	x		x	
Cortinarius cyanites			x	
Cortinarius magnivelatus	x		x	
Cortinarius olympianus	x		x	
Cortinarius spilomius			x	
Cortinarius tabularis			x	
Cortinarius valgus			x	
Dermocybe humboldtensis	x		x	
Hebeloma olympiana	x		x	
Hygrophorus caeruleus	x		x	
Hygrophorus karstenii			x	
Hygrophorus vernalis	x		x	
Russula mustelina			x	

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Rare-Gilled Mushrooms				
Chroogomphus loculatus	x		x	
Cortinarius canabarba	x		x	
Cortinarius rainierensis	x		x	
Cortinarius variipes	x		x	
Cortinarius verrucisporus	x		x	
Cortinarius wiebeae	x		x	
Tricholoma venenatum	x		x	
Uncommon Ecto-Polypores				
Albatrellus ellisii			x	
Albatrellus flettii			x	
Rare Ecto-Polypores				
Albatrellus avellaneus	x		x	
Albatrellus caeruleoporus	x		x	
Tooth Fungi				
Hydnum repandum			x	
Hydnum umbilicatum			x	
Phellodon atratum			x	
Sarcodon fuscoindicum			x	
Sarcodon imbricatus			x	
Rare Zygomycetes				
Endogone acrogena	x		x	
Endogone oregonensis	x		x	
Glomus radiatum	x		x	
Saprobes (Decomposers)				
Uncommon Gilled Mushrooms				
Baeospora myriadophylla			x	
Chrysomphalina grossula			x	
Collybia bakerensis	x		x	
Fayodia gracilipes (rainierensis)			x	
Gymnopilus puntifolius	x		x	
Marasmius applanatipes	x		x	
Mycena hudsoniana	x		x	
Mycena lilacifolia			x	
Mycena marginella			x	
Mycena monticola	x		x	
Mycena overholtsii	x		x	

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Uncommon Gilled Mushrooms (continued)				
Mycena quinaultensis	x		x	
Mycena tenax			x	
Mythicomyces corneipes			x	
Neolentinus kauffmanii	x		x	
Pholiota albivelata	x		x	
Stagnicola perplexa			x	
Rare Gilled Mushrooms				
Clitocybe subditopoda	x		x	
Clitocybe senilis	x		x	
Neolentinus adherens	x		x	
Rhodocybe nitida	x		x	
Rhodocybe speciosa	x		x	
Tricholomopsis fulvescens	x		x	
Noble Polypore (rare and endangered)				
Oxyporus nobilissimus	x	x	x	
Bondarzewia Polypore				
Bondarzewia montana	x	x	x	
Rare Resupinates and Polypores				
Aleurodiscus farlowii	x		x	
Dichostereum granulosum	x		x	
Uncommon Cup Fungi [Additional header added; not in original ROD]				
Cudonia monticola			x	
Gyromitra californica			x	x
Gyromitra esculenta			x	x
Gyromitra infula			x	x
Gyromitra melaleucoides			x	x
Gyromitra montana (syn. *G. gigas*)			x	x
Otidea leporina			x	
Otidea onotica			x	
Otidea smithii	x		x	
Plectania melastoma			x	
Podostroma alutaceum			x	
Sarcosoma mexicana			x	
Sarcosphaera eximia			x	
Spathularia flavida			x	
Rare Cup Fungi				
Aleuria rhenana ["x's" not in original ROD]	x		x	
Bryoglossum gracile ["x's" not in original ROD]	x		x	

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Rare Cup Fungi (continued)				
Gelatinodiscus flavidus ["x's" not in original ROD]	x		x	
Helvella compressa	x		x	
Helvella crassitunicata	x		x	
Helvella elastica	x		x	
Helvella maculata	x		x	
Neournula pouchetii	x		x	
Pithya vulgaris	x		x	
Plectania latahensis	x		x	
Plectania milleri	x		x	
Pseudaleuria quinaultiana	x		x	
Club Coral Fungi				
Clavariadelphus ligula			x	x
Clavariadelphus pistilaris			x	x
Clavariadelphus truncatus			x	x
Clavariadelphus borealis			x	x
Clavariadelphus lovejoyae			x	x
Clavariadelphus sachalinensis			x	x
Clavariadelphus subfastigiatus			x	x
Jelly Mushroom				
Phlogoitis helvelloides			x	x
Branched Coral Fungi				
Clavulina cinerea			x	x
Clavulina cristata			x	x
Clavulina ornatipes			x	x
Mushroom Lichen				
Phytoconis ericetorum			x	x
Parasitic Fungi				
Asterophora lycoperdoides			x	
Asterophora parasitica			x	
Collybia racemosa			x	
Cordyceps capitata			x	
Cordyceps ophioglossoides			x	
Hypomyces luteovirens			x	
Cauliflower Mushroom				
Sparassis crispa			x	

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Moss Dwelling Mushrooms				
Cyphellostereum laeve			x	
Galerina atkinsoniana			x	
Galerina cerina			x	
Galerina heterocystis			x	
Galerina sphagnicola			x	
Galerina vittaeformis			x	
Rickenella setipes			x	
Coral Fungi				
Clavicorona avellanea			x	
LICHENS				
Rare Forage Lichen				
Bryoria tortuosa	x		x	
Rare Leafy (arboreal) Lichens				
Hypogymnia duplicata	x	x	x	
Tholurna dissimilis	x		x	
Rare Nitrogen-fixing Lichens				
Dendriscocaulon intricatulum	x		x	
Lobaria hallii	x		x	
Lobaria linita	x	x	x	
Nephroma occultum	x		x	
Pannaria rubiginosa	x		x	
Pseudocyphellaria rainierensis	x	x	x	
Nitrogen-fixing Lichens				
Lobaria oregana				x
Lobaria pulmonaria				x
Lobaria scrobiculata				x
Nephroma bellum				x
Nephroma helveticum				x
Nephroma laevigatum				x
Nephroma parile				x
Nephroma resupinatum				x
Pannaria leucostictoides				x
Pannaria mediterranea				x
Pannaria saubinetii				x

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Nitrogen-fixing Lichens (continued)				
Peltigera collina				x
Peltigera neckeri				x
Peltigera pacifica				x
Pseudocyphellaria anomala				x
Pseudocyphellaria anthraspis				x
Pseudocyphellaria crocata				x
Sticta beauvoisii				x
Sticta fuliginosa				x
Sticta limbata				x
Pin Lichens				
Calicium abietinum				x
Calicium adaequatum				x
Calicium adspersum				x
Calicium glaucellum				x
Calicium viride				x
Chaenotheca brunneola				x
Chaenotheca chrysocephala				x
Chaenotheca ferruginea				x
Chaenotheca furfuracea				x
Chaenotheca subroscida				x
Chaenothecopis pusilla				x
Cyphelium inquinans				x
Microcalicium arenarium				x
Mycocalicium subtile				x
Stenocybe clavata				x
Stenocybe major				x
Rare Rock Lichens				
Pilophorus nigricaulis	x		x	
Sticta arctica	x		x	
Riparian Lichens				
Cetrelia cetrarioides				x
Collema nigrescens				x
Leptogium burnetiae var. *hirsutum*				x
Leptogium cyanescens				x
Leptogium saturninum				x
Leptogium teretiusculum				x
Platismatia lacunosa				x
Ramalina thrausta				x
Usnea longissima				x

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Aquatic Lichens				
Dermatocarpon luridum	x		x	
Hydrothyria venosa	x		x	
Leptogium rivale	x		x	
Rare Oceanic Influenced Lichens				
Bryoria pseudocapillaris	x		x	
Bryoria spiralifera	x		x	
Bryoria subcana	x		x	
Buellia oidalea	x		x	
Erioderma sorediatum	x		x	
Hypogymnia oceanica	x		x	
Leioderma sorediatum	x		x	
Leptogium brebissonii	x		x	
Niebla cephalota	x		x	
Pseudocyphellaria mougeotiana	x		x	
Teloschistes flavicans	x		x	
Usnea hesperina	x		x	
Oceanic Influenced Lichens				
Cetraria californica	x		x	
Heterodermia leucomelos	x		x	
Loxospora sp. nov. "*corallifera*" (*Brodo* in edit)	x		x	
Pyrrhospora quernea	x		x	
Additional Lichen Species				
Cladonia norvegica			x	
Heterodermia sitchensis			x	
Hygomnia vittiata			x	
Hypotrachyna revoluta			x	
Ramalina pollinaria			x	
Nephroma isidiosum			x	
Bryophytes				
Antitrichia curtipenula				x
Bartramiopsis lescurii	x		x	
Brotherella roelli	x		x	
Diplophyllum albicans [*"Diplophyllu albicans"* in original ROD;corrected typographical error]	x		x	
Diplophyllum plicatum	x	x		
Douinia ovata				x
Encalypta brevicolla var. *crumiana*	x		x	
Herbertus aduncus	x		x	
Herbertus sakurali	x		x	

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Bryophytes (continued)				
Iwatsuklella leucotricha	x		x	
Kurzia makinoana	x	x		
Marsupella emarginata var. *aquatica*	x	x		
Orthodontium gracile [Corrected spelling; was "*Orthodontlum gracile*" in original ROD]	x		x	
Plagiochila satoi [Corrected spelling; was "*Plagiochila satol*" in original ROD]	x		x	
Plagiochila semidecurrens	x		x	
Pleuroziopsis ruthenica	x		x	
Ptilidium californicum	x	x		
Racomitrium aquaticum	x		x	
Radula brunnea	x		x	
Scouleria marginata				x
Tetraphis geniculata	x		x	
Tritomaria exsectiformis	x	x		
Tritomaria quinquedentata	x		x	
Amphibians				
Del Norte salamander		x		
Larch Mountain salamander		x		
Shasta salamander	x	x		
Siskiyou Mountains salamander	x	x		
Van Dyke's salamander (Cascades)		x		
Mammals				
Red tree vole (P. *longicaudus*)		x		
Mollusks				
Cryptomastix devia	x	x		
Cryptomastix hendersoni	x	x		
Helminthoglypta hertleini	x	x		
Helminthoglypta talmadgei	x	x		
Megomphix hemphilli	x	x		
Monadenia chaceana	x	x		
Monadenia churchi	x	x		
Monadenia fidelis minor	x	x		
Monadenia troglodytes troglodytes	x	x		
Monadenia troglodytes wintu	x	x		
Oreohelix n. sp.	x	x		
Pristiloma articum crateris	x	x		
Trilobopsis roperi	x	x		
Trilobopsis tehamana	x	x		
Vertigo n. sp.	x	x		

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Mollusks (continued)				
Vespericola pressleyi	x	x		
Vespericola shasta	x	x		
Deroceras hesperium	x	x		
Hemphillia burringtoni [Corrected spelling; was "*Hemphillia barringtoni*" in original ROD]	x	x		
Hemphillia glandulosa	x	x		
Hemphillia malonei	x	x		
Hemphillia pantherina	x	x		
Prophysaon coeruleum	x	x		
Prophysaon dubium	x	x		
Fluminicola n. sp. 1	x	x		
Fluminicola n. sp. 11	x	x		
Fluminicola n. sp. 14	x	x		
Fluminicola n. sp. 15	x	x		
Fluminicola n. sp. 16	x	x		
Fluminicola n. sp. 17	x	x		
Fluminicola n. sp. 18	x	x		
Fluminicola n. sp. 19	x	x		
Fluminicola n. sp. 2	x	x		
Fluminicola n. sp. 20	x	x		
Fluminicola n. sp.	x	x		
Fluminicola seminalis	x	x		
Juga (O.) n. sp. 2	x	x		
Juga (O.) n. sp. 3	x	x		
Lyogyrus n. sp. 1	x	x		
Lyogyrus n. sp. 2	x	x		
Lyogyrus n. sp. 3	x	x		
Vorticifex klamathensis sinitsini	x	x		
Vorticifex n. sp. 1	x	x		
Vascular Plants				
Allotropa virgata	x	x		
Arceuthobium tsugense subsp. *mertensianae* [change from original ROD;IB#OR-95-443]				x
Aster vialis	x	x		
Bensoniella oregana (California)	x	x		
Botrychium minganense	x	x		
Botrychium montanum	x	x		
Clintonia andrewsiana	x	x		
Coptis asplenifolia	x	x		

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Table C-3. Species to be Protected Through Survey and Management Standards and Guidelines. Each of the four survey strategies is described in the text [of this Appendix].

Species	Survey Strategies 1	2	3	4
Vascular Plants (continued)				
Coptis trifolia	x	x		
Corydalis aquae-gelidae	x	x		
Cypripedium fasciculatum (Klamath)	x	x		
Cypripedium montanum (west Cascades)	x	x		
Galium kamtschaticum	x	x		
Habenaria orbiculata	x	x		
Pedicularis howellii [This species was in original ROD twice.]	x	x		
Scoliopus biglovei	x	x		
Arthropods				
Canopy herbivores (south range)				x
Coarse wood chewers (south range)				x
Litter and soil dwelling species (south range)				x
Understory and forest gap herbivores (south range) [limit to south range; IB#OR-97-045]				x

Survey Strategies: 1 = Manage known sites; 2 = Survey prior to activities and manage sites; 3 = Conduct extensive surveys and manage sites; and 4 = Conduct general regional surveys.

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Appendix C

Survey and Manage Accomplishments (1994-1999)

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APPENDIX C

Survey and Manage Accomplishments (1994-1999)

The following accomplishment report is an updated version of the report included in the appendices to the Environmental Assessment to Change the Implementation Schedule for Survey and Manage and Protection Buffer Species (decision date: Feb. 26, 1999).

In November 1994, the Regional Interagency Executive Committee chartered an Interagency Survey and Manage workgroup. This workgroup operates under the purview of the Regional Ecosystem Office, and is guided by an Intermediate Management Group with regional-level management representatives of the Bureau of Land Management, U.S. Forest Service , U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture Pacific Northwest Laboratory. The main purpose of the workgroup is to develop a database on species locations and to prepare Management Recommendations for species in Categories 1 and 2, Survey Protocols for Category 2 species, and procedures for addressing species in Categories 3 and 4. In addition, because of their similar information needs, the Protection Buffer species were added to the workgroup's purview. The workgroup consists of approximately 50 agency experts and program managers in the various taxonomic groups. There are also three subgroups addressing species in Categories 3 and 4 with a greater research approach, because those surveys are done over a longer term and cover a broader scale than surveys for other species.

Data on locations of all Category 1 Survey and Manage species was collected widely during 1994-1995. The data came from agency files of the Bureau of Land Management, Forest Service, and the National Park Service, as well as from several experts contracted to gather information from herbaria, museums, and private collections located across the country that were thought to have the major holdings of Northwest species. Nearly 8,000 records of variable quality and precision were collected; about 2,000 of those (25%) had location information sufficient to locate the species for project planning. A database containing the collected information was developed and distributed to field units of the Bureau of Land Management and Forest Service to be used in project planning and managing any of the known sites located in proposed project areas.

Location descriptions ranged from vague locations (such as mountains, trails, rivers, or even just name of the state), and legal descriptions with smaller units (but not usually finer approximately 0.25 mile), to accurately located sites indicated by crossings or maps. Because one main purpose of Category 1 is to use the "known site" information to design or modify activities, the location information needs to be precise. The Northwest Forest Plan Record of Decision (USDA, USDI 1994b, page C-4) suggests using a Geographic Information System (GIS) to compile the locations of species. However, spatial depiction of a site requires points or boundaries of the site, which were not generally available, especially from herbarium and museum records.

The data was reviewed and located as finely as possible by looking at aerial photos and topographic maps to follow features identified on data sheets or collection labels. The categories in the "precision" field of the database were identical to those used by the state heritage programs, with the two finest being to the second (approximately 150 feet) and minute (approximately 1.5 miles) of latitude-longitude. The 1.5-mile range was determined to be too indefinite of an area to use for planning projects; consequently, the sites known to approximately 150 feet were identified as "known sites."

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All sites of species where fewer than 10 sites were known were considered "exception" sites and identified as "known sites" for protection. Although these sites were broadly identified, loss of them was considered harmful to the species persistence. Version 1.0 of Known Sites Databasewas transmitted to the field in July of 1995 (see Appendix D). That database version consisted of only those sites considered as "known sites" by the above criteria in such a way that points could be entered in local GIS themes for project planning.

All data collected, regardless of its precision, was compiled and included in Version 2.0 Known Sites Database, which was transmitted to the field in May of 1997. Some problems were identified with this version in updating the database for all field units and in sorting some kinds of data. Currently, a more useful database is being developed called the Interagency Species Management System (ISMS). As explained in Appendix D, the ISMS is designed to store all species-specific data at a central point accessible in real-time by field staff of the Bureau of Land Management, as well as the Forest Service. The ISMS is expected to be fully operational during the year 2000. Data similar to that collected for the Known Sites Database will be managed in ISMS on all Survey and Manage species in Categories 1 and 2.

To facilitate information sharing within their agencies, the BLM and USFS established an intranet site to have information about many aspects of the Northwest Forest Plan readily available. Among the various planning documents available on the intranet site are the FEMAT Report (USDA et al. 1993), the Record of Decision for the Northwest Forest Plan FSEIS (USDA, USDI 1994b), and Northwest Forest Plan Standards and Guidelines. All BLM memoranda pertaining to Survey and Manage, as well as all Management Recommendations and Survey Protocol documents, are also available on the Intranet soon after their release. The information exchange section that allows field offices to post information helps field staff implement Survey and Manage requirements.

The workgroup gathered known information on each of the approximately 280 Categories 1 and 2 species to draft Management Recommendations. These documents are considered the most complete single source of information on most of these species. Completed Management Recommendations for over 250 species are under review at the Regional Ecosystem Office or have been sent to the field for implementation and review.

The same team members who are developing Management Recommendations have also, to date, developed Survey Protocols for all species that either are Category 2 species or are Protection Buffer species or other species whose standards and guidelines require protocols. For more detail on the status of Management Recommendations and Survey Protocols, reference Table 2-1 in Chapter 2 of this SEIS. Survey Protocols were prepared and distributed to the field in time to initiate surveys in 1995 for the great gray owl, and prior to 1997 for ground-disturbing activities as identified in the Northwest Forest Plan Record of Decision for the red tree vole and five amphibians.

In the process of researching the Survey and Manage species, justifications were also prepared to move species among components and to correct errors in the standards and guidelines. These justifications followed the process identified on page C-6 of the Northwest Forest Plan Record of Decision for modification, or agency regulations for correcting minor errors. These species included *Arceuthobium tsugense* (hemlock dwarf mistletoe), lynx, *Buxbaumia piperi*, and the "understory and forest gap herbivores" guild of arthropods.

It has been determined that three vascular plants and some fungi do not need this mitigation. Justifications to remove these species from the Survey and Manage mitigation are in preparation. One Category 2 fungus species has been determined to be inappropriately placed in Component 2, and justification for moving this species to Category 3 is in preparation.

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Subgroups focusing on Categories 3 and 4 species of bryophytes, lichens, and fungi have prepared a work plan and are surveying for these species, starting with those that appear to be of greatest risk. Researchers at the USDA Pacific Northwest (PNW) and Pacific Southwest ResearchLaboratories (PSW) have developed and initiated general regional surveys for two of the arthropod guilds.

In addition to the above efforts, an Interagency Bryologist-Lichenologist and an Interagency Regional Mycologist were hired to direct the survey efforts for taxa in Categories 3 and 4, provide technical advice to the agencies, and present training to field staff. The bryologist and mycologist, as well as the mollusk and amphibian subgroups, present training throughout the region, provide identification and technical advice to field personnel, and assist in preparing documents.

As a result of the work done by the Survey and Manage regional level workgroup and the surveys by field staff, many new sites of species in all components have been found since 1995. The Agencies have been conducting implementation monitoring of projects, which includes monitoring of compliance with Survey and Manage and Protection Buffer standards and guidelines. Implementation monitoring for fiscal year 1996 and fiscal year 1997 has found a high degree of compliance with these standards and guidelines. See *Results of the FY 1996 (Pilot Year) Implementation Monitoring Program* and *Results of the FY 1997 Implementation Monitoring Program* (USDA, USDI 1996 and 1997).

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Appendix D

Interagency Species Management System (ISMS)

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APPENDIX D

Interagency Species Management System (ISMS)

Background

When the Survey and Manage mitigation was adopted in 1994 as part of the Northwest Forest Plan, 260 species were assigned to Category 1 (manage known sites). In an effort to compile all "known sites" of Survey and Manage species, searches were conducted in numerous herbaria, museums, private collections as well as state heritage program and agency databases and file information. A database, called "Known Sites Database," was developed to store this information. The collected information was input in the database in 1995 and updated two years later (1997) for field use. Users recognized, however, that improvements were needed to make full use of the collected data and other information from field surveys and agency management direction.

Needs of the Species Database

The desired database needed to be designed to help its users manage and monitor species throughout their range. For example, in watershed analysis, the users needed a database that would help them consider locations of Survey and Manage species on lands administered by the Bureau of Land Management and on National Forests. Other needs of the database included various ways to sort the data and a Geographical Information System (GIS) component to help locate the species. Also, field units of both agencies needed to have the ability to retrieve and access the database to make more timely inputs than done only periodically for central data compilation.

Development of the Interagency Species Management System (ISMS)

Staff of the Regional Ecosystem Office, Forest Service (USFS), Bureau of Land Management (BLM), and the U.S. Fish and Wildlife Service worked together to plan and develop a better data management system. The system, to be called the Interagency Species Management System (ISMS), would replace the Known Sites Database. Among the first steps taken by agency staff developing ISMS was an extensive search of public and private sector databases, which led them to a system used by the Six Rivers National Forest (California) that met most needs discussed above.

The Six Rivers system was modified to include data fields that would accommodate all information collected under the various Survey and Manage Survey Protocols. Hardware was procured and systems modified to allow the database to be physically located at a central location (Forest Service Region 6 Office in Portland). The system was also modified to allow access by BLM and Forest Service field office personnel in the tri-state area of Oregon, Washington and northern California.

In the fall of 1998, agency field offices and associated USDA Pacific Northwest Research Station (PNW) staff submitted information additional to that in the original species database (Known Sites). The 1998 data submission, along with information from the Known Sites Database, was incorporated into the Interagency Species Management System. Because ISMS was originally established to store information on known sites of Category 1 species, data on species in other categories was not consistently included in ISMS. However, the data input effort to that date did include available data about

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Categories 3 and 4 species collected under contract, data on red tree vole submitted for a research effort, and some data on great gray owl.

A few problems occurred during this data compilation process. One problem was that data was submitted from two different sources, which resulted in some record duplication. Another problem involved software difficulties in displaying some queried information. These problems were circumvented during the systems analyses process by utilizing other data sources, such as the Pacific Northwest regional extensive survey data files (which had incorporated the earlier KnownSites database) and by not relying solely on the given number and distribution of sites provided for species analysis by ISMS. Two sets of testing were conducted, resulting in additional revisions to the program. Staff data stewards are continuing to work towards resolving the quality control problems.

Design and Goal of ISMS

The Interagency Species Management System is designed to allow field staff to input various field observation data, including species locations, positive and negative observations of species, the precision of such locations, information about species habitat and populations, and data collection conditions such as weather. The data can be input daily or periodically.

The goal of ISMS is to enable field staff of the BLM and the Forest Service to readily share information on locations and habitats of species. This data sharing will assist the Agencies manage adjoining or nearby field units and conduct regional analyses. The GIS component of ISMS will allow users to digitize points or areas from mapped information or from global positioning systems into the database. The digitized data will allow users to query for species occurrences in various land allocations and habitat types, or specific to other data such as elevation or climate. The digitized data will also help users analyze geographic ranges of a species by focusing on areas where the species is of greatest concern.

Status of Implementing ISMS

The ISMS database is expected to be used by field office staff and be updated on a frequent basis. All data on Survey and Manage species in the database will be accessible to Forest Service and BLM offices at field and regional levels. Accessible data will include the point location of the species, or the center of a polygon (irregular shape) showing the area occupied by the species. Because GIS files are large, access to GIS data will be limited to the field office managing the associated land base. However, field offices or regional efforts will be able to correlate the geographic location in the ISMS with themes (such as maps) in their local GIS files. This data may also be compiled at nearby local or regional levels by making periodic requests for updated GIS information.

The Interagency Species Management System should be fully operational early in the year 2000.

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Appendix E

Criteria for Developing the List of Species Closely Associated With Late-Successional and Old-Growth Forests

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APPENDIX E

Criteria for Developing the List of Species Closely Associated With Late-Successional and Old-Growth Forests

The Forest Ecosystem Management Assessment Team (FEMAT) identified more than 1,000 species as being closely associated with late-successional forests on federal lands. The criteria that FEMAT used for developing the list of species is listed below. A species was considered to be closely associated with late-successional and old-growth forests if it met at least one of the following criteria:

Criterion 1: The species is significantly more abundant (based on field study or collective professional judgment of the Forest Ecosystem Management Assessment Team) in late-successional and old-growth forest than in young forest, in any part of its range.

Criterion 2: The species shows association with late-successional and old-growth forest (may reach highest abundance there, but not necessarily statistically so), and the species requires habitat components that are contributed by late-successional and old-growth forest (based on field study or collective professional judgment of the Forest Ecosystem Management Assessment Team).

Criterion 3: The species is associated with late-successional and old-growth forest (based on field study) and is on a federal (Fish and Wildlife Service) or state threatened and endangered list; the Fish and Wildlife candidate species list; Forest Service Regions 5 or 6[1] sensitive species list; or is listed by the states of Washington, Oregon or California as a species of special concern or sensitive species.

Criterion 4: Field data are inadequate to measure strength of association with late-successional and old-growth forest, and the species is listed as a federal (Fish and Wildlife Service) threatened and endangered species, and the Forest Ecosystem Management Assessment Team suspects that it is associated with late-successional and old-growth forest.

[1]Regions 5 or 6 = Pacific Southwest Region or Pacific Northwest Region of the Forest Service, respectively.

Source: Table 3&4-18, Northwest Forest Plan Final Supplemental Environmental Impact Statement (USDA, USDI 1994a); adapted from Thomas et al. (1993).

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Appendix F

The Species Review Process

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APPENDIX F - The Species Review Process

The goal of the Species Review Process was to evaluate the latest information about taxa in the "Survey and Manage" and "Protect from Grazing" Standards and Guidelines and some of the taxa in the "Protection Buffer" Standards and Guidelines of the Northwest Forest Plan (NFP) and to use this information to propose changes to management approach for these taxa, as appropriate. This review process was done pursuant to the Survey and Manage Standard and Guideline stating "...changes could include changing the schedule, moving species from one survey strategy to another, or dropping this mitigation requirement for any species whose status is determined to be more secure than originally projected." (USDA, USDI 1994b, p. C-6) No provision for adding taxa to the Survey and Manage Standard and Guideline was suggested or specified in the current direction. Therefore, no information for adding new taxa was sought or considered.

The Species Review Process built on the information and process conducted by the Forest Ecosystem Management Assessment Team (FEMAT) (USDA et al. 1993), the information presented in the Final Supplemental Environmental Impact Statement (FSEIS) (USDA, USDI 1994a) for adoption of the Northwest Forest Plan, and the earlier Scientific Analysis Team (SAT) report (Thomas et al. 1993). This analysis process did not repeat the FEMAT and SEIS analysis processes. Rather, the process examined whether new information or understanding was sufficient to warrant proposing changes in the status of taxa under the Survey and Manage Standard and Guideline. The process also was extended to include most Protection Buffer and Protect from Grazing species, which were being considered in the SEIS for inclusion in the Survey and Manage Standard and Guideline.

The Species Review Process consisted of three sequential analysis steps:

- Step 1*: A filter to determine whether there was substantial new information or other reasons for additional review.*
- Step 2*: A review of current information on the taxa and the Northwest Forest Plan with reference to future persistence and habitat availability.*
- Step 3*: Use of the review and other available information to propose changes to the treatment of the taxon within a proposed alternative in this SEIS.*

Each of the three steps is described below.

Step 1 - Systematic Filter to Determine Level of New Information

The purpose of this step was to separate the taxa for which there was substantial new information, questions as to their presence in the Northwest Forest Plan area, or specific concerns that warrant revisiting the FEMAT and SAT analysis results. Most Protection Buffer species were also identified for additional consideration. Panels of one to three taxa specialists were convened for each taxa group to examine and consider the information available on each taxon (see list of panel participants at end of this appendix).

Panel members were provided with all available information relative to the taxa and taxa group from historic and new sources, including the SAT report (Thomas et al. 1993), FEMAT (USDA et al. 1993), the Northwest Forest Plan FSEIS (USDA, USDI 1994a, including Appendix J2), the Northwest Forest Plan Record of Decision (USDA, USDI 1994b), and any other interagency documents such as Management Recommendations. From the Interagency Species Management System (ISMS) database, panels were

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provided with taxon-specific "dot maps" that showed all point locations, with indications of those found before and after January 1993. The panels also received a tally of the number of records by taxon in three categories (records located since 1993, records located from 1980 to 1993, and records located before 1980).

Because one purpose of this step was to determine whether there was substantial new information on individual taxa since the FEMAT panels completed their review in early 1993, panel members were instructed to assume that all sites located during or after 1993 represented new information. The pre-FEMAT information was further divided into sites located before and after 1980. Sites located before 1980 were considered less likely to be extant due to timber harvest and other habitat-disturbing activities on federal and other lands.

The panels members used this information, along with their knowledge of each taxon and the taxa group, to address the following four basic questions:

1. Was the taxon known or suspected to occur within the range of the northern spotted owl?

2. Was the taxon listed as a Protection Buffer species?

3. Were there any issues or errors that might affect the status of the taxon? Examples include: new taxonomic information that indicates a "species" listed on Table C-3 of the Northwest Forest Plan Record of Decision (USDA, USDI 1994b) was no longer considered a species; species with a FEMAT rating of 100 percent probability to Outcome A; taxon with documentation in Appendix J2 of the Northwest Forest Plan FSEIS (USDA, USDI 1994a) that persistence may not be at risk; and suspected errors in inclusion or placement in components of Table C-3, etc.

4. Was there new information on the taxon since signing of the Northwest Forest Plan Record of Decision that warrants a review of the its status as a Survey and Manage or Protection Buffer species? New information included, but was not limited to, such information as: significant change in number of known sites, sufficient new populations to potentially alter the status of rarity and reduce concern for persistence, new habitat information that indicates the taxon was more or less specialized than previously thought, indications that a taxon may be rarer than anticipated, new understanding of the effects of the Northwest Forest Plan as it has been implemented indicating that habitat protection for the taxon may differ from that anticipated during FEMAT and the SEIS, increase in the known and suspected range of the taxon, and potential technical survey concerns.

Taxa not known or suspected to occur within the range of the Northwest Forest Plan (question 1), which had issues or errors that might affect their status (question 3), or with substantial new information since signing of the Northwest Forest Plan Record of Decision (ROD) (question 4) were reviewed further in Step 2. All Protection Buffer species (question 2) were also reviewed further in Step 2. All information was recorded on Step 1 data sheets and stored in the individual taxon files (USDA, USDI Species Review Process 1999a). Based on this information, 187 taxa were evaluated in Step 2.

Step 2 - Review of Current Information by Taxon

The purpose of this step was to review and document all new information on the individual taxa that passed through the Step 1 process and evaluate the effect of this information on our understanding of the taxon's distribution, habitat association, and level of concern for persistence under the Northwest Forest Plan for use in Step 3. This step was based on current information and knowledge of implementing the Northwest Forest Plan, including interagency implementation memoranda and the results of implementation monitoring.

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Panels of 5 to 10 taxa specialists and other biologists were convened for each taxa group and asked to document the current state of our knowledge of each taxon's biology and habitat associations (see list of panel participants at end of this appendix). They reviewed the FEMAT and the SEIS (Appendix J2 in USDA, USDI 1994a) and SAT report conclusions (Thomas et al. 1993), and evaluated whether and how the new information might affect the basis for the FEMAT and Northwest Forest Plan FSEIS and the SAT conclusions (that is, how our understanding of the risk factors identified in the above documents has changed). The panels were presented specific questions related to the criteria that would be used for determining placement in categories during Step 3 (such as: Was it reasonable for trained field personnel to identify the taxon in the field or were there sufficient differences in rarity or habitat conditions to potentially warrant different levels of concern for persistence or management in major portions if the range?).

Panels were provided with the data sheets, information, and point maps used in the Step 1 process. Each panel was provided with the following information from the Interagency Species Management System Database:

- A point map with records by date categories.
- Number of records by date category and precision of location.
- Number of records by land allocation and ownership.
- Information from individual records if needed, including date and observer.
- For a few taxa groups there was also limited information available on elevation, plant association, feature, and slope of sites or records.

For purposes of consistency, each panel was given a set of assumptions for various components of the Northwest Forest Plan that might affect late-successional and old-growth related taxa. These assumptions were based on the Northwest Forest Plan Record of Decision (USDA, USDI 1994a) and any interagency implementation memoranda for standards and guidelines that might affect the habitat of the Survey and Manage taxa. At the start of each panel session, the Species Review Coordinator met with all panel participants to review the review process and Northwest Forest Plan assumptions, as well as answer any questions. Significant clarifications were added to the documentation of the process.

For each taxon, the individual taxa panels completed a worksheet containing specific questions to ensure that all potential issues were considered when evaluating the current condition of the taxa. Responses to the questions were based on a consensus of the panel, with written documentation of the information and rationale behind the response. The questions covered the following areas to provide the latest information on the individual taxa and allow evaluation of the effect of this information on our understanding of the taxon's distribution, habitat association, and level of concern for persistence:

- Additional screening questions on range relative to the Northwest Forest Plan area, late-successional/old-growth association, and taxonomic changes such as the combining of previously separate taxa into a single, now common, taxon.
- Biological information, including:
  - — Rarity in terms of number of records, distribution of known sites, and range of the taxon.
  - — Habitat association, amplitude, rarity, and seral stage association.
  - — Effects of the Northwest Forest Plan on the taxon or habitat, including: proportion of known sites and suspected habitat on federal lands, and proportion of known sites and suspected habitat in reserved land allocations.
  - — Effects of matrix standards and guidelines and other management requirements of the Northwest Forest Plan area.
  - — Cumulative effects.
  - — Other questions on survey feasibility and differences in condition across range.

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Panels were asked to review the concerns and documentation contained in the FEMAT report (and SAT for Protection Buffer species) and Appendix J2 of the Northwest Forest Plan FSEIS (USDA, USDI 1994a). The panels compared the current information to that presented in the previous documents and provided summary documentation on how the new information might change the perception of concern for persistence for each taxon (that is, how our understanding of the risk factors identified in the above documents has changed).

All information from the Step 2 panels was documented on data forms, including summaries of the discussion of the panel relative to each question. All Step 2 data sheets were stored in the taxon files (USDA, USDI Species Review Panel 1999b).

Step 3 - Determination of Appropriate Management for Each Taxon

The purpose of this step was to use the information provided by the specialists in Steps 1 and 2, as well as other sources, and a set of criteria (see below) for the different proposed Survey and Manage categories to propose changes to the category for each taxon under a proposed alternative for the Survey and Manage Standard and Guideline. This could include removing taxa from the list or moving Protection Buffer and Protect from Grazing species to the Survey and Manage Standard and Guideline, and proposing the categories in which these taxa should be placed.

A panel of eight regional biological staff and managers was convened to review the information (see list of panel participants at end of this appendix). The panel was provided with all the information from Steps 1, including that from the FEMAT report, Northwest Forest Plan FSEIS, and SAT Report. For the 187 taxa reviewed during Step 2 (those with substantial new information or other reasons for additional review), the panel was provided the worksheet and any additional information. Panel members were also provided a description of the six categories included in Alternative 1 of this draft SEIS and criteria for placement of taxa into each category. Individual taxa specialists from the Step 2 panels were available at each session to assist with interpretation of the information, but were not members of the Step 3 panel.

From April 26-28, 1999, the panel reviewed the approximately 400 taxa included in the Survey and Manage, Protection Buffer, and Protect from Grazing Standards and Guidelines. Based on this effort, the panel either recommended removal of a taxon from the Survey and Manage Standard and Guideline, or placement of the taxon into one of the categories (based on the draft Implementation Guide of April 21, 1999) and modified by discussion of all present at start of the Step 3 process. These categories and their defining criteria have been incorporated into Alternative 1 in the SEIS.

The panel reviewed the information on each taxon, compared this to the criteria for each category, and, by majority vote, proposed placing the taxon into the appropriate categories. The primary reasons for placing each taxon in the category were recorded for each decision in a summary table format (Table F-1 in this Appendix)(USDA, USDI Species Review Panel 1999c)

Criteria for Species Analysis

The following criteria and factors were used for evaluating the appropriate status and placement of the taxa within the appropriate Survey and Manage category. Criteria were separated into basic criteria or category-related criteria. The Survey and Manage basic criteria must be met to qualify for consideration under the Survey and Manage Standard and Guideline.

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Survey and Manage Basic Criteria. To be considered or covered by the Survey and Manage Standard and Guideline, taxa must meet *all* of the following criteria. Taxa that did not meet all of these criteria were proposed for removal from the Survey and Manage list.

- The taxon must occur within the Northwest Forest Plan area, or occur close to the NFP area and have potentially suitable habitat within the NFP area. *Taxa known from historic records within the boundary of the Northwest Forest Plan area were considered to occur within the boundaries, regardless of whether the historic sites were known to be extant or not.*

- Taxa must meet the criteria for being closely associated with late-successional or old-growth forest, using the criteria of the Northwest Forest Plan FSEIS (USDA, USDI 1994a), as described in Appendix E of this SEIS.

- The reserve system and other standards and guidelines of the Northwest Forest Plan, other than the Survey and Manage Standard and Guideline do not appear to provide for reasonable assurance of the taxon's persistence. *This generally meant that habitat or habitat categories needed for the persistence of the taxon were not considered to be adequately provided for by the Northwest Forest Plan land use allocations, standards and guidelines (other than Survey and Manage Standards and Guidelines), or the underlying National Forest Land and Resource Management Plans or BLM Resource Management Plans). Persistence in this context meant at a level of assurance intended in the 1994 Northwest Forest Plan.*

Category Criteria

For each taxon meeting the Survey and Manage basic criteria, the following criteria and information were used to place the taxon in the appropriate categories of Alternative 1, and subsequently Alternatives 2 and 3. (See Table F-1 for placement of species in Alternative 1 using the species review process described in this Appendix.) Past inventory efforts have varied widely between taxa groups and geographic locations, so the significance of population numbers and other information was viewed in that context. A low number of sites for taxa that has been well inventoried, for example, may be more indicative of rarity than the same number of sites for taxa for which there have been limited searches. Of the taxa groups covered under the Survey and Manage Standard and Guideline, vertebrates and vascular plants have had the greatest level of interest and inventory prior to the Northwest Forest Plan, especially those taxa on Agency sensitive species lists. However, mollusks and bryophytes received the least attention on federally managed lands prior to the Northwest ForestPlan, and therefore, higher numbers of sites of vertebrates and vascular plants may reflect, at least in part, greater survey effort.

In most cases, the criteria and factors for each category were not mutually exclusive, but rather served as indicators of the appropriate category for the taxon. If a taxon met criteria for more than one category, the more conservative (or protective) category was applied. Factors for determining whether taxon was rare, or whether all sites were likely to be needed to provide a reasonable assurance of persistence, did not include numerical or absolute cutoffs, but rather were treated as comparative values. At the extremes, this does not pose any difficulty (such as two likely extant federal sites were definitely rare). Intermediate values required consideration of the history of inventory for the taxon and other factors, and values for the number of likely extant sites that indicate low numbers for some taxa may equally represent moderate to high numbers for other taxa.

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Category A (Rare; Pre-Disturbance Surveys Practical)

Objective: Manage all known sites and minimize inadvertent loss of undiscovered sites.

Criteria for including a species in Category A involved factors related to reaching the following four primary conclusions:

1. There was a high concern for persistence.
2. The species occurred rarely, and was not well distributed within its range in the Northwest Forest Plan area.
3. All known sites or population areas were likely to be necessary to provide reasonable assurance of the taxon's persistence.
4. Pre-disturbance surveys were practical.

Information used to determine if there was a high concern for persistence and all sites were likely necessary to provide reasonable assurance of the taxon persistence included factors such as:

- The low number of likely extant sites/records on federal lands indicates rarity. *This requires adjusting the number of database records. Records may be lower than expected because of chronic under-reporting of common taxon or greater than the actual number of sites due to multiple database records of individual sites. Sites recorded over two decades ago may no longer be extant, especially in highly developed or quickly developing areas such as the Puget Sound.*
- Taxon is not well distributed within the taxon's range or habitat. *Uneven pattern of distribution relative to potential habitat indicates that other factors may be limiting the distribution and occurrence of the taxon.*
- There is a limited number of individuals per site, indicating that individual sites were considered to be less secure.
- The taxon has highly specialized habitat requirements (narrow ecological amplitude), limiting the habitat available to the taxon and reducing the likelihood that many new sites will be located.
- Microsite habitat is limited, reducing the likelihood that many new sites will be located.
- Declining habitat trend.
- Dispersal capability is limited relative to federal habitat, resulting in potential for individual sites/populations to be isolated.
- Reproduction and/or life history characteristics provide additional risk factors to maintaining existing and future populations. *This may include late age of maturity, low reproductive rates, or low survival rates that indicate a taxon may have trouble persisting at present sites or surviving bottlenecks.*
- Low number of sites in reserves and/or low likelihood of sites or habitat in reserves.
- Factors beyond management of the Northwest Forest Plan affect persistence, but special management under the NFP will help persistence.
- Habitat fragmentation that may lead to genetic isolation.

Surveys prior to initiation of habitat disturbance were considered "practical" if all of the following factors applied:

- The taxon appears annually or predictably, producing identifying structures; or the critical identification characteristics are visible for an extended time.
- The taxon is not so minuscule or cryptic as to be barely visible.
- The taxon can authoritatively be identified by more than a few experts, or the number of available experts is not so limited that it would be impossible to accomplish all surveys or identifications for all proposed habitat-disturbing activities in the Northwest Forest Plan area needing identification within the normal planning period for the activity.
- The taxon can be readily distinguished in the field and needs no more than simple laboratory or office examination to confirm its identification.

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- Surveys do not require unacceptable safety risks.
- Surveys can be completed in two field seasons (approximately 7-18 months). *Therefore, surveys can be completed during a normal project development and planning process.*
- Credible survey methods for the taxon are known or can be developed within a reasonable time period (approximately one year).

Category B (Rare; Pre-Disturbance Surveys Not Practical)

Objective: Manage all known sites and minimize inadvertent loss of undiscovered sites.

Criteria for including a taxon in Category B involved factors related to reaching the following four primary conclusions:

1. There was a high concern for persistence.
2. The taxon occurred rarely and was not well distributed within its range in the Northwest Forest Plan area.
3. All known sites or population areas were likely to be necessary to provide reasonable assurance of the taxon's persistence.
4. Pre-disturbance surveys were not practical.

Surveys prior to initiation of habitat disturbance were not considered "practical" if any of the following factors applied:

- The taxon does not, annually or predictably, produce identifying structures; or the critical identification characteristics are visible during only a very short or unpredictable time period. *Therefore, targeting surveys to correspond with the appropriate timing when the taxon can be identified is highly impractical.*
- The taxon is so minuscule or cryptic as to be barely visible.
- The taxon can only be authoritatively identified by a few experts, or the number of available experts is so limited that it is impossible to accomplish all surveys or identifications for all proposed habitat-disturbing activities in the Northwest Forest Plan area needing identification within the normal planning period for the activity.
- The taxon cannot be readily distinguished in the field and needs more than simple laboratory or office examination to confirm its identification.
- Surveys require unacceptable safety risks.
- Surveys cannot be completed in two field seasons (approximately 7-18 months). *Therefore, surveys cannot be completed during a normal project development and planning process.*
- Credible survey methods for the taxon are not known or cannot be developed within a reasonable time period (approximately one year).

Category C (Uncommon; Pre-Disturbance Surveys Practical)

Objective: Identify and manage high-priority sites to provide for reasonable assurance of the taxon's persistence. Until high-priority sites can be determined, manage all known sites.

Criteria for including a taxon in Category C involved factors related to reaching the following four primary conclusions:

1. There was not a high concern for persistence.
2. It was likely that not all known sites or population throughout the taxon's range in the Northwest Forest Plan area were necessary for reasonable assurance of persistence of the taxon.
3. The taxon was uncommon (as opposed to rare).
4. Pre-disturbance surveys were practical.

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Information used to determine if there was a moderate concern for persistence, and not all sites were likely necessary to provide reasonable assurance of the taxon's persistence included factors such as:

- A higher number of likely extant sites/records does not indicate rarity of the taxon. *This requires adjusting the number of database records. Records may be lower than expected because of chronic under-reporting of common taxon or greater than the actual number of sites due to multiple database records of individual sites. Sites recorded over two decades ago may no longer be extant, especially in highly developed or quickly developing areas such as the Puget Sound.*
- The number of individuals per site does not indicate that many known sites are not secure. *There may be a low to high number of individuals per site, but populations are not consistently low.*
- There is a less restricted distribution pattern relative to range or potential habitat.
- There is a moderate-to-broad ecological amplitude, such that the habitat available to the taxon is more widespread and the likelihood of finding new sites is not reduced.
- There is a moderate-to-high likelihood of sites in reserves.
- Dispersal capability is not substantially limited relative to federal habitat, reducing the potential for individual sites/populations to be isolated.
- Reproduction and/or life history characteristics do not provide additional risk factors to maintaining existing and future populations. *The taxon does not exhibit characteristics, such as late age of maturity, low reproductive rates, or low survival rates that indicate a taxon may have trouble persisting at present sites or surviving bottlenecks.*

Surveys prior to initiation of habitat disturbance were considered "practical" if all of the factors described in Category A applied.

Category D (Uncommon; Pre-Disturbance Surveys Not Practical or Not Necessary)

Objective: Identify and manage high-priority sites to provide for a reasonable assurance of the taxon's persistence. Until high priority sites can be determined, manage all known sites.

Criteria for including a taxon in Category D involved factors related to reaching the following three primary conclusions.

1. There was not a high concern for persistence.
2. It was likely that not all known sites or population throughout the taxon's range in the Northwest Forest Plan area were necessary for reasonable assurance of persistence of the taxon.
3. The taxon was uncommon (as opposed to rare).
4. Surveys were not practical or not necessary. *That is, surveys of suitable habitat across the landscape were likely to be more effective at finding sites needed for long-term persistence than focusing in areas proposed for projects.*

Information used to determine if there was a moderate concern for persistence and not all sites were likely necessary to provide reasonable assurance of the taxon's persistence include the same factors as Category C.

Surveys prior to initiation of habitat disturbance were not considered "practical" if any of the factors described in Category B applied.

Category E (Rare; Status Undetermined)

Objective: Manage all known sites while determining if the taxon meets the basic criteria for Survey and Manage and, if so, to which category it should be assigned.

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Criteria for including a taxon in Category E involved factors related to reaching the following two primary conclusions.

1. The number of known sites indicated the taxon was rare.
2. Information was insufficient to determine whether Survey and Manage basic criteria were met, or to determine what management was needed for a reasonable assurance of the taxon's persistence.

Information used to determine that the taxon was rare primarily included the number of likely extant sites/records and survey information on federally managed lands. *This requires adjusting the number of database records. Records may be lower than expected because of chronic under-reporting of common taxon or greater than the actual number of sites due to multiple database records of individual sites. Sites recorded over two decades ago may no longer be extant, especially in highly developed or quickly developing areas such as the Puget Sound.*

Factors used to reach a conclusion that information was insufficient to determine whether Survey and Manage basic criteria were met, or to determine what management was needed for a reasonable assurance of the taxon's persistence included:

- Significant questions remain as to whether the taxon meets the basic criteria for Survey and Manage (that is, the taxon may not likely occur within the Northwest Forest Plan area, or may not be closely associated with late-successional or old-growth forest using the criteria in Northwest Forest Plan FSEIS (USDA, USDI 1994a), as described in Appendix E of this SEIS.
- Information is insufficient to determine assignment of the taxon in a category.

Category F (Uncommon or unknown; Status Undetermined)

Objective: Determine if the taxon meets the basic criteria for Survey and Manage and if so, to which category it should be assigned.

Criteria for including a taxon in Category F involved factors related to reaching the following two primary conclusions.

1. The total number of sites indicated that the taxon was uncommon, rather than rare.
2. Information was insufficient to determine whether Survey and Manage basic criteria were met, or to determine what management was needed for a reasonable assurance of the taxon's persistence

Information used to determine if the species was uncommon (but not rare) included primarily a moderate-to-higher number of likely extant sites/records. *This requires adjusting the number of database records. Records may be lower than expected because of chronic under-reporting of common taxon or greater than the actual number of sites due to multiple database records of individual sites. Sites recorded over two decades ago may no longer be extant, especially in highly developed or quickly developing areas such as the Puget Sound.*

Factors used to reach a conclusion that information was insufficient to determine whether Survey and Manage basic criteria were met, or to determine what management was needed for a reasonable assurance of the taxon's persistence included:

- Significant questions remain as to whether the taxon meets the basic criteria for inclusion in Survey and Manage (that is, the taxon may not likely occur within the Northwest Forest Plan area, or may not be closely associated with late-successional or old-growth forest using the criteria from the Northwest Forest Plan FSEIS (USDA, USDI 1994a), as described in Appendix E of this SEIS.
- Information is insufficient to determine assignment of the taxon in a category.

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List of Panel Participants

Step 1 Panels

Amphibian Panel		
Charlie Crisafulli	U.S. Forest Service, PNW	Biologist
Deanna Olson, Ph.D.	U.S. Forest Service, PNW	Biologist
Bryophyte Panel		
John Davis	U.S. Fish and Wildlife Service	Biologist
Rick Dewey	Forest Service, Region 6	Botanist
Judy Harpel, Ph.D.	PNW, U.S. Forest Service	Bryologist
Robin Lesher	Forest Service, Region 6	Ecologist
Fungi Panel		
Mike Castellano, Ph.D.	U.S. Forest Service, PNW	Mycologist
Thomas O'Dell, Ph.D.	U.S. Forest Service, PNW	Mycologist
Jane E. Smith	U.S. Forest Service, PNW	Mycologist
Lichen Panel		
John Davis	U.S. Fish and Wildlife Service	Biologist
Chiska Derr	U.S. Forest Service, Region 6	Botanist
Linda Geiser	U.S. Forest Service, Region 6	Botanist
Robin Lesher	U.S. Forest Service, Region 6	Ecologist
Mollusk Panel		
Tom Burke	U.S. Forest Service, Region 6	Biologist
Nancy Duncan	Bureau of Land Management	Biologist
Karen Raftery	U.S. Forest Service, Region 5	Biologist
Vascular Plant Panel		
Russell Holmes	Bureau of Land Management	Botanist
Jenny Lippert	U.S. Forest Service, Region 6	Botanist
Canada Lynx Panel		
Camryn Lee	U.S. Fish and Wildlife Service	Biologist
Elaine Rybak	U.S. Forest Service, Region 6	Biologist

Step 2 Panels

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David Clayton	U.S. Forest Service, Region 6	Biologist
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Steve Goodwin	Bureau of Land Management	Biologist
Richard Nauman	U.S. Forest Service, PNW	Biologist
Kathy Nickell	U.S. Forest Service, Region 5	Biologist
Lisa Ollivier	U.S. Forest Service, PSW	Biologist
Deanna Olson, Ph.D.	U.S. Forest Service, PNW	Biologist
Bryophyte Panel		
John Davis	U.S. Fish and Wildlife Service	Biologist
Rick Dewey	U.S. Forest Service, Region 6	Botanist

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Judy Harpel, Ph.D.	U.S. Forest Service, PNW	Bryologist
Lance Holmberg	U.S. Forest Service, Region 6	Botanist
Robin Lesher	U.S. Forest Service, Region 6	Ecologist
Bruce Rittenhouse	Bureau of Land Management	Botanist

Fungi Panel

Mike Castellano, Ph.D.	U.S. Forest Service, PNW	Mycologist
Claire Hibler	Bureau of Land Management	Botanist
Thomas O'Dell, Ph.D.	U.S. Forest Service, PNW	Mycologist
Jane E. Smith	U.S. Forest Service, PNW	Mycologist
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Lichen Panel

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Linda Geiser	U.S. Forest Service, Region 6	Botanist
Robin Lesher	U.S. Forest Service, Region 6	Ecologist
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Mollusk Panel

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Nancy Duncan	Bureau of Land Management	Biologist
Pat Olmstead	Bureau of Land Management	Fisheries Biologist
Paul Jeske	Bureau of Land Management	Manager
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Vascular Plant Panel

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Russell Holmes	Bureau of Land Management	Botanist
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Jenny Lippert	U.S. Forest Service, Region 6	Botanist
Laura Potash	U.S. Forest Service, Region 6	Botanist
Joan Seevers	Bureau of Land Management	Botanist

Red Tree Vole Panel

Barbara Behan	U.S. Fish and Wildlife Service	Biologist
Brian Biswell	U.S. Forest Service, PNW	Biologist
Mike Blow	Bureau of Land Management	Biologist
Sarah Madsen	U.S. Forest Service, Region 6	Biologist

Great Gray Owl Panel

Cheryl Freisen	U.S. Forest Service, Region 6	Biologist
Eric Forsman, Ph.D.	U.S. Forest Service, PNW	Biologist
Barbara Behan	U.S. Fish and Wildlife Service	Biologist
Shane Kamrath	U.S. Forest Service, Region 6	Biologist
Matt Broyles	Bureau of Land Management	Biologist

Step 3 Panel

Robin Bown (Species Review Coordinator)	U.S. Fish and Wildlife Service	Biologist
Paula Crumpton	U.S. Forest Service, Region 5	Biologist
John Larsen	U.S. Forest Service, Region 5	Manager

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Robin Lesher	U.S. Forest Service, Region 6	Ecologist
Cheryl McCaffrey	Bureau of Land Management	Botanist
Loyal Mehrhoff	U.S. Fish and Wildlife Service	Biologist
Neal Middlebrook	Bureau of Land Management	Manager
Randy Molina, Ph.D.	U.S. Forest Service, PNW	Mycologist

The following Agency taxonomic group leads or specialists assisted in clarifying some taxon-specific information:

Brian Biswell	U.S. Forest Service, PNW	Biologist
Mike Castellano, Ph.D.	U.S. Forest Service, PNW	Mycologist
Nancy Duncan	Bureau of Land Management	Biologist
Judy Harpel, Ph.D.	U.S. Forest Service, PNW	Bryologist
Russ Holmes	Bureau of Land Management	Botanist
Thomas O'Dell, Ph.D.	U.S. Forest Service, PNW	Mycologist

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
Note: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3).

Species	NFP ROD Status	Alt. 1	Comments
FUNGI			
Acanthophysium farlowii (Aleurodiscus farlowii)	1, 3	B	Only one known site in Northwest Forest Plan area, but under-collected. Pre-disturbance survey not practical, multi-year surveys required.
Albatrellus avellaneus	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Albatrellus caeruleoporus	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical, multi-year surveys required.
Albatrellus ellislii	3	B	Low number of records in Northwest Forest Plan area. Need information on habitat and rarity. Pre-disturbance survey not practical; multi-year surveys required.
Albatrellus flettii	3	B	Low number of records in Northwest Forest Plan area; 80 percent federal. Pre-disturbance survey not practical; multi-year surveys required.
Alpova alexsmithii	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Alpova aurantiacus (Alpova sp. nov. # Trappe 1966)(syn. *Fevansia aurantiaca*)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Alpova olivaceotinctus	1, 3	B	Very low number of records in Northwest Forest Plan area, although under-collected. Pre-disturbance survey not practical; multi-year surveys required.
Arcangeliella camphorata (*Arcangeliella* sp. nov. #Trappe 12382; *Arcangeliella* sp. nov. #Trappe 12359)	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Arcangeliella crassa	1, 3	B	Very low number of records in Northwest Forest Plan area, although under-collected. Pre-disturbance survey not practical; multi-year surveys required.
Arcangeliella lactarioides	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical, multi-year surveys required.
Asterophora lycoperdoides	3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year survey required.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
Note: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3).

Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Asterophora parasitica	3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year survey required.
Baeospora myriadophylla	3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Balsamia nigrens (Balsamia nigra)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Boletus haematinus	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Boletus pulcherrimus	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Bondarzewia mesenterica (Bondarzewia montana)	1, 2, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Bridgeoporus nobilissimus (Oxyporus nobilissimus)	1, 2, 3	A	Low number of records in Northwest Forest Plan area. Pre-disturbance survey practical; large and perennial.
Bryoglossum gracile	1, 3	Off	Not late-successional/old-growth forest-associated; associated with subalpine meadows and boulder fields. Large areas of potential habitat protected.
Cantharellus cibarius	3, 4	Off	Synonymous with *Cantharellus formosus* that Step 2 panel indicated was the common variety, which is not at risk.
Cantharellus subalbidus	3, 4	D	Low number of records in Northwest Forest Plan area, but likely under-reported; more common than number of records in Northwest Forest Plan area indicates. Habitat broad. Pre-disturbance survey not practical; multi-year surveys required.
Cantharellus tubaeformis	3, 4	D	Low/moderate number of records in Northwest Forest Plan area, but likely under-reported. More common than number of records in Northwest Forest Plan area indicates. Habitat broad. Pre-disturbance survey not practical; multi-year surveys required.
Cantharellus formosus	1, 3	Off	Not late-successional/old-growth forest associated, most abundant in younger forest. Common.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Catathelasma ventricosa	3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Chalciporus piperatus (*Boletus piperatus*)	3	D	Moderate number of records in Northwest Forest Plan area. Widespread. Pre-disturbance survey not practical; multi-year surveys required.
Chamonixia caespitosa (*Chamonixia pacifica* sp. nov. #Trappe #12768)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Choiromyces alveolatus	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Choiromyces venosus	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Chromosera cyanophylla (Mycena lilacifolia)	3	B	Low number of records in Northwest Forest Plan area, most historic. Pre-disturbance survey not practical; multi-year surveys required.
Chroogomphus loculatus	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Chrysomphalina grossula	3	B	Low number of records in Northwest Forest plan area, none recent. Pre-disturbance survey not practical; multi-year surveys required
Clavariadelphus borealis	3, 4	Off	Not distinct taxonomic entity, synonymous with *Clavariadelphus truncatus* and covered by those requirements.
Clavariadelphus ligula	3, 4	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Clavariadelphus lovejoyae	3, 4	Off	Not in Northwest Forest Plan area; known only from Wyoming.
Clavariadelphus pistilaris	3, 4	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Clavariadelphus sachalinensis	3, 4	B	Very low number of records in Northwest Forest Plan area; historic records only. Pre-disturbance survey not practical; multi-year surveys required.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Clavariadelphus subfastigatus	3, 4	B	One historic site in Northwest Forest Plan area; probably extirpated. Pre-disturbance survey not practical; multi-year surveys required.
Clavariadelphus truncatus	3, 4	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Clavicorona avellanea	3	Off	Synonymous with *Clavicorona piperata*, which passed original FEMAT screens.
Clavulina cinerea	3, 4	Off	Synonymous with *Clavulina cristata*.
Clavulina cristata	3, 4	Off	Common. Not late-successional/old-growth forest associated.
Clavulina ornatipes	3, 4	B	Low number of records in Northwest Forest Plan area; most historic. Pre-disturbance survey not practical; multi-year surveys required.
Clitocybe senilis	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Clitocybe subditopoda	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Collybia bakerensis	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Collybia racemosa	3	B	Low number of records in Northwest Forest Plan area; most historic; half federal. Pre-disturbance survey not practical; multi-year surveys required.
Cordyceps capitata	3	B	Low number of records in Northwest Forest Plan area; most historic; most federal. Pre-disturbance survey not practical; multi-year surveys required.
Cordyceps ophioglossoides	3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year survey required.
Cortinarius azureus	3	B	No known sites in Northwest Forest Plan areas; probably rare. Recent surveys had not located any records. Pre-disturbance survey not practical; multi-year surveys required.
Cortinarius boulderensis	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Cortinarius cyanites	3	B	No known sites in Northwest Forest Plan area; probably rare. Recent surveys had not located any records. Pre-disturbance survey not practical; multi-year surveys required.
Cortinarius magnivelatus	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Cortinarius olympianus	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Cortinarius speciosissimus (Cortinarius rainierensis)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Cortinarius spilomius	3	B	No known sites in Northwest Forest Plan area; probably rare. Recent surveys had not located any records. Pre-disturbance survey not practical; multi-year surveys required.
Cortinarius tabularis	3	B	No known sites in Northwest Forest Plan area; probably rare. Recent surveys had not located any records. Pre-disturbance survey not practical; multi-year surveys required.
Cortinarius umidicola (Cortinarius canabarba)	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Cortinarius valgus	3	B	No known sites in Northwest Forest Plan area; probably rare. Recent surveys had not located any records. Pre-disturbance survey not practical; multi-year surveys required.
Cortinarius variipes	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Cortinarius verrucisporus	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Cortinarius wiebeae	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Cudonia monticola	3	B	Very low number of records in Northwest Forest Plan area, although not expected to be rare. Pre-disturbance survey not practical; multi-year surveys required.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Cyphellostereum laeve	3	E	Low number of records in Northwest Forest Plan area, although very under-reported. Tied to moss; need additional habitat and rarity information. Pre-disturbance survey not practical; multi-year surveys required.
Dermocybe humboldtensis	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Destuntzia fusca	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Destuntzia rubra	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Dichostereum boreale (Dichostereum granulosum)	1, 3	B	Only one site in Northwest Forest Plan area, although likely under-collected. Pre-disturbance survey not practical; multi-year surveys required.
Elaphomyces anthracinus	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Elaphomyces subviscidus	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Endogone acrogena	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Endogone oregonensis	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Entoloma nitidum (Rhodocybe nitida)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Fayodia gracilipes	3	B	Low number of records in Northwest Forest Plan area; none recent. Pre-disturbance survey not practical; multi-year surveys required.
Galerina atkinsoniana	3	E	Low number of records in Northwest Forest Plan area; though under-collected. Late-successional/old-growth forest association questionable. Pre-disturbance survey not practical; multi-year surveys required; difficult to distinguish.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Galerina cerina	3	E	One possible site in Northwest Forest Plan area. Late-successional/old-growth forest association questionable. Pre-disturbance survey not practical; multi-year surveys required; difficult to distinguish.
Galerina heterocystis	3	E	Late-successional/old-growth forest association questionable. Pre-disturbance survey not practical; multi-year surveys required; difficult to distinguish.
Galerina sphagnicola	3	E	Late-successional/old-growth forest association questionable. Pre-disturbance survey not practical; multi-year surveys required; difficult to distinguish.
Galerina vittaeformis	3	E	Low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association questionable. Pre-disturbance survey not practical; multi-year surveys required; difficult to distinguish.
Gastroboletus imbellus	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Gastroboletus ruber	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Gastroboletus subalpinus	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Gastroboletus turbinatus	3	B	Low number of records in Northwest Forest Plan area; rarer than originally thought. Pre-disturbance survey not practical; multi-year surveys required.
Gastroboletus vividus (*Gastroboletus* sp. nov. #Trappe 2897; *Gastroboletus* sp. nov. #Trappe 7515)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Gastrosuillus amaranthii (*Gastrosuillus* sp. nov. #Trappe 9608)	1, 3	F	Found outside Northwest Forest Plan area; some likely habitat exists within Northwest Forest Plan; unknown occupancy. Pre-disturbance survey not practical; multi-year surveys required.
Gastrosuillus umbrinus (*Gastroboletus* sp. nov. #Trappes 7516)	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Gautieria magnicellaris	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.

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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Gautieria otthii	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Gelatinodiscus flavidus	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Glomus radiatum	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Gomphus bonarii	3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Gomphus clavatus	3	F	Low/moderate number of records in Northwest Forest Plan area, although under-collected. Commonly harvested for consumption; not harmed by harvest. May not meet basic criteria. Pre-disturbance survey not practical; multi-year surveys required; difficult to distinguish.
Gomphus floccosus	3	D	Low/moderate number of records in Northwest Forest Plan area, but more common than thought. Need to determine high-priority sites for management. Pre-disturbance survey not practical; multi-year surveys required
Gomphus kauffmanii	3	B	Low number of records in Northwest Forest Plan area; not likely under-collected or under-reported. Pre-disturbance survey not practical; multi-year surveys required.
Gymnomyces abietis sp. nov. (*Gymnomyces* sp. nov. #Trappe 1690, 1706, 1710; *Gymnomyces* sp. nov. #Trappe 4703, 5576; *Gymnomyces* sp. nov. #Trappe 5052; *Gymnomyces* sp. nov. #Trappe 7545; *Martellia monticola*; *Martellia* sp. nov. #Trappe 1700; *Martellia* sp. nov. #Trappe 311; *Martellia* sp. nov. #Trappe 5903)	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Gymnopilus punctifolius	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Gyromitra californica	3, 4	E	No known sites in Northwest Forest Plan area. FEMAT persistence concern related to cumulative effects and non-habitat factors. Pre-disturbance survey not practical; multi-year surveys required.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Gyromitra esculenta	3, 4	F	Low/moderate number of records in Northwest Forest Plan area; poisonous; under-reported. Late-successional/old-growth forest association questionable. Pre-disturbance survey not practical; multi-year surveys required.
Gyromitra gigas (Gyromitra montana)	3, 4	E	No known sites in Northwest Forest Plan area. FEMAT persistence concern related to cumulative effects and non-habitat factors. Pre-disturbance survey not practical; multi-year surveys required.
Gyromitra infula	3, 4	E	Low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association questionable. Pre-disturbance survey not practical; multi-year surveys required; difficult to distinguish.
Gyromitra melaleucoides	3, 4	E	No known sites in Northwest Forest Plan area. FEMAT persistence concern related to cumulative effects and non-habitat factors. Pre-disturbance survey not practical; multi-year surveys required.
Hebeloma olympianum (Hebeloma olympiana)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Helvella compressa	1, 3	Off	Not late-successional /old-growth forest associated; frequent in younger forests and highly disturbed sites. Not rare.
Helvella crassitunicata	1, 3	B	Low number of records in Northwest Forest Plan area; most federal; few recent. Pre-disturbance survey not practical; multi-year surveys required.
Helvella elastica	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Helvella maculata	1, 3	B	Low number of records in Northwest Forest Plan area; most non-federal. Pre-disturbance survey not practical; multi-year surveys required.
Hydnotrya inordinata sp. nov. (*Hydnotrya* sp. nov. #Trappe 787, 792)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Hydnotrya subnix sp. nov. *(Hydnotrya subnix* sp. nov. #Trappes #1861)	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Hydnum repandum	3	Off	Moderate number of records in Northwest Forest Plan area. Broad habitat requirements. Widely distributed. Protected sites and habitat.
Hydnum umbilicatum	3	B	Low number of records in Northwest Forest Plan area. Rarer than previously thought. Pre-disturbance survey not practical; multi-year surveys required.
Hydropus marginellus (Mycena marginella)	3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Hygrophorus caeruleus	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Hygrophorus karstenii	3	B	No information; little known. Probably rare. Pre-disturbance survey not practical; multi-year surveys required.
Hygrophorus vernalis	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Hypomyces luteovirens	3	B	Low number of records in Northwest Forest Plan area; only one since 1993. Pre-disturbance survey not practical; multi-year survey required.
Leucogaster citrinus	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Leucogaster microsporus	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Macowanites chlorinosmus	1, 3	B	Low number of records in Northwest Forest Plan area; most non-federal. Pre-disturbance survey not practical; multi-year surveys required.
Macowanites lymanensis	1, 3	B	Only one known site in Northwest Forest Plan area; in campground. Pre-disturbance survey not practical; multi-year surveys required.
Macowanites mollis	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Marasmius applanatipes	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.

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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Martellia fragrans	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Martellia idahoensis	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Martellia maculata (*Elaphomyces* sp. nov. #Trappe 1038)	1, 3	Off	Now common; considered part of a species that passed FEMAT screens as adequately provided for in Northwest Forest Plan. Preferred high-elevation habitat is largely in protected land allocations.
Martellia nondistincta sp. nov. (*Martellia* sp. nov. #Trappe 649)	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Mycena hudsoniana	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Mycena monticola	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Mycena overholtsii	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Mycena quinaultensis	1, 3	B	Low number of records in Northwest Forest Plan area; most historic, although likely under-collected. Pre-disturbance survey not practical; multi-year surveys required.
Mycena tenax	3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Mythicomyces corneipes	3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Neolentinus adhaerens	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Neolentinus kauffmanii	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Neournula pouchetii	1, 3	B	Low number of records in Northwest Forest Plan area; about half federal. Pre-disturbance survey not practical; multi-year surveys required.
Nivatogastrium nubigenum	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required; timing critical; high elevation at snow line.

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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Octavianina cyanescens (*Octavianina* sp. nov. #Trappe 7502)	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Octavianina macrospora	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Octavianina papyracea	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Omphilina ericetorum (Phytoconis ericetorum)	3, 4	Off	More common than thought; no concern for persistence. Broadly distributed; wide range of habitats.
Otidea leporina	3, PB	B	Low number of records in Northwest Forest Plan area; half federal. Pre-disturbance survey not practical; multi-year surveys required.
Otidea onotica	3, PB	E	Low number of records in Northwest Forest Plan area, but significant question on late-successional/old-growth forest association; rarity. Pre-disturbance survey not practical; multi-year surveys required.
Otidea smithii	1,3, PB	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia attenuata	3	D	Moderate number of records in Northwest Forest Plan area, including new records. Widespread. Habitat relatively common. Need to determine high-priority sites for management. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia californica (Phaeocollybia scatesiae)	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia carmanahensis	1, 3	Off	No longer considered a separate species; combined with *Phaeocollybia californica*, which is already covered by the Survey and Manage Standard and Guideline.
Phaeocollybia dissiliens	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia fallax	3	D	Moderate number of records in Northwest Forest Plan area; half federal; half in reserves. Widespread; habitat relatively common. Need to determine high-priority sites for management. Pre-disturbance survey not practical; multi-year surveys required.

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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Phaeocollybia gregaria	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia kauffmanii	1, 3	D	Low/moderate number of records in Northwest Forest Plan area; most new; likely under-reported. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia olivacea	3	B	Low/moderate number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia oregonensis	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia piceae	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia pseudofestiva	3	B	Low number of records in Northwest Forest Plan area. Rarer than previously thought. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia scatesiae	1, 3	B	Low number of records in Northwest Forest Plan area; few on federal lands. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia sipei	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Phaeocollybia spadicea	3	B	Low/moderate number of records in Northwest Forest Plan area; included in extensive surveys but not being found; still rare. Pre-disturbance survey not practical; multi-year surveys required.
Phellodon atratus (Phellodon atratum)	3	B	Low number of records in Northwest Forest Plan area; most non-federal. Pre-disturbance survey not practical; multi-year surveys required.
Pholiota albivelata	1, 3	B	Low number of records in Northwest Forest Plan area; most historic; few on federal lands. Pre-disturbance survey not practical; multi-year surveys required.
Pithya vulgaris	1, 3	B	Low number of records in Northwest Forest Plan area; most on federal lands. Pre-disturbance survey not practical; multi-year surveys required.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
Note: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3).

Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Plectania melastoma	3	F	Low/moderate number of records in Northwest Forest Plan area; possibly not rare. Late-successional/old-growth forest association questionable. Pre-disturbance survey not practical; multi-year surveys required.
Plectania milleri	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Podostroma alutaceum	3	B	Low number of records in Northwest Forest Plan area. Under-reported and protected. Pre-disturbance survey not practical; multi-year surveys required.
Polyozellus multiplex	1,3, PB	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Pseudaleuria quinaultiana	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria abietina	3	B	Very low number of records in Northwest Forest Plan area; all historic; no recent records despite surveys. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria amyloidea	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria araiospora	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria aurantiisiccescens	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria botryis var. *aurantiiramosa*	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria celerivirescens	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria claviramulata	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria concolor f. marrii	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Ramaria concolor f. tsugina	3	B	Only one known site in Northwest Forest Plan area; historic. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria coulterae	3	Off	Not in Northwest Forest Plan area
Ramaria cyaneigranosa	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria fasciculata var. *sparsiramosa*	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria gelatiniaurantia	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria gracilis	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria hilaris var. *olympiana*	1, 3	B	Only one known site in Northwest Forest Plan area Pre-disturbance survey not practical; multi-year surveys required.
Ramaria largentii	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria lorithamnus	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria maculatipes	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria rainierensis	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria rubella var. *blanda*	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria rubribrunnescens	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria rubrievansecens	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Ramaria rubripermanens	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria spinulosa var. *diminutiva* (*Ramaria spinulosa*)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria stuntzii	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria suecica	3	B	Low number of records in Northwest Forest Plan area; most historic. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria thiersii	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Ramaria verlotensis	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Rhizopogon abietis	3	B	Very low number of records in Northwest Forest Plan area; rare. Pre-disturbance survey not practical; requires expert to identify; also requires multi-year surveys.
Rhizopogon atroviolaceus	3	B	Low number of records in Northwest Forest Plan area; rare. Pre-disturbance survey not practical; multi-year surveys required.
Rhizopogon brunneiniger	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Rhizopogon chamaleontinus (*Rhizopogon* sp. nov. #Trappe 9432)	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Rhizopogon ellipsosporus (*Alpova* sp. nov. # Trappe 9730)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Rhizopogon evadens var. *subalpinus*	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Rhizopogon exiguus	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Rhizopogon flavofibrillosus	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Rhizopogon inquinatus	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Rhizopogon parksii (*Rhizopogon* sp. nov. #Trappe1692; *Rhizopogon* sp. nov. #Trappe 1698)	1, 3	Off	Not late-successional/old-growth forest associated. Very common. Well distributed.
Rhizopogon truncatus	3	D	Low/moderate number of records in Northwest Forest Plan area, but data missing; under-collected. Most known site in Northwest Forest Plan area in reserves. Can be in young stands. Pre-disturbance survey not practical; multi-year surveys required.
Rhodocybe speciosa	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Rickenella swartzii (Rickenella setipes)	3	B	Very low number of records in Northwest Forest Plan area; only vague locations. Pre-disturbance survey not practical; multi-year surveys required.
Russula mustelina	3	E	Only one known site in Northwest Forest Plan area. Need information on late-successional/old-growth forest association, habitat, and rarity. Pre-disturbance survey not practical; multi-year surveys required.
Sarcodon fuscoindicum	3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Sarcodon imbricatus	3	B	Low number of records in Northwest Forest Plan area; most historic; only seven current known sites in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Sarcosoma latahense (Plectania latahensis)	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Sarcosoma mexicana, Oregon Coast Range and Oregon Willamette Valley provinces.	3, PB	Off	Moderate/high number of records in Northwest Forest Plan area; many new records. Most locations not in late-successional/old-growth forest. Not at risk.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Sarcosoma mexicana, outside Oregon Coast Range and Oregon Willamette Valley provinces.	3, PB	E	Few records in this portion of Northwest Forest Plan area. Question on late-successional/old-growth forest association; degree of rarity. Pre-disturbance survey not practical; multi-year surveys required.
Sarcosphaera eximia	3	F	Low/moderate number of records in Northwest Forest Plan area, but considered common. Late-successional/old-growth forest association questionable; seen in disturbed sites. Pre-disturbance survey not practical; multi-year surveys required.
Sedecula pulvinata	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Sowerbyella rhenana (Aleuria rhenana)	1,3, PB	B	Low number of records in Northwest Forest Plan area; rare. Pre-disturbance survey not practical; multi-year surveys required.
Sparassis crispa	3	D	Low/moderate number of records in Northwest Forest Plan area; half federal; very under-reported. Heavily harvested. Pre-disturbance survey not practical; multi-year surveys required.
Spathularia flavida	3	F	Low/moderate number of records in Northwest Forest Plan area. Late-successional/old-growth forest association questionable; found on Christmas tree farms. Pre-disturbance survey not practical; multi-year surveys required.
Stagnicola perplexa	3	B	Very low number of records in Northwest Forest Plan area; last collection 1987. Pre-disturbance survey not practical; multi-year survey required.
Thaxterogaster pavelekii sp. nov. (*Thaxterogaster* sp. nov. #Trappe 4867, 6242, 7427, 7962, 8520)	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Thaxterogaster pingue	3	Off	Widespread; locally abundant. Potential high-elevation habitat; mostly in protected land allocations. Less rare than thought. Not at risk.
Tremiscus helvelloides (Phlogoitis helvelloides)	3, 4	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Tricholoma venenatum	1, 3	B	Only one known site in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
FUNGI (continued)			
Tricholomopsis fulvescens	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Tuber asa (*Tuber* sp. nov. #Trappe 2302)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Tuber pacificum sp. nov. (*Tuber* sp. nov. #Trappe 12493)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; multi-year surveys required.
Tylopilus porphyrosporus (Tylopilus pseudoscaber)	1 ,3	D	Low/moderate number of records in Northwest Forest Plan area. Persistent at historic sites, even impacted ones. Pre-disturbance survey not practical; multi-year surveys required.
LICHENS			
Bryoria pseudocapillaris	1, 3	E	Low number of records in Northwest Forest Plan area; very rare. Narrowly distributed along coast. Late-successional/old-growth forest association. questionable; grows on shrubs and shore pine. Pre-disturbance survey practical.
Bryoria spiralifera	1, 3	E	Low number of records in Northwest Forest Plan area; very rare. Narrowly distributed along coast. Late-successional/old-growth forest association questionable; grows on shrubs and shore pine. Pre-disturbance survey practical.
Bryoria subcana (syn. *Alectoria subcana*)	1, 3	B	Very low number of records in Northwest Forest Plan area; very rare. Narrowly distributed along coast. Pre-disturbance survey not practical; requires hazardous chemical test.
Bryoria tortuosa, East of crest of the Cascades	1, 3	Off	Moderate number of records in Northwest Forest Plan area; many new. Provided for by Northwest Forest Plan; not at risk
Bryoria tortuosa, West of crest of the Cascades	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; difficult identification.
Buellia oidalea	1, 3	E	Low number of records in Northwest Forest Plan area; few protected. Need to determine late-successional/old-growth forest association. Pre-disturbance survey not practical; very difficult.
Calicium abietinum	4	B	Very low number of records in Northwest Forest Plan area, though under-reported. Pre-disturbance survey not practical.
Calicium adaequatum	4	Off	Not late-successional/old-growth forest associated.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
LICHENS (continued)			
Calicium adspersum	4	F	Little known; no new records. Need to determine late-successional/old-growth forest association. Uncertain distribution and rarity.
Calicium glaucellum	4	Off	Not late-successional/old-growth forest associated. Wide range of habitats.
Calicium viride	4	Off	Moderate number of records in Northwest Forest Plan area. Most common pin lichen; widespread. Provided for under Northwest Forest Plan.
Cetrelia cetrarioides	4	F	Moderate number of records in Northwest Forest Plan area; most since 1993. Half of the known sites in reserve land allocations. Broad distribution. Need to determine late-successional/old-growth forest association.
Chaenotheca brunneola	4	Off	Not late-successional/old-growth forest associated. Common; widespread. Wide range of habitats.
Chaenotheca chrysocephala	4	Off	Not late-successional/old-growth forest associated. Wide range of habitats.
Chaenotheca ferruginea	4	Off	Not late-successional/old-growth forest associated. Widespread.
Chaenotheca furfuracea	4	Off	Moderate/low number but under-reported. Widespread and common. Provided for under Northwest Forest Plan.
Chaenotheca subroscida	4	F	Little known; no new records. Need to determine late-successional/old-growth forest association. Uncertain distribution and rarity.
Chaenothecopsis pusilla (syn. *Chaenothecopsis subpusilla*, *Calcium asikkalense*, *Calcium floerkei, Calcium pusillum, Calcium subpusillum)*	4	F	Little known; no new records. Need to determine late-successional/old-growth forest association. Uncertain distribution and rarity.
Cladonia norvegica	3	E	Low number of records in Northwest Forest Plan area; half in reserve allocations; most since 1993. Need to determine late-successional/old-growth forest association. Pre-disturbance survey very difficult.
Collema nigrescens in Oregon Klamath, California Klamath, and California Coast Provinces	4	Off	Moderate/High number of records in Northwest Forest Plan area. Well-distributed. Many new records.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
LICHENS (continued)			
Collema nigrescens, remainder of range	4	F	Low number of records in Northwest Forest Plan area, but not indicative of rarity because habitat is naturally rare on forests and would likely be missed in ecology plot surveys that have produced locations for other species. Need to determine late-successional/old-growth forest association. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Cyphelium inquinans	4	Off	Not late-successional/old-growth forest associated. Many new records despite limited survey effort and cryptic/small size. Common; widespread.
Dendriscocaulon intricatulum	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; cryptic.
Dermatocarpon luridum	1, 3	E	Low number of records in Northwest Forest Plan area. Lack of clear late-successional/old-growth forest association and impact of Aquatic Conservation Strategy objectives on this aquatic species.
Erioderma sorediatum	1, 3	E	Low number of records in Northwest Forest Plan area; very rare. Pre-disturbance survey not practical; require chemical test. Late-successional/old-growth forest association questionable; grows on dune shrubs.
Heterodermia leucomelos (syn. *Anaptychia leucomelaena, Heterodermia leucomelaena*)	1, 3	E	Low number of records in Northwest Forest Plan area; all non-federal. Late-successional/old-growth forest association questionable. Associated with coastal Sitka spruce, shore pine, oak woodland, and redwood. Pre-disturbance survey practical.
Heterodermia sitchensis	3	E	No known sites in Northwest Forest Plan area, but suspected habitat; need to determine range in Northwest Forest Plan area. Pre-disturbance survey practical.
Hydrothyria venosa	1, 3	Off	Moderate number of records in Northwest Forest Plan area. Provided for in Northwest Forest Plan, including riparian reserves and Aquatic Conservation Strategy objectives.
Hypogymnia duplicata (syn. *Hypogymnia elongata*)	1, 2, 3	A	Low/moderate number of records in Northwest Forest Plan area; most federal. Pre-disturbance survey practical.
Hypogymnia oceanica	1, 3	Off	Moderate number of records in Northwest Forest Plan area. Large increase in records since FEMAT. Reserve protection. More common than previously known; widely distributed.

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Species	NFP ROD Status	Alt. 1	Comments
LICHENS (continued)			
Hypogymnia vittata (Hygomnia vittiata)	3	E	No known sites in Northwest Forest Plan area, but suspected habitat; need to determine range in Northwest Forest Plan area. No information on late-successional/old-growth forest association. Pre-disturbance survey practical.
Hypotrachyna revoluta (syn. *Parmelia revoluta*)	3	E	No known sites in Northwest Forest Plan area; need to determine range in Northwest Forest Plan area. No information on late-successional/old-growth forest association. Pre-disturbance survey practical.
Kaernefeltia californica (Cetraria californica)	1, 3	F	Low/moderate number of records in Northwest Forest Plan area; few protected. Grows on many species; broad distribution. Need to determine late-successional/old-growth forest association. Pre-disturbance survey not practical; very difficult.
Leioderma sorediatum	1, 3	E	Very low number of records in Northwest Forest Plan area. Questionable late-successional/old-growth forest association; shore pine. Pre-disturbance survey practical.
Leptogium brebissonii	1, 3	E	Low number of records in Northwest Forest Plan area. Questionable late-successional/old-growth forest association; associated with shore pine. Pre-disturbance survey practical.
Leptogium burnetiae var. *hirsutum* (syn. *Leptogium hirsutum*)	4	E	Only one known site in Northwest Forest Plan area; no new records. Little known; uncertain distribution and rarity. Need to determine late-successional/old-growth forest association. Pre-disturbance survey practical.
Leptogium cyanescens	4	E	Very low number of records in Northwest Forest Plan area; no new records. Little known; uncertain distribution and rarity. Need to determine late-successional/old-growth forest association. Pre-disturbance survey practical.
Leptogium rivale	1, 3	E	Low number of records in Northwest Forest Plan area; most federal. Need to determine late-successional/old-growth forest association. Pre-disturbance survey very difficult; not practical.
Leptogium saturninum	4	F	Low/moderate number records in Northwest Forest Plan area. Need to determine late-successional/old-growth forest association.

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Species	NFP ROD Status	Alt. 1	Comments
LICHENS (continued)			
Leptogium teretiusculum	4	E	Very low number of records in Northwest Forest Plan area; no new records. Little known; uncertain distribution and rarity. Need to determine late-successional/old-growth forest association. Pre-disturbance survey practical.
Lobaria hallii	1, 3	Off	High number of records in Northwest Forest Plan area; not at risk. Not associated with late-successional/old-growth forest. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Lobaria linita	1, 2, 3	A	Limit to variety *tenuior*; other variety not late-successional/old-growth forest associated. Moderate/low number of records in Northwest Forest Plan area despite ecology plot surveys. Low density/number of individuals at sites. Pre-disturbance survey practical.
Lobaria oregana	4	Off	High number of records in Northwest Forest Plan area; not at risk. Widely distributed. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Lobaria pulmonaria	4	Off	High number of records in Northwest Forest Plan area; not at risk. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Lobaria scrobiculata	4	Off	Not late-successional/old-growth forest associated. Common; widespread.
Loxosporopsis corallifera (*Loxospora* sp. nov. "*corallifera*")	1, 3	Off	Not late-successional/old-growth forest associated. Habitat protected. Widespread.
Microcalicium arenarium	4	F	Little known; no new records. Uncertain distribution and rarity.
Mycocalicium subtile	4	Off	Not late-successional/old-growth forest associated. Many new records despite limited survey effort and cryptic/small size.
Nephroma bellum	4	Off	Moderate number of records in Northwest Forest Plan area. Wide distribution and habitat. Provided for in Northwest Forest Plan. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Nephroma helveticum	4	Off	Moderate/high number of records in Northwest Forest Plan area; protected sites and habitat. Wide distribution. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.

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Species	NFP ROD Status	Alt. 1	Comments
LICHENS (continued)			
Nephroma isidiosum	3	E	No known sites in Northwest Forest Plan area, but suspected habitat. Need to determine range in Northwest Forest Plan area.
Nephroma laevigatum	4	Off	Moderate number of records in Northwest Forest Plan area; protected sites and habitat. Wide distribution. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Nephroma occultum	1, 3	B	Low/moderate number of records in Northwest Forest Plan area; most in reserve allocations. Geographically scattered. Pre-disturbance surveys not practical; canopy lichen that requires climbing.
Nephroma parile	4	Off	Not late-successional/old-growth forest associated. Adequately protected by Northwest Forest Plan. Wide distribution. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Nephroma resupinatum	4	Off	Not late-successional/old-growth forest associated. Adequately protected by Northwest Forest Plan. Wide distribution. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Niebla cephalota (syn. *Desmazieria cephaolta, Ramalina cephalota*)	1, 3	E	Low number of records in Northwest Forest Plan area; most non-federal. Late-successional/old-growth forest association questionable; associated with coastal habitat. Pre-disturbance survey practical.
Pannaria leucostictoides	4	Off	Not late-successional/old-growth forest associated. Adequately protected by Northwest Forest Plan. Widespread. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Pannaria mediterranea	4	Off	Not late-successional/old-growth forest associated. Adequately protected by Northwest Forest Plan. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Pannaria rubiginosa	1, 3	E	Low number of records in Northwest Forest Plan area. Widespread but scattered. Late-successional/old-growth forest association questionable. Pre-disturbance survey practical.
Pannaria saubinetii	4	Off	Many records; most since 1993. Broad habitat and widespread. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Peltigera collina	4	Off	Not late-successional/old-growth forest associated. Widespread. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.

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Species	NFP ROD Status	Alt. 1	Comments
LICHENS (continued)			
Peltigera neckeri	4	F	Low number of records in Northwest Forest Plan area, but limited survey effort; question if it is uncommon. Need to determine late-successional/old-growth forest association; may be found more in young stands than older stands. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Peltigera pacifica	4	F	Low/moderate number of records in Northwest Forest Plan area but limited survey effort; thought to be widespread. Need to determine late-successional/old-growth forest association. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Pilophorus nigricaulis	1, 3	Off	Not late-successional/old-growth forest associated.
Platismatia lacunosa	4	C	Moderate number of records in Northwest Forest Plan area; most in reserve allocations. Uncommon, but not rare. Need to determine high-priority sites for management. Air quality concerns beyond purview of Northwest Forest Plan ; air quality managed under other laws. Pre-disturbance survey practical.
Pseudocyphellaria anomala	4	Off	Very high number of records in Northwest Forest Plan area. Common and widespread. Provided for in Northwest Forest Plan. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Pseudocyphellaria anthraspis	4	Off	High number of records in Northwest Forest Plan area. Common and widespread. Provided for in Northwest Forest Plan. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Pseudocyphellaria crocata	4	Off	Moderate/high number of records in Northwest Forest Plan area. Common and widespread. Provided for in Northwest Forest Plan. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Pseudocyphellaria sp. 1 (Pseudocyphellaria mougeotiana)	1, 3	B	Very low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; taxonomic difficulties
Pseudocyphellaria rainierensis	1, 2, 3	A	Low/moderate number of records in Northwest Forest Plan area. Sensitive to pollution. Pre-disturbance survey practical.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
Note: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3).

Species	NFP ROD Status	Alt. 1	Comments
LICHENS (continued)			
Pyrrhospora quernea (syn. *Lecidea quernea, Protoblastenia quernea*)	1, 3	E	Low number of records in Northwest Forest Plan area. Questionable late-successional/old-growth forest association. Pre-disturbance surveys very difficult; require hazardous chemical test.
Ramalina pollinaria	3	E	Low number of records in Northwest Forest Plan area. Questionable late-successional/old-growth forest association. Pre-disturbance survey concern; difficult to determine where to survey; destructive sampling may impact species.
Ramalina thrausta	4	D	Moderate number of records in Northwest Forest Plan area; most in reserve allocations. Uncommon, but not rare. Need to determine high-priority sites for management. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Stenocybe clavata	4	B	Low number of records in Northwest Forest Plan area; rare. Lack information on site protection and ownership. Pre-disturbance survey not practical
Stenocybe major	4	Off	Not late-successional/old-growth forest associated.
Sticta arctica	1, 3	Off	Not late-successional/old-growth forest associated.
Sticta beauvoisii	4	F	Little known; no new records. Need to determine if species occurs in Northwest Forest Plan area. Uncertain distribution and rarity.
Sticta fuliginosa	4	Off	Moderate/high number of records in Northwest Forest Plan area. Common; widespread. Provided for in Northwest Forest Plan. Broad habitat. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Sticta limbata	4	Off	Moderate/high number of records in Northwest Forest Plan area. Common; widespread. Provided for in Northwest Forest Plan. Broad habitat. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
Teloschistes flavicans	1, 3	A	Low number of records in Northwest Forest Plan area. Pre-disturbance survey practical; distinctive.
Tholurna dissimilis, south of Columbia River	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; cryptic and small or unreachable for surveys where in tops of trees.
Tholurna dissimilis, north of Columbia River	1, 3	Off	Low number of records in Northwest Forest Plan area, but protected habitat and sites. High elevation species.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
Note: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3).

Species	NFP ROD Status	Alt. 1	Comments
LICHENS (continued)			
Usnea hesperina	1, 3	E	Low number of records in Northwest Forest Plan area; few protected. Need to determine late-successional/old-growth forest association. Pre-disturbance survey very difficult.
Usnea longissima	4	Off	Moderate/high number of records in Northwest Forest Plan area. Late-successional/old-growth forest association questionable. Riparian reserves may protect. Air quality concerns beyond purview of Northwest Forest Plan; air quality managed under other laws.
BRYOPHYTES			
Antitrichia curtipendula	4	Off	Moderate/high number of records in Northwest Forest Plan area; under-reported. Fairly well protected under Northwest Forest Plan; protection of reserves adequate. Common; well distributed. Broad range of habitats.
Bartramiopsis lescurii	1, 3	Off	Not late-successional/old-growth forest associated; rock talus.
Brotherella roellii	1,3, PB	E	Low number of records in Northwest Forest Plan area; all historic. May not be late-successional/old-growth forest associated; need Washington habitat data. Pre-disturbance survey practical, but identification difficult.
Buxbaumia viridis	PB	D	Low/moderate number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; cryptic nature and timing problems.
Diplophyllum albicans	1, 3	D	Low/moderate number of records in Northwest Forest Plan area; most records historic; half federal. Pre-disturbance survey not practical.
Diplophyllum plicatum	1, 2	B	Low number of records in Northwest Forest Plan area; one since 1993. Pre-disturbance survey not practical; identification problems; detection difficult (cryptic).
Douinia ovata	4	Off	Low number of records in Northwest Forest Plan area, but FEMAT rating of outcome A and B = 100%. Widespread. Was included in Survey and Manage Standard and Guideline based on air pollution concerns and cumulative effects; air pollution no longer a concern for this species.
Encalypta brevicolla v. crumiana	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; need electron microscope.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
BRYOPHYTES (continued)			
Herbertus aduncus	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; small and difficult to locate; lab identification required; survey of cliffs may be dangerous.
Herbertus sakuraii	1, 3	Off	Not late-successional/old-growth forest associated; Saddle Mountain species; North Pacific disjunct; cliff associate.
Iwatsukiella leucotricha	1, 3	B	Very low number of records in Northwest Forest Plan area; none federal. Pre-disturbance survey not practical; small and difficult to locate; identification difficult.
Kurzia makinoana	1, 2	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; need expert to identify; very small.
Marsupella emarginata v. aquatica	1, 2	B	Very low number of records in Northwest Forest Plan area; most federal. Pre-disturbance survey not practical; taxonomic variety problem; expert identification required.
Orthodontium gracile	1, 3	A	Low number of records in Northwest Forest Plan area; most non-federal in State parks. Pre-disturbance survey practical, although can be confused with other species.
Plagiochila satoi	1, 3	Off	Now considered part of common and widespread species, *Plagiochila asplenioides*, which is considered protected by FEMAT.
Plagiochila semidecurrens	1, 3	Off	Not late-successional/old-growth forest associated; Saddle Mountain species; North Pacific disjunct; cliff associate.
Pleuroziopsis ruthenica	1, 3	Off	Highly likely not in Northwest Forest Plan area; only one very questionable record.
Ptilidium californicum, California only	1,2, PB	A	Low number of records in Northwest Forest Plan area in California. Very limited distribution. Pre-disturbance survey practical.
Ptilidium californicum, Oregon, South of Lane-Douglas County line extended east to boundary of Northwest Forest Plan.	1,2, PB	F	Determine extent of area where rarity and persistence are of concern. Under-reported.
Ptilidium californicum, Washington and Oregon, north of Lane-Douglas County line extended east to boundary of Northwest Forest Plan.	1,2, PB	Off	Not indicated of concern by FEMAT process. Common; under-reported.
Racomitrium aquaticum	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; expert identification required.
Radula brunnea	1, 3	Off	Not late-successional/old-growth forest associated; Saddle Mountain species; North Pacific disjunct; cliff associate.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
BRYOPHYTES (continued)			
Rhizomnium nudum	PB	B	Low number of records in Northwest Forest Plan area; most pre-1980 and likely not extant. Degree of protection in reserves uncertain. Pre-disturbance survey not practical.
Schistostega pennata	PB	A	Low number of records in Northwest Forest Plan area. Pre-disturbance survey practical; distinctive.
Scouleria marginata	4	Off	Not late-successional/old-growth forest associated.
Tetraphis geniculata	1,3, PB	A	Low number of records in Northwest Forest Plan area; rare. Restricted habitat. Not likely to find many new records with project surveys. Pre-disturbance survey practical.
Tritomaria exsectiformis	1, 2	B	Low number of records in Northwest Forest Plan area; rare. Pre-disturbance survey not practical; lab verification; confusion with common species; expert verification required.
Tritomaria quinquedentata	1, 3	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; need expert identification.
Ulota megalospora	PB	Off	Not late-successional/old-growth forest associated. Common.
VERTEBRATES			
Del Norte salamander *Plethodon elongatus*	2, PB	D	Moderate/high number of records in Northwest Forest Plan area. Need to determine high-priority sites for management. Pre-disturbance survey practical.
Larch Mountain salamander *Plethodon larselli*	2, PB	C	Low/moderate number of records in Northwest Forest Plan area; moderate level of survey. Need to determine late-successional/old-growth forest association. Need to determine high-priority sites for management. Restricted habitat; not likely to find many new records with project surveys. Pre-disturbance survey practical.
Shasta salamander *Hydromantes shastae*	1,2, PB	A	Low number of records in Northwest Forest Plan area; limited survey; no new records. Need to determine late-successional/old-growth forest association; based on very limited survey. Need to determine high-priority sites for management. Restricted habitat; not likely to find many new records with project surveys. Pre-disturbance survey practical, but not likely to get much information from these surveys.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
VERTEBRATES (continued)			
Siskiyou Mountains salamander *Plethodon stormi*	1,2, PB	C	Moderate number of records in Northwest Forest Plan area. Limited range/habitat. Need to determine high-priority sites for management. Restricted habitat; not likely to find many new records with project surveys. Pre-disturbance survey practical.
Van Dyke's salamander *Plethodon vandykei* (Cascade population only)	2	A	Low number of records in Northwest Forest Plan area; low level of survey yet. Need to determine late-successional/old-growth forest association but deferring to FEMAT. Restricted habitat; not likely to find many new records with project surveys. Pre-disturbance survey practical.
Great Gray Owl *Strix nebulosa*	PB	C	Question persistence concern. Have enough information to develop species-specific management. Concerns more related more to non-late-successional/old-growth forest issues and juxtaposition of habitat; landscape issues. Recommend developing separate standard and guideline with adaptive management connection. Need to determine high-priority sites for management (such as nests) and determine appropriate management at sites. Pre-disturbance survey practical.
Red Tree Vole *Arborimus longicaudus*	2	C	Moderate number of sites. Need to determine appropriate management for this species, including high-priority sites. Pre-disturbance survey practical.
MOLLUSKS			
Ancotrema voyanum	PG	F	Low/moderate number of sites; about half new sites, but with little survey effort; not thought to be very rare. Most sites in LSR or Key Watersheds. Need to determine late-successional/old-growth forest association.
Cryptomastix devia	1, 2	A	Low number of records in Northwest Forest Plan area; most non-federal and historic. Pre-disturbance survey practical.
Cryptomastix hendersoni	1, 2	A	Low number of records in Northwest Forest Plan area; most on private lands. Pre-disturbance survey practical.
Deroceras hesperium	1, 2	E	Reported from two areas in Northwest Forest Plan area; last in 1977 on Olympic Peninsula. May not be extant. Pre-disturbance survey practical.
Fluminicola n. sp. 1	1,2, PG	A	Very low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association needs to be determined but deferring to FEMAT. Pre-disturbance survey practical.
Fluminicola n. sp. 2	1, 2	E	Range issue; habitat exists within Northwest Forest Plan; unknown occupancy.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
Note: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3).

Species	NFP ROD Status	Alt. 1	Comments
MOLLUSKS (continued)			
Fluminicola n. sp. 3	1,2, PG	A	Very low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association needs to be determined but deferring to FEMAT. Pre-disturbance survey practical.
Fluminicola n. sp. 11	1,2, PG	A	Very low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association needs to be determined but deferring to FEMAT: Pre-disturbance survey practical.
Fluminicola n. sp. 14	1, 2	A	Very low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association needs to be determined but deferring to FEMAT. Pre-disturbance survey practical.
Fluminicola n. sp. 15	1, 2	A	Very low number of records in Northwest Forest Plan area; all non-federal. Pre-disturbance survey practical.
Fluminicola n. sp. 16	1, 2	A	Very low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association needs to be determined but deferring to FEMAT. Pre-disturbance survey practical.
Fluminicola n. sp. 17	1, 2	A	Very low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association needs to be determined but deferring to FEMAT. Pre-disturbance survey practical.
Fluminicola n. sp. 18	1, 2	A	Very low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association needs to be determined, but deferring to FEMAT. Pre-disturbance survey practical.
Fluminicola n. sp. 19	1,2, PG	E	Range issue; habitat exists within Northwest Forest Plan; unknown occupancy
Fluminicola n. sp. 20	1,2, PG	E	Range issue; habitat exists within Northwest Forest Plan; unknown occupancy.
Fluminicola seminalis	1,2, PG	A	Very low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association needs to be determined but deferring to FEMAT. Pre-disturbance survey practical.
Helminthoglypta hertleini	1, 2	A	Low number of records in Northwest Forest Plan area; most non-federal. Pre-disturbance survey practical.
Helminthoglypta talmadgei	1, 2	A	Low/moderate number of records in Northwest Forest Plan area; only two known records in reserve allocations since 1993. Pre-disturbance survey practical.
Hemphillia burringtoni *(Hemphillia barringtoni)*	1, 2	A	Low number of records in Northwest Forest Plan area. Pre-disturbance survey practical.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
MOLLUSKS (continued)			
Hemphillia glandulosa	1, 2	A	Low number of records in Northwest Forest Plan area. Pre-disturbance survey practical.
Hemphillia malonei	1, 2	C	Moderate number of records in Northwest Forest Plan area but clumped. Need to determine high-priority sites for management; habitat issues. Pre-disturbance survey practical.
Hemphillia pantherina	1, 2	E	Only one historic record in Northwest Forest Plan area; has not been relocated. May not be extant. Pre-disturbance survey practical.
Juga (O) n. sp. 2	1, 2	A	Very low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association needs to be determined, but deferring to FEMAT. Pre-disturbance survey practical.
Juga (O) n. sp. 3	1, 2	A	Very low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association needs to be determined, but deferring to FEMAT. Pre-disturbance survey practical.
Lyogyrus n. sp. 1	1, 2	A	Very low number of records in Northwest Forest Plan area. Late-successional/old-growth forest association needs to be determined, but deferring to FEMAT. Pre-disturbance survey practical.
Lyogyrus n. sp. 2	1, 2	A	One known site in Northwest Forest Plan area which is at risk. Late-successional/old-growth forest association needs to be determined but deferring to FEMAT. Pre-disturbance survey practical.
Lyogyrus n. sp. 3	1, 2	A	One known site in Northwest Forest Plan area (non-federal) which is at risk Pre-disturbance survey practical.
Megomphix hemphilli,	1, 2	D	Moderate/High number of records in Northwest Forest Plan area. Need to determine high-priority sites for management; based on rarity, specific habitat, riparian hardwood conversion. Pre-disturbance survey practical.
Monadenia chaceana	1, 2	A	Low number of records in Northwest Forest Plan area; clustered; rare; half recent. Pre-disturbance survey practical, but difficult
Monadenia churchi	1, 2	C	Moderate number of records in Northwest Forest Plan area; many recent. More common that previously thought. Need to determine high-priority sites for management; based on rarity. Pre-disturbance survey practical.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
MOLLUSKS (continued)			
Monadenia fidelis klamathica	PG	E	Low number of records in Northwest Forest Plan area; no new sites. Unlikely to find many new sites, even with increased survey effort. Need to determine late-successional/old-growth forest association.
Monadenia fidelis minor	1, 2	A	Low number of records in Northwest Forest Plan area. Pre-disturbance survey practical.
Monadenia fidelis ochromphalus	PG	F	Low/moderate number of sites; about half new sites, but with little survey effort; not thought to be very rare. Need to determine late-successional/old-growth forest association.
Monadenia troglodytes troglodytes	1, 2	A	Low number of records in Northwest Forest Plan area. Very localized; cave mouths. Pre-disturbance survey practical.
Monadenia troglodytes wintu	1, 2	A	Low number of records in Northwest Forest Plan area; none recent. Very localized; cave mouths. Pre-disturbance survey practical.
Oreohelix n. sp.	1, 2	A	Low number of records in Northwest Forest Plan area; most since 1993. Pre-disturbance survey practical.
Pristoloma articum crateris	1,2, PG	B	Low number of records in Northwest Forest Plan area. Pre-disturbance survey not practical; very small; forest floor dweller (2.75 mm).
Prophysaon coeruleum , north of Oregon Highway 22	1, 2	A	Low number of records in Northwest Forest Plan area. Pre-disturbance survey practical.
Prophysaon coeruleum , south of Oregon Highway 22	1, 2	D	Moderate/high number of records in Northwest Forest Plan area. Need to determine high-priority sites for management. Pre-disturbance survey practical.
Prophysaon dubium	1, 2	D	Moderate number of records in Northwest Forest Plan area. Widespread distribution and habitat. Need to determine high-priority sites for management. Pre-disturbance survey practical.
Trilobopsis roperi	1, 2	A	Low number of records in Northwest Forest Plan area; most non-federal; none recent. Pre-disturbance survey practical.
Trilobopsis tehamana	1, 2	A	Very low number of records in Northwest Forest Plan area; most non-federal. Pre-disturbance survey practical.
Vertigo n. sp.	1, 2	A	Only one known site in Northwest Forest Plan area. Pre-disturbance survey practical, but difficult; very small.
Vespericola pressleyi	1, 2	A	Low number of records in Northwest Forest Plan area. Need to determine late-successional/old-growth forest association. Pre-disturbance survey practical, but very small; forest floor dweller.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
Note: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3).

Species	NFP ROD Status	Alt. 1	Comments
MOLLUSKS (continued)			
Vespericola shasta	1, 2	A	Low number of records in Northwest Forest Plan area. Need to determine late-successional/old-growth forest association. Pre-disturbance survey practical.
Vorticifex klamathensis sinitsini	1, 2	E	Range issue; habitat exists within Northwest Forest Plan; unknown occupancy. Need to determine late-successional/old-growth forest association.
Vorticifex n. sp. 1	1, 2	E	Range issue; habitat exists within Northwest Forest Plan; unknown occupancy. Need to determine late-successional/old-growth forest association.
VASCULAR PLANTS			
Allotropa virgata	1, 2	Off	High number of records in Northwest Forest Plan area. Increase in elevational distribution. Protected by Northwest Forest Plan due to extensive potential habitat in reserve allocations.
Arceuthobium tsugense mertensianae (Washington only)	4	F	Previously changed to only include subspecies in Washington and moved to Component 4. Low number of records in Northwest Forest Plan area, but all site and most habitat reserves. Mountain Hemlock parasite.
Bensoniella oregana (California only)	1, 2	A	Very low number of records in Northwest Forest Plan area; two federal; one introduced. Pre-disturbance survey practical.
Botrychium minganense - Oregon/California	1, 2	A	Low number of records in Northwest Forest Plan area; no mitigating information. Need to determine high-priority sites for management. Pre-disturbance survey practical.
Botrychium minganense - Washington	1, 2	Off	High number of sites in protected land allocations. Not late-successional/old-growth forest associated west of Cascade crest; secure under Northwest Forest Plan east of Cascade crest.
Botrychium montanum	1, 2	A	Low number of records in Northwest Forest Plan area; no information to indicate that persistence is not a concern. Need to determine high-priority sites for management. Pre-disturbance survey practical.
Clintonia andrewsiana	1, 2	Off	Not late-successional/old-growth forest associated. High potential for habitat protection under Northwest Forest Plan; 97% probability of Outcome A and B in FEMAT.
Coptis asplenifolia	1, 2	A	Very low number of records in Northwest Forest Plan area. Very restricted range; not expected outside northwest Washington. Pre-disturbance survey practical.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
Note: For taxa having two names, first name is current accepted name and one in parentheses is one used in the Northwest Forest Plan (Table C-3).

Species	NFP ROD Status	Alt. 1	Comments
VASCULAR PLANTS (continued)			
Coptis trifolia	1, 2	A	Very low number of records in Northwest Forest Plan area. Very small range. Not likely to find many new records with project surveys. Pre-disturbance survey practical.
Corydalis aquae-gelidae	1, 2	C	Moderate number of records in Northwest Forest Plan area. Temperature sensitive. Pre-disturbance survey practical.
Cypripedium fasciculatum (all of range)	1, 2	C	Moderate/high number of records in Northwest Forest Plan area but many sites with very low populations; still at risk. Expand to apply to all range within Northwest Forest Plan. Need to determine high-priority sites for management. Pre-disturbance survey practical.
Cypripedium montanum (all of range)	1, 2	C	Moderate/high number of records in Northwest Forest Plan area, but many sites with very low populations; still at risk. Expand to apply to all range within Northwest Forest Plan. Need to determine high-priority sites for management. Pre-disturbance survey practical.
Eucephalus vialis (Aster vialis)	1, 2	A	Low number of records in Northwest Forest Plan area. Populations isolated. Gap species in forests. Pre-disturbance survey practical.
Galium kamtschaticum - Olympic Peninsula, eastern Washington Cascades, western Cascades south of Snoqualmie Pass	1, 2	A	Low/moderate number of records in Northwest Forest Plan area; very rare. Restricted habitat; not likely to find many new records with project surveys. Pre-disturbance survey practical.
Galium kamtschaticum - western Cascades - North of Snoqualmie Pass	1, 2	Off	Moderate number of records in Northwest Forest Plan area; many records in reserve allocations. Lots of potential habitat in protected allocations.
Pedicularis howellii	1,2, PG	Off	Not late-successional/old-growth forest associated.
Platanthera orbiculata var. orbiculata (Habenaria orbiculata)	1, 2	C	Moderate number of records in Northwest Forest Plan area; small number of plants per site. Moderate/high likelihood of sites in reserve allocations. Does not occur on rare microsites. Pre-disturbance survey practical.

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Table F-1. Primary Factors for Recommending Placement of Species in Categories of Alternative 1.
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Species	NFP ROD Status	Alt. 1	Comments
VASCULAR PLANTS (continued)			
Scoliopus bigelovii	1, 2	Off	Low number of records in Northwest Forest Plan area, but considered too common to survey for, so very under-reported. Not late-successional/old-growth forest associated. Viability not at risk. Protected in Redwood National Park. 100% rating for Outcome A and B in FEMAT (but this was based on 180-year rotation in California in Option 9 that was dropped in Northwest Forest Plan).
ARTHROPODS			
Canopy herbivores (south range)	4	F	FEMAT concerns remain. No new information to indicate change in approach would be appropriate.
Coarse wood chewers (south range)	4	F	FEMAT concerns remain. No new information to indicate change in approach would be appropriate.
Litter and soil dwelling species (south range)	4	F	FEMAT concerns remain. No new information to indicate change in approach would be appropriate.
Understory and forest gap herbivores (south range)	4	F	FEMAT concerns remain. No new information to indicate change in approach would be appropriate.

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Appendix G

Additional Information on Timber Effects

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APPENDIX G

Additional Information on Timber Effects

Overview of Effects Analysis on Probable Sale Quantity (PSQ)

The Northwest Forest Plan standard and guideline requiring surveys prior to ground-disturbing activities (Survey and Manage Category 2) was phased in to allow time for developing Survey Protocols and beginning surveys. Surveys were required for seven species prior to fiscal year 1997 activities, and for the other 80 Category 2 species prior to fiscal year 1999 activities. Considerable information, both historic and pre-1998, has been gathered about Category 2 species sites. In addition, actual field surveys for most species were conducted on all administrative units in fiscal year 1998 and have continued through 1999. Since surveys move to different areas each year, depending on the schedule of proposed activities, it may be assumed that 1998 and 1999 survey results establish a trend that will be repeated in future years, until the entire suitable timber land base has been surveyed.

For Probable Sale Quantity (PSQ) analysis, the results of the two years of survey sites were compiled, with estimates of the acres essentially "removed" from timber production because of the requirement to manage known sites. These acres were projected over the estimated time frame (25 years) to survey all areas in the Matrix and Adaptive Management Areas. These acres differ among alternatives, based on which species receive known-site management, how many species get known-site management, and how long the species get known-site management, as well as the size of a "site." The number of acres being managed for known sites will have a direct effect on the Probable Sale Quantity. The process of projecting effects on the PSQ involved several detailed steps and data sets. These steps are outlined below and discussed in detail in a technical paper (Cadwell and Denton 1999) in the administrative record for this SEIS.

Analysis Outline

Pre-1999 Sites: GIS Data Set

Most information about known sites is stored in the Interagency Species Management System (ISMS) database, which is described in Appendix D of this SEIS. A thorough reference search from museums and herbarias, as well as information derived from surveys (including special status species, and Survey and Manage) through1998, has contributed to this database of more than 10,000 records. Each record was considered a known site where information was determined to be current and the location was recorded accurately enough to relocate the site during project planning. For analysis purposes, the known sites on nonfederal lands or in reserves were separated out using a Geographic Information System (GIS) to identify and calculate overlap in the areas managed around adjacent or nearby known sites of the same or different species, and to summarize acreage.

Riparian reserves are intermingled and scattered across the Matrix and Adaptive Management Areas. Because the available GIS data across the Northwest Forest Plan area cannot distinguish between lands inside and outside of riparian reserves, a

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reduction factor of 25 percent was developed with input from the administrative units. This 25 percent reduction factor was applied to the sites to account for those sites in riparian reserves. As noted above, the results of the Interagency Species Management System and GIS analyses were separated by date to use the 1998 data in estimating likely site detection rates in future years. Acres of pre-1998 known sites also affect PSQ, but these were held constant for the analysis.

1999 Known Sites: Non-GIS Data Set

To help with analysis in this SEIS, National Forests and BLM Districts supplied 1999 survey results and other information that was currently unavailable in the Interagency Species Management System database. This data included the number of known sites, by species, submitted in 1999; total acres that received required surveys in 1998 and 1999; and the portion of 1998 ISMS Matrix/Riparian Reserve sites likely to be within Riparian Reserves.

Acreage Projection Methods

The 1998 and 1999 sites were assigned a per-site acreage for each taxa or species to represent the average area managed per site as interpreted from the Management Recommendations for each species or representative species. Average site acreage was reduced for overlap as described above. For analysis purposes in projecting total expected future sites, the two years of data were added together, assuming they represented two years of average surveys.

The total acreage that was surveyed averaged about 4 percent of the Matrix/Adaptive Management Area late-successional forest per year, or 8 percent for the 1998-99 two-year time period. Based on this rate, all late-successional forest in the Matrix/Adaptive Management Area lands would be surveyed in 25 years; also, for most species, the total expected future late-successional forest acres affected was calculated by multiplying the 1998-99 average annual acreage by 25.

The 20 species with the most acres of known sites were analyzed individually to compare 25-year projections against likely scenarios of future management. For example, the Interagency Species Management System database and 1999 survey results have 4,772 sites of blue-gray tail dropper (*prophysaon caeruleum)* identified through 1999. Projections at the current survey rate indicated that 40,000 sites might be located in the Matrix within 25 years. This projection was reviewed with taxa specialists who predicted that, for PSQ analysis purposes, the species could be presumed to be dropped from Survey and Manage within five years. Twenty individual species projections were viewed by taxa specialists, and total sites for 14 of the species were capped before reaching the 25-year projection. Caps ranged from 20 to 50 percent of the 25-year rate, because sites were so numerous at some point it was likely that either a Management Recommendation would identify high priority sites, or the species would be removed from Survey and Manage. Contributing to the decision to cap sites was the likelihood that if many sites were found in the Matrix, strategic surveys would find similar numbers in reserves. The capping assumptions are not binding on future species decisions, but were used only for PSQ and economic effects calculations, to simulate the adaptive management process. Since the species considered for capping were the most common, the capping estimate substantially reduced total known site acreage from that of a 25-year projection.

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Two other significant adjustments were made in calculating projected acres of known sites. Projected acreage was increased 10 percent for each of the following:

Inoperable Acres - The arrangement of managed sites will result in additional acreage that will be inoperable for harvest due to restricted access. It was estimated in FEMAT that the riparian reserves would result in an additional 5 to 10 percent being inoperable. Because Survey and Manage known sites will be scattered within sale units, they will likely result in a higher proportion of inoperable acres than riparian reserves.

Strategic Surveys - Most 1998 and 1999 site acreage is for surveys prior to habitat-disturbing activities. In future years, particularly under the action alternatives, strategic surveys are expected to also contribute to the number of known sites, even in the Matrix.

Calculations Specific to an Alternative

The standards and guidelines of the specific alternatives required that projections, species, and/or sizes of known sites vary among alternatives. Differences in assumptions or modeling of the alternatives from that described above are described below.

No Action Alternative - The 64 species proposed to be removed from Survey and Manage in the action alternatives are assumed to be removed from Survey and Manage over the next 1 to 5 years (average 3 years).

Alternative 1 - The 64 species proposed for removal are not included as known sites, nor are species in Category 1F since management of known sites is not required for that category. Acreage projections for 14 species were capped as described above.

Alternative 2 - The 64 species proposed for removal are not included as known sites. Known sites for all "uncommon" species (Category 2D) are capped at current levels.

Alternative 3 - The 64 species proposed for removal are not included as known sites. Sites for "rare" species (Category 3A) were projected using 48 acres per site to reflect the required 250-meter buffer. For species for which pre-disturbance surveys are not practical, "equivalent-effort" surveys in Alternative 3 were predicted to locate sites at 20 percent of the rate for "surveys practical" species, because the characteristics of the species reduce the likelihood of detection during surveys.

Relationship of Late-Successional Forest and Probable Sale Quantity

The relationship between late-successional forests and the PSQ can be quantified by comparing Alternatives 1 and 9 in the Northwest Forest Plan FSEIS as shown in the table below.The Northwest Forest Plan FSEIS Alternative 1 placed all late-successional stands in reserves and calculated PSQ using only early-successional forest. Otherwise, the standards and guidelines and the acreage available for PSQ were similar between the two alternatives. The difference between the PSQ for these two alternatives, therefore, approximates the amount of the PSQ from late-successional forests. In the table below, the PSQ numbers are also updated for 1999 by assuming that the ratio of PSQ dependent on late and early-successional stands is the same as in 1994.

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PSQ Contribution from Late-Successional Forests (Northwest Forest Plan FSEIS, Alternative 9 [in million board feet])

Alternative in the Northwest Forest Plan Final Environmental Impact Statement (USDA, USDI 1994a)	Northwest Forest Plan FSEIS PSQ (1994)	PSQ Reduced by 15 Percent (1999)
Alternative 9	958	811
Alternative 1 (No harvest in late-successional forests)	102	87
Alternative 9 Late-successional portion of PSQ (This represents difference between Alternative 9 and Alternative 1.)	856	724

Quantifying the portion of the PSQ that originates from late-successional forests permits quantifying the effects of Survey and Manage. The reduction to 1.1 million acres of late-successional forest available for harvest, related to management of known sites for Survey and Manage species, was assumed to have a direct proportional effect on the 724 million board feet (MMBF) portion of the PSQ dependent on late-successional forests. The 87 million board feet from early-successional forests was assumed unaffected by Survey and Manage and, therefore, was held constant across all alternatives in the PSQ analysis.

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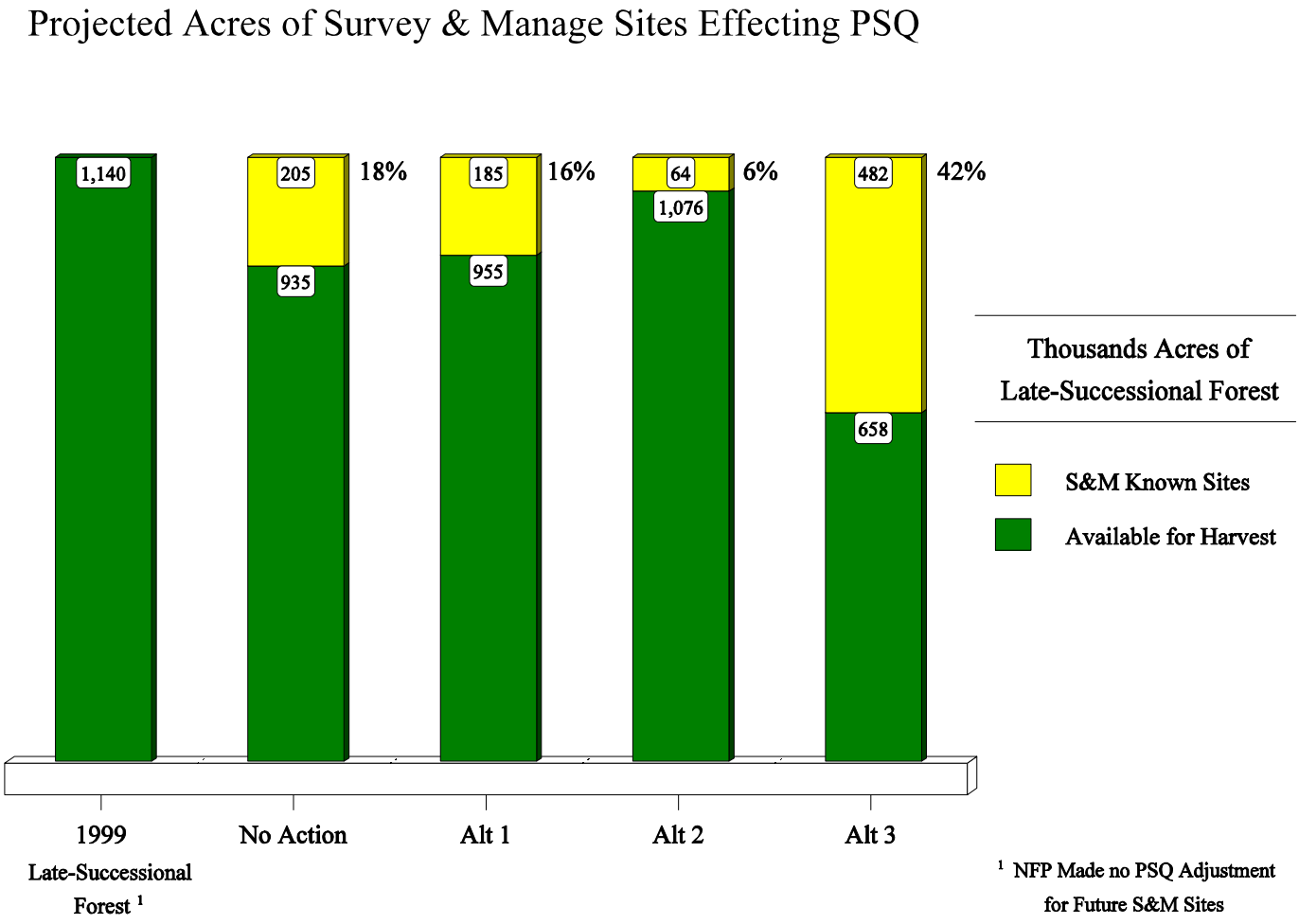
Projection Results

The quantities of the 1.1 million acres of late-successional forests in Matrix and Adaptive Management Areas affected by each of the alternatives is displayed below.



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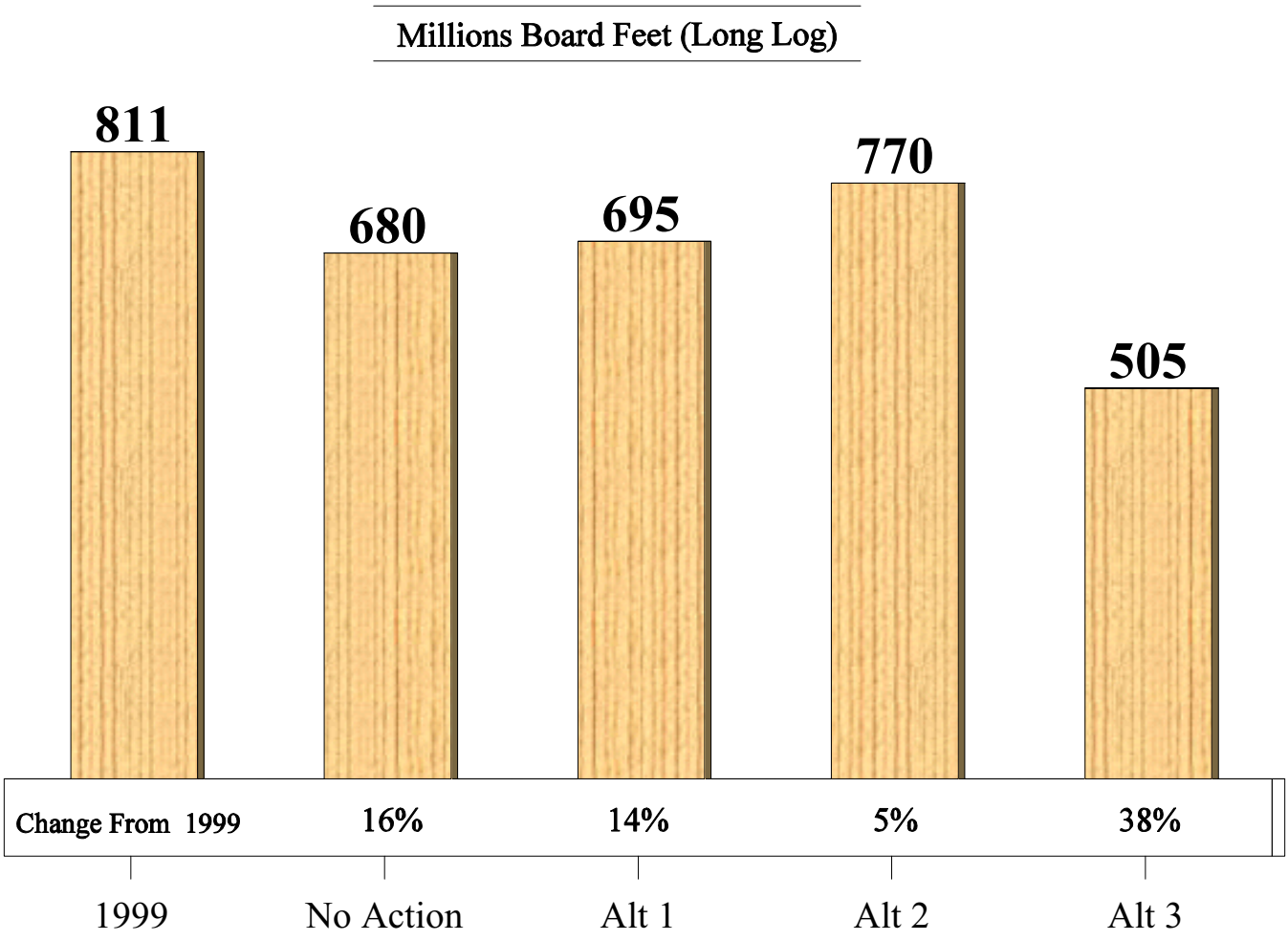
Corresponding effects on PSQ by alternative are displayed below.



NOTE: PSQ estimates do not include the contribution of "10% other wood". PSQ volumes are expressed in 32-inch long log measure. To convert to short log, divide PSQ by 0.825. The entire process is summarized in the following flow chart.

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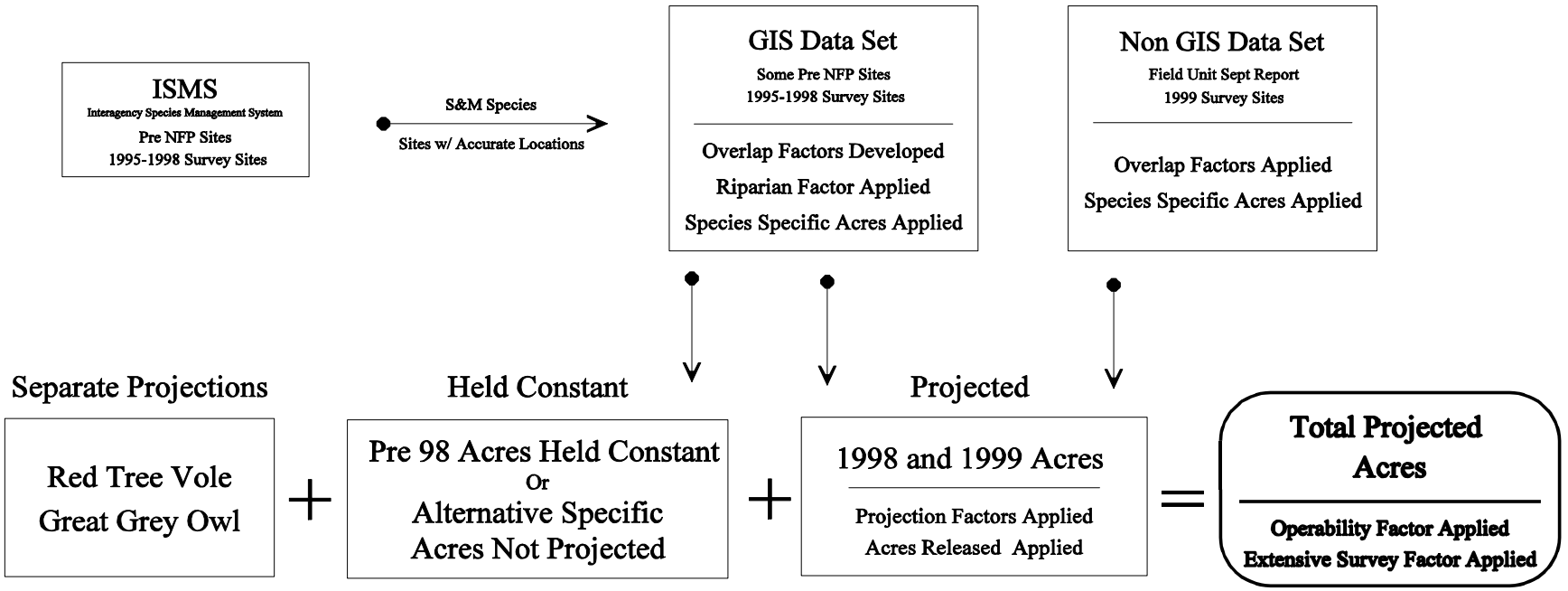
Survey & Manage PSQ Effects Process



1999 PSQ - 811 MMBF

LSF PSQ 724 MMBF = 1.1 Million Acres LSF Available for Harvest

+

Non Late-Successional Forest PSQ 87 MMBF

October 21st, 1999

Total Projected Acres = Reduction to 1.1 Million Acres LSF

% Reduction of LSF = % Reduction 724 MMBF

Alternative PSQ = % Reduction to 724 MMBF + 87 MMBF

TERMS - Acres = Late-Successional Forest Effected by Management for S&M Sites LSF = Late-Successional Forest

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Appendix H

Additional Information on Bryophytes and Amphibians

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APPENDIX H

Additional Information on Bryophytes and Amphibians

Bryophytes

Mosses, liverworts, and hornworts (collectively known as bryophytes) are small, green, nonvascular, spore-bearing plants, which have evolved a wide array of species that are well adapted to nearly every habitat on earth. About 170 species of liverworts and 450 species of mosses occur within the range of the northern spotted owl. About 20 percent of these species are endemic to western North America or to the Pacific Northwest (Lawton 1971)

Old-growth forests may be essential to the continued existence of some bryophytes. Most species of bryophytes do not become established in stands until 100 years, and they are best developed in stands 400 years or older. Epiphytic mosses and lichens (those that grow on another plant) can total up to 2.6 metric tons per hectare in old-growth Douglas-fir forests of western Oregon (McCune 1993). In the understory, mosses often comprise 20 percent of the biomass and 95 percent of the photosynthetic tissue biomass (Binkley and Graham 1981).

Bryophytes provide food and habitat for a host of invertebrates (Russell 1979, Gersun 1982, Varga 1992) and vertebrates. They are a perennial source of organic material and function as efficient filters for trapping sediments. Marbled murrelet nest in moss mats in old-growth trees. Flying squirrels, birds, and mammals commonly use mosses to build their nests. Bryophytes also intercept, absorb, and buffer nutrients and water in the canopy and understory (Brown and Bates 1990). They play an important role in the dynamics of understory vegetation, as well as soil structure, soil stability, and interception and retention of water. Bryophytes are also a major component of the forest stream ecosystem, providing year-round habitat for a wide array of algal species, aquatic invertebrates and amphibians.

Background and Affected Environment

Bartramiopsis lescurii*, *Herbertus sakuraii*, *Plagiochila semidecurrens*, *Radula brunnea

The above four species are proposed for removal from Survey and Manage and Protection Buffer Standards and Guidelines under the three action alternatives, because they do not meet the criteria for being closely associated with late-successional/old-growth forests. However, these species are thought to be quite rare within the Northwest Forest Plan area.

Bartramiopsis lescurii is a northern species that reaches the southern extent of its range in northern Washington where climatic conditions are similar to areas where it occurs farther north. The only known site for this species in the area of the Northwest Forest Plan is on the Mt. Baker-Snoqualmie National Forest, where it occurs in a nonforest community on talus at the bottom of a long, steep north-facing slope (USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). This species is thought to be quite rare in Washington (Christy and Wagner 1996; USDA, USDI Species Review Panel 1999b).

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Herbertus sakuraii, *Plagiochila semidecurrens* and *Radula brunnea* reach the southern extent of their range for North America in northwestern Oregon. These species are known only from one site in the Northwest Forest Plan area—the Saddle Mountain in the Oregon Coast Range, which is nonfederal land (Christy and Wagner 1996). The habitat at the known site is a nonforest community on a north-facing basalt cliff near the fog-drenched ridgetop (USDA, USDI 1996; USDA, USDI 1998f; USDA, USDI Species Review Panel 1999b). These species appear to be quite rare in the Pacific Northwest.

Scouleria marginata

Scouleria marginata is endemic to the Pacific Northwest, but has a wide distribution within this area (Christy and Wagner 1996). This species grows on rocks in the splash zone of streams or waterfalls, and may be inundated by water for part of the year (Appendix J2 in USDA, USDI 1994a; Christy and Wagner 1996). This species is not closely associated with late-successional/old-growth forests, as it occurs in both exposed or shaded conditions (Christy and Wagner 1996) and does not require the canopy of a late-successional forest. Under the FEMAT process, *Scouleria marginata* was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands because of the riparian protection provided by the Aquatic Conservation Strategy. *Scouleria marginata* was originally included in Survey and Manage Component 4 because of concerns that cumulative effects on nonfederal land may raise concerns about the species viability on federal lands (Appendix J2 in USDA, USDI 1999a).

Ulota megalospora

Ulota megalospora is a widespread and common species within the Northwest Forest Plan area. This species does not meet the criterion of close association with late-successional/old-growth forests because it occurs on a wide variety of substrates in a broad range of habitats and stand ages, from low elevation to montane areas (Christy and Wagner 1996; USDA, USDI Species Review Panel 1999b). *Ulota megalospora* was one of two species in the Canopy Twigs-Exterior group that was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands (USDA et al. 1993). *Ulota megalospora* was included as a Protection Buffer species in the Northwest Forest Plan's Record of Decision, where it was stated as being locally abundant in northern California and southwestern Oregon, but generally scarce throughout its range and also poorly known ecologically (USDA, USDI 1994b). Information acquired since then shows that the species is well distributed throughout the Northwest Forest Plan area, with well over 100 new sites since 1993 (USDA, USDI Species Review Panel 1999b), and that it is not closely associated with late-successional/old-growth forests. This species is probably more widespread or common than the data represents. Known site reports are steadily increasing as field personnel survey for this species.

Pleuroziopsis ruthenica

The global distribution of *Pleuroziopsis ruthenica* includes Japan, the Russian Far East, Alaska and British Columbia. In Alaska and British Columbia, *Pleuroziopsis ruthenica* occurs along creek banks and hummocks, and in low-elevation shrub thickets (USDA, USDI 1998f). Reports on its abundance vary from very rare in northern British Columbia (Schofield 1976), rare throughout its Pacific range (Schofield 1990), and a common northern species (Pojar and MacKinnon 1994, USDA, USDI 1998f).

Pleuroziopsis ruthenica is reported from only one historical collection in the Northwest Forest Plan area. The historical collection of *Pleuroziopsis ruthenica* was made by N.L.Gardner in about 1898 "in marsh, Seattle" (USDA, USDI 1998f). This collection is subject to question because of potential mislabeling of the specimen and because the

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habitat likely no longer exists (USDA, USDI 1998f; USDA, USDI Species Review Panel 1999b; Harpel pers. comm.), as well as being far south of its present range. Christy and Wagner (1996) note skepticism from some bryologists that this species was actually collected in Puget Sound, although state it may be a "real vestige of a vanished landscape".

Despite extensive bryological collection in Washington State over the last century, no additional collections of this species have been made. Because there are no documented sites of this species that can be verified, it is currently assumed to not occur in the Northwest Forest Plan area (USDA, USDI Species Review Panel 1999b).

Antitrichia curtipendula* and *Douinia ovata

Antitrichia curtipendula is a widespread and common species throughout the Northwest Forest Plan area (Christy and Wagner 1996) and occurs in a broad range of habitats from low elevation to mid-montane forests. This species may be quite abundant where it occurs. It is a common species and is generally undercollected, so there are many populations on the landscape that are not represented in the ISMS database, or in herbaria collections (USDA, USDI Species Review Panel 1999b).

Douinia ovata is a widespread species at low elevations in habitats with cool, moist microsites. *Douinia ovata* is not restricted to forest habitats. It may occur in stands of various ages as well as on rock or soil in cool, moist sites (Christy and Wagner 1996; USDA, USDI Species Review Panel 1999b). It is generally not abundant where it occurs.

Antitrichia curtipendula and *Douinia ovata* were rated as the canopy interior group in the FEMAT analysis. They were rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands, though with some possibly of significant gaps in the historic distribution (USDA et al. 1993). *Antitrichia curtipendula* was originally included in Survey and Manage Component 4 because of concerns that cumulative effects on nonfederal land may raise concerns about the species viability on federal lands. *Douinia ovata* was originally included in Survey and Manage Category 4 because of concerns of air pollution threats (Appendix J2 in USDA, USDI 1994a).

Ptilidium californicum

Ptilidium californicum occurs on the west coast of North America, from southeastern Alaska to northern California (Christy and Wagner 1996). *Ptilidium californicum* is a common and widespread species in the Pacific Silver Fir and Mountain Hemlock vegetation zones of the Olympics (Henderson et al. 1988) and Cascades of Washington and northern Oregon (Christy and Wagner 1996). It commonly occurs on bark near the base of conifers (especially *Abies amabilis*), and occasionally on recently fallen logs (Henderson et al. 1988; Christy and Wagner 1996). It is unknown at this time where the species becomes more restricted in its distribution to the south in Oregon.

Ptilidium californicum reaches the southern limit of its range in northern California. In this area, the species becomes restricted to mid-elevation old-growth true fir forests between 4,500 and 5,000 feet elevation (Appendix J2 in USDA, USDI 1994a; USDA, USDI 1998f; USDA, USDI Species Review Panel 1999b). There are currently three known sites in northern California: on the Lassen, Shasta-Trinity and Rogue River National Forests (USDA, USDI 1998f). At these sites, *Ptilidium californicum* is uncommon to rare, sporadically distributed and only small colonies are found (USDA, USDI 1998f; USDA, USDI Species Review Panel 1999b).

Previous analyses reported different concerns for persistence of *Ptilidium californicum* depending on the geographic area (Thomas et al. 1993; USDA et al. 1993; Appendix J2 in

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USDA, USDI 1994a). The FEMAT bryophyte viability panel rated *Ptilidium californicum* in two different groups based on its geographic distribution. *Ptilidium californicum* in Oregon and Washington was included in the Tree Boles/Understory group and was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands, though with some possibly of significant gaps in the historic distribution. *Ptilidium californicum* in California was included in the Rare Species group, and was rated separately as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands (USDA et al. 1993). Between the draft and final Northwest Forest Plan FSEIS, the 180-year rotation was dropped for California, which elevated the concern for this rare species in California (Appendix J2 in USDA, USDI 1994a). *Ptilidium californicum* was added to the Survey and Manage Standards and Guidelines, but the geographic designation of California was inadvertently omitted from Table C-3 in the Northwest Forest Plan Record of Decision (USDA, USDI 1994b). In addition, *Ptilidium californicum* was included as a Protection Buffer species (Thomas et al. 1993; USDA, USDI 1994b). The geographic designation of California was also inadvertently omitted in Appendix 5-H of the SAT Report. The viability concerns expressed for *Ptilidium californicum* by the taxonomic experts in both panels had been for the California populations only (Thomas et al. 1993; USDA et al. 1993; and Appendix J2 of USDA, USDI 1994a). *Ptilidium californicum* would benefit from the requirement in the Northwest Forest Plan to retain old-growth fragments in watersheds where little remains. However, if the oldest stands (greater than 200-years old) are not selected for protection in landscape areas where little late-successional forest exists (USDA, USDI 1994b, p. C-44), the Survey and Manage mitigation becomes more important for this species.

Current information indicates that there are portions of the range of *Ptilidium californicum* where different management direction is warranted based on different levels of concern. Concerns for maintaining stable, well-distributed populations are highest for *Ptilidium californicum* in California, where it reaches the southern extent of its range, has a very limited distribution, and is quite rare. There is uncertainty about concerns for maintaining stable, well-distributed populations of this species in southern Oregon (from Douglas County south to the California border); this uncertainty is due to insufficient information on distribution, habitat and populations at this time to reach a conclusion. *Pilidium californicum* is likely to exist in stable, well-distributed populations (from Lane County, Oregon and north through Washington to the Canadian border), because the species is widespread and common within suitable habitat.

Plagiochila satoi

Taxonomic debate surrounds the recognition of the taxon *Plagiochila satoi*. It was the treatment by Hong (1992) that was the basis for considering *P. satoi* a potential species of conservation concern. An extensive study of specimens from this region concluded that Hong's key used characters to distinguish this taxon which are not consistently. Wagner concluded that it is not possible to distinguish *P. satoi* from *P. asplenioides* using these characters (Christy and Wagner 1996). Other bryologists concur with Wagner's assessment (USDA, USDI Species Review Panel 1999b; J. Harpel pers. comm.).

Based on current information, *P. satoi* is now considered part of the P. *asplenioides* complex (USDA, USDI Species Review Panel 1999b; J. Harpel pers. comm.). *Plagiochila asplenioides* is a widespread and common species (USDA, USDI Species Review Panel 1999b). The FEMAT bryophyte panel placed the *Plagiochila asplenioides* complex in the Wet Shaded Humic Soil group, which was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands, though with a limited possibly of significant gaps in the historic distribution.

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Brotherella roellii

Brotherella roellii is known only from historical collections within the range of the Northwest Forest Plan (USDA, USDI 1999d;USDA, USDI Species Review Panel 1999b). Known sites for this species date back to the early 20th century. Herbaria searches and specimen verifications compiled in the Interagency Species Management System database show five collections for this species in the Northwest Forest Plan area, dating from 1900 to 1911 (J. Harpel pers. comm.). It is unknown if *Brotherella roellii* is still extant at these sites. *Brotherella roellii* is endemic to the Pacific Northwest, known from southern British Columbia, and historically from Washington (Christy and Wagner 1996; USDA, USDI 1999d).

In addition, *Brotherella roellii* may not meet the criteria for close association with late-successional/old-growth forests (USDA, USDI Species Review Panel 1999b; USDA, USDI 1999d). Data in the Interagency Species Management System database shows that habitat data is very limited from the five collections of this species in Washington (USDA, USDI Species Review Panel 1999b). Christy and Wagner (1996) note it occurs at low elevation on slopes, stream terraces and swampy floodplains; red alder and bigleaf maple are the preferred hardwood habitat. Recent habitat data from British Columbia populations indicate this species occurs in second-growth mixed conifer/deciduous forests, mostly on rotten bigleaf maple logs (USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b).

Little is known about *Brotherella roellii* in the Northwest Forest Plan area. It was not rated by the FEMAT bryophyte panel because it was poorly known (USDA et al. 1993), and outcomes under the different alternatives could not be assessed. It was listed in Mitigation Step 5 Standard and Guideline for Rare and Locally Endemic Species (Thomas et al. 1993), and included in the Protection Buffer Species Standards and Guidelines (USDA, USDI 1994b). Because *Brotherella roellii* is so poorly known, there is no documentation to support the mitigation that was recommended (Thomas et al. 1993; USDA, USDI 1994b) for this species (USDA, USDI Species Review Panel 1999b).

Diplophyllum plicatum, Kurzia makinoana, Marsupella emarginata var. aquatica, Tritomaria exsectiformis, Rhizomnium nudum

Diplophyllum plicatum has a North Pacific distribution from northeastern Asia around coastal Alaska and British Columbia south to Oregon (Christy and Wagner 1996). There are about 20 collections from the Northwest Forest Plan area, and only one new site has been reported since 1993. It is unknown at this time how many different locations in the Interagency Species Management System database are represented by the collection. Most collections prior to 1993 that are identified in the Interagency Species Management System database are from the Olympic Peninsula and northern Cascades of Washington (USDA, USDI Species Review Panel 1999b), and it is not known if the species still occurs at these sites. Little is known about the habitat and ecological requirements of *Diplophyllum plicatum*, although it occurs where there is high humidity and cool temperatures (Christy and Wagner 1996).

The FEMAT bryophyte panel included *Diplophyllum plicatum* in the Rare Species group. The species was rated as having a low likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands (USDA et al. 1993). *Diplophyllum plicatum* is described as rare with a spotty distribution, and over half of the known sites in Oregon occur on nonfederal. It was also noted that mitigation may not be effective because of the species rarity (Appendix J2 in USDA,USDI 1994a).

Kurzia makinoana is an extremely small liverwort and is thought to be rare (USDA, USDI Species Review Panel 1999b;, Christy and Wagner 1996). Little is known about its

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abundance, distribution and ecology (Appendix J2 in USDA, USDI 1994a). It has a North Pacific distribution and occurs from Asia to California, but has not yet been reported from Oregon, and is known from very few sites in Washington (Christy and Wagner 1996; USDA, USDI Species Review Panel 1999b). This species is reported from old-growth forests in Washington, and from bogs in California (Appendix J2 in USDA, USDI 1994a). *Kurzia makinoana* was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands—although with a small possibly of significant gaps in the historic distribution, restriction to refugia, or extirpation. Herbaria searches have only found five collections of this species from the Northwest Forest Plan area (USDA, USDI Species Review Panel 1999b). The number of collections of this species may not have been known at the time of the FEMAT panel (USDA et al. 1993; Appendix J2 in USDA, USDI 1994a). The inconspicuous nature of this species may make it extremely difficult to relocate known sites and conduct surveys before ground-disturbing activities (USDA, USDI 1996). *Kurzia makinoana* would benefit from the requirement in the Northwest Forest Plan to retain old-growth fragments in watersheds where little remains. However, if the oldest stands (over 200 years old) are not selected for protection in landscape areas where little late-successional forest exists (USDA, USDI, 1994b, p. C-44), the Survey and Manage mitigation becomes more important for this species.

Marsupella emarginata var. aquatica is an aquatic species that grows attached to rocks in streams. It is only known from one site within the Northwest Forest Plan area (USDA et al. 1993; Christy and Wagner 1996; Appendix J2 of USDA, USDI 1994a;). For the FEMAT analysis, it was included in the Rare Species group; it was rated as having a low likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands, with a high likelihood of being confined to refugia and some possibility of extirpation (USDA et al. 1993). Appendix J2 noted that riparian and stream buffers would protect this taxon, but that recreational pressures pose threats (USDA, USDI 1994a). According to the records in the Interagency Species Management System, no new sites have been reported for this taxon in the Northwest Forest Plan area (USDA, USDI Species Review Panel 1999b).

There is currently debate among bryologists regarding *var. aquatica* as a distinct taxonomic entity (USDA, USDI Species Review Panel 1999b). This uncertainty makes it very difficult to determine the management needs of this species. However, at this time, it was not placed in a category with undetermined status (USDA, USDI Species Review Panel 1999c).

Tritomaria exsectiformis is known from less than 10 populations in the Northwest Forest Plan area. It occurs on the eastside of the Cascades, near perennial seeps and. There were three sites known as of 1993; four new sites have been discovered on the Deschutes National Forest since that time. Most of the known sites are on the Deschutes National Forest, although one site reported from the Wenatchee National Forest needs to be verified (USDA, USDI Species Review Panel 1999b).

Tritomaria exsectiformis was included in the rare species group, and was rated as having a low likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands and a high likelihood of being confined to refugia or extirpated. The major threats to populations and habitat are trampling impacts from grazing, horses and recreation (Appendix J2 in USDA, USDI 1994a; USDA, USDI Species Review Panel 1999b).

Rhizomnium nudum has a North Pacific distribution and occurs from Kamchatka and Japan east to the northwest coast of North America, and south from Alaska to northern Oregon (USDA, USDI 1998f). Most sites reported in the Interagency Species Management System database for this species are in the Olympic Mountains and

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northern Washington Cascades, although the majority of collections (56) date prior to 1980 (USDA, USDI Species Review Panel 1999b). There is no information on whether the species is extant at these historic sites. *Rhizomnium nudum* is a conspicuous moss, although it requires microscopic examination to distinguish it from several other *Rhizomnium* species that are more common and widespread (Lawton 1971; Christy and Wagner 1996; USDA, USDI 1998f). Specific habitat and abundance information is limited for this species. It is known to occur on moist forest humus or soil, sometimes near seepage areas, in mid to high elevation coniferous forest, and into alpine areas near late-melting snow banks (Christy and Wagner 1996, USDA, USDI 1998f).

Orthodontium gracile

Orthodontium gracile has a broad global distribution, occurring in England, France, Australia, and the west coast of North America. In North America, it is known only from the coastal redwood forests in southern Oregon and northwestern California, where it may have been introduced from Australia (Christy and Wagner 1996). The majority of known sites of *Orthodontium gracile* identified in the Interagency Species Management System database occur on nonfederal land (USDA, USDI Species Review Panel 1999c). The management recommendation for this species lists 19 historical records, with only two reported from federal land. The Oregon population may have been extirpated by logging (USDA, USDI 1996).

Orthodontium gracile was not rated during the FEMAT bryophyte panel because of insufficient information (USDA et al. 1993); also, outcomes under the different alternatives could not be assessed. Concerns for species persistence were based on its very limited range, apparent close association with old-growth redwood forests and few known sites on federal land (USDA, USDI 1996). Because of these concerns, it was included in the Survey and Manage Standards and Guidelines. There is no new information to change this previous assessment (USDA, USDI Species Review Panel 1999b).

Encalypta brevicolla* var. *crumiana*, *Herbertus aduncus*, *Iwatsukiella leucotricha*, *Racomitrium aquaticum*, *Tritomaria quinquedentata

These five species were not rated by the FEMAT bryophyte panel, because of insufficient information (USDA et al. 1993), and outcomes under the different alternatives could not be assessed. They were included in the Survey and Manage Standards and Guidelines because of persistence concerns since they were thought to be quite rare (USDA, USDI 1996).

Encalypta brevicolla var. *crumiana* is endemic to the Pacific Northwest where it is known only from two historical collections in the Northwest Forest Plan area (Christy and Wagner 1996; USDA, USDI Species Review Panel 1999b). It was collected in Oregon from Squirrel Peak in Curry County, and in Washington in Mt. Rainier National Park (USDA, USDI Species Review Panel 1999b). Limited habitat information is available, but it is reported on soil in shaded rock crevices along ridgetops with frequent fog (Christy and Wagner 1996). This taxon may not meet the criteria for close association with late-successional/old-growth forests (USDA, USDI Species Review Panel 1999b). The genus is very difficult to identify in the field by experts if the sporophyte is not present. Detailed and intensive microscopic examination is essential to identify the taxon (Christy and Wagner 1996), and requires electron microscopy (USDA, USDI Species Review Panel 1999b).

Herbertus aduncus is circumboreal (occurs at northern latitudes) and is known in western North America from Alaska south to Oregon. The species is abundant in British Columbia, becomes rare in Washington, and is very scarce in Oregon (Christy and Wagner 1996; USDA, USDI 1996). It is reported from five localities in the Northwest

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Forest Plan area, three of which occur on federal land (USDA, USDI 1996). Habitat data is limited with only a few known sites (USDA, USDI Species Review Panel 1999b). *Herbertus aduncus* occurs on a wide variety of substrates, from low to high elevations, in areas with high moisture and moderate temperature. This species is "more tied to undisturbed sites than to old-growth forests" (Christy and Wagner 1996).

Iwatsukiella leucotricha occurs in Asia and the Pacific Northwest. There are only two known sites in the Northwest Forest Plan area . These sites are in northwestern Oregon and are not on federal land (USDA, USDI Species Review Panel 1999b). Habitat information is very limited, but it has been reported as occurring on fog-drenched ridgetops, as an epiphyte on *Abies amabilis* (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). At the time of the FEMAT analysis, it was only known from one site; since then, one additional site has been documented (USDA, USDI Species Review Panel 1999b).

Racomitrium aquaticum has a broad global distribution (Christy and Wagner 1996). In the Pacific Northwest, it is known from the Coast and Cascade Ranges, and from the Siskiyou and Klamath Mountains, ranging from northern California to Alaska. It was known from 16 sites at the time of the FEMAT analysis, with six collections reported since then (USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). Habitat information is limited, but it is reported from shaded, moist rocks and cliffs along shady streams and in forests, often in the splash zone, but never aquatic (Christy and Wagner 1996). Although it is often reported from the splash zone, it also occurs on seasonally dry cliffs and on boulders within forests (USDA, USDI 1996). The genus *Racomitrium* is typically very difficult taxonomically, and verification of specimens to species can be problematic (USDA, USDI Species Review Panel 1999b). This has led to confusion with other closely related species, and the distribution of *Racomitrium aquaticum* is unclear (Christy and Wagner 1996, USDA, USDI Species Review Panel 1999b).

Tritomaria quinquedentata is a circumboreal species and is known in the Pacific Northwest, from northwestern Washington and northwestern Oregon (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). It is known from four sites within the Northwest Forest Plan area—three historic sites on the Mt. Baker-Snoqualmie National Forest, and one verified extant site at Saddle Mountain State Park in Oregon (USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). Habitat data is limited, and it is noted as restricted to organic substrates in shady, cool, moist conditions (Christy and Wagner 1996). The association of this species with late-successional/old-growth forests is uncertain. This species may be confused with other liverworts, so accurate identification may be problematic (USDA, USDI Species Review Panel 1999b).

Tetraphis geniculata

Tetraphis geniculata occurs in the Russian Far East, Japan, the Pacific Northwest, New England and the Canadian Maritime Provinces (Christy and Wagner 1996). In the Northwest Forest Plan area, it is known from 11 sites in Washington and Oregon. Eight of these sites have been reported since 1993 (USDA, USDI Species Review Panel 1999b; USDA, USDI 1999d; Harpel pers. comm.). *Tetraphis geniculata* occurs on large rotten logs in coniferous forests from sea-level to subalpine. It has been reported from late-successional or old-growth forests, but also from younger stands in cool, moist sites, on large logs that were derived from older forests (USDA, USDI 1999d). It has a spotty distribution, and where it occurs, is often associated with a closely related species, *Tetraphis pellucida* (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b). Sporophytes are required for identification of *Tetraphis geniculata*.

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Tetraphis geniculata was not rated by the FEMAT bryophyte panel, because it was poorly known (USDA et al. 1993), and outcomes under the different alternatives could not be assessed. It was included in the Survey and Manage Standards and Guidelines because of persistence concerns since it was thought to be a rare species (USDA, USDI 1996). It was also listed in Mitigation Step 5 Standard and Guideline for Rare and Locally Endemic Species (Thomas et al. 1993), and included in the Protection Buffer Species Standards and Guidelines (USDA, USDI 1994b).

Schistostega pennata

Schistostega pennata is a circumboreal species (occurs at northern latitudes), and is known in this region from British Columbia, Alberta, Montana, Washington and Oregon (Christy and Wagner 1996; USDA, USDI 1999d). It is reported from 12 sites in the Northwest Forest Plan area (USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b; Harpel pers. comm.). The majority of the known sites are from collections prior to 1980, although several collections have been made in recent years. During the FEMAT analysis, it was only known from Washington. It was reported in 1998 from Douglas and Lincoln counties in Oregon, which extended the known range of the species (USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b). The species occurs on mineral soil in moist, shaded, protected sites of upturned root wads, or on rock or mineral soil near cave entrances, animal burrows and old cellars (USDA, USDI 1996; Christy and Wagner 1996; USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b).

Schistostega pennata is considered a rare species in the Northwest Forest Plan area (USDA et al. 1993; Christy and Wagner 1996; USDA, USDI 1996). S*chistostega pennata* was included in the Rare Species group by the FEMAT bryophyte panel, and was rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands. This rating reflected a high level of confidence the species would be well distributed due to prescriptions for riparian zones. However, it was included in Mitigation Measure Step 5 in the SAT report, and included as a Protection Buffer species in the Record of Decision (USDA, USDI 1994b). At the time of the Scientific Analysis Team assessment, *Schistostega pennata* was known to occur only in "mature western red cedar forests in the Olympic National Forest and Washington Cascades" (Thomas et al. 1993; USDA, USDI 1994b). Knowledge of the distribution and habitat of the species has increased since FEMAT, although there are still very few known sites in the region (USDA, USDI 1999d; USDA, USDI Species Review Panel 1999b; J. Harpel pers. comm.)

Diplophyllum albicans

Diplophyllum albicans has a circumboreal (northern latitudes) distribution (Christy and Wagner 1996). Within the area of the Northwest Forest Plan, this species occurs along the coast and west of the Cascade crest. The majority of its known sites are reported from herbaria collections made prior to 1993. The species review panel notes 78 known sites with only three reported since 1993 (USDA, USDI Species Review Panel 1999b). The species is widespread, but patchy in its distribution, and occurs on a variety of moist, shaded substrates (USDA, USDI 1996; Christy and Wagner 1996). The spotty distribution of sites may be a function of lack of collection (USDA, USDI Species Review Panel 1999b). It is uncertain if the species is closely associated with late-successional/ old-growth forests (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). This species is reported as abundant in forested regions, but its ability to occur on a variety of substrates indicate it is not tied to old-growth forests (Christy and Wagner 1996).

Diplophyllum albicans was not rated during the FEMAT analysis, due to insufficient information at the time, and because outcomes under the different alternatives could not

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be adequately assessed (USDA et al. 1993; USDA, USDI 1996). It was described as most common in the Coast Range in the Sitka Spruce Zone and infrequent outside of the coastal strip (USDA et al. 1993; USDA, USDI 1996). Additional information now indicates that it may be sufficiently common to not require management of all known sites , and that it may not be closely associated with late-successional/old-growth forests (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI Species Review Panel 1999b).

Buxbaumia viridis

Buxbaumia viridis has a broad global distribution and is reported from North America, Europe, Russia, China, Japan, North Asia, New Zealand. In North America, it occurs in British Columbia, Alberta, Montana, Idaho, Colorado, Washington and Oregon (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI 1999d; USDA, USDI 1999d). It is documented from northern Washington into southern Oregon, and on both sides of the Cascades. The distribution is somewhat patchy, although this may reflect levels of survey and difficulty with locating the species in the field due to its cryptic and ephemeral nature (USDA, USDI 1996; USDA, USDI Species Review Panel 1999b). Mature sporophytes are required to accurately identify *Buxbaumia viridis* (Lawton 1971; Christy and Wagner 1996, USDA, USDI 1999d). The species has a broad ecological distribution, occurring from sea level to subalpine elevations, in cool, shaded, humid sites on a various substrates such as decayed logs, peaty soil and humus, and mineral soil (Christy and Wagner 1996; USDA, USDI 1996; USDA, USDI 1999d).

Various levels of concern were noted for *Buxbaumia viridis* during the assessments of the Scientific Analysis Team and FEMAT (Thomas et al. 1993; USDA et al. 1993). *Buxbaumia viridis* was included in the list of species covered by Mitigation Step 5 of the Scientific Analysis Team Report (Thomas et al. 1993). Here it was noted as a rare species that needed additional mitigation in terms of site management and pre-disturbance surveys to document presence and distribution. *Buxbaumia viridis* was included in the "Decaying Wood-Less Common" group and rated as having a high likelihood of having habitat of sufficient quality, distribution, and abundance to allow the species population to stabilize, well distributed across federal lands, though with some possibly of significant gaps in the historic distribution. This rating reflected a high level of confidence that this group would remain well distributed throughout its range under Option 9. *Buxbaumia viridis* was subsequently included as a Protection Buffer species in the Record of Decision (USDA, USDI 1994b). This species appears to be dependent on a continuous supply of large, well decayed logs for persistence (Christy and Wagner 1996, USDA, USDI 1996).

The number of known sites has increased for *Buxbaumia viridis* since the initial analyses in 1992 and 1993. The Management Recommendation lists 10 known sites as of 1996 (USDA, USDI 1996). *Buxbaumia viridis* is now reported in the Interagency Species Management System database from over 100 collections in the Northwest Forest Plan area. The majority of reports are recent collections since 1997. However, many of these recent sites are in project areas (USDA, USDI Species Review Panel 1999b), as they were detected during implementation of pre-disturbance surveys.

Amphibians

Background and Affected Environment

The amphibian fauna of the Pacific Northwest includes 20 species that are endemic to, or have a majority of their ranges within, the Northwest Forest Plan area. The Pacific Northwest supports the second highest number of amphibian species in the United

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States, second only to the southeast. Approximately 32 species of amphibians are found in the Pacific Northwest, but fewer are found in coniferous forests.

Amphibians are functionally important components of coniferous forests in the Pacific Northwest. Amphibians, particularly salamanders, can reach high densities in forest ecosystems. Larvae, juveniles, and adults may function as predators or as a major food source for other vertebrate species and invertebrates.

Amphibians are particularly sensitive to environmental change because their complex life cycle exposes them to hazards in both aquatic and terrestrial environments. Most of the species require cool, moist conditions to maintain respiratory function. Stream dwelling species generally require cool water, and are sensitive to sedimentation that can inhibit reproduction and foraging. Within locales in the Pacific Northwest, populations of several species of amphibian have been extirpated, and the ranges of numerous species have been drastically reduced. Most declines have occurred in forest dwelling species. Several species including Del Norte, Larch Mountain, Siskiyou Mountains, and Shasta salamanders and western spotted, red-legged, and Cascades frogs were on the federal Candidate species list (C2) under the Endangered Species Act; these species have subsequently been removed from Candidate status. The five salamanders included in Survey and Manage and/or Protection Buffers are discussed below.

Shasta Salamander (*Hydromantes shastae*)

In the northwest, this species is the least known salamander with the smallest range (Appendix J2 in USDA, USDI 1994a). Concern for the maintenance of its few, scattered populations stems from its low dispersal ability, low reproductive rate, and narrow habitat/microclimate requirements that are sensitive to disturbance (see below; USDA, USDI in prep.). Both the identification and maintenance of occupied habitats are essential for management contributing to the long-term maintenance of this species on federal lands.

Habitat is primarily limestone rock outcrops, as originally described in the Northwest Forest Plan (Appendix J2 in USDA, USDI 1994a). New information has demonstrated that this animal also inhabits the forested slopes adjacent to rock outcrops, at least up to 200 meters from the edge of an outcrop (Lewendal 1995; USDA, USDI in prep.). Survey and Manage mollusk surveys have recently located additional occupied habitat (forested sites distant from rock outcrops) (P. Lewendal, pers. comm.; P. Crumpton, pers. comm.). This new habitat knowledge is important because the species may have a broader distribution than historically recognized. Surveys for this species have focused on limestone rock outcrops (Papenfuss and Brouha 1979; Lewendal 1995). Potential habitat has not been well surveyed (P. Lewendal, pers. comm.).

Cool, moist microclimate conditions are important for this species survival. For example, it is most predictably surface-active at rock outcrops when relative humidity is 90 percent or greater, such as during rain events (USDA, USDI in prep.). During dry conditions, it is not found on the surface, or only in refugia. During seasons of surface activity, downed wood appears to be used as dominant microhabitat cover by this animal in forested slopes adjacent to outcrops and in those few sites not associated with rock (Lewendal 1995; USDA, USDI in prep.). Downed wood and rocky substrates apparently provide cool, moist retreats needed for the survival of this animal. Changes in habitat that alter microclimates (e.g., increasing temperatures or decreasing moisture levels) or microhabitat structure (reduced wood or compacted substrates) are expected to have adverse effects on the survival of this animal. Such changes occur with timber harvest and ground disturbing activities (de Maynadier and Hunter 1995).

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The Northwest Forest Plan and FEMAT summaries do not discuss the species being associated with late-successional and old-growth habitat, yet there are attributes of old-growth or late-successional forest that are important for this species survival (that is, down wood and cool moist microclimates) (USDA, USDI Species Review Panel 1999b, c). At some localities, the species appears to persist without canopy closure because those sites have deep rocky substrates. At such sites, edaphic conditions (regolith: soil and substrate) may be a surrogate for the canopy, relative to microclimate buffering (USDA, USDI in prep.).

As stated in the Northwest Forest Plan, this species occurs as naturally disjunct populations that are genetically isolated (USDA, USDI 1994a). There is a concern about some populations of this species in light of the genetic information (Wake et al. 1978; Pappenfus and Brouha 1979; USDA, USDI in prep.). Genetic differences among some adjacent populations of the Shasta salamander are as great as between this species and its congener in the Sierra Nevada Range. This is relevant because loss of single populations may represent a significant loss of biodiversity (such as evolutionary significant units).

Currently, there are 35 sites that likely represent 14 populations. A site or known site is distinguished as a distinct geographic location (USDA, USDI 1999b). Several known sites may be one population. As was indicated when compiling the Interagency Species Management System database, multiple database records exist for many sites. Two levels of patchiness apply to the distribution of this species: (1) their limestone habitat is patchy in distribution, and (2) the species distribution is patchy within apparently suitable habitat.

Most sites were reported from over two decades ago. The time periods of sites is as follows: 26 of 35 sites were before 1980; 7 of 35 sites were 1980 through 1993; 2 of 35 sites were located since 1993 (USDA, USDI 1999b); this does not include sites found during 1999. It is not known how many sites are extant (USDA, USDI Species Review Panel 1999a). These three time periods are used because they represent shifts in natural resource information and management for the region. Awareness of multiple resource management issues in forests accelerated in the 1980s, the period 1980-1993 represents a period of increasing effort to understand forest salamander habitats in both the management and research communities (review in Blaustein et al. 1995). Starting in 1994, the Northwest Forest Plan was implemented, leading to a surge of federal survey efforts for salamander species named in the Survey and Manage mitigations (USDA, USDI 1999b).

Only two sites have been identified since 1993 because surveys are conducted relative to proposed ground-disturbing activities and few have been proposed in the species range. This is due to: (1) overlap of the species with the recreation area around Shasta Lake, California (USDA, USDI 1999b); (2) the previous establishment of a comprehensive species management plan (Bogener and Brouha 1979); (3) the requirement by the State of California that those involved in capture, handling or take of this animal sign a Memorandum of Understanding with the State; and (4) ease of limestone habitat identification (to presume occupancy and potentially defer projects).

Federal lands figure prominently as habitat for this animal because under the Northwest Forest Plan, standards and guidelines were developed to mitigate the potential adverse effects of land management within the species range at known sites (USDA, USDI 1994a). Currently, 23 of 35 known sites are on federal lands. Likewise, about 70 percent of the known range is on federal lands, with about 23 percent in Administratively Withdrawn and 47 percent in Matrix (USDA, USDI 1999b). Given these numbers and the sensitivity of this species to disturbance, this species distribution and maintenance of populations relies heavily on federal land management activities being planned in a manner that will not adversely affect the species or its habitat.

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Van Dyke's Salamander (*Plethodon vandykei*) - Cascades Range populations

Concern for the maintenance of this species few, scattered populations in the Cascade Range stems from its low dispersal ability, low reproductive rate, and narrow habitat and microclimate requirements that are sensitive to disturbance (see below; USDA, USDI 1999b). Also, there is concern about some populations of this species in light of potential genetic and morphologic variation (Brodie 1970, Highton and Larson 1979); loss of biodiversity (such as evolutionary significant units) could result if sites are not maintained. Both the identification and maintenance of populations are essential to contribute to the long-term maintenance of this species in this area because sites can then be managed for the species continued persistence. Olympic Peninsula and Willapa Hills populations were not included in the Survey and Manage mitigation because these portions of the species range were distributed primarily on non-federal lands (Willapa Hills, 18 sites (USDA, USDI 1994a; Wilson et al. 1995) or in federal Late-Successional Reserves (Olympic Peninsula, 37 sites (Wilson et al. 1995; USDA, USDI 1999b)).

Habitat types are (USDA, USDI 1999b; USDA, USDI Species Review Panel 1999c): headwater streams (perennial or intermittent); seeps; along larger streams; riparian zones of montane lakes; waterfall splash zones; fractures and cliffs with water flowing over them; forested habitats; all soils/substrates and seral stages; open rock faces; basalt tubes entrances and sky lights; and sites at elevations up to 5,200 feet are known.

Although habitat is very broad when including caves, talus, streams, and lakes, this species appears to have a strong association with riparian environments. If the few cave entrance and upslope sites were not considered, this species would have a narrow habitat breadth (USDA, USDI 1999b; USDA, USDI Species Review Panel 1999b). In and near aquatic habitats, the most important habitat attributes appear to be cool temperatures (such as 4 to 14 degrees Celsius; USDA, USDI 1999b) and moist habitats with geologically stable substrates. Such microclimates can be found in interior forest stands, but may be affected by a variety of timber harvest and other land management activities (Chen et al. 1995, Brosofske et al. 1997).

The Northwest Forest Plan and FEMAT summaries do not discuss the species being tied to late-successional old-growth habitat. There may be attributes of late-successional old-growth habitat (such as cool, clear, water; cool moist microclimates) to which this species has associations, however, this has not yet been clearly established for the Washington Western Cascades Province (USDA, USDI 1999b; USDA, USDI Species Review Panel 1999b). Preliminary results from the Olympic Peninsula population have found the species to have a higher frequency of occurrence and greater abundances in stands with late seral characteristics (Jones et al. unpublished).

While the Northwest Forest Plan reported 8 known localities, and Wilson et al. (1995) documented 23 localities, 28 sites are known currently (USDA, USDI 1999b). Of these, 9 sites were reported before 1980, 15 were found from 1980 through 1993, and 4 were post-1993. There is no information on relative abundance.

The known sites within the Cascade Range are extremely patchily distributed, and are found in three distinct clusters (USDA, USDI 1999b). Although habitat is not homogeneous in this area, Van Dyke's salamanders are certainly spotty in distribution given available riparian habitat that may comprise more than 11 percent of this landscape (USDA, USDI Species Review Panel 1999b). This species is known to be patchily distributed at several spatial scales from subbasin, to landscape. To some extent, the currently known distribution of sites may be the result of survey efforts rather than the actual distribution of the species across the landscape (USDA, USDI Species Review Panel 1999b). The few number of sites with patchy occurrences contribute to the high concern for this species.

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Federal lands figure prominently as potential habitat for this animal because under the Northwest Forest Plan, standards and guidelines were developed to mitigate the potential adverse effects of land management within the species range at known sites (USDA, USDI 1994a). This species is not afforded this same level of protection on nonfederal lands. Currently, 20 of 28 (70%) sites and 49 percent of the known range are on federal lands (USDA, USDI 1999b). Sites occur in several federal land allocations: 7 sites are in Withdrawn lands; 8 sites are in Matrix; and 5 sites are in Late-Successional Reserves.

Several potential and known threats to the maintenance of this salamander at known sites are identified due to adverse effects on habitats and microclimates. These include road building and timber harvest. In particular, channel scouring resulting from mass-wasting events may be detrimental to this species. Recently, there have been two cases of mass-scouring that resulted in population extirpation (Crisafulli, pers. comm.; USDA, USDI Species Review Panel 1999b). The species low dispersal and patchy distribution, coupled with the channel scouring effects, may reduce recolonization potential. In the known cases, tailed frogs returned to the disturbed streams within one year, although this species has not been detected since the event (Crisafulli, pers comm.).

Siskiyou Mountains Salamander (*Plethodon stormi*)

This species is included in the Survey and Manage provision due to its high site fidelity and low movement rate, narrow habitat and microclimate requirements (see below), patchy habitat distribution across the known range, patchy distribution among sites containing suitable habitat, very limited overall range relative to the areal extent of the Northwest Forest Plan, and the sensitivity of both the species and its required habitat elements to adverse disturbance effects (Welsh 1990; Welsh and Lind 1992; USDA, USDI 1994a; USDA, USDI 1999b). Additionally, species in this genus are long lived, but slow to develop to sexual maturity and have small clutch sizes (Houck 1977). Both the identification and maintenance of occupied habitats are essential for management contributing to the long-term maintenance of this species on federal lands.

Known habitat for this species is as originally described in the Northwest Forest Plan: forested rocky substrates under a closed canopy that provides cool, moist microclimates suitable for salamander surface activity (Appendix J-2 in USDA, USDI 1994a). Although the substrate associations and microclimate constraints of this species are well known, more comprehensive habitat models are developing as a result of recent Northwest Forest Plan funded research (Nussbaum 1974; USDA, USDA in prep.). For example, canopy closure has been one focus because this measure is directly related to microclimate (Welsh and Lind 1995). Sites with greater canopy closures tend to have less fluctuation in ambient temperature and relative humidity as compared to more open sites. Recent studies have reported average canopy closure on occupied sites was 73 percent and 78 percent (USDA, USDI Species Review Panel 1999b). At sites with deep rocky substrates, Siskiyou Mountains salamanders may occur in conjunction with lower canopy closures. Edaphic conditions (regolith: soil and rocky substrate) may be a surrogate for the canopy relative to microclimate buffering (deMaynadier and Hunter 1995). These attributes of old growth or late-successional/old-growth forests (such as cool moist microclimates during times of salamander surface activity, dense canopy closures, and down wood) are important to this species. These attributes provide surface activity for the salamander to feed and breed, cover from predators, and a food source for many of their invertebrate prey species (Feder 1983; USDA, USDI 1999b; USDA, USDI Species Review Panel 1999b; USDA, USDI in prep). The species can occur in all seral stages, but abundances in southwestern Oregon are higher in older forest (Nussbaum 1974).

Habitat in the form of rocky substrates is relatively widespread throughout the range of the species, but is often extremely patchily distributed and is highly variable in patch

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size and contiguity (USDA, USDI Species Review Panel 1999b; USDA, USDI in prep.). Occupancy rates in suitable habitat are quite low, ranging from 20 percent south of the Siskiyou crest in California to 30 percent north of the Siskiyou crest in Oregon (L. Ollivier, unpub.).

Recent federal survey efforts have contributed significantly to knowledge of the species distribution and habitat. This species is found only in the Oregon and California Klamath Provinces. Due to federal research and survey efforts since the implementation of the Northwest Forest Plan, the range has been extended approximately 18 kilometers to the south, 11 kilometers east, and 16 kilometers west. These range extensions include the addition of one to two populations south of the Klamath River. The upper elevational limit has been extended to 1,830 meters (6,000 feet). The range has roughly doubled to approximately 130,000 hectares since 1993 (with the addition of Mill Creek, Thompson Creek, and Grider Creek in California). The edge of the northern portion of the range is fairly well delineated. The edges of the southern portion are not fully delineated and may intergrade (no hybridization) with the Del Norte salamander (USDA, USDI 1999b; USDA, USDI Species Review Panel 1999b). Although the species range is significantly expanded, it remains limited to a small area of the Oregon-California border.

Currently, there are 163 known sites of this species within a range covering 136,595 hectares (federal and nonfederal lands) (USDA, USDI 1999b). Most of the sites have been discovered by recent federal research and surveys: 34 were before 1980, 13 were from the period 1980 to 1993, and 116 were located since 1993. Sites reported prior to 1980 and many sites discovered from 1980-1993 may no longer be extant, particularly on nonfederal land, because of adverse impacts from land management activities on habitat and microclimate in these occupied sites. For analysis in this document, all 129 sites reported (from 1980 to present) are considered possibly extant. A site or known site is a distinct geographic location. Several known sites may be one population. As the Interagency Species Management System database indicates, multiple database records exist for many sites. There appear to be 6 to 10 populations based on contiguous habitat and site clusters; some may be more isolated than others (USDA, USDI Species Review Panel 1999b).

Federal lands figure prominently as habitat for this animal because under the Northwest Forest Plan, standards and guidelines were developed to mitigate the potential adverse effects of land management within the species range at known sites (USDA, USDI 1994b). This species is not afforded this same level of protection on nonfederal lands. Currently, 151 sites (93%) and 84 percent of the range are on federal lands (USDA, USDI 1999b). The 151 occupied sites on federal land are predominantly located in land allocations where land management activities may adversely affect the species: 109 (67%) are in Adaptive Management Areas and 3 (2%) are in Matrix. Thirty-eight percent of the range is located in Adaptive Management Areas and 9 percent is in Matrix. Other federal land allocations do not prohibit activities (such as thinning to accelerate late-successional and old-growth conditions) that have the potential to adversely affect this species unless they are properly designed, provide adequate mitigation measures and are implemented accordingly. These other federal land allocations contain 35 (21.5%) sites in Late-Successional Reserve and 4 (2.5%) sites in Administratively Withdrawn lands. There are currently no sites identified in the Congressionally Withdrawn Areas; this is the only land allocation where land management activities are prohibited that could adversely affect this species. About 27 percent of the current known range is Late-Successional Reserve, 7 percent is Administratively Withdrawn lands, and 4 percent is Congressionally Withdrawn Areas (USDA, USDI 1999b).

There is concern about some populations of this species in light of the new genetic and morphologic information (USDA, USDI Species Review Panel 1999b). Preliminary results from a recent genetics study indicate that several sites in California show genetic

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divergences that may be species level differences. To date, the sites in Oregon do not show such differences (USDA, USDI Species Review Panel 1999b). Potential loss of genetic biodiversity is a significant concern if unique populations are lost, regardless of the extent of future taxonomic revisions.

Larch Mountain Salamander (*Plethodon larselli*)

This species is included in the Survey and Manage provision due to its high site fidelity, low movement rate, long generation time, microclimate constraints and association with late-successional or old-growth forest components (USDA, USDI 1994b). This species range is very limited in size relative to the Northwest Forest Plan area, and occupied sites are found in limited areas within the known range. Additionally, species in this genus are long lived, but slow to develop to sexual maturity and have small clutch sizes (Houck 1977).

Habitat types are as originally described in FEMAT and the Northwest Forest Plan, including talus and rocky slopes with a dense conifer overstory (Herrington and Larsen 1985; Appendix J2 in USDA, USDI 1994a). Two populations were discovered prior to 1993, and nine additional sites discovered through Northwest Forest Plan supported research depart from the previous narrow habitat description; characteristics of these sites are much broader (Aubry et al. 1987; USDA, USDI in prep.). The habitat description now includes: forest with late seral characteristics growing on loamy soils; early to late seral forest growing on gravelly soils or talus; non-forest talus (such as non-vegetated, and shrub or herb dominated); cave systems (such as twilight zones and entrances), and boulder fields, occasionally in or around seeps, and occasionally in close proximity (1 to 5 meters) to streams (USDA, USDA 1999b; USDA, USDI in prep.).

The species has a narrow range of microclimate requirements at all sites. Sites under a dense canopy with large amounts of coarse woody debris and other moist refugia may provide similar microclimates to deep rocky substrates more typical to other portions of the species range where lower canopy closures are reported (USDA, USDI in prep.). The majority of known sites for this species reflect narrow habitat and microclimate requirements. The upper limit on elevation extent is 1,219 meters (4,000 feet) (USDA, USDI Species Review Panel 1999b).

The FEMAT and Northwest Forest Plan summaries for Larch Mountain salamander habitat did not specifically mention stand age or structure, except in regard to canopy closure. Some attributes of old-growth or late-successional forest (such as cool moist microclimates during times of salamander surface activity, dense canopy closures, and down wood) are important to this species for providing opportunities to breed and feed, protection from predators, and food for a portion of their invertebrate prey base (deMaynadier and Hunter 1995; USDA, USDI Species Review Panel 1999b).

Currently, there are 99 known sites of the Larch Mountain salamander. About a third of these have been identified since implementation of the Northwest Forest Plan and are known extant sites. Of the 99 known sites, 18 sites were found before 1980; 54 sites were found from 1980 to 1993; and 27 sites were found since 1993 (USDA, USDI 1999b).

The range of the Larch Mountain salamander is not well delineated. The portions of its range south of Mount Hood and north of Interstate Highway 90 are not fully delineated. In areas north of Mount St. Helens and south of Mount Rainier, the salamander appears to be very patchily distributed. This pattern appears to be related to differences in geology and soil characteristics and upper elevational extent for the salamander (Cadwell 1999b; USDA, USDI Species Review Panel 1999b).

From relatively recent Northwest Forest Plan surveys, the range has been extended approximately 67 kilometers to the north. Total area encompassed by known sites

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(minimum convex polygon method) has increased from 167,281 hectares in 1980, to 625,029 hectares in 1993, and finally to 1,077,587 hectares in 1998 (USDA, USDI 1999b).

Federal lands are important for this species because standards and guidelines were developed to mitigate potential adverse effects of land management within the species range at known sites (USDA, USDI 1994b). Fifty-eight of the 99 known sites (70% of the range) are located on federal lands (USDA, USDI 1999b). Currently, the extent of suitable habitat within the range. Thirty-seven sites are located in Late-Successional Reserve, four in Administratively Withdrawn lands and six in Congressionally Withdrawn Areas. Other federal land allocations do not prohibit activities (such as thinning to accelerate late-successional or old-growth forest conditions) that have the potential to adversely affect this species unless they are properly designed, provide adequate mitigation measures and are implemented accordingly. The remaining 11 sites are located in Adaptive Management Areas (6 sites) and Matrix allocations (5 sites); these land-use allocations are available for land management activities that may adversely affect the species or its habitat unless activities are properly designed, provide adequate mitigation measures, and are implemented accordingly (USDA, USDI 1999b).

Del Norte Salamander (*Plethodon elongatus*)

This species is included in the Survey and Manage provision due to its high site fidelity and low dispersal rate, narrow habitat and microclimate requirements (see below), patchy habitat distribution across the known range, patchy distribution among sites containing suitable habitat, very limited overall range relative to the areal extent of the Northwest Forest Plan, and the sensitivity of both the species and its required habitat elements to adverse disturbance effects (Welsh and Lind 1992). Additionally, species in this genus are long lived, but slow to develop to sexual maturity, and have small clutch sizes (Houck 1977). Both the identification and maintenance of occupied habitats are essential for management contributing to the long-term maintenance of this species on federal lands. Information provided below is new compared to the Scientific Analysis Team panel notes and the Northwest Forest Plan Administrative Record.

Known habitat types, as originally described in the Scientific Analysis Team Report (Thomas et al. 1993) and Northwest Forest Plan Administrative Record with some additions, are rocky substrates in mature to old-growth forest, talus slopes protected by overstory canopy, and rock outcrops.

New information since 1994 details attributes of old-growth or late-successional forest (such as cool moist microclimates during times of salamander surface activity, dense canopy closures, and down wood); these attributes are important to this species because they provide for conditions appropriate for salamander surface activity to breed and feed, and provide cover from predators and a food source for many of their invertebrate prey species (Feder 1983; USDA, USDI 1999b; USDA, USDI Species Review Panel 1999b; USDA, USDI in prep). Average canopy on occupied sites (inland) was 72 percent canopy closure (Welsh and Lind 1995). In California redwood stands less than 80 years old (coastal), canopy closure in sites with salamanders averaged 52 percent (Diller and Wallace 1994). At interior sites with deep rocky substrates, Del Norte salamanders may occur in conjunction with lower canopy closures. Edaphic conditions (regolith: soil and substrate) may be a surrogate for the canopy, relative to microclimate buffering (deMaynadier and Hunter 1995). The elevational extent for this species increased to 5,700 feet (1,737 meters) (USDA, USDI 1999b; USDA, USDI Species Review Panel 1999b; USDA, USDI in prep.). The species can occur in all seral stages, but abundances in northwestern California are significantly higher in older forest (Welsh and Lind 1995).

There is geographic variation in habitat associations of this species (USDA, USDI 1999b; USDA, USDI Species Review Panel 1999b; USDA, USDI in prep.). Extreme microclimate conditions appear to be ameliorated in the near-coast zone due to cool moist maritime

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conditions; therefore, the species seems to be able to tolerate lower canopy closure levels (Diller and Wallace 1994). Interior sites are more vulnerable to habitat disturbance that results in decreased canopy closures; the forest canopy ameliorates extreme microclimate conditions (Welsh and Lind 1995). Due to more xeric conditions inland, neighboring populations may be more isolated in habitat patches that are not contiguous because intervening non-rocky habitats do not provide adequate microclimate buffering. Impacts can be reduced by limiting surface activity to the periods of high relative humidity and cool temperatures associated with fall and spring rainy seasons (Houck 1977, Feder 1983).

Habitat in the form of rocky substrates is relatively widespread throughout the range of the species, but is often extremely patchily distributed and is highly variable in patch size and contiguity (USDA, USDI 1999b; USDA, USDI Species Review Panel 1999c; USDA, USDI in prep.). Habitat is scarce in the Oregon Coast Range Province north of the Chetco River drainage and in the California Coast Range Province south of the Smith River drainage. Within the Klamath Province, rocky substrates are well distributed (USDA, USDI 1999b). Approximately 35 percent of sites on federal land in this province contained suitable rocky substrates for this species occupancy (Welsh and Lind 1992). They reported that about half of the sites with suitable microhabitat were occupied by Del Norte salamanders.

In contrast to the Northwest Forest Plan administrative record, riparian reserve areas do not appear to provide significant habitat for this species for two main reasons. This species is a surface rock obligate, and rocky substrates do not always occur in close association with riparian areas (USDA, USDI Species Review Panel 1999b; USDA, USDI in prep.). Also, this species does not require standing or running water to complete its life cycle, and therefore, the proximity to water is not a limiting factor for this species distribution across the landscape (Feder 1983).

There is concern about some populations of this species based on information generated from new genetic and morphologic analyses. Unique populations of this species have been identified, because of new genetic and morphologic analysis results. Coastal populations are fairly similar to one another (Oregon and California)(Bury unpub., in USDA, USDI Species Review Panel 1999b). Bury proposed that the Trinity River populations are a new species due to isolation (inland aridity and hotter temperatures) and geographic changes (mountain-building, glaciation, path of rivers). Research by David Wake and Richard Highton has revealed genetic differences for this species, suggesting there may be two to three species (Wake pers. comm. in USDA, USDI Species Review Panel 1999c) or up to six species (Wake pers. comm. in USDA, USDI Species Review Panel 1999b). There seem to be species-level differences north and south and east and west, with intergradation (not hybridization) occurring with the Siskiyou Mountains salamander in the southeastern portion of the range (Klamath River). Potential loss of biodiversity is a concern if unique populations (such as evolutionary significant units) are lost, regardless of the extent of future taxonomic revisions.

Recent federal survey efforts have contributed significantly to our knowledge of the species distribution. This species is found in the Oregon and California Coast Provinces, and the Oregon and California Klamath Provinces. Due to federal survey efforts since implementation of the Northwest Forest Plan, the range has been extended 8 kilometers to the north and 32 kilometers east. The upper elevational limit has been expanded to 1,737 meters (5,700 feet). However, the edges of the range are not well delineated. The portion of the range nearest Seiad Valley, California is not fully delineated and may intergrade with the Siskiyou Mountains salamander. There are five records at Cow Creek, Douglas County, Oregon. This may be the northeastern limit of the range (USDA, USDI Species Review Panel 1999b). The species range in the Northwest along the coast in Oregon (Coos County) is not yet fully surveyed.

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Currently, there are 882 known sites of this species within a range covering approximately 574,400 hectares (federal and nonfederal lands) (USDA, USDI 1999b). Most of the 822 sites have been discovered by recent federal surveys: 86 are pre-1980; 395 are 1980 to 1993; 266 were located prior to 1993; and 135 have an unknown location date. Sites identified previous to 1993 and many sites discovered from 1980-1993 may no longer be extant because of adverse impacts from land management activities on habitat and microclimate in these occupied sites. As a conservative approach, the post-1993 sites (266) and approximately half of the 1980-1993 sites (198) may be recognized as extant (464) for analysis in this document. A site or known site is a distinct geographic location. Several known sites may be one population. As the Interagency Species Management System database indicates, multiple database records exist for many sites.

New information since 1994 demonstrates that federal lands figure prominently as habitat for this animal because under the Northwest Forest Plan, standards and guidelines were developed to mitigate the potential adverse effects of land management within the species range and at known sites (USDA, USDI 1994b). This species is not afforded this same level of protection on nonfederal lands. Currently, 689 sites (72%) and 70 percent of the range are on federal lands (USDA, USDI 1999b). Half of the 689 sites on federal land are located in land allocations where land management activities may adversely affect the species: 33 (4%) are in Adaptive Management Areas, and 314 (36%) are in Matrix. Other federal land allocations do not prohibit activities (such as thinning to accelerate late-successional and old-growth conditions) that may have the potential to adversely affect this species unless they are properly designed, provide adequate mitigation measures, and are implemented accordingly. These other federal land allocations contain 270 (31%) sites in Late-Successional Reserve and 38 (4%) sites in Administratively Withdrawn. Currently, 34 (4%) sites are located in Congressionally Withdrawn Areas; this is the only land allocation where land management activities that could adversely affect this species are prohibited. About 26 percent of the known range is Late-Successional Reserve; 5 percent is Administratively Withdrawn lands; and 21 percent is Congressionally Withdrawn Areas (USDA, USDI 1999b).

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